



In order to encourage improvements, especially in the working environment, as regards the protection of the safety and health of workers as provided for in the Treaty and successive action programmes concerning health and safety at the workplace, the aim of the Agency shall be to provide the Community bodies, the Member States and those involved in the field with the technical, scientific and economic information of use in the field of safety and health at work.

European Agency for Safety and Health at Work

<http://osha.eu.int>



Gran Via 33, E-48009 Bilbao, Spain  
Tel. +34 944 794 360; Fax. +34 944 794 383  
Email: [information@osha.eu.int](mailto:information@osha.eu.int)

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SYSTEMS AND PROGRAMMES

How to reduce workplace accidents Accident Prevention Programmes in the Member States of the European Union

European Agency for Safety and Health at Work



SYSTEMS AND PROGRAMMES

# How to reduce workplace accidents





How to reduce  
workplace accidents

Accident Prevention Programmes  
in the Member States of  
the European Union



European Agency  
for Safety and Health  
at Work

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (<http://europa.eu.int>).

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## FOREWORD

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Every year, about 5 500 people are killed in workplace accidents across the European Union. There are over 4.5 million accidents that result in more than three days' absence from work, amounting to a loss of around 146 million working days. The problem is particularly acute in small and medium-sized enterprises (SMEs).

For this reason, in 2001, the European Agency for Safety and Health at Work is targeting accident prevention both during the European Week for Safety and Health at Work and by funding a major new initiative to reduce the risks and seriousness of work-related accidents in SMEs.

In order to strengthen the knowledge base on accident prevention, the administrative board of the Agency decided to include a study on good practice and programmes in this field in its work programme for 2000/01.

The 22 cases of accident-prevention approaches from the 15 Member States presented here provide detailed information about the way these approaches were implemented and the experiences in doing so. The report also includes opinions of key stakeholders such as company management, safety and health managers, safety and health authorities, worker representatives, and representatives of the developers of the schemes. It does not seek to promote any of the particular schemes presented. Its aim is to stimulate accident prevention at the workplace by providing examples of successful prevention programmes.

The Agency would like to thank Jean-Loup Wannepain, Marie-Chantal Blandin and Catherine Lecoanet from Eurogip and all the organisations who participated in the production of this report by sharing share their experiences. Without their contributions, the project could not have been completed. Finally, the Agency would like to thank the members of its thematic network group systems and programmes for their valuable comments and suggestions with respect to the project.

**European Agency for Safety and Health at Work**  
**October 2001**



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## SUMMARY

## INTRODUCTION

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This report includes many indications that accident prevention programmes can have substantial positive outcomes such as lower frequency and severity rates of work accidents and positive cost-benefit ratios. Although the type and level of intervention varies substantially, it seems that close contacts with the target group increases the impact of the intervention. The report also stresses the importance of using monitoring systems, preventing risks at source, and the advantages of social dialogue, partnership and workers' involvement.

The cases included in this report relate to interventions to reduce the number of accidents at both national and regional level and at sector and enterprise level. In addition, this report includes a number of descriptions of specific instruments or tools that can be applied in general to prevention programmes.

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*This report contains a set of 22 good practices from 15 European Member States that have had positive effects in reducing occupational accidents*

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This report contains a set of 22 good practices from 15 European Member States that have had positive effects in reducing occupational accidents. Improving workers' safety conditions is the main objective but there are many possible routes to reach this objective. This report includes a wide range of possible approaches and means that have been implemented to reach this target.

The actions are classified according to four levels.

## ACTIONS TAKEN AT THE NATIONAL OR REGIONAL LEVEL

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This report contains two actions that focus on specific measures during the construction of major infrastructure works: safety during the construction of the high-speed rail link between Bologna and Florence and the so-called Øresund fixed link between Denmark and Sweden.

The programme carried out during the construction of the high-speed rail link between Bologna and Florence (Italy) between 1996 and 2001 is a good example of action at regional level. The authorities of Tuscan region initiated it when they realised that this construction project would be of an exceptional



nature. They decided to implement substantial preventive measures in order to reduce the risk of accidents. Several actions were taken to achieve this. The companies involved were encouraged to adopt the highest possible prevention standards and their safety plans were carefully examined. Further, an agreement was signed between the companies, the Tuscan region, the local health authority and the trade unions to guarantee all the workers a basic health assistance similar to that available to local residents. An observatory was also set up to provide real-time monitoring of accidents, workers' health and progress of work in order to identify the safety priorities. The experiences resulting from the programme were positive overall. Major infrastructure works of this kind, that include excavations, often lead to very high fatality rates. Past experiences with similar constructions indicate about one fatality per kilometre. Due to the preventive measures taken during the construction of the high-speed rail link, the current situation is that with over 50 km of finished works so far two fatalities have occurred.

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*An agreement was signed between the companies, the Tuscan region, the local health authority and the trade unions.*

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A somewhat similar initiative was carried out in Denmark during the construction of the Øresund fixed link between Denmark and Sweden. This case describes the initiatives taken to prevent accidents and to avoid the experience of many accidents and fatalities while building the Danish fixed link across the Great Belt.

The link includes a four-lane motorway and a dual-track railway linking Copenhagen and Malmö. The construction work consisted of three elements. One is the Danish landworks, consisting of an 18 km, dual-track railway with stations in Ørestaden, Tårnby and Copenhagen Airport in Kastrup and a 9 km four-lane motorway between the existing traffic system and Copenhagen airport and on to the coast to coast facility.

AS Øresund set up OSH and environmental requirements for inviting tenders. It also established an organisation to follow up and carry out auditing and finally it initiated a campaign.

In total, four fatal accidents occurred, one while building the Danish landworks and three while building the fixed coast-to-coast link. The goal of reducing the number of occupational accidents by 50% was not completely reached. However, the number of accidents was reduced to 30 per one million working hours compared to a branch average of 40 per one million working hours.

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*The number of accidents was reduced to 30 per one million working hours compared to a branch average of 40 per one million working hours.*

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Both cases described above represent rather unique — public — construction works requiring a lot of new and creative approaches and solutions. More traditional risks are also dealt with as a priority at national or at regional level.

The scaffolding action in the construction sector of Alsace-Moselle is one such example. This initiative was carried out by the Regional Health Insurance Fund of Alsace-Moselle (Cramam). In the construction sector, falls from heights are frequent. A priority goal was to reduce the number of these accidents. The Cramam therefore encouraged those concerned to use scaffolding that could be assembled and used safely. The employers' union of the building industry, trade unions, architects, scaffolding manufacturers and people specialised in the assembly of scaffolding took an active part in the action. Demonstrations

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*Demonstrations were given to show how to put up and take down scaffolding safely.*

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were given to show how to put up and take down scaffolding safely. A task force comprising architects, people working in the building trade and the Cramam was set up to develop a document aimed at helping enterprises describe precisely the type of scaffolding they needed. Changes in the number and seriousness of accidents due to falls show that improvements have been made. Although only a limited number of all enterprises using scaffolding were reached, accident rates have dropped by almost 10%.

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*Close cooperation with safety officers and the Labour Inspectorate.*

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Another example of a national level campaign on a traditional risk comes from Austria. The campaign 'Safety with every step' was aimed at preventing falls in the working environment. The campaign was conducted between 1997 and 1998. Falls are the most frequent and most underestimated causes of accidents among Austrian employees. Thus the Austrian accident insurance (AUVA) launched an information campaign. It was carried out by the AUVA's accident-prevention services, which worked in close cooperation with safety officers and the Labour Inspectorate. Assistance was provided to companies in order to analyse accident causes, raise risk awareness of those concerned, and support them to adapt their behaviour to the work environment and develop appropriate preventive measures. At the end of the campaign, falls had decreased by 9.3%; the costs of new pension entitlements by 5.7% and fall-related working days lost by 4.4%.

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*Follow-up controls were established.*

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Finally, this chapter of the report on national and regional initiatives includes a description of an initiative of a regional inspectorate to reduce accidents in companies with the highest rates: Programa Aragón. Companies with accident rates exceeding by 50% or more the average rate for their specific activity were selected to take part in this one-year programme in 1999. The tools used in this programme were: advising the companies involved of the seriousness of their situation; examining the appropriate preventive measures; setting deadlines for the companies to correct their errors; and reducing accident rates. Also some follow-up controls were established. The companies involved were visited by technicians and given support. The reductions in accident figures were about 25%. In the year 2000, 1 163 companies took part in the programme. Their accident rate decreased by about 28%. At present, several other autonomous communities are carrying out similar programmes with similar results.

## ACTIONS TAKEN AT THE SECTOR LEVEL

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The maritime sector is a branch of activities that has not always been at the forefront of attention. Therefore, the French initiative on OSH in the maritime sector, 'Falling overboard. Let's talk about it!', is of great interest. This national campaign to prevent the risk of drowning is carried out under the supervision of the Institut Maritime de Prévention (IMP) of Lorient. In the fishing industry, the main risk is falling overboard followed by drowning. The objectives of the

campaign were to promote awareness of this risk, and to encourage the wearing of personal protective equipment (PPE). The administrative organisation of the sector, the industry, the media and schools strongly supported the action. In parallel to the dissemination of information, the IMP organised PPE demonstrations and tests in several ports with PPE manufacturers. Given the working conditions and the fragmented structure of the sector, it was quite hard to reach the people concerned and the use of relays was essential. So far, no evaluation of the impact of the campaign has been made. However, a growing awareness of the need to communicate about overboard falls and preventive measures has been observed.

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*A growing awareness has been observed.*

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One of the most interesting initiatives at sector level relates to the development of a prevention strategy for the security industry in Germany. This model for occupational safety in the security industry was implemented between 1990 and 1996. The security industry is a fast growing sector in which many accidents at work are reported. The main risks are falls, accidents with motor vehicles, accidents with dogs and attacks while transporting money. To reduce the number and cost of accidents and to improve working conditions, the Federal Association of German Security Firms (BDWS) and the accident insurance organisation covering the administrative sector (VBG) prepared a catalogue of measures ranging from training to financial support and promoted its implementation in the industry. The action can be considered as very successful with an average reduction of the accident rate by 37% in the participating companies and by 25% in the security industry as a whole. The close cooperation between trade association and accident insurance organisation, the continuous monitoring of the action by the VBG and the fact that the safety measures usually strengthened the market position of the companies contributed to the success of the initiative. The action programme was well targeted and led to a broad acceptance by the companies and their employees.

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*An average reduction of the accident rate by 37% in the participating companies.*

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An example of a target group receiving specific information and training is found in the case on farm accidents in Denmark. The incidence rate of serious occupational accidents is three times higher in farming than in other branches of activity. Taking into account that information campaigns generally do not solve all the problems, the Department of Occupational Medicine of the Herning Hospital and the Danish Agricultural Advisory Centre in Skejby decided to carry out an intensive action in the agricultural sector in one county between 1992 and 1997. The intervention focused on behavioural changes and a safer planning of working routines in view of reducing the incidence and seriousness of accidents at work. A study developing a specific prevention model was initiated. All accidents were systematically reported, post-accident interviews were conducted, questionnaires on psychosocial variables were sent out to all workers over 18, a quantitative and qualitative risk analysis was made, and prevention actions were designed. It also included a safety check at the farm and a one-day training course. The programme proved effective in reducing injury incidence. The injury rate decreased significantly from 32.6 to 18.2 per 100 000 hours worked. This implies a reduction of over 40%.

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*A safety check at the farm and a one-day training course.*

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An example of an intervention at sector level initiated by a governmental organisation — Health and Safety Executive from the United Kingdom — can

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*A combination of effective targeting and joint effort by stakeholders is key to achieving significant injury reductions.*

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be found in the 'Recipe for safety' campaign that focuses on safety at work in the food and drink industry. The aim of the campaign was to reduce injury rates in the industry, particularly manual handling and injuries from slips, and to target specific sites that had a high injury incidence rate. In 1990, the food and entertainment sector, the Food and Drink Federation, the Industry Trade Association and the main trade unions produced a common strategy document setting down actions for each party in order to reduce injuries in the sector. Through the use of conferences, seminars, circulars, publications and inspections, the campaign aimed to raise awareness of the most significant health and safety risks in the industry. From 1990 to 2000, the injury incidence rate for the sector fell by approximately 13% and for fatal injuries by 49%. This example of prevention through partnership shows that a combination of effective targeting and joint effort by stakeholders is key to achieving significant injury reductions.

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*It took time to change working methods.*

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Accidents in the construction industry involving falls from heights can be considered an almost classic issue. In 1993, the German accident insurance organisation (BG) carried out an initiative that aimed at preventing falls from heights in the construction industry. In 1990, the number of occupational accidents was twice as high in this sector as in the other branches of industry. Most of them occurred in the timber construction, carpentry, roofing and on scaffolding. The BG developed a programme to reduce the frequency and seriousness of such falls by identifying the areas in which they most frequently occurred, analysing their causes and adapting the existing regulations accordingly. At the same time, more stringent technical rules were applied. It took time to change working methods and the restrictive measures applying to work conducted from a ladder led to a number of difficulties in practice. In 1996, the number of falls from heights had dropped by 30% compared to 1990. There was a clear reduction in the number of falls recorded for carpentry and roofing, but not for the use of ladders.

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*Police officers realise now more than before that road accidents can be prevented.*

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This section on sector initiatives also includes an example on the prevention of road accidents in the Italian Highway Police force. This action was launched in Italy by the University of Genoa and the SIULP (Italian Police Officers' Union). The objectives of the campaign were threefold:

- to inform the police officers about the causes of accidents and the specific 'sleep hygiene' rules;
- to train them;
- to set up a dialogue with the administration in order to optimise the prevention strategies.

The cooperation of the Ministry of the Interior and the Police Force Headquarters were recognised as crucial for the success of the campaign. The results are positive because the police officers realise now more than before that improving the management of shift schedules, night work and general work organisation can prevent road accidents.

The construction sector is one of the highest risk sectors in relation to accidents. The Irish construction safety partnership (CSP) is another good example of a sector level action. This initiative followed widespread concern over the high

level of fatal and serious accidents during the construction boom. An agreement was signed by the Construction Industry Federation (CIF), the Irish Congress of Trade Unions (ICTU) and the Health and Safety Authority (HSA) in order to radically change the health and safety culture in the industry. The CSP was created and a plan was launched for 2000–02. Under the plan, a joint safety committee involving unions and employers was created to collaborate on information, promotion and research. A safety representation was made mandatory on sites employing more than 20 persons. Further safety training was made obligatory for all, the CIF agreed to increase safety management training, the HSA agreed to double the rate of site inspections, and construction regulations were amended to implement the recommended measures. It took some time to promote the initiative and develop its credibility, but, a year into the project, an improved collaboration has been noted between all the parties concerned. It is also encouraging to see that the reduction in fatal accident rates has continued.

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*The HSA agreed to double the rate of site inspections.*

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An example of how to deal with the use of alcohol at work stems from the Netherlands. The 'Invisible co-driver' is an alcohol awareness programme for truck drivers. The risk of traffic accidents due to alcohol is high among truck drivers. The private occupational health organisation, BGZ Wegvervoer (road transport), carries out in cooperation with the Alcohol Consultancy Netherlands Foundation (Alcon) the programme that is intended for employers and employees. Meetings are organised around talks and a video on the negative effects of alcohol on driving. The video is a powerful tool to increase the level of safety awareness among truck drivers and to motivate them to change their behaviour. More than 100 groups take part in the programme each year. So far, no data have been collected on the evolution of the number of accidents caused by truck drivers. The success of the programme can only be assessed by the enthusiasm shown by the participants.

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*Video is a powerful tool to increase the level of safety awareness.*

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Another classic sector-related OSH problem relates to the prevention of hazards from dust fires and dust explosions in the aluminium industry. The prevention programme for the elimination of hazards from dust fires and explosions was carried out in Germany in 1979–80. These risks were high in the metallurgical industry. In the 1970s, numerous and often serious accidents were caused by dust explosions associated with the grinding and polishing of aluminium. The accident insurance, the Labour Inspectorate and the Institute for Occupational Safety therefore decided to launch a programme to reduce the number and cost of such explosions. Any accident was immediately and systematically investigated by all the parties concerned and technical and organisational measures were proposed, based on guidelines for the prevention of hazards from dust fires and explosions published in 1981. Support was provided with the practical implementation of the guidelines. The overall results were good. No dust explosion has been registered since 1983. Also, enhanced risk awareness and a large-scale adoption of the safety strategies have been observed.

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*No dust explosion has been registered since 1983.*

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Finally, this chapter contains a case on a prevention campaign in the textile and clothing industry (Portugal). In this sector operators are not always aware of the risks to which they are exposed. The goal of the campaign was to create a

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*The action was carried out in the form of a partnership.*

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general culture of occupational risk prevention while carrying out a specific action for the textile industry. It aimed at reducing the number of occupational injuries and promoting social dialogue. Specific objectives were targeted such as noise, chemical products, manual handling as well as repetitive work. The action was carried out in the form of a partnership between IDICT, trade associations, trade unions, the Ministry of Economy and the Technological Centre for the Textile and Clothing Industry. To ensure follow-up and satisfactory implementation of the campaign, a standing consultative council was set up. The campaign material included posters, leaflets, a liaison bulletin providing specific technical solutions, prevention manuals, advertisements in the national press, TV spots, etc. The involvement of the social partners contributed greatly to the success of the action.

## ACTIONS TAKEN AT THE ENTERPRISE LEVEL

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*A small team was established in the factory and included two union (GMB) safety representatives.*

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An initiative at the enterprise level is the action taken in 1996 by the British clothing company, William Baird, to prevent needle-in-finger injuries. These injuries are not usually reportable but represent 25% of accidents needing first aid treatment. In 1995, such accidents cost William Baird about € 195 000. The company decided to redesign the standard guarding for sewing machines to better protect operators' fingers, be more practical and to reduce accidents and civil claims. The company identified a factory that had the highest incidence of needle-in-finger injuries. A small team was established in the factory and included two union (GMB) safety representatives, an engineer and a supervisor. It took six months to achieve the first prototype guard that encapsulated the needle. In 1998, the GMB agreed with William Baird to promote the guarding solution within the industry and the Health and Safety Executive also started encouraging its use. Within two years of the first guard being fitted in the company, needle-in-finger accidents dropped from around 500 to 40 and saved William Baird over € 162 400. This item is now widely used by the clothing industry and all industries using sewing machines and it has been the basis of a new sewing machines safety standard adopted by CEN.

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*Its main activity was to collect accident figures, investigate the causes and take measures.*

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Not only do private organisations implement prevention programmes, many public organisations also do. Cutting accident figures amongst staff of the Dienst voor de Scheepvaart in Belgium (navigable inland waterways) by implementing a systematic safety policy is one such example. In 1989, this medium-sized public service company, which is in charge of inspection, maintenance and exploitation of inland waterways in North Belgium, had to set up an accident-prevention policy according to the new health and safety legislation. The main risks to which employees were exposed were falls, slips, wounds and assaults by the public. Dienst Scheepvaart launched a systematic safety policy aimed at improving working conditions and cutting accident figures rates. An internal prevention structure was created — a consultation

committee on prevention and protection, supported by an independent safety consultant. Its main activity was to collect accident figures, investigate the causes and take measures. It visited all the locations and met every six weeks to discuss accidents. The systematic approach of the Committee led to a steady decrease in the number of accidents at work as well as in their frequency (over 60%) and severity (also over 60%).

Another example of an initiative taken at enterprise level is the programme for the prevention of occupational hazards led by TITAN Cement Co. in Greece. This company programme was launched in 1970, at a time when accidents at work were very high in Greece and when there was practically no national or community legislation in the field of occupational health and safety. The action aimed at reducing occupational hazards. Technical measures were taken and particular emphasis was put on the use of PPEs. Even though the drop in the number of accidents was considerable, it was still high and the company adopted an innovative approach focused on the motivation of the staff. Training seminars were organised for executives as well as employees. The unions played an important part in supporting the action. This pioneering initiative proved successful as the number of accidents at work decreased considerably and the employees became aware of the importance of safe working conditions. Furthermore, it demonstrated that prevention and competitiveness are not incompatible.

A final example comes from Luxembourg — ‘Safety management in the steel industry: ARBED’. This is a large company in the steel industry. Since risks are usually considered high in the sector, the main objective of the programme was to create an accident/incident-free working environment. Safety was to be integrated into all aspects of the business as part of a total quality approach. To achieve this, a strong commitment of the management and positive relations with the unions were necessary. Before 1997, the ARBED’s efforts were mostly directed towards creating safer working conditions, improving technical equipment and increasing employee competence through training. Based on the fact that attitude and behaviour are important factors in preventing accidents, the new initiative put a special emphasis on safety awareness and motivation of all employees. The implementation of the programme took time because of the heterogeneous structure of the company and an ageing staff. After three years, most performance indicators improved by 70%.

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*Training seminars were organised for executives as well as employees.*

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*Attitude and behaviour are important factors in preventing accidents.*

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## ACTIONS USING STANDARDISED INSTRUMENTS

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Intervention programmes have to be practical so that companies can easily implement them. This section includes a number of tools that can be considered to live up to these criteria.

The first example — ‘Tuttava: safe and productive working habits’ — was developed in Finland in the 1980s. It was designed to prevent unsafe behaviour.

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*Using a behavioural approach, it aims at improving order and tidiness in companies in order to increase safety and reduce the number of accidents.*

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Using a behavioural approach, it aims at improving order and tidiness in companies in order to increase safety and reduce the number of accidents. Tuttava is based on a systematised approach, employee participation, management/employee support and a positive feedback. A step-by-step procedure has been defined to carry out the programme. It includes setting up an implementation team, defining good work practices, removing technical and organisational obstacles, designing an observation checklist, measuring the baseline, training employees, providing feedback and follow-up. Tuttava has been implemented in more than 1 000 companies ranging from construction to university laboratories and it has yielded good results. Considerable decreases in work accidents have been noted (around 20 to 40%). The programme has been applied in several countries and it is assessed to be suitable for both small and large companies.

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*WASP is based on survey procedures, feedback and group discussions.*

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A somewhat different approach comes from Sweden: the WASP method — workgroup analysis for safety promotion. The National Institute designed this participatory and behavioural approach for working life. It meets the demand from companies needing a tool to handle unsafe work practices in a systematic and constructive way and from safety experts looking for a method favouring workers' involvement in prevention. WASP is based on survey procedures, feedback and group discussions. Its objectives are to identify workplace characteristics that provoke unsafe behaviour, discuss unsafe work practices openly in workgroups, and develop realistic prevention programmes. Workgroup discussions aim at identifying the causes of risky behaviours and proposing preventing measures to the management that will decide upon an action plan. The results of the evaluation of the four pilot groups show that the method was successfully implemented in three of the four groups. Those three groups wanted to go on using the method. The fourth one estimated that the method that offered too little in relation to time and effort spent. Group discussions were stated as the most important element to achieve behavioural changes.

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*Since 1988, more than 14 000 contracts have been signed.*

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The final case is on the prevention contracts for SMEs based on sector agreements in France. These contracts — aimed at SMEs — are signed by the regional health insurance funds (CRAMs) and the companies following agreements between the National Health Insurance Fund for Salaried Workers (CNAMTS) and the industrial sectors. In accordance with these agreements, the CNAMTS commits itself to providing technical and financial aid to the companies, and the sectors agree to improve the employees' health and safety. In the framework of a prevention contract, which lasts three to four years, an initial risk analysis is carried out in the company, objectives are defined and a prevention programme is worked out. The CRAM performs regular follow-ups and the company makes a final evaluation. Since 1988, more than 14 000 contracts have been signed; mostly in the metallurgical, timber, food and transport industries. In 1992, 86% of the participating managers were satisfied with the approach. A quantitative study carried out in 1998 showed that the average cost of occupational injuries had decreased by 40% over five years in the companies which had taken part in the action. Obviously, the prevention contract is an effective tool to prevent occupational risks and improve working conditions in SMEs with less than 200 employees but it is necessary to make it more attractive by simplifying the procedures and reinforcing the employees' participation.



## CONCLUSIONS

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### Quantitative assessment of the cases

The report includes many indications that accident prevention programmes can have substantial positive outcomes such as lower frequency and severity rates of work accidents and positive cost-benefit ratios. Although the type and level of the interventions can vary substantially, it seems that the more direct contacts with a specific target group the greater the positive impact of the intervention. It also stresses the importance of monitoring systems, preventing risks at source, and the advantages of social dialogue, partnership and workers' involvement.

The cases in the report indicate that direct contact with the target group is an important success factor for accident prevention programmes. The closer the contact, the better the results. This is illustrated below more in detail.

#### *Lower accident frequency rates*

The Austrian national awareness campaign on the prevention of falls at the workplace using an advertising and PR campaign, reduced falls at the workplace by almost 10%. Interventions by public authorities such as the Health and Safety Executive in the 'Recipe for safety' campaign in the food and drink industry, aiming to increase safety awareness resulted in a decrease of about 13%. An awareness raising campaign in Alsace-Moselle on scaffolding safety resulted in a reduction in accident rates of almost 10%.

Interventions at national or regional level, including direct contact with companies, show that more impact can be obtained. The case of Programma Aragón shows that action by regional inspectorates can help to reduce accident rates by more than 25% in 'high-risk companies'. Other regional Spanish inspectorates have had similar experiences. In the 'Recipe for safety' campaign by the UK's Health and Safety Executive a reduction of 33% has been obtained when they focused on 19 companies or 'black spots' with injury incidence rates more than three times the average for the food and drink industry.

Intervention programmes initiated by sector organisations also generally have high impact. An intense campaign on falling from heights in the construction industry (Germany) that included the introduction of some accident prevention regulations and reaching out to all stakeholders obtained a reduction in the accident rates of about 30%. A campaign organised by the security industry in Germany obtained an accident rate reduction of about 37% in the companies involved. Another initiative in the farming sector in Denmark focused on a specific group. This group was 'exposed' to safety checks at the farm and behaviour training. This initiative managed to cut down accident rates by over 40%.

Prevention programmes designed to cut down accidents in specific companies often report quite dramatic results. Reductions of over 50% seem to be possible if the specific issues with the working environment are dealt with systematically. But also more general methods such as Tuttava - focussing on tidying up the workplace - seem to be able to cut accidents by about 20-40%.

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*The cases in the report indicate that direct contact with target group is an important success factor for accident prevention programmes.*

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*Intervention at national or regional level that includes direct contact with companies show that bigger effects can be obtained.*

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*Prevention programmes designed to cut back accident in specific companies often report quite dramatic cuts.*

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Further it seems that safety can be improved substantially in major infrastructure projects such as building bridges and making tunnels for high-speed railway by taking special safety measures or through campaigns.

#### *Reduced severity rates*

In most cases information was included about changes in the severity of the accidents – the severity rate, which is reflected by the length of absence of work. Often the severity rate goes in line with the reduction in the frequency of accidents. Although there seem to be exceptions:

- in the Belgium case on navigable inland waterways there seems to be hardly a decrease in the severity rate in spite of a strong decrease in the frequency;
- in the French case on prevention contracts there seems to be a substantial decrease in the severity, as indicated by about 40% lower costs per accident, but the decrease in frequency was apparently not substantial.

#### *Reduction in fatal accidents*

In some cases information on the number of fatal accidents has been included. This indicator seems to follow the trend of the accident frequency rates mentioned before; although fatal accidents seem to be reduced relative stronger:

- in the scaffolding case (Alsace-Moselle) the number reduced from 4 to 1 per year;
- in the Austrian campaign to prevent falls at the workplace this was - 18%;
- in Ireland it reduced from 19 to 15 per 100.000 at work in the construction sector.

In some cases where complicated infrastructure works are carried out such as the Øresund bridge and the high-speed railway between Florence and Bologna this indicator is also used. Both projects seem to have had considerably lower rates than other previous infrastructure works.

#### *Positive cost-benefit ratios*

In some cases it was possible to calculate a cost-benefit ratio. The ratio for the Austrian case on preventing falls at the workplace is 1: 6. That means that every euro invested is returned six times. In the case 'Recipe for safety' – safety in the food and drink industry this ratio was 1:4-1:5.5. In the case of the security industry in Germany it was pointed out that the safety measures introduced paid for themselves within three years.

#### *Qualitative assessment of the cases*

The cases described in the previous chapters contain several features that seem to have contributed to the success of the action and can be considered as essential elements in good practices aiming to cut accident rates.

#### *The importance of a monitoring system*

All the cases showed the need for an effective assessment of analyses of the risks, whether at a sector level or in the individual workplace, and a well

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*Often the severity rate goes in line with the reduction in the frequency of accidents.*

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*Safety measures introduced paid for themselves within three years.*

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functioning monitoring system appears to be an important input into this process. Many cases show that monitoring systems that contain statistical information were used as a tool to identify and assess problem areas. This information could then be used to make a more in-depth analysis. In many cases, such as ‘Cutting accident figures’ as well as ‘Programa Aragón’, use was made of existing data to enable actions to be targeted at specific companies or workplaces. In ‘Farm accidents’, all accidents were systematically recorded and post-accident interviews were conducted. In ‘Preventing hazards from fires and dust explosions in the aluminium industry’, all accidents in the sector were investigated over a period of several years. In ‘Recipe for safety’ — Safety at work in the food and drink industry, statistical data analysis enabled the identification of two major causes of accidents: injuries from manual handling, and slips or trips. Consequently, the prevention campaign was targeted on these risks.

The process of identifying problems, assessing and subsequent formulating and implementing prevention programmes relies largely on a well functioning monitoring system that provides sound statistical information about possible priority areas. This is then often used as an input to more in-depth risk assessments and analyses.

#### *Preventing risks at source*

In some cases, such as ‘Scaffolding action in the construction sector in Alsace-Moselle’ and ‘Preventing needle-in-finger injuries — William Baird’, it is shown how technical measures can control and sometimes even eliminate risk at its source. Scaffolding that can be set up and used safely and finger protection guards that can be installed on new or old sewing machines are examples of actions to overcome the risk by technically. However, their use by other companies still has to be promoted. Such devices are a first step towards greater safety at work, as new technology often also requires training, advice, new working methods and financial resources.

#### *Social dialogue, partnership and workers’ involvement*

Social dialogue between employers, employees or their representatives at the enterprise level, and unions and employers’ associations at the sector, regional or national level, is an important condition for success. This is illustrated by the case ‘Prevention campaign in the textile and clothing manufacturing sector’, where the aim was to create a general awareness of safety and health to serve as a basis for further action. Agreement on a safety and health subject turned out to be an important means of promoting dialogue between the social partners.

In Ireland, in response to a bad occupational accident record, a partnership agreement was signed between government, employers, employees and the institution in charge of occupational risk prevention. The objective of this partnership action was to promote a culture of safety in the construction sector. Each player has its own role to play in the partnership. In ‘Recipe for safety’ — Safety at work in the food and drink industry, employers and the employees’ unions in this industry agreed on a ‘common strategy’ document. This agreement incorporates a commitment by each partner, and also lays down actions for each of the parties, including the institution in charge of occupational

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*The process of identifying problems, assessing and subsequent formulating and implementing prevention programmes relies largely on a well functioning monitoring system.*

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risk prevention, covering all stages of the campaign. ‘Preventing needle-in-finger injuries — William Baird’ is another example of cooperation where action started with a corporate initiative. The aim was to develop a safety device for the company’s own use. Once the device was shown to be effective, and with the company’s agreement, it was promoted within the industry by the union with the help of the institution in charge of occupational risk prevention. The device has been widely accepted and the concept has been integrated into a CEN standard.

‘Tuttava — Safe and productive working habits’ and the WASP method illustrate the benefits of involving employees and all levels of management in the prevention process. Consultation of employees was also an essential factor in ‘Safety management in the steel industry — Arbed’. Finally, the importance of employee involvement is made clear in the case of ‘Long-term action for occupational safety and health — TITAN’.

#### *Means and capabilities of the enterprise or sector*

Enterprises must be able to implement the proposed measures. Measures therefore have to take into account the enterprise’s needs and means. Measures have to be appropriate: not too complex or expensive. This also implies that sometimes enterprises may have to be assisted with financial support or grants, but help can also consist of technical advice or training. Prevention contracts for SMEs based on a sector agreement illustrate this. Within the framework of a national sector agreement, a contract can be signed between the enterprise and its regional accident insurance fund. These contracts set objectives to be implemented at enterprise level that are in principle already agreed at the national level. Experience shows that this is one way of helping enterprises to design prevention measures that often go further than their original plans and the legal requirements.

#### *Transferability*

It seems that in principle all Accident Prevention Programmes described in the report can be used in another context. Irrespective of whether it concerns initiatives at Member State level, the regional level, the sector level or in companies. Some programmes such as the Tuttava instrument are even explicitly designed for use in different companies/workplaces, sectors, and even countries.

The most important features in order to implement Accident Prevention Programmes successfully are mentioned above:

- using an adequate monitoring system;
- adapting the initiative to the means and capabilities of the enterprise or sector;
- organising social dialogue, partnership and workers’ involvement.

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*Measures have to be appropriate: not too complex or expensive.*

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# 1.



## INTRODUCTION

Although nowadays accident rates are lower than for example in the 1970s, there seems to have been a 'levelling off' of the improvements in recent years. This poses the question as to whether there are other/new methods or ways that can contribute to cutting back accidents figures to a lower level than today. The aim of this report is to give an overview of these new and creative approaches. Moreover, this report aims to contribute to the development of 'open coordination' — as drawn up in a recent EU Summit in Lisbon (23 and 24 March, 2000) in which goals are set, decisions are made based upon benchmarking and national plans, and indicators and exchange of best practices are used.

The cases in this report relate to interventions to reduce the number of accidents both at national and regional level and at sector and enterprise level. In addition, a number of descriptions on specific instruments or tools that can be used within prevention programmes are included. The report contains a set of 22 good practices from 15 European Member States that seem to have had positive effects in cutting back occupational accidents.

Each one of these initiatives demonstrates that the level of occupational accidents is neither fixed nor a law of nature that cannot be influenced. By looking more in depth at the causes of accidents in companies and sectors, working methods, OSH prevention structures and also on the behaviour and attitudes of the various players concerned, shortcomings can often be detected quite easily and therefore also improved.

The report shows that there is a wide range of possible measures that can dramatically influence the number of occupational accidents. Modifying work equipment, elaborating guidelines for risk assessment, identifying proper working methods, setting up training programmes, launching awareness campaigns, investing in social dialogue, and the availability of financial incentives, etc., are all possible elements that can be used in this context. Improving workers' safety conditions is clearly the main objective but there are many possible routes to reach this objective. This report includes a wide range of possible approaches and means that have been implemented to achieve this target.

One of the main goals of the report is to facilitate the possibility of transferring a specific approach to another setting, country or sector, by giving a detailed description of the implementation conditions of the actions, including any difficulties encountered, the underlying success criteria and the tangible results.

Positive results are often observed as regards quantitative results (lower number of accidents or less severe accidents) but also as regards qualitative results, for example improved social dialogue between employers or employers' organisations and workers or workers' organisations can be seen as a positive outcome.

The cases in the report are divided into actions at the national or regional level, the sector level or the enterprise level, and examples of standardised instrument. They could be presented in other ways, for example by type of risk or by method of intervention. However, the aim of this report is to focus on the distinct initiators of the examples.

Finally, it should be mentioned that in the course of this project many suggestions have been made about possible case descriptions. As the resources for any project are limited — as for this one — some choices had to be made. Basically, the aim was to include at least one case description from each Member State and to cover in the set of descriptions as many aspects as possible. By doing so, leaving out other, sometimes very interesting, initiatives was made unavoidable. It should also be mentioned that the case of 'Safe procurement during the building of the Øresund fixed link' has already been published in an earlier Agency report on 'OSH in marketing and procurement'. It is included here in order to enlarge the diversity of the cases in the report.

# 2.

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ACTION TAKEN AT NATIONAL  
OR REGIONAL LEVEL



# 2.1 SAFETY DURING THE CONSTRUCTION OF THE BOLOGNA–FLORENCE HIGH-SPEED RAIL LINK

- Special agreements
- Monitoring arrangements
- Relative low number of fatal accidents



## Background

The Tuscany Region, which, considering the exceptional nature of the construction project of the Bologna–Florence (Florence) high-speed rail link, decided to favour the organisation of especially incisive prevention measures, initiated this programme. For this purpose, in the last two regional plans (1996–2001) considerable financial resources were allocated (€ 8.7 million), thus allowing the Florence Local Health Authority to put into action all means of accident prevention.

The Bologna–Florence high-speed rail link, currently being built, is a highly complex infrastructure consisting of a 78 km long railway line of which 73 are tunnels. In total, there are 9 tunnels ranging from a minimum length of 600 metres to a maximum of 18 km. Plans also call for 8 access windows to the tunnels with a total length of 9 km and an emergency tunnel parallel to the longest one. Altogether, 92 km of tunnels will be built, of which 73 are line tunnels with a cross section of approximately 132 square metres and 19 km of service tunnels with a cross section of approximately 40 square metres for the windows and approximately 30 square metres for the service tunnel. Approximately 3 000 workers are employed, housed in 10 base camps. They are working on 22 industrial building sites with up to 40 active sites at the same time.

### Key points:

- Very complex work involving enormous technical, engineering and geo-technical problems.
- Extensive movement of material in small spaces using large machines and using explosives.
- Risk of structural collapse and falling material from tunnel walls and ceilings.

The construction of such complex works involves enormous technical, engineering and geo-technical problems in making tunnels in an area with considerable instability in the rocks, as well as the presence of gas that could lead to highly dangerous explosive concentrations in the tunnels. It should be recalled that during the building of the existing Bologna–Florence line a fire occurred which took six months to extinguish. The risks of exposure to accidents and occupational diseases occur due to:

- the extensive movement of material in small spaces using large machines;
- the use of explosives;
- the possible presence of gas;
- the risk of structural collapse and falling material from tunnel walls and ceilings;
- possible outbursts of water;
- the presence of compressed air and electrical equipment in humid environments;
- the continuous passing of trucks;
- the presence of smoke, vapour, gas and dust;
- exposure to noise and vibrations, unfavourable microclimatic conditions;
- uncomfortable postures and the need to lift heavy loads;
- the risk of material falling from above;
- shifts which are often too long etc.

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*An enormous work — the most important one built in Italy in the last 50 years, result of an unparalleled engineering challenge.*

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Giancarlo Cimoli (Managing Director,  
Ferrovie dello Stato — FS)

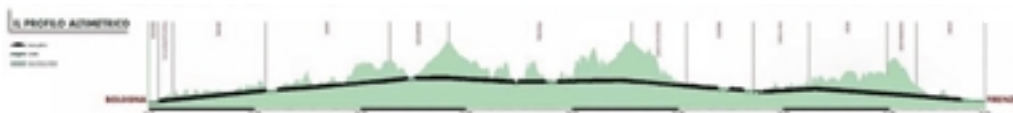


### Occupational safety and health objectives

The main prevention objectives are covering the following aspects:

- to stimulate the enterprises involved in the works to adopt the highest possible prevention standards;

- to ensure that all the workers, in case of an occupational accident, receive qualified treatment within a maximum of 20 minutes, as laid down for all the citizens of Tuscany Region, although some building sites are located in hard-to-reach locations, accessible only via site roads;
- to guarantee all the workers involved in the construction, most of whom are residents of other regions, a basic health assistance similar to the one available to local residents;
- to perform a careful monitoring of the health conditions of the workers, accident rates, and the activity of the prevention services and the state of advancement of the works.



### Design and implementation

The programme of the Tuscany Region was structured on the following initiatives:

- examination of the executive plans;
- special agreements between local health authority and companies;
- setting up of a monitoring observatory on the high-speed project.

#### *Examination of the executive plans*

The first stage of the intervention involved the examination of the executive plans for completing the base camps and the industrial building sites, and the resulting definition of minimum standards to be implemented with regard, for example, to the height of workplaces, ventilation, microclimate, rooms' sizes, dressing rooms, lighting, toilets, external road access, etc. These standards have often been debated with the enterprises involved in the project, but in the end an agreement was reached. In general, the same parameters applicable to residential buildings were applied.

Once the basic infrastructures were completed (building sites and base camps), prevention measures focused on the safety plans presented by the enterprises for the construction of the tunnels with the aim of defining the levels of prevention possible in various working situations. This result was also achieved by the issuing of regional circulars on some topics highly relevant to the protection of the health of workers, such as:

- suspension of excavation works in cases of inaccessibility to the connecting roads;
- safety standards: fire-fighting, rescue, individual protection devices;
- excavation of tunnels in unstable soil: safety standards;
- rescue in emergency situations: rules on access of ambulances;
- characteristics of the rescue container to be used in tunnels;

- characteristics of the fire-fighting water line;
- communications systems in tunnels;
- ventilation in tunnels;
- measures to be adopted at the time of suspension of the works and before their resumption;
- construction standards for the base camps.

The initiative then concentrated on an attentive and constant vigilance regarding safety conditions on the building sites. On the Tuscany side only, from the time of start-up of the works (June 1996) up to 31 December 2000, 2 041 inspections were made involving 4 685 members of personnel on building sites. Following these interventions, 539 risk situations were identified and then removed thanks to the intervention of the prevention department.

It should be stressed that most of the violations recorded (over 80%) concerned the old prevention rules dating back to the 1950s, while less than 20% concerned the European rules (Leg. Decree 626/94, Leg. Decree 494/94, Leg. Decree 277/91).

Numerous environmental tests were also made in order to identify any risk factors in the work environment (airborne pollutants, noise, microclimate, lighting) which, with regard to, for example, airborne pollutants, showed risk situations in over 40% of the cases.

#### *Special agreements between the local health authority and companies*

In order to ensure qualified healthcare for workers in case of occupational accidents, a special convention was signed between the Florence local health authority and the enterprises constructing the Bologna–Florence high-speed railway link. Under the agreement, first aid is ensured by health authority personnel and with the cost and necessary equipment being paid for by the enterprises. On the basis of this agreement, a first aid system was started on the building sites and includes the following:

- An internal rescue coordination provided by a physician, on-the-spot 24 hours a day, familiar with the location of the building sites and the emergency roads and who, in locations reachable by an ordinary ambulance, provides first aid.



- Four nurses to give initial first aid in four base camps. This involves the presence 24 hours a day of an expert nurse guaranteeing assistance in critical situations, trained in relation to the main safety rules for working in tunnels as well as in the use of individual protection devices. Each nurse is equipped with a rescue vehicle designed to reach the workplaces where the accident has occurred and connected via radio with the internal rescue centre and the infirmary.
- A system of dedicated telephone links for health emergencies, connected via double line and radio to the workplaces, infirmaries and internal rescue centre.
- Three heliports located near the building sites designed to guarantee faster intervention in very serious cases and in weather conditions allowing for helicopter flight.

The specially created emergency system is manned by specially trained workers who activate the internal rescue centre and provide initial first aid to victims.

The internal rescue centre physician issues the necessary instructions to the relevant infirmary and activates the ambulance call system. The nurse who intervenes gives initial first aid, stabilises the patient and ensures the latter's transport to the previously agreed meeting point with the ambulance. The internal rescue centre physician also activates the workplace prevention hygiene and safety service of the Florence local health authority and, if necessary, the Fire Department and Civil Protection Department. The ambulance system decides on admission to the most suitable hospital facility according to the site of the accident, the type of injuries and the capacity of the hospital concerned. In order to ensure that the system functions, suitable training is required for all the personnel concerned, as well as close coordination with the ambulance system. The infirmaries of the building sites also provide healthcare service not related to accidents. These cover over 80% of the approximately 5 000 interventions provided annually. Most of the cases (over 82%) are taken care of in the infirmaries without any need for further specialised measures, with evident savings for the national health system as well as less inconvenience for the workers.

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*The continuous presence of vigilance bodies on the site, granted by the local health unit of Florence on the basis of a previous agreement among all partners involved in the project, has led to good results for what concerns accidents.*

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Ing Magaldi (Deputy Manager of the Work Inspection Sector of the Tuscany Regional Work Agency)



In order to guarantee that those workers who are far away from home benefit from the same health care standards they enjoy in their home place, an agreement has been made between the enterprises building the line, the Tuscany Region, the Florence Health Authority and the medical trade unions. The agreement establishes that workers benefit from free treatment by a general practitioner chosen by them in the town where they work, maintaining at the same time the relationship with their family doctor in their town of residence.

#### *Setting up of a monitoring observatory on the high-speed project*

In collaboration with the Emilia Romagna Region, a monitoring observatory was set up on the high-speed project. The priority objective was to provide real-time monitoring of accident rates, the state of health of the workers and the activity of the services. With this information, priorities on which to focus the activity of prevention in the local health authority and of the enterprises undertaking the work could be identified. This observatory, managed with the constant collaboration of these enterprises, provides real time information on the state of advancement of the various tunnels, the number of workers employed and the hours worked in the various tunnel-building operations.

This means that the accident rates can be determined not only for events with an absence of more than three days (i.e. the ones reported to the insurance organisation). It also includes the ones with a one-day impact (derived from the accident register) and even those which do not cause an absence from the job (and can only be seen in the registers of the building site infirmaries).

To reach all objectives, the last two regional plans (1996–2001) allocated considerable financial resources (€ 8.7 million). This allowed the Florence Local Health Authority:

- to hire dedicated personnel (one physician for occupational medicine, one hygiene physician, one chemist, one engineer, eight experts in industrial accidents and expert in prevention in the hygiene and public health sector);
- to properly train all the personnel involved with at least 15 days of update courses;
- to purchase the technical and scientific instruments necessary for detecting risks and harm to workers, to purchase the vehicles required to reach the building and excavation sites;
- to supply to all the workers the individual protection equipment needed for use in tunnels (high-visibility suits, boots, jackets, helmets, earmuffs, antidust face masks, respirators).

#### **Experience gained and effectiveness**

The experience resulting from the programme was overall positive, even if many questions had to be solved during its realisation. The main problems recorded are related to the fact that authorisation for building this line was granted by a special services conference attended by representatives of several ministries, regions and municipalities. This conference did not take into account the costs related to the organisation of adequate public prevention services and did not

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*A work considered as unique for the control systems and for the techniques used in comparison to the environmental sensitivity of the site.*

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Antonio Savini Nicci (Managing Director, TAV — Treni Alta Velocità)

provide a complete assessment of all the aspects of the problems of health and safety at work.

In some cases, authorisations were issued for setting up building sites on a too small area, and the permissions issued by the services conference could not be challenged by the local authorities and the health service, which could only try to mitigate any negative effects.

The Tuscany Region, considering the absolutely exceptional nature of the project, therefore decided, as already mentioned, to favour the organisation of especially incisive prevention measures.

*A decrease of the number of accidents has been observed.*

On the basis of similar major projects previously undertaken, the forecasts made before the construction of the Bologna–Florence high-speed railway line estimated one fatal accident per kilometre of tunnel completed. With the work half completed by now with over 50 kilometres of tunnels made, there have been only two fatal accidents so far.

The frequency rate of accidents with an impact of over three days (number of accidents / 1 000 000 hours worked) was 156 in 1998, 161 in 1999 and 143 in the first half of 2000.

**Frequency rate — accidents with more than three days out of work excluding commuting accidents**

	1998	1999	Sem. 1, 2000	Total
No of accidents	352	476	225	1 053
Worked hours	2 252 753	2 952 237	1 568 217	6 773 207
<b>Frequency rate</b>	<b>156</b>	<b>161</b>	<b>143</b>	<b>155</b>

*Concerning a preventive investment on safety, fundamental for a trade union, we wanted to demonstrate that a work of such dimensions (79 km of length, of which 68 in galleries) could be realised without the usual human lives contribution, which unfortunately still afflicts the construction sector. Until now, facts prove that we are right. Thanks to the agreement, the work carried out on safety has been notable.*

**Severity rate — accidents with more than three days out of work excluding commuting accidents**

	1998	1999	Sem. 1, 2000	Total
Days — temporary incapacity	11 458	14 294	5 959	31 711
Worked hours	2 252 753	2 952 237	1 568 217	6 773 207
<b>Severity rate</b>	<b>5.1</b>	<b>4.8</b>	<b>3.8</b>	<b>4.7</b>

Mr Cavallini and Mr Zaghi (Fillea — Italian Federation of Workers — wood, construction and mining chapter).

The severity rate of the accidents with recovery rates of over 3 days (number of days of temporary incapacity per 1 000 hours worked) was 5.1 in 1998, 4.8 in 1999 and 3.8 in the first half of 2000. As can be seen, these rates are high, since

the work is highly risky, but rates were falling steadily till the beginning of 2000 as two fatal accidents were recorded during the first semester.

Nevertheless, the accident frequency rates and seriousness are still high and require special attention by all the parties concerned (workers, worker safety representatives, the construction enterprises, the public prevention service).

### Transferability

This project has two particularly interesting aspects:

- The role undertaken by the public prevention service in defining in specific regional circulars the levels of possible prevention which the enterprises must comply with.
- The capacity of real time monitoring of accidents, the health status of the workers, the advancement of the works and the activity of the services in such a way that all the parties concerned (workers, worker safety representatives, trade unions, enterprises and the public prevention service) can adjust their behaviour to the safety priorities emerging from time to time.

### Further information

Ing. Marco Masi  
Tuscany Region  
Florence  
Tel. (39-55) 438 32 15  
Fax (39-55) 438 30 58  
E-mail: m.masi@mail.regione.toscana.it

Dr Giuseppe Petrioli  
USL 10 Florence  
E-mail: angiolo.baroni@asf.toscana.it

Dr Maria Castriotta  
ISPESL Documentation Dept. Rome;  
Tel. (39-6) 44 28 02 92  
Fax (39-6) 44 25 09 72  
E-mail: castriotta.doc@ispesl.it



## 2.2 SCAFFOLDING INITIATIVE IN THE ALSACE-MOSELLE REGION

- Demonstrations by suppliers how to set up scaffolding safely
- A prescriptive document on scaffolding
- Almost 10% reduction in accident rate



Prévention et Gestion des Risques Professionnels  
sécurité sociale  
caisse régionale d'assurance maladie Alsace-Moselle

### Background

This initiative 'Scaffolding action: use of scaffolding assembled safely and adapted to work' is the regional version of a national action. It began in 1994, and is still ongoing. For the regional health insurance funds of Alsace-Moselle (Cramam), the prevention of falls from a height is an ongoing priority. The interested enterprises are mainly SMEs from the building and civil engineering trades and more precisely those working in masonry, painting, facade renovating, stone cutting, carpentry and roofing fields. Contractors, engineers and architects are equally concerned about the issue as constructors of scaffolding and as enterprises specialised in the installation of scaffolding (*échaafaudeurs*).

### Occupational safety and health objectives

The construction trade is characterised by a high number of falls from a height counting for 18% of the total number of accidents and for 34% of the cost. To lower these percentages is a priority goal. A common reflection to the Cramam and to a professional painters union sensitised to the risk and aware of the lack of knowledge about the safe assembly of scaffolding, has allowed this action to be initiated. Manufacturers of scaffolding know that their products are not very well known by their potential users.

Two specific observations made on the spot helped to get a better global understanding of the problem. The first one concerned the installing phase of the scaffolding. Scaffolding is often not assembled safely and thus presents important risks of fall during the preparatory phase. The second observation has to do with the use of the scaffolding. A large number of scaffolding is not adapted to the works undertaken. This maladjustment can present important fall risks of persons and of loads. For example, scaffolding designed for paint works does not support loads generated by masonry or stone cuttings works. Similarly, the space between the scaffolding and the facade of the building

*The safe assembly of scaffolding was rather misunderstood.*

Mr Balzer (Consulting Engineer, Cramam)

varies according to whether it is being used for painting or for fitting external carpentry. The scaffolding has to be adapted to the work to ensure the safety of the work and the quality of the work to be done.

**Key points:**

- High number of occupational accidents caused by falls from a height.
- Emphasis on the safe assembly and on the safe use of scaffolding.
- To ensure the good adaptation of the chosen scaffolding to the work that needs to be done thanks to the use of a descriptive document.

**Design and implementation**

Various partners, who had previously operated separately, were brought together. The professional organisations of three departments (Union Patronale du BTP du Bas-Rhin, Union Départementale des Syndicats du Haut-Rhin, Syndicat Général des Entreprises du BTP de Moselle), architects, scaffolding manufacturers as well as the *échafaudeurs* were linked. The need for knowledge allied to the need to have their products known for others prefigured the topics of the action to come.

The action of the Cramam was therefore articulated around two aspects:

- privileging the use of scaffolding that can be assembled and exploited safely;
- setting up scaffolding adapted to specific tasks.



General view of an office building under construction.



Above and next page: scaffolding that can be assembled safely for private dwellings.

### **Scaffolding assembled safely**

For the first aspect, the awareness action began by recommending to enterprises of the building trade scaffolding that could be assembled safely. Manufacturers put adapted means to the user's disposal, whereby railings are associated to floors at all levels and can be put into place at the current level, before the installation of the floor above. Collective protection is thus ensured at any given time. Equipment benefiting from the NF mark comprises railings for assembly and for use.

During these demonstrations, the users of scaffolding were able to appreciate the advantages of this type of equipment, which spares the fitters the wearing of personal protective equipment, thus giving them greater freedom of movement.

### **Scaffolding adapted to specific tasks**

The second aspect of this action addresses the contractors' clients in order for them better to describe the nature of the work to be accomplished with scaffolding. Such a description is the only way for enterprises and *échafaudeurs* to anticipate the scaffolding installation suited to the work to be done.

As many clients have not been taught how to provide an appropriate description, it was necessary to create a guideline, simple but exhaustive, for answering this need. A document developed by the Cramam intended to satisfy this need.

### *Implementation*

Addressing the aspect of installation and use, regular professional meetings were organised to provide installation demonstrations. Scaffolding constructors, using models that can be assembled safely, gave a demonstration of how to set up this equipment. During each meeting, two or three constructors set up an assembly. These assemblies were done according to specific requests formulated by attending entrepreneurs who wanted to see how this equipment could answer their own needs. Some asked for scaffolding for a chimney and others for scaffolding for a façade; this exchange of experience was also profitable to the manufacturers. During these demonstrations, emphasis was placed on training the client in receiving, assembling and using scaffolding.

Some 300 to 400 enterprises using scaffolding in the region of Alsace-Moselle attended these meetings. This amounts to approximately 8% of the total number of enterprises susceptible to use scaffolding. These exhaustive

demonstrations constituted a real help in the choice of adapted equipment. As the cost of scaffolding is high, it is difficult for an enterprise to renew its equipment often.

The prevention contracts of the Cramam, which also include some financial incentives, facilitate the acquisition of this equipment. In the long run, the building trade as a whole should see its contribution premium to the occupational accidents insurance decline since this rate depends on good or bad results in terms of occupational accidents.

In 1999, the action tackled the problem of appropriate scaffolding for the work to be done. A task force (architects, professionals of the building trade, and the Cramam) was created to jointly develop a descriptive document of the scaffolding.

This document addresses the clients and the enterprises themselves. First, it addresses the clients, architects, engineering studios, and others, in order to help them complete a description of the scaffolding needed in the most exhaustive possible manner. It was written to reduce the clients' ignorance of standards. The originality of the document resides in its presentation as a multiple choice questionnaire. It makes the client consider all the possible constraints in order better to define the necessary parameters of the choice, usage and assembly of scaffolding.

Finally, the description concerns the enterprises using scaffolding as they can provide details of the components of the scaffolding's and its cost, and thus give a clear indication of it to their clients.



*Below: Scaffolding in the European Parliament construction site in Strasbourg.*

### Experiences gained and effectiveness

Evaluations using surprise controls have been made since 1998. All agents of the Prevention department of the Cramam participate in these controls. An annual report on the state of the equipment used by the building trade is made. It seems that there is an increased awareness in companies of the risk of falls from a height as indicated by the reduction of the number of observations made. The share of observations (oral or written) made in function of risks linked to falls from a height and access means has declined from 80% in 1998, to 71% in 1999 and 65% in 2000. Nevertheless, for companies with less than 10 workers, measures of prevention have been demanded for 72% of the controls made for the year 2000. The next action is scheduled for June 2001.

*It is better to pay the right price upstream rather than afterwards. Everybody is better off with a work of quality done in time and in safety.*

Mr Biseglia (Contractor)

Statistics on the number and the gravity of accidents caused by falls from a height in the building trade confirm the observed improvement made on the spot. It is difficult to figure out the individual impact of each of the factors composing the action. These data are to put on the account of a global policy having a well-defined priority.

Year	Number of accidents with interruption of work	Lost days	Fatal	Number of workers	Number of worked hours	Frequency rate	Severity rate
1994	1 309	88 145	4	67 272	115 340 301	11.35	0.76
1995	1 274	89 868	2	64 147	113 195 189	11.25	0.79
1996	1 268	79 851	5	62 936	113 926 164	11.13	0.70
1997	1 194	73 208	5	60 800	108 464 967	11.01	0.67
1998	1 181	70 484	3	60 534	108 084 109	10.93	0.65
1999	1 139	74 381	1	61 391	108 949 365	10.45	0.68

Regional technological statistics - construction/falls from a height.

*This action is interesting as it backs the construction sites monitoring done by the labour inspectorate. This long-term action is complementary to the authorities' action. Good results are observed on the construction sites and less criminal procedures have started.*

Mr Petit (Assistant Director, Regional Head Office for Labour, Employment, Professional Training)

Architects - representing an important category of clients - indicated in the evaluation that they have difficulties in promoting the use of this equipment to companies that are engaged in price competition. Equally, they fear an escalation of prices if their descriptive documents are too exhaustive. The pedagogical work made in respect of enterprises will show that this descriptive document allows a more precise calculation of the real cost of the use of scaffolding. For the customer, the possible initial added cost is largely balanced out by the absence of surprises during the execution of works.

The use of the scaffolding descriptive document has another advantage because it isolates this element from the whole project. Thus isolated, there is a specific focus on scaffolding and on an important risk factor. The scaffolding descriptive document is now available and is currently being distributed. Awareness of enterprises only moderately integrated into the system remains a problem.

### Effectiveness

Protagonists of this action regret not having reached enough enterprises during demonstrations. SMEs are especially difficult to mobilise, as are the enterprises at a distance from the professional union system. The appearance on the market of safer scaffolding adapted to specific tasks is a positive element. The policy of prevention contracts played a role also thanks to subsidies granted to the échafaudeurs for the renewal of their scaffolding park that they install for the account of enterprises. The enterprises have likewise benefited from these subsidies. The prescribers are henceforth requested to use the descriptive document. An action - in the long run - for its promotion to the large contractors is under way. A charter, elaborated on the instigation of the Quality Construction Club Alsace, recommends its use. This club, regrouping nearly 100 partners playing a part in the construction trade in various capacities in the construction trade, has as an objective to develop the quality and synergy between safety and quality.



*The Craman is composed of the departments 57/67/98 in the east of France.*

### Transferability

The action is considered transferable if the tools brought to the enterprises are concise, pedagogical and directly exploitable. Similarly, the dialogue between the different economic actors to determine the risks to prevent and to adapt prevention measures is judged necessary. It is also of importance to include associations of all actors involved.

### Further information

Mr R. Wendling and Mr J. Balzer  
Regional health insurance fund of Alsace-Moselle  
14, rue A. Seyboth BP 392  
F-67010 Strasbourg cedex  
Tel. (33) 388 14 33 00  
Fax (33) 388 23 54 13  
E-mail: [tapr67idf@wanadoo.fr](mailto:tapr67idf@wanadoo.fr)

## 2.3 THE ØRESUND FIXED LINK: SAFE PROCUREMENT IN THE CONSTRUCTION SECTOR — THE DANISH LANDWORKS

- Denmark
- Large construction work
- Requirements for contractors
- Site inspections and audits
- OSH campaigns



### Background

This case study describes a number of initiatives taken in order to reduce occupational accidents at a large construction project, the Øresund fixed link between Denmark and Sweden. The initiative to reduce occupational accidents was among other things taken based on the experiences gained while building the Danish fixed link across the Great Belt. Many accidents occurred during this construction work and a political will to do better when building the Øresund link was pronounced.

The link includes a four-lane motorway and a dual-track railway linking Copenhagen and Malmö. The construction work consists of three elements:

1. The Danish landworks. Client: AVS Øresund

The Danish landworks, consists of an 18 km dual-track railway with stations in Ørestaden, Tårnby and Copenhagen airport in Kastrup, and a 9 km four-lane motorway between the existing traffic system and Copenhagen airport and the coast-to-coast facility.

2. The fixed coast to coast link. Client: Øresundskonsortiet

The coast-to-coast link comprises a four-lane motorway and a double track electrified railway between Lernacken on the Swedish side and Kastrup on the Danish side. In total, the link is almost 16 km long and passes over an artificial peninsula off the Danish coast, a 3.5 km tunnel, an artificial island about 4 km

long and a 7.8 km bridge consisting of a two-level high bridge and two approach bridges.

### 3. The Swedish landworks. Client: Svedab

The Swedish landworks include a 10 km long stretch of motorway and railway from Lernacken to Lockarp/Fosieby, an upgrade of the existing continental line railway, and an upgrade of Malmö freight terminal. In addition, the Swedish Vägverket is building a 10 km motorway to connect to the E6 north of Malmö.

A/S Øresund began the construction of the Danish landworks for the Øresund fixed link in September 1993. The bridge was inaugurated on the 1 July 2000.

The three building owners did not have the same business organisation and therefore used different methods when inviting tenders. A/S Øresund and Svedab divided the work into smaller contracts and were working with many different contractors. This model implied that the A/S Øresund, as the building owner on the Danish side, already took responsibility for incorporating OSH when designing the works. In Denmark, it is the responsibility of the building designer to incorporate OSH in the design phase. Additionally, the A/S Øresund and Svedab had a responsibility to coordinate the safety issues, i.e. when more contractors were working in the same area.

This case study describes how the Danish building owner A/S Øresund:

- set up OSH and environmental requirements when inviting tenders;
- established an organisation to follow up and carry out auditing;
- initiated a campaign in cooperation with the two other clients.

For A/S Øresund, the objectives of starting OSH initiatives were:

- to reduce the number of occupational accidents by 50% compared with the average within the building industry;
- to obtain a good reputation by communicating that 'any accident is one too many'.

## Occupational safety and health objectives

A/S Øresund had an environmental policy, which, in relation to OSH, stated that maximum attention should be paid to the employees' safety and health, both when planning and carrying out the work. Additionally, it was stated that the work should be planned and carried out so that no worker was exposed to any risk. Right from the start, this policy was the measure for success for the building owner.

A/S Øresund established an OSH and environmental staff function with reference directly to the managing director of A/S Øresund. Four full-time persons were employed to implement the OSH and environmental policy of A/S Øresund. Approximately one and a half full-time employees were allocated specifically to the OSH issues and were involved in:



- setting up OSH and environmental requirements in tender material to contractors;
- evaluating the planners templates for safety and health plans;
- the evaluation of contractors' tenders;
- taking action related to input from site inspections and audits;
- acting as A/S Øresund's representative in the OSH campaigns;
- evaluating the results obtained.

Furthermore, four full-time employees were employed primarily to carry out OSH site inspections, lead the regular safety meetings held in areas where more contractors were working at the same time, and in general guide the contractors in OSH-related questions. Finally, independent consultants certified as OSH auditors were employed to carry out OSH audits.

Before starting the work, A/S Øresund was certified according to ISO 9001, ISO 14001 (draft version) and in 1997 also according to BS 8800.

A/S Øresund did not require tenders to be ISO certified, because it would have limited the number of contractors able to make an offer too much. Instead, A/S Øresund defined a number of requirements and an independent consulting firm evaluated the contractors' bids. The parameters evaluated included the performance with respect to price, OSH, quality and environment.

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*When the constructor takes safety seriously, the contractor takes safety seriously and then the management takes safety seriously and the employees take safety seriously.*

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Jørgen Huno Rasmussen (Adm. Director, H. Hoffmann & Sanner A/S, Denmark — Statement in the Danish report 'Godt begyndt — halvt fuldent', Oct. 1995–June 1997.

## Design and implementation

The main focus has been on the prevention of occupational accidents. A number of instruments have been applied in order to prevent accidents.

### *OSH and environmental requirements in tender materials*

In the tender material, the contractors were asked to make a plan for safety and health. This requirement gave A/S Øresund a possibility to evaluate the contractors' attitude to OSH. From mid-1994, the tender material included a template for a safety and health plan in which the contractors should add information about the methods and equipment they intended to use and the possible impact on human health. Information on the expected need for personal protective equipment should also be included. Various planners completed the templates based on information about the specific contract. If A/S Øresund found a template incomplete, because it did not cover all work-related risks, the template was returned to the planners for improvement.

Having received the contractors' offers, A/S Øresund asked an independent consulting firm to evaluate the proposals. Depending on the nature of the contracted work and the related human risk, OSH counted for approximately 5–15% among other issues when the consulting firm recommended which contractor A/S Øresund should choose.

### *Follow-up and auditing*

Immediately after a contractor had been chosen and before the work began, an introduction meeting was held. At this meeting, A/S Øresund stressed the

requirements related to the plan for safety and health and the contractor presented the guidelines for structuring his work. While the contracted work was going on, A/S Øresund carried out audits to ensure that the contractor implemented and reviewed his plan for safety and health. In general, the audit frequency was 1–2 times per year. Audits were carried out as a coordinated action combining quality, environment and OSH auditing by having auditors representing all three kinds of skills visiting the same workplace at the same time. The auditors were certified as OSH auditors according to the Danish auditor programme established by DIEU, the Danish International Continuing Education.

Furthermore, A/S Øresund had four OSH coordinators employed full-time to carry out inspections and advise the contractors in OSH questions. The OSH coordinators were authorised to stop work, which was not considered safe and in compliance with previously received information from the contractor. This was a measure that had actually been brought into play a couple of times during the project period. The contractors were obliged to participate in the audits and the inspections with a number of requested persons. Also, sub-contractors could be subject to an audit, although it was the main contractors who were responsible for passing on the requirements to the sub-contractors and making sure that only sub-contractors fulfilling A/S Øresund's requirements were used.

Notification of accidents was another instrument in use. All contractors were requested to report all occupational accidents to A/S Øresund. Both accidents which were legally requested to be reported to the Danish Working Environment Authority (accidents that result in one or more days of absence in addition to the day the accident occurs) and near misses should be reported. The notification procedure was used to follow up on occupational accidents and was considered very useful in the dialogue with contractors.

### *OSH campaign*

In order to motivate contractors to prevent accidents and improve OSH, an OSH campaign was established in 1995 in cooperation with the three building owners. A mascot — a beaver — was introduced to create identity and team spirit. The mascot was placed on huge posters at the entrance to the construction sites bearing the text 'We take care here'. Some contractors also awarded a mascot to employees who had completed an obligatory safety training course. By wearing the mascot-label on the helmet, the employee showed that he or she was ready to start working for the contractor.

An OSH prize of approximately € 3 600 was awarded twice a year to the contractor who put the most effort in safety on the construction site. The four OSH coordinators evaluated the contractors using a scoring system when they inspected the contractors' work. The evaluation included attitude towards OSH, equipment, planning, training and specific initiatives taken to improve OSH. Actual slips and defects resulting in minus points and injunctions or bans from the Danish Working Environment Authority excluded the contractor from being nominated. The managing director of A/S Øresund then proclaimed a winner among the nominated coordinators and OSH staff.

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*When a constructor sets up [OSH] requirements something happens. All governmental and local authorities ought to do so as constructors or clients.*

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Bjarne Rundberg, (Team Manager, Building and Civil Works, SID, Denmark. Statement in the Danish report 'Godt begyndt — halvt fulendt', Oct. 1995–June 1997)

Furthermore, a newspaper was issued four times a year. The newspaper reported the progress of the project, the OSH work and the ongoing events at A/S Øresund's different construction sites. The newspaper was distributed to all employees. The blue-collar workers received the newspaper on the site and for other employees the newspaper was available in the canteen, the reception or distributed by internal post. The newspaper was translated into Danish, Swedish and English.

In addition, the campaign included a video, which could be used free of charge by the contractors and which was used as an element in the safety training courses. The video was available in Danish, Swedish and English.

Finally, bulletin boards were placed on the on-site containers and were used to inform about OSH, the campaign and issuing warnings about specific risks, i.e. information about situations nearly resulting in accidents.

### Experiences gained and effectiveness

#### *Current use of the scheme*

The initiatives taken by A/S Øresund were to a certain extent continued in the contracted work related to the coast to coast project. The experience obtained from being a proactive constructor setting up OSH requirements to the contractors will most likely be continued in other public construction work in Denmark. The Danish Minister for Labour has recently proclaimed that he and the Danish Ministry of Housing are discussing how the Danish State may take action being largest constructor in Denmark. The two ministers will coordinate initiatives with the purpose of setting up OSH requirements to contractors. Future contractors may be obligated to show a good OSH performance if the contractor wants to carry out contracted work for the Danish State.



### Effectiveness

Along with the two other constructors, A/S Øresund has evaluated the effect of their OSH initiatives. The evaluations are based on questionnaires and interviews with a large number of stakeholders, plus statistical surveys of occupational accidents and the causes of those accidents. Some 500 employees have received the questionnaire, 19 contractor firms and 9 professional and industrial bodies have been interviewed. Additionally, the relevant authorities have stated their opinion about the effectiveness of the OSH initiatives.

The main conclusion is that the initiatives have had a substantial impact on safety and health. The employees, the contractors, the authorities and the professional and industrial bodies all have sympathy for the clear goals and the building owners' continued efforts to reach these goals.

The personal commitment shown by the management of the constructors is stressed as being crucial to the success. Establishing a team spirit and setting a common goal for reducing the number of accidents are emphasised as the most important reasons for achieving success.

The evaluation reveals that every third employee has gained OSH knowledge and changed their working habits during the project period. Improvements included better planning, better tidying up at the workplace, more meetings about safety and more cooperation, and a feeling of better safety on the construction sites, more frequent use of personal protection equipment and more information and training in safety questions.

### Purchasers' experience

Four fatal accidents occurred, one while building the Danish landworks and three while building the fixed coast-to-coast link. In general, the goal of reducing the number of occupational accidents by 50% was not completely reached. The number of accidents was reduced to 30 per one million working hours compared to a branch average of 40 per one million working hours. In spite of this, the two OSH staff employed believe that the OSH initiatives have been a success. It is, however, important to note that all of the accidents which occurred during the Øresund project were reported, whereas an underreporting of accidents is typical for the branch.

Having coordinated requirements in different standards saves the contractors the problem of finding out which requirements to fulfil, and by coordinating OSH, environmental and quality audits, the contractors save time at the audits. The reporting and analysing of near misses have been very useful. Some persons stress that the initiative might have been even better if more information had been given about how to define a near miss and if an average group had been established to analyse and take action when occupational accidents or near misses occurred.

The employees working with OSH explained that a few contractors gave up before tendering, but, in general, the contractors showed a positive attitude when presented with OSH requirements. And from the constructors' point of

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*The contractor has an economic interest in working with safety issues because it is the contractor who has to pay for the first month of absence and also has a great responsibility in restoring the injured employee.*

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Jan Gabrielson (Region Manager, NCC Anläggning, Sweden. In the Danish report 'Godt begyndt — halvt fulendt', Oct. 1995–June 1997)

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*It is positive to have a constructor, who explicitly informs that this is the way he wants it to be. It works. It is the first time it is carried out with this effect in this way.*

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Axel Kjær (Production Manager on-shore — Højgaard & Schultz A/S, Denmark In the Danish report 'Godt begyndt — halvt fuldent', Oct. 1995–June 1997)

view it was not a disadvantage to sort out the 'bad' contractors before having them on the project.

### *Contractors' experience*

Half of the contractors' employees replied that the health and safety measures were better on the Øresund fixed link than on other construction sites.

Both the contractors and the contractors' employees considered the OSH campaign to be a positive initiative. As an example, the newspaper was read by 49% of all employees; and 49% of the employees found that the OSH prize was a good or very good initiative.

The initiatives taken by A/S Øresund seem to have been successful, which was also indicated by the more limited number of occupational accidents that occurred.

### **Transferability**

The organisation built up to carry out A/S Øresund's OSH policy proved successful and, in particular, the commitment from the top management was important for this success. Even though the initiatives were carried out in relation to a large project and therefore may be of specific interest for big contractors, many of the methods used can be applied in relation to smaller contracts.

### **Further information**

More information regarding the Øresund link initiatives is presented in the Danish mid-term report 'Godt begyndt — halvt fuldent' ('Well begun — half done') describing the OSH initiatives in relation to the construction project from 1997, and on the homepage for the Øresund consortium ([www.oresundskonsortiet.com](http://www.oresundskonsortiet.com)).

## 2.4 'SAFETY WITH EVERY STEP': A NATIONAL CAMPAIGN BY AN AUSTRIAN ACCIDENT INSURANCE INSTITUTION TO PREVENT FALLS



- An awareness raising campaign
- 10% accident reduction
- Cost-benefit ratio 1 to 6

### Background

In 1997 and 1998, the Austrian accident insurance institution (AUVA) carried out a campaign to prevent falls in the working environment under the motto of 'Safety with every step'. The initiator of the campaign was AUVA's department for the prevention of accidents and occupational diseases. The campaign was targeted at all employees insured by AUVA and their employers. Persons insured with other accident insurance institutions, i.e. civil servants, farmers and employees of the Austrian railway, were thus excluded from the campaign's target group.

During the planning phase in 1995, 2 573 190 employees and 213 880 self-employed persons were insured against occupational accidents and diseases by AUVA.

#### Key points:

- Accidents due to falls are by far the most frequent cause of accidents among Austrian employees.
- Falls are very costly to businesses and to AUVA.

### Occupational safety and health objectives

Accidents due to falls are by far the most frequent cause of accidents among Austrian employees. Falls are very costly to businesses and to AUVA.

The campaign therefore focused on preventing falls:

- on the ground;
- on steps and stairs;
- from ladders;
- from elevated positions;
- through openings;
- from scaffolds.

The statistical data on accidents at work and on the way to and from work were analysed before the campaign was launched. Table 1 lists the key basic data for 1994: the number of falls in absolute figures, the respective numbers of insured blue-collar and white-collar workers (in round brackets), and the accident rate (accidents per 1 000 employees) in the case of falls [in square brackets].

**Table 1. Falls reported to AUVA in 1994**

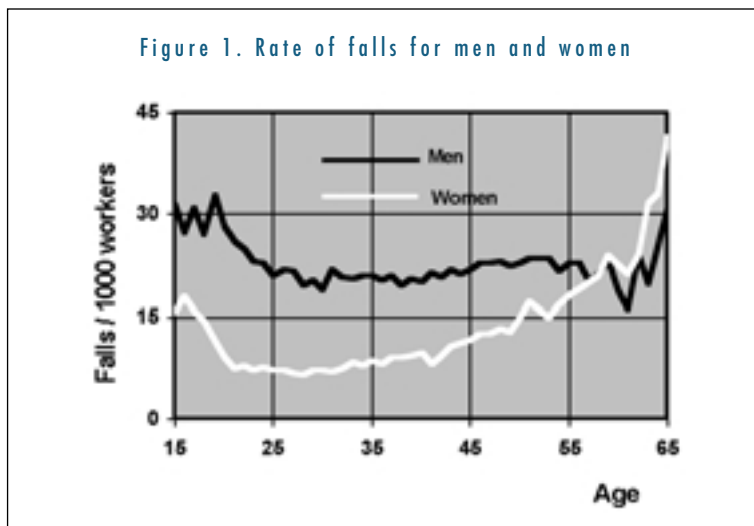
	Falls		
	Workers		Total
	Blue-collar	White-collar	
Men	26 712 (856 674) [31.2]	4 723 (609 421) [7.8]	31 435 (1 466 095) [21.4]
Women	5 667 (404 336) [14.0]	5 121 (702 789) [7.3]	10 788 (1 107 125) [9.7]
Total	32 379 (1 260 980) [25.7]	9 844 (1 312 210) [7.5]	42 223 (2 573 190) [16.4]

The highest accident rates are observed for the group of male workers (31.2/1 000). The accident rate among the self-employed, at 6.8/1 000 persons, is slightly lower than that among white-collar workers (7.5/1 000 persons). Some 75% of the reported falls took place at work and the rest on the way to and from work. Among blue-collar workers the risk of having an accident on the way to and from work is slightly higher (4.6/1 000) than among white-collar workers (3.5/1 000).

In all, 41.1% of the costs arising due to new pension entitlements in 1994 — about € 8.65 million — was attributable to falls. From the fact that 27% of accidents (falls) generate 41% of pension costs, it was concluded that falls have consequences of above-average magnitude. The costs incurred in 1994 for fall-related disability pensions came to ATS 766 million (€ 55.7 million). The average annual accident-related disability pension came to ATS 44 272 (€ 3 220). At the time of evaluation, a cost study was published which took account of other consequential costs too, e.g. costs for rehabilitation, retraining, medication, sick pay, personal expenses, etc.

The initiators of the campaign were not only interested in these costs and accident-rates related matters, but also in qualitative aspects. The main causes of falls include lack of knowledge among workers of the risks at the place of work and how to prevent them, as well as hazardous conditions at the workplace. At the same time, falls are the most underestimated accident cause at the workplace, and this is where it is necessary to raise awareness among those concerned.

Youths figure prominently among the accident victims (see Figure 1). When they start work, they are confronted with totally unfamiliar hazards. Accidents, and particularly falls, are the result of their lack of experience. Among older employees, the risk of having a fall increases dramatically, particularly among women.



In its campaign 'Safety with every step', AUVA set itself the goal of permanently reducing falls in the working environment by 10%. In addition, AUVA launched an advertising and PR campaign to brief employers and employees on the problems of falls, produced training and information material, and publicised itself as the expert institution to contact on all aspects of accident prevention.

**Campaign goals:**

- Permanently reducing falls by 10%.
- Launching an advertising and PR campaign to brief employers and employees on the problems of falls.
- Producing training and information material.
- Publicising AUVA as the expert institution to contact on all aspects of accident prevention.

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*It is our aim to get out onto the shop floor in a whole range of industries and help to raise the awareness of slipping, tripping and falling. A good deal of suffering and expense can be spared with more information. Wolfgang Haunsberger (former Chairman of AUVA)*

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## Design and implementation

The main target group comprised all workers insured with AUVA and their employers. The campaign was mainly implemented by AUVA's accident-prevention services. The central campaign location was the shop floor itself where cooperation was sought above all with safety officers. Another partner was the Austrian labour inspectorate which, like AUVA, is involved in accident prevention. Under the campaign umbrella, it delegated staff to highlight the problem of falls from ladders and how to prevent them.

The basic campaign strategy was to introduce a risk-management strategy to prevent falls at work. This risk-management system encompassed information and communication.

On the information side, it was a question of identifying and analysing the focuses and causes of accident and disseminating information to eliminate technical and organisational accident causes. Further, by raising the hazard awareness of those concerned, to help them dynamically to adapt their behaviour at work to the particular situation of work. In addition, employees were to be encouraged to wear shoes that gave them a surer footing and, through the encouragement of mobility, to prevent falls or at least minimise the consequences. The training package consisted of transparencies, folders, info sheets and leaflets.

On the communication side, it was important to consider that Austrian industry is dominated by small and very small enterprises. Some 220 000 businesses have 50 or fewer employees. Approximately 1.2 million employees work in these businesses. Public advertising was employed to draw the attention of these businesses to the problems of falls.

The specialists of the accident-prevention services had the specific task of training employees for the accident focuses in their companies and cooperating with them in drafting accident-prevention measures specifically for the company. Specially produced leaflets were distributed and posters displayed in connection with these activities.

Over and above this, the problem of falls was raised at every visit by AUVA staff to companies, even if the primary reason for the visit was a different one. Furthermore, all letters sent out to companies contained information material and campaign stickers.

Some problems were encountered.

The costs of materials and equipment for the campaign came to ATS 14 million (approx. € 1 million), while personnel costs came to about ATS 11 million (about € 800 000). The project was financed by AUVA. The EU supported the campaign with a grant worth € 20 000.

## Experience gained and effectiveness

During the campaign, the trend in the accident figures was studied every quarter and action taken if needed. At the end of the campaign, the statistical data were thoroughly analysed. A fact that had to be considered was that in the

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*We know that success in improving accident prevention is a long and arduous task. Whereas it is relatively easy to eliminate technical accident sources by removing obstacles and remedying slippery floors, encouraging employees to take greater personal care demands a great deal of psychological persuasion.*

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Wilhelm Thiel (former Director-General of AUVA)

period of the project there was a change in the recording of accident data, i.e. accidents from external casualty wards in hospitals were no longer (or rarely) reported as AUVA had terminated its contracts with the casualty wards of public hospitals. This made evaluation difficult.

Since the change in the counting method is independent of accident cause, a net reduction attributable to the campaign was calculated (see Table 2). This shows that falls in the project period fell by a total of 9.3%, the costs of new pension entitlements by 5.7% and fall-related working days lost by 4.4%. AUVA is convinced that these figures represent a conservative estimate.

Table 2. Evaluation of the accident figures

<b>Recognised occupational accidents (falls) inclusive of accidents on the way to and from work</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>Change in 1996–97 (%)</b>	<b>Change in 1997–98 (%)</b>	<b>Change in 1996–98 (%)</b>
Total	43 745	36 038	33 053	- 17.6	- 8.3	- 24.4
Men	32 267	26 756	24 479	- 17.1	- 8.5	- 24.1
Women	11 478	9 282	8 574	- 19.1	- 7.6	- 25.3
Fully insured blue-collar workers	30 476	25 266	23 298	- 17.1	- 7.8	- 23.6
Fully insured white-collar workers	9 974	8 004	7 185	- 19.8	- 10.2	- 28.0
Fatal accidents	39	45	32	15.4	- 28.9	- 17.9
School pupils and students	20 228	18 656	16 331	- 7.8	- 12.5	- 19.3
Accidents (excluding falls)	106 204	92 711	90 110	- 12.7	- 2.8	- 15.2
<b>Net reduction in accidents</b>				<b>- 4.9</b>	<b>- 5.5</b>	<b>- 9.3</b>

<b>New pension entitlements including dependants</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>Change in 1996–97 (%)</b>	<b>Change in 1997–98 (%)</b>	<b>Change in 1996–98 (%)</b>
Pension cases	2 259	2 225	1 859	- 1.5	- 16.4	- 17.7
Pension costs (falls)	105 004 844	105 338 380	89 265 764	+ 0.3	- 15.3	- 15.0
Pension costs (excluding falls)	168 726 530	160 534 248	159 156 956	- 4.9	- 0.9	- 5.7
Pension costs (total)	273 731 374	265 872 628	248 422 720	- 2.9	- 6.6	- 9.2
<b>Net reduction in pension costs</b>				<b>- 3.2</b>	<b>- 8.7</b>	<b>- 5.7</b>

<b>Treatment, sick leave</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>Change in 1996–97 (%)</b>	<b>Change in 1997–98 (%)</b>	<b>Change in 1996–98 (%)</b>
Working days lost due to falls	797 750	738 072	676 156	- 7.5	- 8.4	- 15.2
Lost working days excluding falls	1 386 353	1 300 089	1 272 035	- 6.2	- 2.2	- 8.2
Total working days lost	2 184 103	2 038 161	1 948 191	- 6.7	- 4.4	- 10.8
<b>Net reduction in lost working days</b>				<b>- 0.8</b>	<b>- 4.0</b>	<b>- 4.4</b>

In July and August of the first year of the campaign, the following poster was displayed on public boards (Figure 2). Opinion surveys were carried out before and after to evaluate the recall value of the poster campaign. Experts considered 8% as high.



Large quantities of the information material produced during the project were ordered and purchased by companies even in the years thereafter. The industry's response is therefore considered very positive. Particularly worthy of mention is that over 150 (unpaid) articles about falls were published in daily papers, magazines and the electronic media in the project period.

Most of the goals were achieved within the project period. It was disappointing to note that the incidence of falls increased across the board when the campaign came to an end. This suggests that personal attention plays a crucial role in preventing falls. As soon as this declines, e.g. at the end of an advertising or other PR campaign, the number of accidents increased again.

The most important outcome is that the number of falls and the associated costs were significantly reduced as a result of the campaign during the project period. On the basis of a model for determining the consequential costs of accidents (W. Kolb, R. Bauer, 'Unfallfolgekosten in Österreich'), it was calculated that the net savings came to a total of ATS 323 million (approx. € 23.5 million).

This sum is broken down as follows:

AUVA	ATS 150 million	€ 10.9 million
Companies	ATS 76 million	€ 5.5 million
Other social insurance institutions	ATS 30 million	€ 2.2 million
Others	ATS 67 million	€ 4.9 million

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*It is possible to convince industry that occupational health and safety is economically beneficial.*

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A. Korntheuer (Deputy AUVA Chairman)

AUVA spent a total of ATS 25 million (€ 1.8 million) on the campaign and achieved cost savings for itself of ATS 150 million (€ 10.9 million). The cost-benefit ratio for AUVA therefore comes to 1 to 6.

AUVA campaign costs:	ATS 25 million	(€ 1.8 million)
AUVA cost savings:	ATS 150 million	(€ 10.9 million).

The above list of costs also shows that accident prevention makes sound economic sense for companies.

Even after the project, medium-size and large companies carried out their own campaigns to prevent falls with great success. This, however, had no effect on the fall statistics for Austria as a whole.

### Transferability

Although the campaign was tailored to the needs and organisational set-up of a social insurance institution, the information material produced for this campaign, i.e. the videos, training transparencies, folders and posters, is suitable for use in other areas.

### Further information

Dr. Karl Körpert  
 AUVA – HUB  
 Adalbert Stifterstraße 65,  
 A-1200 Wien  
 Tel. (43-1) 33 11 15 12  
 Fax (43-1) 33 11 13 47  
 E-mail: karl.koerpert@auva.sozvers.at

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*Almost 700 out of 800 employees in our company were informed about the campaign. Awareness of accidents due to falls was increased to a point that 90 persons made suggestions as to their prevention.*

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Thomas Scharinger (Safety technology/plant layout SAT — Steyr daimler Puch AG)

## 2.5 HOW TO REDUCE ACCIDENTS IN HIGH-RISK COMPANIES BY USING A TARGETED INSPECTION CAMPAIGN: PROGRAMA ARAGÓN

- Focusing on high-risk companies
- Reducing accident rates by more than 25%
- Transferability of the method



### Background

This action is called Programa Aragón. The labour risk-prevention service of the General Labour Authority in the Department of Economics, Internal Welfare and Employment of the government of Aragón initiated it. This programme is carried out in this autonomous community annually since 1999. Programa Aragón for 1999, also known as Programa 677, covered the calendar year 1999. The programme was implemented again in 2000, and January 2001 saw the commencement of the programme for the year 2001. All productive sectors are concerned by this action. The companies concerned are those which, during the previous year, have suffered a certain number of accidents with suspension of work shifts that surpasses a certain percentage of the accident rate for a specific economical activity.

### Occupational safety and health objectives

The coming into law of new legislation in matters of preventive labour safety (labour accident-prevention law, and later amendments) has not offered the desired benefits in our productive environments. In the last few years, in relation with an increase in economic activity and employment characteristics, there has been a gross increase in the figures for labour accidents. For this reason, an accident-prevention programme was implemented that also permitted the introduction of models of preventative measures mandated by the new legislation. Urgent measures should be taken in the companies showing comparatively high accident rates, since they must have serious faults in terms of labour accident prevention (see Table 1).

As has been indicated, the companies forming part of the annual programme have reached certain labour accident figures. Obviously, all labour risk must be considered.

**Table 1. Number of accidents with work shift suspensions in Aragón, 1993–2000**

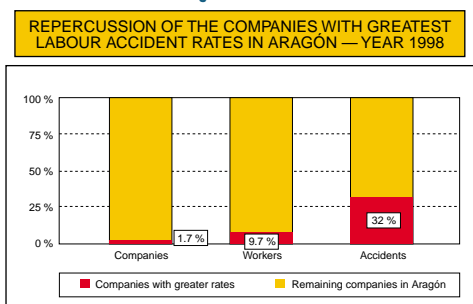
1993	14 293
1994	14 919
1995	17 117
1996	17 394
1997	19 237
1998	21 124
1999	21 953
2000	22 859

**Key points:**

- Each year, 40% of the accidents with work shift suspensions in Aragón occur in 3% of Aragonese companies.
- The administration concentrates its resources on this small group of companies.
- The initiation of efficient preventative measures in such companies reduces their annual accident rate by 28%.

The programme carried out in 1999 included 677 companies (1.7% of the companies in Aragón), that employed 32 533 workers (9.7% of Aragonese workers), which suffered 6 761 accidents with suspension of work shifts in 1998. They counted for 32% of this type of occupational accidents (see Figure 1). The average accident rate of the entire group of these 677 was 208. All companies involved surpassed with 50% or more the accident rate for their specific economic activity and had suffered four or more labour accidents with work shift suspension.

**Figure 1 (1)**



ARAGÓN 1998	No OF COMPANIES	No OF WORKERS	No OF ACCIDENTS	AVERAGE RATE
GENERAL DATA IN ARAGÓN	39 253	335 306	21 124	62.9
COMPANIES THAT SURPASSED THEIR AREA (*) BY 50%	677	32 533	6 761	208
PERCENTAGE	1.7 %	9.7 %	32 %	

(\*) Accident rate for their specific economical activity.

(1) Accident rate of a company: number of accidents divided by the number of workers multiplied by 1 000. Accident rate for an activity: number of accidents of all companies dedicated to this activity divided by the number of workers dedicated to this activity, multiplied by 1 000. Comparative accident rate: the relationship between the two above.

The programme carried out in 2000 included 1 163 companies (2.9% of the companies in Aragón), employing 47 014 workers (13.3% of the working population in Aragón) suffering accidents with labour shift suspension in 1999, some 9 047 accidents labour shift suspension (41.2% of these accidents in Aragón). The average accident rate in these companies was 192. All 1 163 companies involved surpassed by 25% or more the accident rate for their specific economic activity and had suffered three or more labour accidents with work shift suspension.

The programme to be carried out in 2001 includes 1 175 companies (2.8% of the companies in Aragón), employing 48 911 workers (13.3% of the employees in Aragón) that suffered 8 649 accidents with labour shift suspension (37.8% of these accidents in Aragón). The average accident rate of these companies is 177. All 1 175 companies involved surpassed by 25% or more the accident rate for their specific economic activity and had suffered three or more labour accidents with work shift suspension.

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*It is intolerable that 3% of the companies produce 40% of accidents.*

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J. L. Martínez. (General Director of Labour — Government of Aragón)

To identify the companies making up the programmes for 1999, 2000 and 2001, the rates have always been calculated for all Aragonese companies. To identify the companies making up Programa 677 (year 1999) the rates were calculated for 38 different economic activities. To identify the companies making up the programmes for 2000 and 2001, respectively, the accident rate for 103 and 106 different economic activities was calculated. This greater accuracy in information has permitted lowering the company selection criteria: from four to three accidents per company per year and a 25% rate increase instead of 50%.

It has been demonstrated in the last three years that 3% of the companies in Aragón account for 40% of the accidents with work shift suspension in Aragón.

It is interesting to note that 60% of the companies that went through these three annual programmes have a workforce ranging from 11 to 50. Some 35% of the workers included in the programmes are found within this interval. These companies, from 11 to 50 workers, account for 45% of the accidents covered by the programmes.

Finally, the purpose of the programmes and objectives are:

- to advise the companies included in the programmes of the seriousness of their situations;
- to examine the preventive measures detecting the errors;
- to set deadlines for the companies to correct their errors;
- to reduce the accident rate for these companies;
- to let the companies reduce, at the end of the year, accident rates that correspond to their activities (i.e., that are similar to those of their direct competitors).

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*Taking advantage of the information available is the key for carrying out prevention programmes.*

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J. Rey (Section Chief for Labour Risk Prevention — Government of Aragón)

### Design and implementation

As mentioned before, the programme is carried out on the group of companies which, each year, have an excessive number of accidents with work shift

suspensions. The evolution over these three years of carrying out the programme shows that a group of companies whose accident prevention measures are inadequate can be defined.

#### *The organisms associated with the programme*

The provincial inspections and social security within the autonomous community supported the programme. These inspections act directly on construction companies, temporary employment companies and public administration. The reason is the sanctioning capacity of the organism and the difficulty of the technical activities in these sectors, either due to the mobility of the work or the administrative complexity of the accident-prevention measures. Also collaborating with the programme were the insurance funds of labour accidents and professional illnesses from which a special dedication on the companies in the programme that are associated with them is requested. Finally, the collaboration and understanding that the corporate and labour union associations have shown is worth mentioning.

#### *The working method*

All claims for accidents with labour shift suspension occurring within the Autonomous Region of Aragón are studied and coded and computerised (approximately 22 000 per year). Along with the population data for each activity (associated with social security), the accident rates for all of them are studied. The accident rates for each of the companies with accidents in the corresponding year are also calculated and are compared with the accident rates for all the companies surpassing the criterion of the minimum number with those corresponding to their specific activities.

The concept, already mentioned earlier, consists in acting on the companies with high accident rates.

#### *Resources*

The resources used are the human and technical ones of the labour accident-prevention service. The programme did not require special financing or training.

#### *Programme activity period*

The companies included in the programme are notified in January. From January to December, the companies are visited by the technicians and are given support. Over the year, follow-up controls are established. In June, those companies that have not reduced their accident rate are called to mandatory meetings. In December, the activities of the programme are closed. The following year, the evolution of the companies that formed the programme for the previous year is monitored.

### **Experiences gained and effectiveness**

#### *The year 1999*

The system for monitoring and controlling the results is a monthly control of the accident rate for all companies enrolled in the programmes and the

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*Administration resources should be focused on the companies with the highest comparative accident rates.*

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C. Heras (Head of the Labour Risk Prevention Service — Government of Aragón)

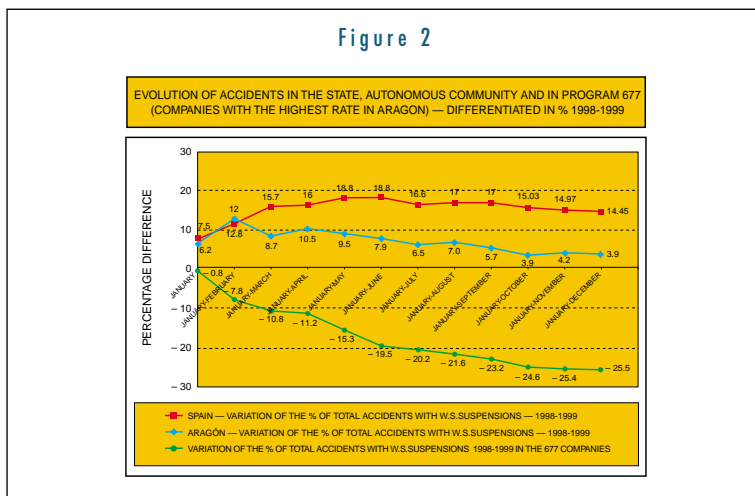


*Programa Aragón for labour accidents is the one that has obtained the best results in Spain.*

F. Durán (President of the Economic and Social Council of Spain — report for the Prime Minister)

observations of the technicians in the visits to the companies. In the year 1999, there were 677 companies in the programme. They reduced their accident rate by 25.5% in spite of having increased their workforces by 9.4%.

The monthly evolutions of the results in the groups of companies that formed the programmes for the years 1999 are shown in Figure 2. All 677 companies involved surpassed by 50% or more the accident rate for their specific economic activity.



**The year 2000**

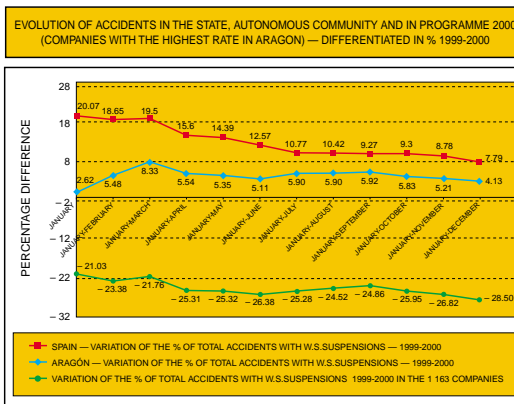
In the year 2000, there were 1 163 companies enrolled in the programme. They have reduced their accident rate by 28.5%, in spite of having increased their workforces by 4%. The monthly evolutions of the results in the groups of companies that formed the programmes for the year 2000 are shown in Figure 3. All 1 163 companies involved surpassed by 25% or more the accident rate for their specific economic activity.

**Experiences**

The main problem foreseen, and in fact, encountered, has been the lack of preventive culture in most companies included in the programme. Another anticipated aspect was the difficulty of small and medium-sized companies to understand and adopt the prevention systems foreseen in the new legal framework. In addition, material deficiencies in safety and hygiene were anticipated in the visited companies. The latter could be resolved through a traditional report of corrective technical means. The difficulty for companies to implement an efficient system of occupational accident prevention was solved during visits from the technicians, who gave them explanations. Nonetheless, the absence of a preventative culture, which stems from deficiencies in awareness and corporate training of labour and management cannot be resolved through the technical activities at the companies.

The biggest problems were found in deficiencies in completing the labour accident claims (accident notification), which consisted in some of the relevant data of the companies not figuring in the claims or their being erroneously completed. These problems, especially when calculating the accident rates, had to be resolved through numerous phone calls before starting calculations. On the other hand, some companies were found to be classified in economic activities different from those they actually carried out. This led to non-valid comparisons between the accident rate of the incorrectly classified companies and a labour accident rate that did not correspond in reality to that of the company in question. This fact obliged some companies to be removed from the programme.

Figure 3



One important observation is that the mechanics for obtaining information and identifying companies has been shown to be efficient. Furthermore, the period of one year to change the situation in the companies has been shown to be efficient in most cases; the reductions in accidents are significant. The most valued aspect of the project was the speed with which the first positive results were achieved. Even more valued was that this was obtained by adopting the same basic preventive measures in the companies.

*The method has shown to be efficient*

The majority of the companies have established a contact with the administration through the technical visits and meetings sufficient to make the problem understood and organise resources for resolving it. The companies, in general, have understood the need for adequately managing prevention and the corporate associations have understood the need for priority action in the companies with greater comparative accident rates.

Nevertheless, there is a small group of companies that have each year an excessive number of accidents with work shift suspensions. The evolution of these three years of carrying out the programme shows that a group of

*We share the concern of the administration. Programa Aragón appears completely appropriate to us.*

M. A. Hidalgo (Regional Confederation of Businessmen in Aragón)

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*The labour unions accept Programa Aragón. We should guard against any under-reporting of accidents by some companies.*

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T. Iglesias (Secretary of Social Action of General Workers Union in Aragón),  
B. Carrera (Head of Health Labour of Workers. Commission in Aragón)

companies is being defined whose accident-prevention measures are inadequate. In the second year of the programme, 27% of the companies were again included. After three years, the percentage of the programmes that made contact at least twice is 42%. This means that in the coming years a nucleus of companies that do not have adequate accident-prevention measures will be defined.

The correct management of the information was considered a crucial argument in the contacts with the companies. In particular, the comparison of accident rates with their direct competitors was a very effective instrument to stimulate attention for occupational safety and health issues.

Another noteworthy result is undoubtedly the optimisation of resources of the Administration itself for dealing with the problem of reducing accidents. It should be mentioned that the significant improvements that have been produced in information input (contained in the labour accident claims) to the labour accident prevention service were due to the insistence made by the service itself.

As a consequence of the positive experiences over the year 1999 and 2000 this programme is now — in 2001 — being repeated for the third consecutive year.

Occasionally, a company was detected with a tendency to hide slight labour accidents. Adequate measures were taken in response. Usually, intervention caused strong reactions from the companies involved when the administration made clear that their high accident rate (compared to companies in the same activity) pointed at serious shortcomings in preventive management.

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*Programa Aragón should be extended to the rest of the autonomous communities in the Spanish kingdom.*

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Juan Chozas (General Secretary of Employment — Ministry of Labour and Social Affairs)

### Transferability

The method should be easily transferable. In fact, at present, various autonomous communities in the Spanish State are following programmes based on the programme in Aragón. In these communities, the experience is so far however limited to one year.

The system should not suffer modifications by being implemented in other regions. The most useful recommendation for transferring the experience would be to make a correct calculation of the accident rates of the companies and the different economic activities and to establish a continuous follow-up of the evolution of accidents in the companies included in the programme.

### Further information

Mr J. L. Martínez, Mr C. Heras, Mr J. Rey  
General Labour Authority  
The Department of Economics, Internal Welfare and Employment of the Government of Aragón  
Bernardino Ramazini No 5  
E-50014 Zaragoza  
Tel: (34-976) 51 66 00  
Fax (34-976) 51 04 27  
E-mail: gsh.san@aragob.es

# 3.

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ACTION TAKEN AT SECTOR  
LEVEL

# 3.1 FALLING OVERBOARD IN THE MARITIME SECTOR — LET'S TALK ABOUT IT

- In the fishing industry more than one 'fall overboard' out of two is fatal
- It is difficult to convince personnel at sea to use personal protective equipment
- Campaign messages have been incorporated in vocational training programmes



## Background

A national campaign in France for preventing the risk of drowning aimed at the occupational safety and health of the crew in the fishing, commercial shipping and fish farming businesses. These seafarers work in small and very small enterprises operating fishing, commercial shipping and fish farming ships. The sector employs 40 000 people in around 6 000 boats working of all the coasts of France.

The identified risk is falling overboard followed by drowning of the victim. The goal of this campaign is to alter the behaviour of seafarers and change their attitude so that they consider not wearing personal protective equipment (PPE) as abnormal.

The initiators of this campaign are the Direction des Affaires Maritimes et des Gens de Mer (DAMGM — Maritime Affairs Department) and l'Établissement National des Invalides de la Marine (ENIM — social security regime for French sailors) in the Ministry of Equipment, Transport and Housing. The campaign was carried out under the supervision of the Institut Maritime de Prévention (IMP) of Lorient.

### Key points:

- Promote awareness of wearing personal protective equipment.
- Mobilisation of all levels of the administration and industry to put an end to a taboo according to which falls happen only to others.

## Occupational safety and health objectives

Until recently, only collective protective measures were compulsory. These concerned the safety of the ship and prevention of the consequences of shipwreck. As a result, the maritime sector was lagging behind with regard to the systematic wearing of PPE at work.

A set of government measures promoted use of personal protection in 1997.

The first measure was the ‘fishing’ act, which extended to the maritime sector the general principles of prevention of occupational risks applicable in other activities (in accordance with framework Directive No 89/391).

The second is the creation of the Administrative Enquiry Office — Sea (‘BEA-Mer’) responsible for enquiring into all accidents occurring at sea (commercial shipping, fishing, leisure boating). It was in this context and at the request of the ministry that in 1999 the IMP implemented a campaign that it had proposed in 1996.

The campaign aimed to tackle a major problem, as shown by the following figures. Numerous fatal accidents (drowning) occur following falls into the sea from ships.

Falls: from 1993 to 1997	Fishing	Shellfish farming	Commerce	Total
Submersion	59	0	8	67
Hypothermia	23	1	2	26
Lost at sea	20	0	5	25
Lost in collective shipwreck	25	0	3	28
	<b>127 (*)</b>	1	18	146

The objectives of the campaign were:

- to promote awareness among those concerned of the risks of falling overboard and the consequent risk of drowning;
- to describe the means of prevention;
- to inform the seafarers, the captain and the ship-owner of their respective obligations and duties.

## Design and implementation

First, it was necessary to clarify for all the partners the difference between the rescue equipment required under the shipping regulations to cope with emergency situations occurring in the event of shipwrecks, and the personal

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*The IMP is the only prevention organisation specialised in safety and the living and working conditions of those employed at sea. Moreover, it works actively with the other players in the prevention of occupational risks at sea.*

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Yvon Le Roy (IMP)

(\*) Of which 68 deaths — in the fishing industry more than one fall overboard in two is fatal. Source: Sailors’ Health Department.

protective equipment that has to be worn systematically to counter the risk of drowning at all places on the ship where this risk has been identified.

The ministry's departments provided the clarification of regulations concerning the use of PPE. The local authorities were informed of the legal provisions to be applied. These provisions indicate that the employer should analyse the risks. Since the risk of drowning is due above all to falling overboard, the employer should make work clothing (PPE) available to the seafarers' which will keep them afloat. The inspectors would then have to check the individual aspect of protection and not merely the collective aspect.

A working group was formed, with representatives of industry, cooperative and trade union organisations, experts and state departments. All the players were involved in this preparatory work, together with the marine training schools and staff organisations. The IMP, responsible for preparing the campaign materials (brochures, posters, circulars, and standard press releases) had this equipment validated by the working group. Funding for the campaign was provided by the ENIM.

## *Implementation*

The campaign logistics were strongly supported by the administrative organisation for the sector. Communication materials were distributed to the 21 regional departments of maritime affairs. Each department was in charge of managing the campaign at the level of its region under the authority of the regional manager of maritime affairs, redistributing the material, and ensuring that this information would be available wherever it could come to the knowledge of people in the industry.

Each administrative level had specific tasks to be carried out; for example, forwarding instructions to the lower levels, placing messages in internal reviews, and informing the local press or trade associations. All the industry structures were also mobilised for the circulation of the campaign materials in their organisations and in trade reviews.

In parallel to this dissemination, the IMP organised floatation PPE tests in several ports on the French shoreline (five in 1999). These demonstrations, aimed at targeted audiences, were organised according to identified needs. The manufacturers responded favourably to the IMP's requests for collaboration and contributed to the success of these events. Each of the demonstrations was covered by a local press campaign and a standard press release formed part of the campaign material. The media again largely relay the campaign themes.

The campaign themes were also promoted by the systematic presence of a 'drowning' PPE stand at trade fairs and in vocational training schools. The action targeting schools was initiated prior to the campaign but was reinforced during the campaign. A growing number of schools are being visited (83 in 1999, 106 in 2000) and a growing number of students are being made aware of safety as of the training stage (1 304 in 1999, 1 587 in 2000).



Leaflet showing the various types of floatation PPE available and their respective uses.

### Experiences gained and effectiveness

The first difficulty is due to the fact that PPE is not compulsory equipment under shipping regulations; the State departments responsible for checking the application of these ‘shipping’ regulations find it hard to be committed. It is only since the fishing act of 1997 that the articles of the labour code transcribing the framework directive apply in addition to the provisions of the maritime labour code. The obligation on the employer to supply PPE is therefore recent, which partly explains the lack of interest shown by those in charge of inspection. Likewise, the circulation of campaign material at the level of certain regional departments of maritime affairs has been less extensive than in others. A lack of mobilisation has been observed in certain places.

The other difficulties are structural. The fact that the enterprises are spread over the entire shoreline and the special work hours in the sector means that numerous demonstrations of equipment are required. There are slightly less than 80 ports on the shoreline for approximately 5 800 boats, of which 4 300 measure less than 12 metres, and there are only 250 inspectors and controllers of ship safety and for prevention of occupational risks at sea. The latter are State officials, at various points on the shoreline in about twenty ‘ship safety centres’.

It is also hard to reach the various people concerned given the working conditions (personnel at sea and working all hours). The system of



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*In general, the cost of compulsory safety is an obstacle in this environment. Adding PPE to the equipment required under “shipping” regulations is too much for some people.*

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Yvon Le Roy (IMP)

remuneration is an obstacle to the extent that when the fisherman is not at sea he is not remunerated (remuneration on a piecework basis), and training time is not remunerated. In terms of social security contributions, occupational risks are managed jointly with illness risk; enterprises are therefore not directly aware of the cost of occupational risks because their contributions do not change in line with costs. The employer does not isolate the cost of the occupational injury risk, thus making relatively ineffective the financial incentives of prevention under the general social security regime.

Among the positive results, the growing awareness among all ‘preventers’ (private, institutional or representing the public authority) of the need for communication about ‘falls overboard’ and ways of preventing them should be noted. Previously, this subject was not discussed very much. The basic publicity message for this campaign (including a play on words in French) is indicative of this state of mind: ‘Falling overboard. Let’s talk about it!’

As the fishing sector is very specific and fragmented, manufacturers of PPEs are hesitant to develop appropriate products given the narrowness of the market and the cost of certification of such products. PPEs have been acquired by professional seamen and by ship-owners. This is now mandatory for the ship-owner, but seamen must be convinced that they are required to wear it. At present, it is difficult to put a figure on the volume of PPE bought. Experience shows that if a relay is active in this field, real progress can be observed.

Some manufacturers have made improvements to existing equipment and new products, better adapted to the needs of the industry, have appeared on the market. The manufacturers have agreed to take part in demonstrations in the ports and in schools. This is a new development on the part of the manufacturers, who are more attracted by the leisure boating market, but technical transfers between the two sectors are possible, because the products are virtually identical.

The campaign messages have been incorporated in vocational training programmes, and this measure has been well received. Wherever seafarers congregate, thousands of documents (posters, brochures, and stickers) are circulated, giving reminders of the risk of drowning and encouraging people to protect them.

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*If it (the PPE) is not worn at the time when someone falls into the sea, it is of no use.*

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Guy Cotten (manufacturer of PPEs, Quest France, 10.4.2001)

Following the campaign, marine doctors, during compulsory annual medical inspections, carried out around 5 600 interviews of seafarers. The aim was to evaluate the impact of the campaign and the perception of the risk of drowning. This showed that the number of overboard falls followed by the seamen climbing back on board was unknown, but much underestimated. Falling overboard is a reality in the life of seafarers: 11% of those interviewed had fallen overboard, of which 15% come from the fishing sector, 7% from commercial shipping and 7% from shellfish farming. Such falls are lived with intensity: 70% of those interviewed say they sense the fear of this risk as something very present. These figures provided a posteriori justification for the action taken, because only falls having medical sequels are counted as occupational injuries.

**Chute !... par dessus bord**

**Plateau des Birvideaux**

« sur les ans ils ont un moyeu d'âme : le cœur »

... un des leurs dont ils n'ont jamais oublié et n'oublieront jamais les regards, les rires et les plaisanteries, les humeurs et attitudes, les silences et les aïres.

**obligations de l'armateur**

Le chef d'établissement prend les mesures nécessaires pour assurer la sécurité et protéger la santé des travailleurs de l'établissement.

**devoirs de marin**

Avant tout, il indique qu'il "souhaite à chaque travailleur de prendre soin, en fonction de ses facultés et selon ses possibilités, de sa sécurité et de sa santé".

**Le jour /'étais sur le plateau avec mon meilleur capot. Le plateau a chuté et mon capot est tombé à l'eau à 2 heures de matin. Le chlot est défilé à l'eau, ce n'a pas pu être tout de suite. Quand on a récupéré mon œil, il était trop tard.**

**Le jour /'étais sur le plateau, le moteur était arrêté, je me suis retrouvé dans l'eau froide, en ballée et en dé, maintenant doucement vers le surface, j'ai aperçu le bateau à une trentaine de mètres. Il me paraissait lointain. Tout l'équipage était rangé le long de la file à mes gauches. J'ai pu voir le moteur et à mes côtés. Pendant quelques secondes, je n'ai pu parler. Puis j'ai senti de mes réflexions. Je me sentais déjà aspiré vers le fond ; pas moyen d'entraîner mes ballés et de me maintenir à la surface. J'ai pu voir le plateau sauté la bande orange et me le lancer [...]. Le plateau a bien été, et j'ai réussi à attraper le bateau et à m'efforcer dessus. Là, je me suis dit "un bon, l'air sauté". Je ne suis pas comblé de temps je n'ai dit tout ça, mais j'ai vraiment eu que j'allais partir au fond [...]. Il n'y a pas eu un mot de tout ça et le chef et certains pas de regard de moi, une fois rentré à terre [...]. Au temps au temps, cette histoire me revient à l'esprit, et j'ai toujours le même image ; je remonte à la surface et je vois le bateau en face ..."**

**DÉP**

**Campagne nationale de prévention contre le risque de noyade**

**Falling overboard. Let's talk about it!**  
**Plateau des Birvideaux**

'All seafarers have a drowned person in their heart ...  
 [...] one of their own people, whose laughs and jokes, moods and attitudes, silences and words they will never forget.'

Alain Jégou

'Marin pêcheur', in 'Les poètes de Bretagne',  
 Poesie I, No 18, June 1999, p. 79

**National campaign for the prevention of the risk of drowning**

**Effectiveness**

What has been described is just the start of the work. Personnel in the field has been made aware of the problem. The next step is to keep this state of mind alive. One of the leading manufacturers of safety clothing for human survival at sea has clearly understood this. The manufacturer in question has developed equipment suited for fishing sailors and organised demonstrations of PPE in early 2001 of its own initiative.

This campaign has received State backing. This backing has taken the form of the establishment of the 'BEA-Mer' (aiming to carry out an administrative enquiry into all fatal accidents occurring at sea) and the passing of the fishing act of 1997. This has made it possible to aim at more than the strict safety of the ship. Official services are asked to give life to the campaign through the departments over which they have authority.

### Transferability

If a counterpart institution were to carry out a similar campaign it should make sure that it has local relays to inform and reply to local questions. Given the specific features of this population, fragmented in small units and scattered over a large geographic area, the constant action of a local relay to renew the message is essential. An another criterion for success is establishing a cooperation with the manufacturers of PPE so that a range of products may be made available.

### Further information

Yvon Le Roy  
Institut Maritime de Prévention  
33, Bd Cosmao Dumanoir  
F-56100 Lorient  
Tel. (33) 297 64 78 40  
Fax (33) 297 64 78 41  
E-mail: [Imp@wanadoo.fr](mailto:Imp@wanadoo.fr)  
Web site: <http://www.salvanos.org/info/IMP.htm>

## 3.2 PREVENTION STRATEGY FOR THE SECURITY INDUSTRY IN GERMANY — A MODEL FOR OCCUPATIONAL SAFETY



- A catalogue of safety measures
- Acceptance by major companies compel others to take action
- Accident rates fell by over 30%

### Background

The security industry, part of the service sector (which is expanding vigorously in general in Germany), is experiencing rapid growth. The number of enterprises registered as members of the VBG increased by about 114% to 1 462 between 1985 and 1995. In the same period, the number of insured persons in the industry increased by around 140% to 163 000.

As the security industry reports a large number of costly occupational accidents, a specific prevention strategy was developed for this branch of the industry. In cooperation with the Federal Association of German Security Firms (BDWS), the German institution for statutory accident insurance and prevention in the administrative sector (Verwaltungs-Berufsgenossenschaft — VBG) prepared a catalogue of measures. This could serve as a model for occupational safety in the security industry and promoted its implementation in the industry between 1990 and 1996.

Around 200 large and small companies with a total of 80 000 employees took part in the prevention project on a voluntary basis.

### Key points:

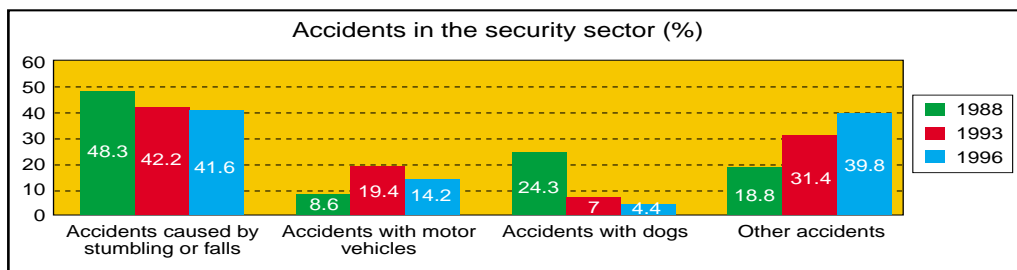
- Fast-growing economic sector — many new companies with high staff turnover — many occupational accidents at a high cost to companies and accident insurance.
- Main campaign objectives: reduction of the number and cost of accidents and improvement of working conditions as a whole.
- Close cooperation between professional association, accident insurance, prevention institution and the continuous, active monitoring of the campaign were key success factors.
- The action programme closely fitted in with the needs of the profession, thus leading to broad acceptance by the companies and their employees.

### Occupational safety and health objectives

The Verwaltungs-Berufsgenossenschaft is the statutory accident insurance and prevention institution responsible for the security industry. It is required by law to employ all suitable means of preventing accidents in its member companies. Of the types of enterprise insured by the VBG, the security industry is one that reports a relatively large number of accidents — many of them costly in terms of both compensation payments by the VBG and economic losses by the companies. In the main, the industry’s typical risks lead to accidents of the following kinds:

- accidents with vehicles on journeys during working hours;
- accidents while handling dogs;
- accidents while guarding buildings or on patrol, e.g. caused by stumbling or falls;
- risk of attack while transporting money and valuables.

An analysis of the trends in accidents of this kind over a long period reveals the following information on the industry as a whole:



The objective of the prevention strategy ‘A model for occupational safety in the security industry’ was to reduce the rate of accidents in the industry and to improve the working conditions of the employees. At the same time, it was hoped that the companies themselves would benefit financially from the accident-prevention measures. The aim was to make an active occupational safety and health policy financially attractive to companies by achieving lower compensation payments, less continued payment of wages during illness and less disruption of operations in general.

### Design and implementation

The measures were intended to cover all aspects of operations and improve workplace safety in general through important disseminators within the enterprises (company owners, executive staff, on-site managers, supervisors, dog-handling instructors, etc.). To achieve this, measures specific to the industry were developed together with the BDWS:

These measures aimed at:

- training company owners at one-day motivation seminars;



- holding occupational safety seminars to train on-site managers, corporate inspectors, supervisors or persons with similar functions;
- ensuring that employees who regularly drive motor vehicles in the service of the company take part in general road safety training courses;
- training dog-handling instructors and dog handlers; document the use of dogs;
- ensuring that employees can contact each other;
- equipping armoured money conveyors with air-cooling devices;
- equipping all company vehicles with tachographs or other recording systems.

As a highly respected representative of the industry, the Federal Association of German Security Firms was able to contribute practical advice and inform the companies concerned through communication channels of its own.

The VBG strategy included giving financial support for the implementation of the safety measures in the companies. All the measures went beyond what was required by law and were directed towards the types of accident currently most common in the industry. The companies taking part were also to benefit financially from the higher safety standard, since a reduction of continued wage payments during illness and optimum planning of personnel deployment without distortion enables considerable savings.

The implementation of the measures stated in the catalogue of criteria was checked in the companies by the VBG's experts familiar with the specific features of the security industry, who were also available to the companies at all times to give advice. It was hoped that this would reduce the difficulty of implementing the measures and thus create better conditions for their acceptance by the staff.

For example, some 32 000 persons in the security sector were trained in first aid between 1990 and 1994; 11 000 employees took part in road safety training courses, and 8 500 disseminators were trained at 450 seminars lasting several days. The direct cost of the courses was paid by the VBG; but the wages of the employees during their training period were paid by the companies themselves.

### Experiences gained and effectiveness

The VBG's experts monitored the campaign in the companies throughout the programme period. This made it possible to deal directly with any problems arising during implementation and solve them without much loss of time. For example, bottlenecks in seminar capacity were identified early, which meant that extra seminars could be given outside the schedule. This procedure ensured that the campaign as a whole was never in danger of failure.

The project was carried out from 1990 to 1996. For the VBG, it was important to find out whether the additional safety and health measures introduced in the companies on a voluntary basis were producing good results. These results were measured with the aid of statistical test methods.

However, it was found that the accident rate could not be calculated reliably in the usual manner (per thousand insured persons) because of the high level of personnel fluctuation and the different numbers of hours worked by the individual employees. So, in the context of the test series, the quotient 'number of reportable accidents/total wages paid' was calculated as the accident rate for each company. In the accident rate calculations, the total wages paid were adjusted to account for inflation.

The analysis revealed the following:

- In the companies taking part in the programme, the accident rate fell by 37%. In the industry as a whole, the rate fell by about 25%. This very noticeable overall improvement in the guarding and security sector is due to the fact that most of the firms taking part in the project were large ones, and this greatly raised the general level.
- In many companies, the accident rates were found to improve from one year to the next one. It can be explained by the need for adequate run-up time.
- It was found that the number of companies with improved accident rates increased with the length of their participation to the programme. After five years, about 70% of all the companies taking part in the pilot project had a better accident rate than before.

The success of the prevention strategy 'A model for occupational safety' was described favourably by the industry at a forum carried out on the subject. Two employers from the industry are quoted here as examples.

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*The considerable investments in safety measures and health protection paid for themselves after only three years.*

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Dr E. Feuerstein, (owner of a security firm)

The owner of a security firm, described the success of the measures in his enterprise with a staff of about 830. He observed that, between 1992 and 1995, the number of accidents in the company increased by only 3%, although the number of employees increased by 50%. This had a cost but the considerable investments in safety measures and health protection paid for themselves after only three years. Damage to company vehicles was greatly reduced, with the result that the insurance premiums fell noticeably too and the cost of continued wage payments during illness was reduced by DEM 80 000 per year. Last but not least, employee motivation was increased.

The overall results show that the project achieved its objectives and all the parties involved drew benefit from it.

### *Effectiveness*

As described under the preceding headline, the action can be considered as very successful with an average reduction of the accident rate of 37% in the participating companies and of 25% in the security industry as a whole.

Different criteria emerge as important for the success of the project as a whole, depending on the point of view of the parties involved. The prerequisite for this was good cooperation in a spirit of partnership by the parties involved, and at all times they made constructive efforts to solve the problems jointly with the objective in mind. In particular the following aspects should be mentioned here.

#### Acceptance by the industry

Because of the express relevance of the strategy to the industry concerned, the employers felt they were being approached directly. This increased their readiness to take part in the project. Acceptance by the major companies compelled others that were less convinced initially to take part. At times, the safety measures practised by the companies were even used in their publicity, as it was felt they enhanced the quality of the services offered.

#### Support from VBG

The VBG did not only describe the prevention strategy in theory; it accompanied its implementation actively at every stage. VBG experts familiar with the specific features of the security industry interpreted the catalogue of measures to meet practical needs and individual companies' requirements. The campaign was monitored in the companies over the whole period, which made it possible to take corrective action if problems arose.

The VBG either carried out the training described in the catalogue of measures itself or paid the cost of it. The VBG gave financial support to relieve the financial burden on the companies for the technical equipment required, which was sometimes considerable.

#### Stronger market position/usefulness to the business

One employer described the financial effects of the additional safety and health measures in his company at a forum for the industry. Occupational safety contributed to the financial success of this enterprise. For example, the additional safety measures introduced paid for themselves in only three years.

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*The staff feel we care about them, and they take their duties more seriously.*

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R. Wackerhagen, (company owner and President of the Entrepreneurs' Association).



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*All the parties involved in the project emphasised that the campaign encouraged cooperation in a spirit of partnership.*

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J. Da Pont (technical inspector, VBG)

But the additional safety measures were also found to bring success that is difficult to quantify in terms of money. The creation of good working conditions had a direct effect on employee motivation. This resulted in greater satisfaction on the part of the clients and enabled the service companies to develop long-term relationships with them.

All the parties involved in the project emphasised that the campaign encouraged cooperation in a spirit of partnership.

### Transferability

This safety measures model achieved its objective, namely to improve occupational safety and health in the security sector. The VBG also carried out the above prevention strategy successfully in another industry. This means that this strategy can be transferred to any industry if the overall conditions described above are taken into account.

### Further information

Dipl.-Ing. Rudolf Otto  
Isaac-Fulda-Allee 3  
D-55124 Mainz.  
Tel. (49-6131) 389-154  
Fax (49-6131) 389-400  
Rudolf.Otto@vbg.de

Dipl.-Ing. Jürgen Da Pont  
Solinger Straße 18  
D-45481 Mülheim.  
Tel. (49-208) 99 37-284  
Fax (49-208) 99 37-236  
E-mail: Juergen.DaPont@vbg.de

# 3.3 FARM ACCIDENTS: A DANISH MODEL FOR PREVENTION



LandbrugsInfo

- faglig information fra Landbrugets Rådgivningscenter

- Information campaign
- Safety course
- Accident reduction: more than 40%

## Background

In Denmark, the risk of serious occupational accidents is greater in farming than in most other occupations. The yearly incidence of fatal work accidents per 100 000 employed is roughly three times greater in farming than in other occupations grouped together. More precisely, 9.85 fatal accidents per 100 000 employed were registered (average 1993–96). In relation to the number of persons employed, farming ranks highest in fatal accidents for the years 1990–96, except in the year 1992, where it had the second largest incidence. Despite such figures, research into work-related accidents have been limited in the farming sector.

Information campaigns, for example about shielding of power transmission axles and safety cabs on tractors, have been conducted, but campaigns are assessed as being too weak a prevention tool. Consequently, a study developing a specific prevention model applicable to agriculture was initiated. The objective was to obtain detailed knowledge of injuries and working conditions related to farming for purposes of designing possible preventive interventions. The study should, among other things, extend the knowledge regarding the role of psychosocial factors or the mechanisms through which accidents occur.



The West Jutland study on prevention of farm accidents was initiated in 1992 and closed in 1997. The study was carried out by the Department of Occupational Medicine, Herning Hospital and the Danish Agricultural Advisory Centre in Skejby. Geographically, the study was restricted to one county in Denmark, Ringkoebing county, with 270 000 inhabitants, 13 835 of whom are engaged in full-time farming on 7 922 farms.

## Key points:

- To obtain detailed knowledge of fatal and non-fatal unintentional injuries and working conditions related to farming.
- To design possible preventive interventions.
- To carry out the intervention at a large number of farms.
- To evaluate the results of the intervention.

## Occupational safety and health objectives

The intervention focuses on behaviour changes and a planning of safer working routines with the purpose of reducing the injury incidence and the severity of the accidents.

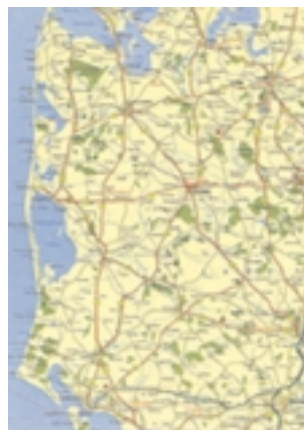
The effects of the programme will thus be measured with reference to pre- and post-performance regarding:

- frequency and type of accidents;
- attitude to occupational health and safety, risk situations in particular;
- results of safety checks carried out by an agricultural safety engineer.

## Design and implementation

### Registration

Findings regarding the role of psychosocial factors and the mechanisms through which farm-work accidents occur are very limited. Furthermore, previous research has not adequately calculated the amount of time the farmer spends on specified tasks presenting a risk, such as time working with machinery, animals, maintenance-related work, etc. However, this information is needed to establish an appropriate foundation for the preventive efforts and therefore a first and second phase of the project were designed to thoroughly investigate accidents and risk factors.



Phase 1: Registration and interview of all farm accident victims receiving hospital treatment in Ringkoebing county during one year.

Phase 2: Weekly farm level accident registration and interview study conducted on a representative sample of 399 farms in Ringkoebing county aimed at acquiring information on risk factors. The sample covered in total 1 597 farm residents.

The farm level accident registration was based on filling in a small questionnaire on the occurrence or non-occurrence of accidents. Accidents were broadly defined as unexpected events causing more than a 10 minute break from work. Near accidents were included. At the end of each month, the farmer returned the filled-in questionnaires covering the previous four weeks. All reported accidents were followed up two to three months after the accidents occurred, with a telephone interview requesting details of the accident and its consequences. Accidents not related to farm work were sorted out. In addition, details of work tasks and hours spent on them were collected, to allow task-specific estimations of time exposed to risk.

Eight months after completion of accident registration, questionnaires on psychosocial variables were sent out. The 17 page questionnaires contained scales and items on demographics, work characteristics, safety perceptions, behaviours and attitudes, safety locus of control, stress perceptions, and symptoms. The questionnaires were sent out to all persons over 18 years of age on the farms.

The study combines both quantitative and qualitative methods. The former involves statistical analyses of the questionnaire and observational data, the latter involves the in-depth interviews with accident victims and qualitative analyses of the accident sequences.

### *Intervention*

For the intervention study, the initial group of farms were divided on a random basis into an intervention group and a control group. The groups consisted of 99 and 102 farms respectively.

Phase 3: An evaluated intervention study designed as a randomised trial using the same sample of farmers as in phase 2.

The intervention study stretched for two years, from 1995–97 and included the following activities for the intervention group:

1. A safety check at the farm with scoring of the safety conditions.
2. Behaviour training in a one-day course performed in small groups.
3. A six-month accident registration, identical with the phase two registration.
4. A second safety check at the farm with scoring of the safety conditions.

The control group was only involved in activities 3 and 4.

Activity 1: An agricultural safety engineer conducted a half-day walk-through of each farm along with the farmer. The inspection focused on 66 major work

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*During the safety course the participants heard from an injured farmer. This affected the farmers and they will remember this for a long time. This, I believe, has contributed to the identified change to safer behaviour.*

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Morten Svane (The Danish Agricultural Advisory Centre)

routines, e.g. milking, feeding, harvesting, pesticide handling, repair work. The farmer received immediate verbal feedback about problems, risks and hazards, and advice about what he could do to rectify these. A standardised checklist was used to score safety conditions of the hardware (buildings, machinery, equipment and tools) and the reported behaviour involved in the specific working routines looked at. For each routine, hardware and safety behaviour was rated separately on a scale of 1 to 4, where 4 represents a bad safety standard. Upon conclusion of the safety check, the farmer received a brief written report containing recommendations for immediate and long-term actions that could improve the safety standard on his farm.

Activity 2: A few weeks later, the farmer, and all others engaged in farm work on the farm over 18 years of age, attended a one-day safety course. Medical doctors and psychologists conducted the course, which typically was attended by 10–15 persons at a time. The safety course contained five main elements.

The safety course's five main elements:

- I. The participants are informed about risk factors registered in the first phases of the study. Discussion about how typical the accidents are and how they fit with the farmers' own perception of risks and hazards.
- II. Focus group interviews are carried out. The farmers talk about their own accident or near accident experiences, why they occurred and what could have been done to prevent them. Obstacles to safe behaviour and what the farmers actively do to improve safety are discussed. The farmers act as experts in that ideas and successful solutions are disseminated throughout the group. Aspects from the previous phases of the study, e.g. the influence of stress on work practices and safe behaviour, are introduced and how these conditions might be dealt with is also discussed. These group discussions increase the participants' personal involvement and commitment to solution-finding. An important role for the two psychologists, who are moderators, is to channel social processes and group pressure.
- III. A farmer, who has been injured, tells about his experience of losing the use of his arm due to a farm accident. This direct confrontation with the seriousness of the consequences of accidents, aims at building up increased knowledge and motivation by intensifying the emotional salience of farm accidents.
- IV. Demonstration of personal protective equipment.
- V. Group discussions, based on the written reports, which the farmers have received following the safety check of their farms. Discussion focus on the extent to which each farmer intends to follow the report's recommendations and whether he has other ideas/plans for improving safety on his farm. Each farmer, along with the other members of his household, writes an action plan, listing changes that he commits himself to make. Farmers are informed that the second safety check will be partly used to document the extent to which they have carried out their action plans.

**Activity 3:** A six-month registration of accidents was made in the same way as the previous registration (phase 2).

**Activity 4:** A second safety check was carried out using the same methodology as for the first safety check. Furthermore, the follow-up of the action plan created at the safety course was checked.

### Experiences gained and effectiveness

The experience shows that the methods used and the demands on the participating farmers were received quite positively. Out of 661 farms, 399 responded positively to participate to the study (60.4%). A dropout analysis of the 262 non-participating farms revealed that the most common reasons for not participating were 'participation irrelevant because of untypical farm type' (67.4%) and 'workload requirements of participation too great' (50.2%). Some farmers considered the study unnecessary (22.7%), while the same percentage felt the study entailed meddling in farmer's affairs.

#### Registration of accidents

The results show that the owner of the farm and the part time farmers had the highest injury rate per working hour. During the 12-month long phase 2 period, 479 occupational accidents were reported, of which 389 resulted in an injury.

Thus, farm injuries occur among 32% of full-time farmers and farm workers each year. A quarter of these requires professional treatment. 11% of all children living on a farm experienced an accident, and the incidence per work hour in the 0–13 years age group was high.

Looking at the incidence per 100 000 work hours, there was no difference between animal- and field-related work, but the incidence for repairing machinery and buildings was highly significant.

#### Intervention

The number of injuries per 100 000 work hours decreased significantly from 32.6 to 18.2 in the intervention group ( $p < 0.05$ ). No significant decrease in incidence was seen in the control group. Also injuries requiring medical treatment showed a reduction among the farmers in the intervention group, but not in the control group, see Table 1.

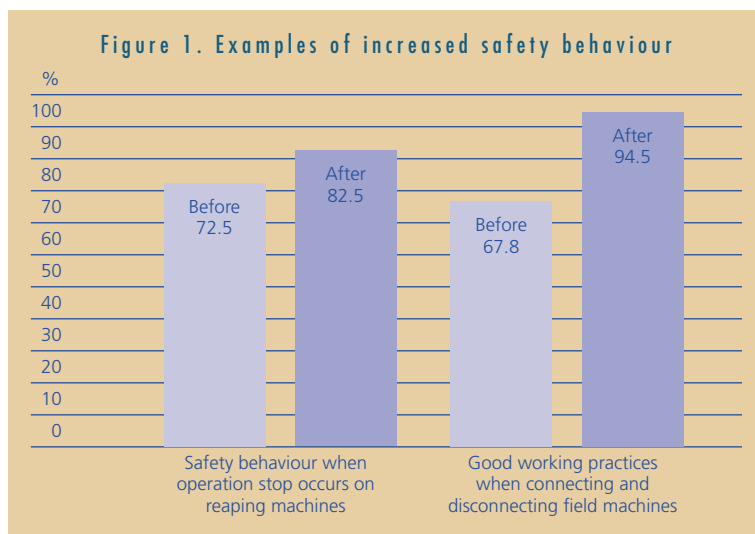
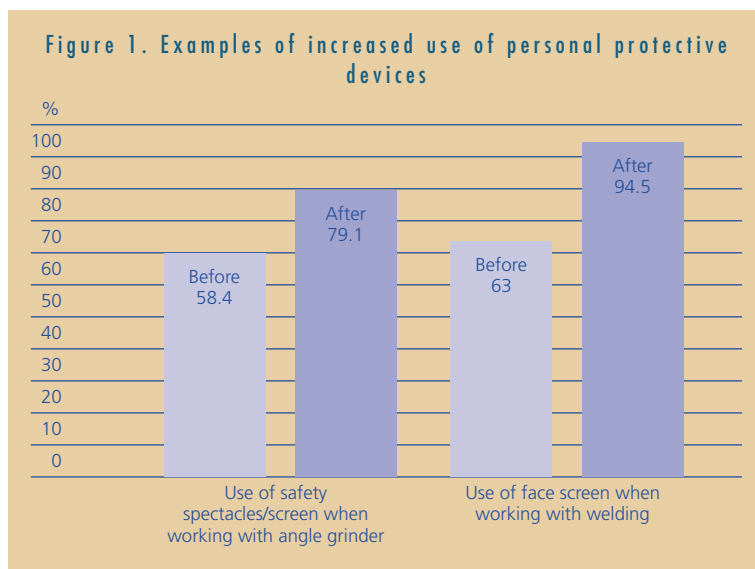
**Table 1. Injuries before and after the intervention.**

		Before intervention		After intervention		Reduction/increase in rate	
		No	Rate	No	Rate*	Rate*	%
Intervention group	All injuries	78	32.6	40	18.2	14.4	44
	Medically treated	22	9.2	12	5.6	3.6	39
Control group	All injuries	57	24.7	42	20.0	4.7	19
	Medically treated	18	7.8	17	8.1	0.3	4

\* rate = incidence / 100 000 work hours.

Regarding the safety level assessed by the agricultural safety engineer, improvements in the safety level of the 66 assessed working routines were seen in the intervention group, while the safety scores remained high in the control group (high score means a bad safety standard).

The improvements particularly concerned the use of personal protection devices and repair/maintenance routines, while there were no improvements working with animals.



*The farmers and employees we met when we inspected the farms have all expressed great satisfaction with the programme.*

Inspector Claus Nielsen (National Working Environment Authority — Ringkøbing County)

## Transferability

The intervention presented has been effective in reducing injury incidence in farming. It has not yet been evaluated whether the effect persists or if the safety course needs to be repeated in order to anchor the improved safety behaviour.

The transferability of the method to other countries should be based, among other things, on an assessment of the organisational form of the farms. The farms involved in the intervention are typically, as many farms in Denmark, small family units with one to three persons occupied on a full-time basis and a fluctuating number of family members working a few hours daily. Most farms focus their production on swine, dairy, crop or a mixture of these.

The method used in relation to accident and injury registration is assessed to be transferable to other branches and farms, while the intervention and the material used for preparing safety check at the farm and the one-day course are developed specifically for farming.

## Further information

MD Ole Carstensen  
The Department of Occupational Medicine, Herning Hospital  
Gl. Landevej 61  
DK-7400 Herning  
Tel: (45) 99 27 27 27; fax (45) 97 21 26 73.

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*We find the intervention programme very effective, and have introduced a similar programme for all Danish farming trainees in the period 2000–02.*

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Morten Svane (Advisory Centre of Agriculture)

## References

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# 3.4 THE 'RECIPE FOR SAFETY' — SAFETY AT WORK IN THE FOOD AND DRINK INDUSTRY

- Awareness raising campaign
- Injury incidence rate fell by 13%
- Cost–benefit ratio 1:4–1:5.5



## Background

In 1990, the Health and Safety Executive’s food and entertainment sector established the ‘Recipe for safety’ campaign. The campaign was targeted at all food and drink factories, ranging from large multinational companies to small premises with only a small number of employees.

Through the use of conferences, seminars, circulars, publications, and inspections, the campaign aimed to raise awareness of the most significant health and safety risks in British food and drink industries. As part of the campaign, key national objectives (KNOs) were set. These have been taking place every year since 1990 with different health and safety topics covered in different years. Two examples of high-priority KNOs include manual handling in food and drink sites and drinks delivery and management of slip prevention at food and drink sites.

In Britain, the food and drink industries cause 24% of all manufacturing injuries. These industries have the highest reported injury incidence rate of any manufacturing sector as well as the highest injury rate of any industry (except mining/quarrying). Data from the labour force survey indicates that occupations in these industries are the riskiest of all manufacturing/service occupations and have a relative risk of three times that of ‘all’ occupations generally, comparable only with construction labourers and dockers.

**Key points:**

- In Britain, the food and drink industries cause 24% of all manufacturing injuries.
- Manual handling incidents and slips cause over 50% of injuries among employees in British food and drink industries.

Manual handling injuries cause over 30% of over-three-day absence injuries; these injuries frequently cause long-term disability and can be more serious than so called ‘major’ injuries. Slips and trips cause 33% of major injuries and 22% of over-three-day absence injuries in food and drink industries. This poor injury record was significantly influenced by a relatively small number of higher incidence rate reporting sites. These ‘black spot’ sites became the targets for improved health and safety management in a further key national objective (KNO).

Deaths	Major injuries*	Over three-day injuries
84% of all deaths between 1990–97 were from these causes. In recent years, silo entry has been replaced by machinery facilities.	62% of major injuries between 1994–97 were from these causes.	68% of over-three-day injuries between 1994 and 1997 were from these causes.
<b>1. Transport (41%)</b> Especially from tipping vehicles, ramps into vans in loading bays and use of lift trucks.	<b>1. Slips (33%)</b> More significant in food and drink industries than elsewhere (only 22% elsewhere). 86% of slips and trips are slips, of which 90% are caused by wet contamination.	<b>1. Handling and lifting (31%)</b> 60% of these involved handling heavy objects.
<b>2. Falls from a height (21%)</b> Stairs, ladders, scaffolds, temporary access and falls from vehicles account for about a quarter of the total of fatal and major injuries (stairs account for a third of over-three-day injuries). No safe access was provided in 10% of cases.	<b>2. Falls from a height (17%)</b> See deaths.	<b>2. Slips (22%)</b> See major injuries.
<b>3. Entry into silos (previously 22%, currently 0%)</b> This remains the third potential hazard for deaths; current vigilance must be maintained.  Between 1994–97 machinery has replaced entry into silos as causing 22% of fatal injuries.	<b>3. Machinery (12%)</b> A quarter occur during cleaning. Three quarters of injuries are at machines with no or inadequate guarding. In only 3% of cases does an employee abuse the guard.	<b>3. Struck by moving objects (15%)</b> A quarter from hand tools (especially hand knives), a third from falling objects. Then being hit by moving pallet trucks etc.

\* Major injuries include hospitalisation, serious fracture, amputation, etc., as defined by Riddor 95.

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*The Food and Drink Federation has been closely involved with the 'Recipe for safety' campaign for many years. It has our full support and our member companies will continue to take action to ensure the priority health and safety issues are tackled effectively.*

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Edward Davey (Food and Drink Federation)

## Occupational safety and health objectives

The aim of the 'Recipe for safety' campaign was to reduce injury rates in food and drink industries across Britain. The aims of the KNOs were to reduce the risk of specific types of injury. As manual handling and slips injuries combined cause 53% of injuries for these industries they were especially targeted. The following aims were set for manual handling injuries, slips and the 'black spots' KNOs:

### *Manual handling*

Investigations of reported manual handling accidents indicate that employers need to have effective controls in place for three predominant manual handling risk activities:

- stacking/destacking containers (sacks, boxes etc);
- pushing/pulling wheeled racks (e.g. oven racks);
- handling drinks containers (e.g. delivery of casks/crates to pubs).

The aim is to improve compliance with the manual handling regulations (1992) at sites visited to a level above the baseline figures.

### *Slips and trips*

Slips in British food and drink industries occur at about four times the average. The objective was to reduce injuries from slips in the food and drink industries and to improve compliance with the management regulations (Regulations No 3 and 4) with regard to slip management by 20% at those sites visited.

### *Black spot sites*

The aim of this KNO was to reduce injury rates at 19 specially selected 'black spot' sites that had an initial reported injury incidence rate more than three times the average for food and drink industries (six times that for manufacturing generally); each site employed between 200–650 people.

## Design and implementation

In 1990, the food and entertainment sector produced with the Food and Drink Federation (FDF), the umbrella food industry trade association, and the four main food industry trade unions (GMB, USDAW, TGWU, BFAWU), a document agreeing a common strategy to reduce injuries and ill health in the food and drink industries. This common strategy, which set down actions for each of the parties, showed a commitment from all sides of industry to tackle the main health and safety issues. In 2000, the Health and Safety Commission launched a strategic appraisal of the health and safety framework, 'Revitalising health and safety — joint implementation strategy'. In line with this, a new joint HSE/FDF/TU document was produced. This sets out how the success to date will hopefully be continued.

### *Implementation*

Over the last decade, to fulfil its part of the strategy, the HSE's food and entertainment sector was involved in:

- the publication of industry-specific guidance (in discussion with industry);

- working with individual trade associations to help them prepare guidance specific to risks in their industry;
- working with the FDF, other trade associations and trade unions to participate in joint seminars and run stands at trade exhibitions;
- writing articles in trade publications and assisting others to write articles;
- keeping inspectors informed of the agreed joint HSE/industry strategy via internal guidance and seminars.

In addition, the HSE was committed to the dissemination of information to industry. Some 23 industry-specific HSE food information sheets were published. An HSG booklet on manual handling and a video on slip-prevention management were published.

Commitment by the FDF and trade unions involved a working partnership with the HSE to target the management of health and safety issues. The FDF and trade unions supplemented this by participating and running conferences, seminars and producing guidance.

### Experiences gained and effectiveness

One of the main issues to emerge from the campaign, of concern for the HSE, is how to influence inspectors away from the tendency to concentrate/enforce on machinery guarding, which has been the historical favourite. Machinery only causes 7% of accidents but results in most enforcement action. Considerable efforts have been made, and will continue to be made, to get inspectors and industry to look at other issues such as manual handling and slips.

To help evaluate the results of the campaign, Riddor <sup>(1)</sup> data was used to construct a baseline against which the industries' performance since the advent of the campaign was compared. It was observed that over the 10 years of the campaign, the number of injuries reported per 100 000 employees for manufacturing generally fell by approximately 6%. Over the same period, the injury incidence rate for the food and drink industries fell by approximately 13%. Fatal injuries were also reduced from an average of 9.2 deaths per year prior to 1990 to 4.7 deaths per year between 1990 and 2000. In addition, many individual food sectors have dramatically reduced their injury incidence rates.

Dairies	↓ 25%
Meat processing	↓ 26%
Poultry processing	↓ 32%
Sugar confectionery	↓ 34%
Grain milling	↓ 35%
Bread production	↓ 36%

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*By working together, trade union safety representatives and managers have developed action plans for their site that have really made a difference. Injury reductions of between 25 and 60% have been recorded in many sites — in just a few years. It is an excellent example of Prevention through Partnership.*

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Nigel Bryson (GMB Trade Union  
Director — Health and Environment)

(1) Reporting of injuries, diseases and dangerous occurrences regulations, 1995 (Riddor).

*The ‘Recipe for safety’ campaign shows significant injury reductions can be achieved by effective targeting. In the food and drink industries, the joint effort by the health and safety executive, the Food and Drink Federation, trade unions and industry to target manual handling, slips and other major causes of injury has led to a significant reduction in the incidence of injuries. Additionally, targeting specific sites, which had a high injury rate, has also been very effective. We intend to continue the campaign for the foreseeable future with the hope of reducing the injury rate still further.*

Richard Morgan (Head of the HSE’s food section)

Total cost savings over the 10 years were calculated by comparing the actual reduction in injury incidence with the baseline. This gave the approximate number of injuries prevented. Applying unit costs figures per injury <sup>(?)</sup> gave an estimated cost saving to industry of between approximately GBP 7 million (€ 11 367 000) and GBP 11 million (€ 17 863 000). Total cost savings to society were estimated between GBP 26 million (€ 42 million) and GBP 33 million (€ 53.5 million).

Costs to the HSE were estimated at approximately GBP 6 million (€ 9 744 000) over the 10 years.

**Key points:**

- From 1990 to 2000, the injury incidence rate fell by approximately 13%.
- From 1990 to 2000 fatal injuries fell by 49%.
- Cost–benefit ratio: 1/4–1/5.5.

*Manual handling*

The overall food and drink industries injury incidence rate for manual handling has dropped by approximately 8% over the last four years.

In order to be able to test for changes in compliance with the manual handling regulations, a small survey of manual handling audit forms returned by inspectors was carried out in 1995/96. This baseline for compliance indicated that the control of risks was rated as good/very good at 23% of sites and fair/bad at 41% of sites visited. When tested again in 2000, the audits showed that an average of 70% of food and drink sites inspected ‘fully/mostly’ comply with the key factors of manual handling management.

The breakdown for the specific targeted activities is given below.

Activity	Compliance
Manual stacking/destacking (of containers/boxes, etc.)	45%
Pushing/pulling racks (e.g. oven racks)	46%
Manual handling of drinks containers (e.g. delivery to pubs)	9%

The manual handling initiative was successful in raising awareness of this major cause of injuries with both industry and inspectors.

*Slips and trips*

Reports of slip injuries have decreased by 4% over the last year but the rates have fluctuated over the last four years.

The baseline for compliance with the management regulations was similarly derived from a small survey of slips audit forms returned by inspectors in 1995/96. This baseline indicated 0% compliance. This clearly indicated that the

<sup>(?)</sup> The costs to Britain of workplace accidents and work-related ill health in 1995/96, HSE (1999).

key factors and new approaches to tackling slips introduced in HSG156 'Slips — Guidance for the food industry' were not being implemented prior to that publication in 1996. The survey was repeated in both 1998/99 and 1999/00, which found that there is now 70% compliance with the key factors of slip management at sites visited.

### *Black spot sites*

This initiative ran for two years. Initially, a seminar was held to bring together the managers from these sites with local health and safety inspectors. The HSE, Food and Drink Federation and main trade unions highlighted constructive ways to tackle the issues at these sites. Safety representatives were mobilised in many of the sites by trade unions centrally. Guidance was also issued to inspectors with details of each of the sites and topics for discussion at site visits. After the first year:

- injury incidence rates have reduced on average by 33%;
- injuries have reduced at 14 of the 19 sites;
- total injury numbers dropped from 576 in 1998/99 to 446 in 2000/01, a reduction of 23%;
- effectiveness of health and safety management is now 62% (compared to a baseline of 30%) <sup>(3)</sup>.

### *Effectiveness*

Cooperation between the social partners was a key factor to success for past, present and future actions. Currently, new HSE food information sheets are being developed as well as two new HSGs on noise and health and safety in bakeries. A further 19 'black spot' sites have been chosen in a continuation of this particular KNO.

### *Transferability*

The HSE believes that a combination of effective targeting and joint effort by stakeholders is a key to achieving significant injury reductions. This has been demonstrated in the food and drink industries. However, there is no reason why similar reductions cannot also occur in other industries and sectors.

### *Further information*

Richard Morgan  
Head of the HSE's food section  
Pegasus House  
375 West George St.  
Glasgow G2 4LW  
Tel. (44-141) 275 30 16  
Fax (44-141) 275 30 15  
E-mail: richard.morgan@hse.gsi.gov.uk

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*Cooperation between the employers and the main trade unions in the industry was essential to the success of the campaign. For example, following one of the trade union seminars held to promote the campaign USDAW safety reps at one factory took the message back to the safety committee. Management agreed to set up joint teams of managers and safety reps to tackle the three main causes of injury on the site and achieved reductions of between 20 and 50% within a year. All the trade unions involved have similar tales to tell.*

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Doug Russell (Health and Safety Officer  
—USDAW)

<sup>(3)</sup> The food industry average of 30% compliance with the management regulations was used as the baseline. This was derived from an earlier analysis of inspectors' compliance proformas.

# 3.5 ACCIDENTS IN THE GERMAN CONSTRUCTION INDUSTRY INVOLVING FALLS FROM HEIGHTS

- On-the-spot investigations of accidents
- Falls from heights reduced by 30%
- Falls from ladders remained at a stable rate



## Background

In 1993, a programme was introduced by the construction industry Berufsgenossenschaften (institutions for statutory accident insurance and prevention in Germany) to reduce the number of accidents in the construction industry involving falls from a height. This project was aimed at workers involved in constructing, converting or demolishing buildings or employed in the maintenance of buildings. During the year in which the programme was initiated, there were around 352 000 companies in the industry in Germany, employing a total of 3.6 million people.

## Occupational safety and health objectives

The number of occupational accidents in trade and industry has been dropping steadily in recent years, but the construction industry continues to have the highest number of accidents. In 1990, the average number of occupational accidents in trade and industry as a whole was 50 per 1 000 workers, while in the construction industry this number was twice as high.

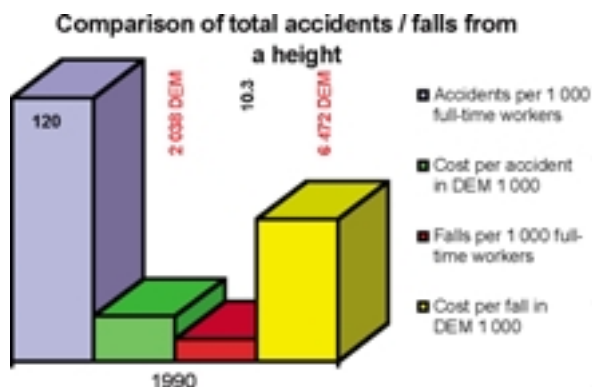
There is a powerful human and economic incentive within the building industry to continue to achieve a considerable reduction in the high accident figures. The need for the programme was further underlined by the fact that in 1990, 260 people lost their lives through occupational accidents in the construction industry alone. In the same year, the construction industry's institutions for statutory accident insurance and prevention (hereafter 'Berufsgenossenschaften') paid out approximately DEM 2.6 billion (€ 1.3 billion) in compensation and pensions. This figure does not take into consideration the cost of continued wage payments and of the loss of labour

resulting from occupational accidents — costs borne by the individual employer.

#### Key points:

- Falls from heights, even if they are not the most numerous cause of accidents, have the highest severity rate and the highest costs.
- From the detailed analysis of the cause of these accidents' and of the working methods, it was possible to increase productivity and safety at work by modifying some working methods.
- Legal measures combined with an effective publication and implementation programme did help to reduce the number of occupational accidents.

Due to the severity of accidents involving falls from a height, the average cost resulting from them was more than three times higher than for other occupational accidents in 1990, while in purely numerical terms the frequency of such accidents was relatively low in the building industry. The Berufsgenossenschaften for the construction industry decided therefore to conduct a survey of all the accidents involving falls from a height that occurred in Germany's construction industry during 1990.



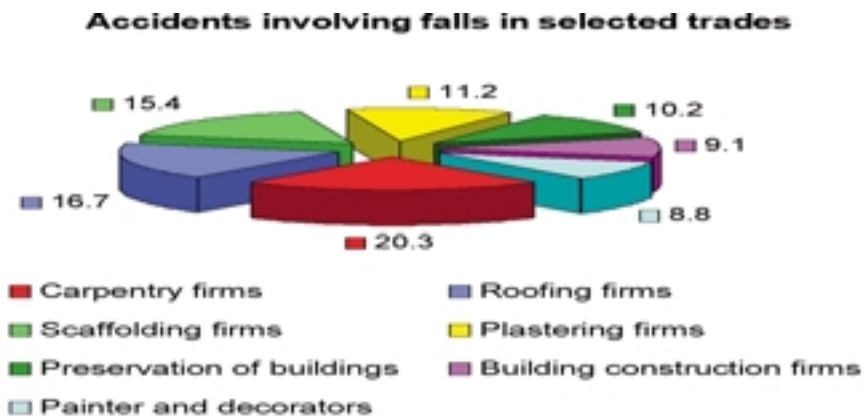
*Detailed investigations of work methods and the occupational accidents linked with them reveal that it is quite possible to reduce the risk of accidents and increase productivity by altering work methods. Industrieverband Bauen mit Stahlblech (industrial association for construction involving steel)*

The industrial association for construction involving steel (Industrieverband Bauen mit Stahlblech) emphasised from their experience that detailed investigations of work methods and the occupational accidents linked with them reveal that it is quite possible to reduce the risk of accidents and increase productivity by altering work methods. Consequently, the programme aimed to considerably and permanently reduce the frequency and severity of falls from a height in the construction industry by identifying the areas in which these accidents most frequently occur, then analysing the causes of these and adapting the existing regulations accordingly.



### Design and implementation

The 1990 survey was based on on-the-spot investigations of accidents involving falls from a height. For this purpose, a specific questionnaire was used by the experts of the Berufsgenossenschaften to make sure all accident-related aspects were taken into account. A look at the branch-specific accident rates reveals that the majority of such accidents occur in the timber construction, roofing and scaffolding trades.



The high number of falls in the carpentry and roofing trades can be attributed to the particular circumstances involved in constructing or converting a building. When working on roof trusses or roofing, the use of suitable protective equipment to prevent workers from falling is relatively expensive and time-consuming. Operational and safety scaffolding — which in many cases could be used to provide a suitable working area for such jobs, or to arrest falls, is often substituted by ladders. Personal protective equipment in the form of safety ropes designed to prevent workers from falling can only be used to a limited extent owing to the progressive nature of the work.

A detailed analysis in this area revealed that 30% of all accidents involving falls were from a height of over 3 m during work at roof level. A reduction in the permissible height of a fall during roof work from 5.0 m, as it was previously, to 3.0 m was designed to considerably and permanently reduce the number of accidents involving falls from a greater height, particularly in the carpentry and roofing trades.

This measure was accompanied by the implementation of the European directive on minimum safety and health requirements for the use of personal protective equipment by workers at the work place (89/656/EEC), which consistently gives priority to the use of collective protection equipment over personal protective equipment (safety ropes). This was also reflected in the national accident-prevention regulations on construction work (UVV 'Bauarbeiten') which list the following measures:

- Suitable equipment shall be provided to prevent workers from falling (safeguards against falling).
- Where the nature of the work does not allow for such safeguards, equipment shall be provided to arrest falls (fall-arresting equipment).
- Safety ropes shall only be used if suitable anchorage equipment is available for the work in hand and the use of fall-arresting equipment is not reasonably practicable. The individual in charge must specify the anchorage equipment to be used and ensure that the safety ropes are utilised.

Another area involving frequent accidents involving falls was the use of ladders simply propped up against a wall. In 1990, 42% of all accidents involving falls in the construction industry were from a ladder. As could be read in the news sheet produced by the Berufsgenossenschaften for the construction industry, falling from a ladder continues to be the most common form of accident in the construction industry. An improvement will only occur if the use of ladders is considerably reduced and alternative safe work places selected instead.

The amendment of the German accident-prevention regulations on construction work aimed to limit the permissible use of ladders, thus providing a basis for the development of ergonomic working environments for construction work off the ground. Overall, this measure was designed to limit the possibility of workers falling from a ladder.

The amended accident-prevention regulations prevented the use of ladders for work conducted over 7.0 m above the ground. The following conditions were imposed for workers standing on a ladder between 2.0 m and 5.0 m from the ground:

- Any work to be undertaken shall not include more than a total of two hours of work conducted from a ladder.
- The weight of the tools and materials to be taken up the ladder shall not exceed 10 kg.
- No articles taken up the ladder shall have a surface area exposed to the wind of more than 1 m<sup>2</sup>.
- No substances or equipment shall be used which could pose an additional hazard to the worker.
- No work shall be conducted from the ladder which would require greater exertion than that required to tip the ladder.
- Work shall be conducted in such a way that the worker is able to keep both feet on one rung at all times.

The amendment to the accident-prevention regulations on construction work, which were passed on 1 April 1993, was announced primarily through extensive publications in construction industry journals. The changes were also publicised in a practical way through supportive training measures provided for safety specialists who support and advise employers on occupational safety issues and for safety officers who are responsible for identifying any safety deficiencies at the construction site and working with staff to remedy them.

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*Falling from a ladder continues to be the most common form of accident in the construction industry. An improvement will only occur if the use of ladders is considerably reduced and alternative safe workplaces selected instead.*

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Bau BG Aktuell (news sheet produced by the Berufsgenossenschaften for the construction industry)

In the subsequent years, inspectors from the Berufsgenossenschaften for the construction industry paid particular attention to the implementation of the above regulations when inspecting construction sites.

Additional funds were not provided for implementing the accident-prevention measures. At this point, it is not possible to say to what extent the measures led to increased costs for the building industry. However, it is thought that costs incurred to the industry would have been counteracted by the increased efficiency. For example, shorter building times brought about by the provision of more ergonomic working conditions.

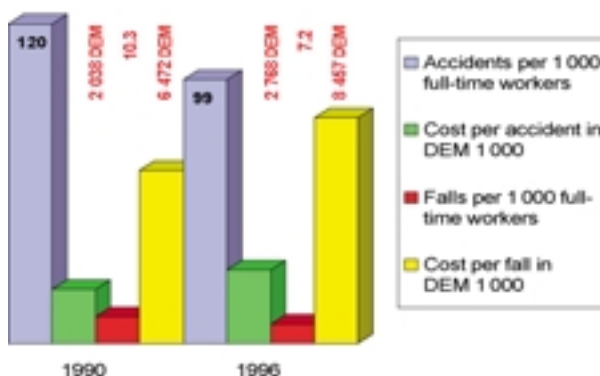
### Experience gained and effectiveness

As expected, however, the restrictive measures applying to work conducted from, and using, a ladder led to a number of difficulties in practice. In many areas of the construction industry, this involved making changes to established methods of work and providing more suitable working equipment. This process was supported by the construction industry's Berufsgenossenschaften and was implemented in close cooperation and consultation with associations and firms of the individual trades concerned.

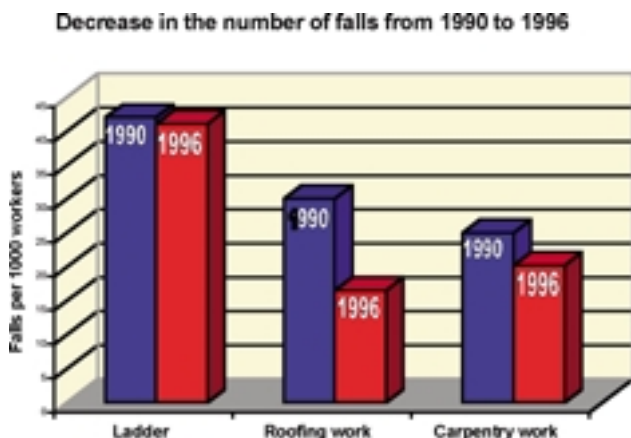
The provision and thereby usage of new and more suitable working equipment was supported in particular by the development and distribution of lifting work platforms. These are not, however, always suitable as an alternative to a ladder. Particularly when cleaning windows on buildings, the surrounding conditions are not always suitable for a lifting platform. Likewise, when fitting wooden roof trusses in houses, the limited space available means that a ladder is in many cases the only possible means of working.

In 1996, the construction industry's Berufsgenossenschaften conducted another general survey of all accidents involving falls in the building industry in order to assess the effect of the new measures. The result showed a generally positive trend. The number of accidents involving falls from a height had dropped by 30% compared to 1990. Due to the general rise in the cost of medical care, however, the cost of compensation in the event of an accident had also increased by 30%.

Comparison of total accidents / falls from a height



There was also a noticeable reduction in the number of accidents involving falls in the roofing and carpentry trades.



Unfortunately, the clear reduction in the number of falls noted for the carpentry and roofing trades does not apply when it comes to the use of ladders. Here, the frequency of accidents had dropped by just 1%. It is evident that the necessary change in working methods cannot be implemented in practice in a period of just under three years. In the coming years, the task of occupational safety and health will be to provide support in this area, focusing in particular on testing alternative methods of working and developing more suitable working equipment.

### Effectiveness

Publishing a set of accident-prevention regulations cannot in itself prevent occupational accidents. What is decisive is that employers and workers in the construction industry understand the need for these more stringent legal requirements and agree to implement them on a long-term basis. According to the information and training schemes, the stricter measures applying to work on roofs — which prescribe suitable equipment to prevent or arrest a fall if the roof guttering exceeds 3.0 m — were accepted as reasonable and implemented by all parties concerned.

To summarise, it can be concluded that analysing the causes of accidents, and introducing suitable legal measures accompanied by an effective publication and implementation programme, can help to reduce the number of occupational accidents. This programme clearly shows that imposing legal requirements only produces the desired effect if the industry is made to appreciate the need for these regulations and if suitable equipment and measures are available to implement them.

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*This programme clearly shows that imposing legal requirements only produces the desired effect if the industry is made to appreciate the need for these regulations and if suitable equipment and measures are available to implement them.*

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J. Edeler (Deputy Chief Inspector for Safety and Health — Berufsgenossenschaft for the construction industry in Hanover).

### Transferability

In the light of the 1996 survey and analysis of accidents involving falls in the construction industry, and the findings of the programme above, it is now up to the construction industry's Berufsgenossenschaften to develop and

implement programmes to further reduce the number of falls, and in particular those in the scaffolding trade and through the use of ladders.

In 2001, another project entitled 'No more falls from scaffolding' will be conducted in Germany. Investigations will be conducted simultaneously to develop suitable working methods and working equipment aimed at largely replacing the ladder as a work place, as it has proved so conducive to accidents.

#### **Further information**

Fachausschuss Bau der gewerblichen Berufsgenossenschaften  
Hildesheimer Straße  
30169 Hanover, Germany  
Tel. (49-511) 987 25 10  
Fax (49-511) 987 25 45  
E-mail: fa-bau@t-online.de

## 3.6 PREVENTING ROAD ACCIDENTS IN THE ITALIAN HIGHWAY POLICE FORCE



**UNIVERSITÀ  
DEGLI STUDI  
DI GENOVA**



- Identification of high-risk shift hours
- Information on 'sleep hygiene rules'
- Increase in awareness amongst police officers

### Background

In close collaboration with the researchers from the University of Genoa, the SIULP (Union of Police Workers) has undertaken an awareness campaign among police workers in order to inform shift workers of the State Police about the risks related to a lower level of alertness in driving while on the duty.

The objectives of this campaign, which was started in 1999 and is still under way, are the following:

- to contribute to a better awareness of the mechanisms of accidents and of the causes linked to sleepiness factors;
- to raise awareness among workers about the risks of accidents/injuries on the job happening while on duty during the hours identified as most critical;
- to make workers aware of the basic rules of sleep hygiene (e.g. importance of the signals that announce sleepiness, etc.).

The prevention campaign also involves vocational training envisioned institutionally for members of the police force.

### Key points:

- Work organised in shifts and particularly night work represents a risk factor for the workers' health.
- Various studies have shown that alteration of the sleep structure and excessive sleepiness are the leading disturbances reported by shift workers.
- Police officers suffer a high number of car accidents as a result of inadequate shift schedules and task organisation.

### Occupational safety and health objectives

With the recent Legislative Decree No 542 of 26 November 1999 (regulations concerning night work), the intention of the Italian legislator was to acknowledge and reaffirm European Directive No 93/104. This directive recognises that ‘the human body is more vulnerable at night in relation to environmental changes and that certain stressful forms of work organisation and long periods of night work can be harmful to health’. It also aims to inform the competent physicians of a new specific risk factor to take care of.

Sleep disorders and daytime sleepiness are the most frequent disturbances reported by shift workers. Sleepiness and fatigue can increase the risk of human errors and accidents especially during night work. Excessive sleepiness, characterised by a strong tendency to fall asleep, leads to a lower reaction time, minor motor coordination, a decline in memory capacity, and the difficulties of focusing attention with a slowdown in decision-making processes. In general, there is a decline in psychomotor performance, thereby increasing the probability of an accident. Thus, it seems evident that sleepiness among shift workers can represent an important risk factor of accidents at work.

Road accidents to shift workers (including transport and vehicles) are in constant increase in Italy. Road transportation represents the fourth cause of accidents at work after the construction, agriculture, and metalworking sectors.

The following table details the pattern of road accidents for all Italian workers.

Police workers’ activities on the road have specific peculiarities which are not fully comparable with the situations of most of the workers working on the road:

- police workers are subject to shifts on the road;
- at any moment, highway police work can change from a quiet surveillance operation to unpredictable emergency action.

A five-year study (1993–97) on the national highway network was conducted by the Centre for Neurology and Medical Psychology, State Police Health Service, and Ministry of the Interior, in collaboration with a number of academic institutions and the SIULP. The objective of the study was to evaluate the frequency and distribution in relation to time (24 hours) of all traffic accidents among the drivers with the Italian Highway Police working on the national

Sector	1994			1995			1996			1997		
	A	B	C	A	B	C	A	B	C	A	B	C
Transport	22 072	1 370	107	21 297	1 307	133	26 232	1 403	134	25 844	1 489	152

Source: Istituto Superiore per la Prevenzione e la Sicurezza sul Lavoro, 2000.

A = total number of events

B = total number of permanent invalidity

C = total number of workers deceased

highway network between 1993 and 1997. These data were compared with those concerning the distribution of accidents related to sleepiness among the general Italian population.

**Design and implementation**

The study was based on accidents analysis (and corresponding internal reports) and interviews. The time distribution of road accidents was examined in a total of 1 218 traffic accidents occurring among members of the Italian Highway Police between 1993 and 1997. The average age of the subjects was 35.5. All of them were involved in control and safety operations on the highway network.

The drivers with the Italian Highway Police work with a system of shifts lasting six hours with a rapid and fixed rotation, referred to as a ‘five-day shift’, divided into four work days with one day off (Table 1). The interval of rest hours falls between 7.00 a.m. on the fourth working day and 7.00 p.m. on the first working day, for a total of 60 hours. Each day, approximately 600 patrols circulate on the Italian highway network, with slight periodic variations over the course of the year. On each shift, the number of kilometres covered by the drivers is virtually constant, corresponding to a minimum of 300 km.

The level of alertness is regulated by homeostatic factors such as the quantity and quality of previous wakefulness and by circadian factors such as the time of day. The level of wakefulness is further affected by other factors such as the richness or paucity of stimuli during the activity that is being performed and by work-related fatigue.

In addition to homeostatic (quantity and quality of previous wakefulness and sleep) factors and circadian factors (fluctuations in alertness over a 24-hour period), drivers who work at night are also subject to specific risk factors tied to the organisation of shifts and work-related fatigue.

Because of their constant presence on the highway, divided into shifts over a 24-hour period, the drivers from the Italian Highway Police permit a better evaluation of risk factors involved. For example, the effects of traffic intensity

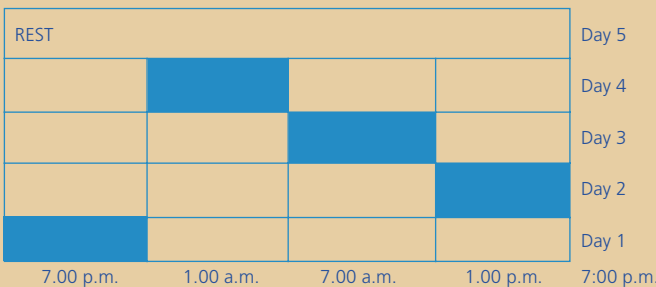
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*At last a research activity which addresses our most feared risk at work: road accidents! The identification of higher-risk shift hours and the possibility to develop effective counter-measures are most valuable achievements in order to improve safety and performance of us police drivers.*

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Mr. Andrea Barbieri, (Shift Supervisor, Highway Police of Genoa)

**Table 1. Descriptive chart of the type of shift rotation (five-day shift). The grey areas represent the shift hours over five consecutive days.**





(the main cause of traffic accidents), the influence of fluctuations in circadian rhythms in terms of alertness, driving fatigue and effect of homeostatic pressure due to sleep deprivation.

*Results*

Table 2 shows the frequency per year and per shift of the traffic accidents that occurred among drivers on patrol with the Highway Police.

**Table 2. Distribution of traffic accidents divided by year and shift**

	7 p.m.–1 a.m.	1–7 a.m.	7 a.m.–1 p.m.	1–7 p.m.
1993	37	35	77	74
1994	45	36	78	74
1995	50	38	83	77
1996	54	55	93	81
1997	41	43	71	76
<b>Total</b>	<b>227</b>	<b>207</b>	<b>402</b>	<b>382</b>

The data show that the distribution of traffic accidents occurring among the shift workers of the Italian Highway Police during daytime hours is related to traffic intensity. This relationship is not present during night hours, where circadian factors related to drowsiness, together with homeostasis and work-related fatigue, seem to play a prime role.

With regard to the night hours, it seems possible to exclude the hypothesis of a significant effect of traffic intensity on the distribution of traffic accidents, with the exception of the first two hours of the first shift. When intensity is high, the traffic factor seems to influence traffic accidents among shift workers.

During night hours, differences emerge between the second part of the first shift (7.00 p.m.–1.00 a.m.) and the fourth shift (1.00 –7.00 a.m.). Despite the fact that no significant differences were observed in the number of traffic accidents between the evening shift and the night shift, the distribution of accidents during the last four hours of the first shift presents aspects that can be differentiated from the second part of the night.

In fact, in the period between 9.00 p.m. and 1.00 a.m., a steady rising trend can be seen in traffic accidents, with statistically significant peaks in the middle and at the end of the first shift. The presence of a peak in accidents at about 11.00 p.m. could express the circadian drive to sleep that is concentrated particularly during these hours, also defined as the ‘primary sleep gate’. The progressive increase in accidents toward the end of the shift could be caused by homeostatic pressure to sleep combined with fatigue accumulated during driving. The presence of a link between the distribution of traffic accidents in the 7.00 p.m.–1.00 a.m. shift and sleepiness seems to be confirmed by the significant correlation between traffic accidents of shift workers and accidents caused by sleepiness among the general population.

The distribution of accidents during this shift could thus be interpreted as a consequence of the interaction of several factors, such as driving fatigue and the steady rising trend in both the circadian propensity and homeostatic pressure to sleep.



It can rightly be expected that these factors will have a greater effect during the fourth shift (1.00–7.00 a.m.), which corresponds to the maximum propensity to sleep and in which the homeostatic pressure to sleep can predictably reach its maximum levels. However, the number of accidents that occur during the night shift is not significantly higher than the ones occurring during the previous shift, and no distribution trends were observed in relation to time or peaks attributable to fatigue or sleepiness.

These differences could be explained by the different sleeping habits adopted by the shift workers of the first two shifts. During the telephone interviews, it was not possible to collect data demonstrating true sleep deprivation prior to each traffic accident. Nevertheless, the data concerning the different sleeping habits prior to the two night shifts could have a certain level of importance in understanding the different distribution of the accidents during the two evening and night shifts. In fact, it seems that the drivers underestimated the hazard caused by sleepiness and fatigue factors during the first shift and did not implement any spontaneous prevention strategy to minimise the effects of a long period of wakefulness before getting behind the wheel. Moreover, the first shift starts after 60 hours of rest, during which — paradoxically — a lifestyle offering little rest and greater sleep deprivation can be adopted (a weekend-like effect).

There seems to be greater awareness of the danger caused by sleepiness during the 1.00–7.00 a.m. shift. The long nap that the drivers take spontaneously before the start of the shift seems to be effective at keeping their level of alertness at a sufficient level and preventing traffic accidents caused by sleepiness during the hours between 1.00–7.00 a.m.

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*I accepted to take part in the project with an initial reluctance. I felt that our role in society and our paramilitary structure could have caused a confrontation on such a critical subject. However, if I look at the results achieved — in terms of new prevention strategies to improve the work environment in which my subordinates operate every day — I can subscribe to the success of this initiative.*

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Dr Sergio Tinti, (Director, Highway Police Department of Rome — Ministry of the Interior).

### Implementation

Based on the results of this study, and in close collaboration with the authors and researchers from the University of Genoa, the SIULP has undertaken an awareness campaign among police workers in order to inform shift workers of the State Police about the risks related to a lower level of alertness in driving while on duty. The awareness campaign was launched in 1999, and is currently continuing.

The campaign is structured around three themes:

1. Training
2. Information intended for highway police workers
3. Social dialogue with administration to look for optimal prevention strategies

Major issues of the awareness campaign are:

At present, follow-up data on road accidents reduction possibly resulting from the prevention campaign are not yet available. An ongoing research activity is currently gathering data on accidents to compare with past data and evaluate the campaign benefits.

In collaboration with Sindnova (the union institute for research into labour conditions), on 10 and 11 November 2000 in Genoa, the SIULP, in agreement with the UISP (International Police Force Union) organised an international seminar to take an in-depth look at the results of the research and awareness campaign.

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#### Lifestyle and basic hygiene rules

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- The workers' residence should be not too far from the workplace.
  - Physical health should be monitored (doing sport regularly).
  - Alcohol, smoking, tea, and coffee should be limited as much as possible.
  - It is preferable to have a late dinner before the night shift, favouring assimilation of proteins in order to increase vigilance; at the end of the night-shift, it is preferable to take a meal with a high quantity of carbohydrates to facilitate sleep.
- 

#### Specific sleep hygiene rules

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- To be regular in sleeping habits during the week.
  - To avoid intense psychophysical activities before night shift.
  - To arrange the bedroom with comfortable disposition, temperature, darkness, silence.
  - To identify a better timetable to sleep after the night shift (i.e. to avoid sleeping the morning immediately after the night shift).
  - To avoid drugs (tranquillisers) to go to sleep.
  - To be aware of the fact that adopting simple preventive strategies composed of brief periods of sleep before evening shifts can be effective in significantly reducing the number of accidents during the evening shift (between 11.00 p.m.–1.00 a.m.).
-

The seminar, which was backed by the European Commission, included the participation of the police unions of Italy, Spain, Germany, Sweden, Greece, Slovenia and Slovakia. The meeting, the first of its kind on the subject highlighted the existence of similar problems in all these countries as well as the serious delay in information and training for these operators in order to prevent accidents.

Based on the seminar results, the participants then decided to promote an awareness campaign on a European level on the issue of traffic accidents caused by sleepiness among police workers and appointed researchers from Sindnova and the University of Genoa to study the contents and procedures.

### Experiences gained and effectiveness

Initiatives aimed at promoting road accident-prevention strategies among police officers are not easy to be carried out: the social importance of police force tasks on the one hand, and the paramilitary structure and climate on the other hand, discourage police officers from openly debating the daily challenge of their job. Moreover, young officers involved in shift work show social habits which need to be taken into account when developing information campaigns.

With this pioneering initiative in a crucial workforce sector, the sleep loss has been acknowledged as a key cause of fatigue. Sleep disorders have been acknowledged as leading to poor decision-making, slowed reaction times, reduced vigilance and poor communication, and these factors have an influence far beyond the police drivers' environment.

The results of the initiative have been unanimously judged as most impressive. Police officers have openly realised that road accidents can be prevented by improving the management of shift schedules, night work and the organisation of work. Circulation and dissemination of information on the optimisation of working hours have been most welcomed among police officers.




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*We carried out a very demanding task: the police workforce was never explored in such detail, and with such a great amount of data. The results exceeded our expectations.*

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Prof. Sergio Garbarino. (Principal Doctor of Italian Police — Police Health Service — Ministry of the Interior)

The data suggest that sleepiness has an important effect on traffic accidents in the early hours of the night as compared with the hours that follow. This phenomenon seems to be a result of behavioural errors rooted in a mistaken perception of the dangers linked with sleepiness and in the great overestimation of one's ability to maintain adequate alertness and performance levels behind the wheel.

### Transferability

This low level of awareness might be very widespread not only among the patrol drivers of the Highway Police, but also generally speaking among shift workers in all job categories, and this situation can easily be remedied through an educational prevention campaign.

### Further information

Claudio Stanzani, President of Sindnova  
Via Po, 102  
I-00198 Roma  
Tel. (39-6) 853 74 61  
Fax (39-6) 85 37 46 32  
Email: sindnova@cisl.it

Sergio Garbarino  
Centro di neurologia e psicologia medica servizio sanitario della Polizia di Stato  
Ministero degli Interni (Roma)  
Centro di Medicina del Sonno, DISM Università di Genova  
Largo R. Bensi No 10  
I-16132 Genova  
Tel./Fax (39-10) 254 30 39  
Tel. (39-10) 353 74 65  
E-mail: fifi@dism.unige.it

# 3.7 THE IRISH CONSTRUCTION SAFETY PARTNERSHIP — CSP



- Partnership in safety issues
- Recognisable increase in safety awareness
- Substantial decrease in accident rates

## Background

The safety partnership in construction had its beginning in the widespread concern felt in the industry over the level of fatal and serious accidents against a background of rapid expansion. The industry has been enjoying an unprecedented boom, the number of workers employed in the sector had doubled in the eight years up to the end of 1999 when some 150 000 workers were working in the sector.

Following discussions between the Minister for Labour Affairs, the social partners, government agencies and others, an agreement was signed on 14 October 1999, by the Minister, the Director-General of the Construction Industry Federation, the General Secretary of the Irish Congress of Trade Unions and the Chairman of the Health and Safety Authority.

### Key points:

- The initiative followed widespread concern over the high level of fatal and serious accidents during the continuing construction boom in Ireland.
- Government and the social partners agreed to work to radically change the safety culture in the construction industry.
- Specific agreed measures were published and are being regularly monitored.
- The present trend in fatal accident rates is encouraging.

It was recognised that the culture in the industry generally was not conducive to health and safety. Management of safety was often weak and accidents involving falls from heights, site machinery, electricity and excavations were responsible for an unacceptable number of fatal and serious accidents. The fatal accident rate per 100 000 persons at work rose from 10.9 per 100 000 persons

at work in 1996, less than the European average for the sector, to a peak of 16 in 1998. Table 1 shows some of the key statistics.

**Table 1. Key accident statistics in Irish construction 1996–2000**

	1996	1997	1998	1999	2000
Employment in the Irish construction sector <sup>(1)</sup>	101 000	110 000	126 200	142 100	166 300
Persons injured (> three days of absence) <sup>(2)</sup>	1 500	1 900	—	2 300	2 100
Injury rate per 100 000 employed	1 485	1 820	—	1 620	1 263
Directly employed in the construction sector (including self-employed)	11	15	19	16	15
Employed in other sectors undertaking construction activities	1	3	2	1	5
Fatal accidents <sup>(3)</sup>					
Persons not at work injured by construction activities	3	—	1	2	4
Total fatalities resulting from construction activities within the scope of the Safety, Health and Welfare at Work Act 1989	15	18	22	19	24
Fatality rate for persons directly employed in the construction sector per 100 000 employed	10.9	13.6	16.0	11.3	9.0

NB: The fatal accident rate in construction for the European Community as a whole in 1996, the latest year for which data are available, was 13.3 per 100 000 persons at work <sup>(4)</sup>.

### Occupational safety and health objectives

The goals of the initiative are:

- to provide a structure by which management and workers can cooperate in making construction sites safer places to work;
- to radically change the health and safety culture in the industry;
- to bring accidents into line with other sectors of the economy and with those in the construction sector in those Member States of the Community with the best performance in this regard;
- to raise the standards of health for construction workers throughout their working lives and welfare and working conditions generally in the industry to those prevalent in other sectors of the economy.

### Design and implementation

#### *The construction industry safety plan*

Under the agreement, a tripartite body — the construction safety partnership (CSP) — was set up with the aim of achieving the highest possible standards within the construction industry. The CSP met for the first time on 1 November

<sup>(1)</sup> Quarterly national household survey (QNHS), Central Statistics Office, Skehard Road, Cork.

<sup>(2)</sup> QNHS.

<sup>(3)</sup> Health and Safety Authority data.

<sup>(4)</sup> *Statistics in Focus*, 'Accidents at work in the EU in 1996', Eurostat.

1999 with a mandate to produce, within three months, a construction industry safety plan which had the support of all sides. The CSP met regularly throughout 2000 to monitor progress and in April 2001 published a report on progress made during the first year.

The CSP met in a series of intensive meetings between November 1999 and February 2000 and the construction safety partnership plan, 2000–02, aimed at improving safety, health and welfare in the construction industry, was launched on 28 February 2000. The plan is ambitious and aims to lay the foundations for a radical change in the health and safety culture in the construction industry.

### *Implementation*

The initiative covers the whole construction sector and is aimed at all sides of the industry. While the initial plan covers the years 2000 to 2002, it is recognised that the goals are ambitious and will take many years to realise with continuing commitment from the parties involved. The fact that the plan was formally launched by the Minister for Labour, Trade and Consumer Affairs highlights the importance given by the government to this plan.

The measures agreed in this plan fall under four main headings:

- safety consultation;
- safety training;
- safety management systems etc.;
- actions by the health and safety authority.

### *Safety consultation*

#### The Construction Safety Partnership Committee

The committee set up under the plan to draw up a strategy and oversee its implementation was made up of members from the following bodies:

- The Construction Industry Federation (CIF);
- The Irish Congress of Trade Unions (ICTU);
- An Foras Áiseanna Saothair (FÁS) <sup>(<sup>1</sup>)</sup>;
- The Government Contracts Committee (Department of Finance);
- The Department of the Environment and Local Government;
- The Department of Enterprise, Trade and Employment;
- The Health and Safety Authority (HSA).

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*This plan will, on a cooperative basis, ensure not only better levels of safety and wellbeing but will improve the overall performance and efficiency of our industry.'*

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Mr Liam Kellegher - (Director-General of the Construction Industry Federation)

<sup>(<sup>1</sup>)</sup> The Irish Training and Employment Authority.



### Consultation for safer work

A recommendation in the construction safety partnership plan that safety representation be made mandatory on sites where more than 20 persons are employed is to be implemented.



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*This plan provides a structure by which site management and workers can cooperate in making construction sites safer places to work. Mr Peter Cassells (General Secretary of the Irish Congress of Trade Unions)*

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A safety representative pilot project, funded by the HSA and CIF, was undertaken during 2000 with two facilitators: one appointed by the CIF and one by the ICTU. The objective of the project was to develop consultation between site management and workers on selected construction sites. The facilitators jointly conducted visits to construction sites with support from the CIF, ICTU and the HSA to promote the appointment of safety representatives.

A joint safety committee involving unions and employers was set up under the plan to collaborate on information, promotion and research.

An ongoing review of safety auditing arrangements in the industry is being carried out by the ICTU and CIF, and in consultation with HAS.

### *Safety training*

FÁS safe pass, a one-day safety awareness programme developed by FÁS with support from the CIF, ICTU and HSA, is to be made mandatory for all construction workers.

In addition, the construction skills certification for persons engaging in a range of safety critical activities such as scaffolders, plant operators, crane drivers and slingers/signallers is to be made mandatory on a phased basis up to mid-2003. Construction skills training programmes already exist for the relevant areas and

the FÁS is keeping the capacity of these programmes under review to ensure that the demand can be met.

The CIF and ICTU have committed themselves to a major training programme for safety officers and safety representatives.

#### *Safety management*

The CIF is to increase safety management training and to develop a safety management system.

#### *Actions by the health and safety authority*

A review of legislation is underway as amended construction regulations are to be drafted to implement the recommendations of the CSP report. The HSA is to commit additional inspection resources to construction to effectively double the rate of inspections in the sector. Inspectors will routinely meet safety officers and safety representatives on every visit and to leave a copy of their report in all cases. Codes of practice on roof work, the use of cranes in construction and welfare are to be drafted by the end of 2001.

#### *Experiences gained and effectiveness*

The report <sup>(6)</sup> by the Project Management Committee of the safety representatives' facilitation pilot project to the CSP on progress from February 2000 to December 2000 presented a number of conclusions.

In this report, some problems have been identified. The initial support and cooperation from the industry could be viewed as disappointing and the facilitators' identified management concerns regarding the possible use of safety as an industrial relations tool. Instilling confidence into employees to encourage them to take on the role of safety representative was also perceived as a problem. To overcome these problems, guidelines aimed at allaying concerns about the project were produced. So, in the first few months of the project, the facilitators spent much of their time promoting the project and developing its credibility. Overall, the project involved with 132 companies up to December 2000. There has been a recognisable increase of safety awareness in the industry since the commencement of the project and a greater awareness of the benefits of having an active safety representative on site has been generated. In the initial 12 months, 100 safety representatives were trained through the joint ICTU/CIF training course.

So far, it can be said that achievements have been reached in the following fields:

- In the area of safety training, the FÁS safe pass programme was developed, piloted and evaluated within the first six months of the year 2000. During, the latter half of the year, focus was given on the delivery of the FÁS safe pass

<sup>(6)</sup> Safety representatives facilitation pilot project, Project Management Committee, year-end report to the construction safety partnership from February 2000 to December 2000 (copy held in HSA Library, 10 Hogan Place, Dublin).



tutor programmes by the CIF, FÁS and trade unions representing construction workers. To date a total of 118 trainers have been trained and certified by the FÁS to deliver the programme and over 1 350 construction workers have been trained and registered. Tutor training will continue throughout 2001 and the FÁS will implement programmes to meet demand. The FÁS estimates that a further 200 additional tutors will be required to ensure the availability of safe pass training within the construction sector. The monitoring of tutors will continue during 2001 to ensure that required standards are met by all tutors delivering safe passes. The FÁS safe pass is to be included in all apprenticeship programmes and has already been implemented for apprentices in the eastern region which includes Dundalk, Dublin and Athlone.

- The safety training programme for managers has also gone well as the CIF has increased the number of safety management courses. Over 1 000 managers were trained on various courses during the first year of the CSP.
- The CIF and the trade unions are undertaking a major training programme for safety officers and safety representatives. Ten courses have been provided by the ICTU and CIF in Dublin, Cork, Galway, Limerick and Waterford.
- Construction skills training programmes for persons engaging in safety critical activities are being increased to meet the demand which will be generated by the introduction of mandatory certification by mid-2003. It is recognised as crucial that the provision of training in each area be synchronised with the demand which will be created by the amended regulations.
- In addition to safety training, the SAFE-T safety management system was launched in October 2000 by the CIF and the Construction Employers Federation (CEF) representing employers in both parts of Ireland. The system, which takes account of international guidelines and the recommendations of the CSP, is independently audited.
- Progress has been made regarding legislation as amended construction regulations requiring mandatory facilitation of safety representation where more than 20 are employed, certification and monitoring of safe pass and CSCS and better coordination of the provision of welfare facilities are at an advanced stage of drafting and are on course for implementation in 2001.

All in all a close cooperation between all the involved parties is a contributing factor to success.

*Effectiveness*

The key recommendations of the CSP report were:

- Greater employee representation in health and safety matters.
- Validated obligatory safety training for all.
- Greater involvement by the Health and Safety Authority in both setting regulations and following through with increased site inspections.

A year into the project, the CSP can report significant improvements in collaboration on safety, health and welfare in the industry with employers and workers representative organisations and government agencies working more closely together in various forums.

In particular, following the establishment of the safety representatives pilot project using personnel from both employer and employee organisations as facilitators, more than 100 site safety representatives have been appointed. The FAS safe pass programme, which is to be made mandatory for all building

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*The momentum which led to the establishment of the construction safety partnership needs to now be maintained by all sides. What the setting up of this partnership proved is that there was never going to be an easy or a one-sided solution to improving construction site safety. All parties have to be actively and equally involved — and the right of all parties to be involved has to be acknowledged.*

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Mr. Tom Kitt, T. D. (Minister for Labour, Trade and Consumer Affairs)



industry employees, has already proved very successful with a substantial number of companies participating on a voluntary basis. As a result of the increased resources made available to it, the Health and Safety Authority has been able to increase on-site inspections from 4 500 in 2000 to a planned level of 7 000 in 2001. The authority has completed a review of the safety, health and welfare at work (construction) regulations, 1995, in order to give a legal mandate to the key recommendations of the CSP.

It is encouraging to see that the reduction in fatal accident rates, from a peak of 16 per 100 000 persons at work in Construction in 1998, has continued. While this trend predates the project, it is significant that it has been maintained against the background of the continuing growth of the number employed in the sector with the inevitable influx of new and inexperienced workers. It is felt that the various initiatives being pursued under the CSP are beginning to take effect and have contributed in part to the fact that the rate for 2000 is lower than that for 1996.

The widespread public recognition that the level of safety, health and welfare in the construction industry is unacceptable has greatly assisted the project. General good will on the part of the interests concerned has facilitated agreement on difficult issues.

## Transferability

The partnership approach, involving cooperation between the main players, is seen as having a high degree of transferability. The close collaboration of both sides of the industry, as well as relevant government agencies, has generated a fund of good will which has facilitated agreement on difficult issues.

## Further information

Jim Heffernan  
Health and Safety Authority  
10 Hogan Place  
Dublin 2  
E-mail: jim@hsa.ie

Fergus Whelan  
Irish Congress of Trade Unions  
31–32 Parnell Square  
Dublin 1  
E-mail: fergus.whelan@ictu.ie

# 3.8 THE INVISIBLE CO-DRIVER: AN ALCOHOL AWARENESS PROGRAMME FOR TRUCK DRIVERS IN THE NETHERLANDS

- An awareness-raising programme
- Being a truck driver is a solitary profession
- Few people are fully aware of the influence of alcohol



BGZ WEGVERVOER

alcon

## Background

Driving under the influence of alcohol is socially highly unacceptable. This is especially the case for truck drivers, as they make up a group which is vulnerable to the temptation of alcohol. It is believed that in one out of four traffic accidents drinking has been involved. Alcohol and work do not go together.

An awareness programme called 'Meet the invisible co-driver' has been developed by ALCON (an alcohol consultancy foundation) to improve the behaviour of drivers during working time as well as in private time. Facts of alcohol use are shown in order to motivate drivers to abstain from drinking alcohol. Results of scientific investigations (facts and figures) are used to underlie the programme. Annually, more than 100 groups follow the sessions.

### *Drinking, driving and social behaviour*

Alcohol abuse is a major social problem. Driving under the influence of alcohol is even more problematic as this increases the risk on road accidents with for example fatalities. Truck drivers are solely responsible for their driving behaviour and there is no direct surveillance; during their work they are solitary. They are obliged to be and stay in good mental and physical shape for their own and others' safety.

Young people do a lot of drinking in their free time during the weekend: 10, 20 or even more glasses of beer may be usual. Truck drivers are no exception and

will also show this conduct, but with more reason. Friday afternoon usually is the end of a busy week. The events of the stressful week are discussed round the canteen table and a few beers are taken. The coming weekend is the time

**Key points:**

- Alcohol is involved in one in four traffic accidents.
- The programme 'The invisible co-driver' helps to increase the level of safety-awareness.
- More than 100 groups take part in the programme annually.
- Management is stimulated to set up an alcohol (and drugs) policy.

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*After each session, one important misunderstanding has been removed; it has been made perfectly clear that after 10 or more beers one is still under the influence next morning.*

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Mr R. Peletier (Project leader, ALCON)

for social events (birthdays, pub and disco visits). Few people are aware of the long-lasting effects of alcohol. The breakdown time of alcohol-in-blood amounts to about one glass an hour. People may still be under the influence while sitting behind the steering wheel the next morning.

*The costs of an accident: statistics*

Some calculations show that the costs of traffic accidents in the Netherlands amount up to about € 20 million a day. That includes material damage as well. According to the Central Bureau of Statistics, every year there are about 1 200 fatalities in traffic, together with about 50 000 injuries. It is believed that 25–30% of these accidents are alcohol related. Because of alcohol, at least 250 lives are lost in traffic. Each year, about 30 000 persons are prosecuted for driving under the influence of alcohol (i.e. level more than 0.5 ‰). Some of them are forced to follow an educational programme (when above 1.3 ‰), a three-day course called 'EMA' (alcohol educational measure). About 7% of those EMA participants appear to be truck drivers. Nearly all of them were caught during their free time.

**Occupational safety and health objectives**

Traffic fatalities are accepted by the society as the toll to be paid to a motorised society but its combination with alcohol use is highly unacceptable. Truck drivers will find no understanding or sympathy and may even lose their driving licence as well as their job.

The borderline between work and leisure is not always that clear. Especially for the younger people who tend to consume a lot of drinks during the weekend (10–20 glasses). Few drivers do really know the effects of alcohol and many are unaware of the fact that next morning they still will exceed the limit (0.5 ‰) of alcohol in blood.

The private occupational health organisation BGZ Road Transport (!) took the initiative and contacted ALCON to set up a programme, which was financed by a number of concerned parties.

*Increasing the knowledge level*

The effects of alcohol are easily misunderstood; if not unknown. For instance, it is believed that eating will reduce the effect of alcohol and that drivers will experience little or no effect when they combine drinking with food. Experiments however show that effects of alcohol are definitely there. Because of alcohol, response times will be diminished, hence increasing the risk factor. Even one or two beers, which is still below the legal limit, will affect driver's behaviour, for instance: faster driving, less steering control.

*Policy*

Companies are obliged (Safety and Health Act: Arbowet) to implement a safety and health policy in order to improve the working conditions of their employees. When alcohol appears to interfere in safe conduct at work an alcohol policy can be part of it. A safety behaviour policy on behaviour-improvement will be necessary apart from other measures. The step-by-step approach (as a general observed practice) consists of the following elements:

- information and education;
- introduction of the rules;
- stimulation of safety behaviour;
- surveillance;
- sanction of the behaviour.

This scheme is based on a supportive policy not a punitive one. It may be applied to alcohol abuse as well.

*Target group*

Truck drivers have the following characteristics (according to ALCON's experience), which make them more vulnerable to alcohol (mis)use than other professions, and thus a target group for the campaign:

- no surveillance during work;
- lower or middle education;
- irregular working hours, long time from home;
- stress due to traffic jams and work pressure;
- management often shows little interest in the well-being of the driver.

The drinking of alcohol is for instance considered to be a maladjusted coping response to stress or loneliness. Also, job dissatisfaction may be a predominant cause.



(<sup>1</sup>) The BGZ Wegvervoer (road transport) is an institution, in which employers and employees (unions) are represented, and has the mission of improving safety and health in transportation companies.



### Design and implementation

The programme is designed and carried out by ALCON. The health organisation, BGZ Road Transport, supported the design of the programme in particular by supplying the assistance of a publicity office. A main constituent of the programme is formed by the presentation of a video film, which consists of two parts. The making of the video film required research on the characteristics of the target group. The first part shows the social behaviour in private time, which is well recognised by the participants. The second part of the video film shows the effect of alcohol on driving. Truck drivers were invited to drink a high amount of alcohol (more than five glasses, but together with a big meal) and then (on a test circuit) fulfil some instructions (such as parking at a dock board) to demonstrate their driving skills.

It is very important for the management to recognise the problem and to really want to help its employees instead of screening or testing them for the use of alcohol. The programme is a continuation and specialisation of previous public alcohol campaigns, in which information is provided and help is offered (on a voluntary basis) to break with the drinking problem. The driver himself needs to recognise that drinking is not macho or tough, but definitely irresponsible behaviour.

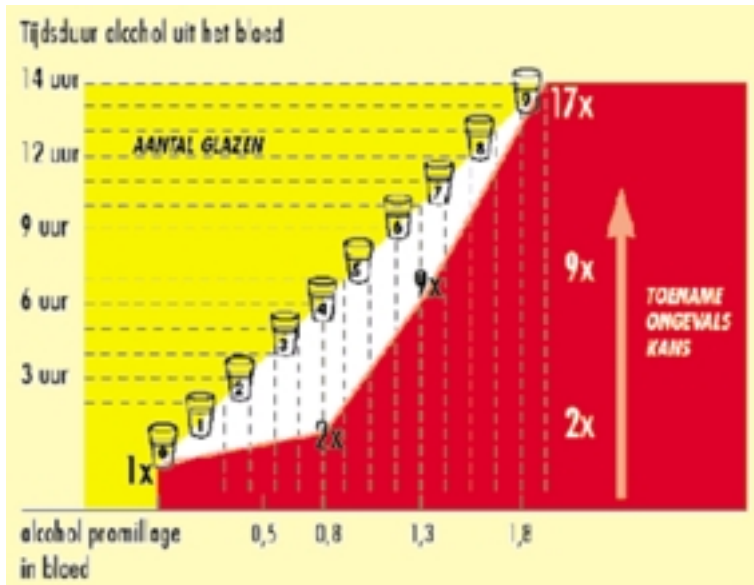
### Insight, facts and figures

Each glass of beer, wine or other spirit introduces about 0.20 ‰ alcohol into the bloodstream! It takes 1.5 hours to eliminate the amount of alcohol of one glass. Alcohol increases the probability of being involved in an accident. The risk factor strongly increases after 0.80 ‰.

Table 1. Risk effects of alcohol

Number of glasses	To a thousand ‰	Risk factor	Breakdown time (hour)
0	0	1	0
1	0.2	—	1.5
2	0.4	—	3
4	0.8	2	6
6	1.2	8	9
9	1.8	17	13

In the Netherlands, the legal limit lies 0.5 ‰. Above that level, one is considered to be 'under the influence' and not allowed to drive for at least two hours. At 1.3 ‰ the licence will be temporarily withdrawn by the police; at 1.8 ‰ one will be sentenced in court to a nine-month driving ban (this applies all types of vehicles).

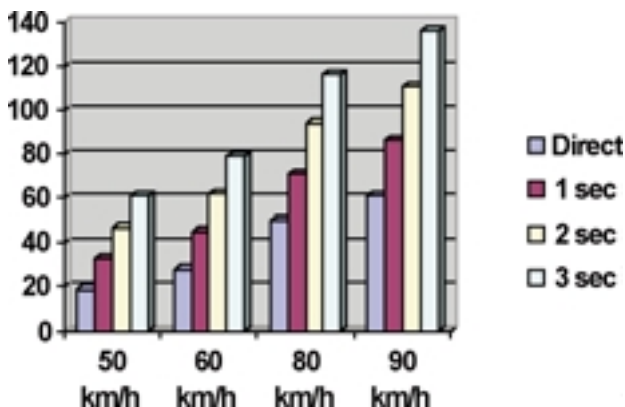


The figure shows the results of drinking a number of glasses, the alcohol in blood content, the time to remove the alcohol from the blood, and the increase of risk factor (accident rate) as a consequence of less control.

Table 2. Response time; distance travelled before complete standstill (braking distance)

Speed km/h	50 km/h	60 km/h	80 km/h	90 km/h
Distance travelled m >				
Immediate response	19 m	28 m	50 m	61 m
+ 1 sec. response	33 m	45 m	72 m	86 m
+ 2 sec. response	47 m	62 m	94 m	111 m
+ 3 sec. response	61 m	79 m	116 m	136 m

The normal deceleration of a vehicle when breaks are used amounts to 5 m/sec<sup>2</sup>. The table shows the standstill distance at several speeds. The normal time of reaction amounts to 1 second. This reaction time will be longer when under the influence of alcohol.



There are three ways of introducing the invisible co-driver programme:

- management meetings;
- in-company meetings;
- tailor-made meetings.

Participants <sup>(2)</sup> to the programme have to pay a fee of € 450. Members of BGZ obtain a 50% discount.

A management meeting is a meeting organised specially for the management of companies. The purpose of the main programme (see next) is explained. Management is invited to set up an alcohol (and drugs) policy.

In-company meeting: the complete programme takes about 1.5 hours. With the help of a video the above mentioned facts and figures are discussed. This is a good opportunity to elaborate on all misunderstandings about the effects of alcohol. A quiz is included in the programme.

Tailor-made meeting: the programme may also be incorporated in a general safety meeting or in a schooling programme.

### Experiences gained and effectiveness

The maximum capacity in organising the programme has been reached. The programme is expected to continue for the next few years under full subscription.

Participants are happy that the subject is discussed in the open. Thanks to professional guidance, discussions yield different points of view. Participants recognise the situations shown in the video film. They confirm that they feel the social pressure to join drinking parties, even when it is irresponsible. They admit that they might have a drinking problem, because it is so easy to go over the

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*If you are entirely dependent on yourself, there are enough reasons to drink during work.  
An anonymous truck driver*

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<sup>(2)</sup> BGZ Wegvervoer offers its services on its web site. The invisible co-driver is one example of these. It is the company that subscribes for the group of drivers attending the programme.

line. The facts and figures are a revelation to most of them. Participants declare that they will alter their drinking behaviour from now on. This is a hopeful result, but it should be embedded in a company policy on alcohol in order to have a lasting effect.

Participants are sometimes concerned about the confidentiality of their sayings. It is the skill of the trainer to cross the barrier of reluctance and denial. Facts and figures alone are not enough. They need to be personalised to their own situations.

Apart, from the companies, the schools for professional driving also incorporate this programme in their training course.

### *Effectiveness*

Participants feel relieved that their problems are recognised. The key factor to success however depends on company management. The programme invites management to set up a root-cause policy for the difficulties met by employees. This policy should be a supportive one and not a punitive one.

ALCON and BGZ are designing a set of effectiveness indicators in order to continue or alter the programme. The number of participants and their appreciation are main indicators, but so is the number of accidents caused by truck drivers should diminish. Arrangements with authorities and public organisations will be made in order to gather these figures.

The success also depends to a high extent on the skills of the trainer. ALCON carries out a severe selection procedure on the social trainers, who have to follow a train-the-trainer programme before they start. Depending on the results of the evaluations gathered in the groups, trainers can be dismissed from further employment at the meetings.

The success of the programme can therefore only be measured by the enthusiasm of the participants. If management recognises the problems and agrees to implement an alcohol policy, behaviour might be permanently improved.

### *Transferability*

This kind of programme can be used in other business sectors, but also for other themes, such as repetitive strain injury (RSI), hearing damage, etc. Support from the company's management and confidentiality are keys for success.

Usually, the subject of drugs (medical and mental drugs) is incorporated into the alcohol programme. The effects of drugs may be similar to those of alcohol. In fact, alcohol can be considered as a drug. Some drugs have influence on the awareness, some may lead to overestimation by the driver. Medical drugs may be classified as yellow label drugs, meaning they can cause sleepiness or lower awareness.

Although it is forbidden to drive under the influence of any drug, no limits have been yet laid down. The effect of drugs on driving capabilities is being strongly discussed. The government is intensively seeking a reliable measuring method.

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*The programme 'Invisible co-driver' is a powerful tool to increase the awareness of truck drivers on the risks of alcohol drinking, even in their spare time. The video and the discussions ensure a longer lasting effect.*

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Ad Smit (Managing Director, BGZ)

Also, the method must be able to distinguish between the types of drugs. Unfortunately, no figures are known on traffic accidents caused by drug abuse.

#### Further information

Robert Peletier  
ALCON  
Servaasbolwerk, 15  
Utrecht  
The Netherlands  
Tel. +31-30 233 01 90  
Internet: [www.alcon-advies.nl](http://www.alcon-advies.nl)  
E-mail: [info@alcon-advies.nl](mailto:info@alcon-advies.nl)

Marijke van Hemert  
BGZ Wegvervoer  
Tel. (31-182) 58 02 66 or (31-900) 463 62 49  
Internet: [www.bgz.nl](http://www.bgz.nl)  
E-mail: [info@bgz.nl](mailto:info@bgz.nl)

# 3.9 PREVENTING HAZARDS FROM DUST FIRES AND DUST EXPLOSIONS IN THE ALUMINIUM INDUSTRY

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- Guidelines and motivational actions required
  - SMEs are predominant in this industry
  - Complete elimination of dust explosions
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## Background

In the 1970s, there were numerous, in many cases serious, accidents due to dust explosions associated with the grinding and polishing of aluminium and its alloys. Against this background, an accident-prevention programme for the elimination of hazards from dust fires and dust explosions was carried out in the metalworking industry in 1979 and 1980. The initiator of the campaign was the Iron and Metal I Committee of Experts of the German accident insurance and prevention institutions (BGs), which cooperated closely with the North-Rhine/Westphalian labour inspectorate offices and the BG Institute for Occupational Safety (BIA).

The accident-prevention programme was targeted principally at aluminium grinding shops in which dust-releasing machining processes had caused a large number of dust explosions. In this branch of industry, small businesses usually with up to 20 employees are predominant. This sector is under severe competitive pressure (which is also due to alternative materials) and is therefore especially affected by loss-related costs (rising accident insurance contributions, economic loss due to serious property damage, loss of output and absence from work).

**Key points:**

- The 19 reported aluminium dust explosions from 1972 to 1979 killed 13 workers, injured 55 and caused property damage of several million Euro.
- The action described resulted in no dust explosions in aluminium grinding shops being recorded since 1983.
- The effectiveness of accident prevention is frequently assessed solely on the basis of short-term success, while secondary importance is attached to efficiency and sustainability.

### Occupational safety and health objectives

In the 1970s, there were numerous dust explosions in aluminium grinding shops with many killed and injured persons. From 1972 to 1979 alone, 19 dust explosions were reported from this sector, killing a total of 13 and injuring 55.

The damage to property due to these accidents frequently cost millions as whole production sites were totally destroyed. In addition to the associated economic loss for the businesses themselves, this gave rise to rising expenditure at the metalworking BGs responsible for accident insurance in this branch of the industry. The prevention of occupational accidents, along with rehabilitation and compensation, is part of the BGs' statutory brief. The programme described above was therefore launched to bring down the number of dust explosions in the industry. It was also meant to contain the effects of such loss-incurring incidents with the goal of reducing human suffering as well as the loss-related costs both for the businesses themselves and for the accident insurance institutions.

### Design and implementation

Systematic accident investigations and industrial hazard analyses were carried out to identify the existing risks. Accident investigations were carried out immediately after the event in the affected businesses. In connection with the industrial hazard analyses, talks were also held between entrepreneurs, employer representatives, employees, inspectors and experts. Involved in this concerted effort were not only the metalworking BGs, but also the labour inspectorates in their capacity as the State inspection authority for OSH, and the BG Institute for Occupational Safety (BIA).

On the basis of the hazard analyses and risk assessments, proposals for safe working methods were formulated and supplied to the operators and employees of aluminium grinding shops. Also, the responsible inspection authorities were informed by means of 'Guidelines for the prevention of hazards from dust fires and dust explosions during the grinding and polishing of aluminium and its alloys' (ZH 1/32).

Hazards in aluminium grinding shops arise due to the occurrence of explosive dust/air mixtures as a consequence of dust-releasing machining methods. The

focus here is on dust-removal equipment and dust deposits on the shop premises. For the risk assessment, the probability of ignition sources and the possible effects of explosions have to be taken into account as well. Particularly problematical in this connection is the fact that not only the proper hazard source, i.e. explosive dust, has to be considered, but also that the possible causes of ignition in the machining methods have to be identified.

The results of the hazard analyses and risk assessments were summarised in the first report of what was then the Dust Research Institute (STF), the predecessor of the BIA. The report contained proposals for specific technical and organisational measures for the prevention of dust explosions and was supplied to the responsible BGs, public authorities and industrial federations for discussion and revised on the basis of their comments. This yielded the basis for the BGs' 'Guidelines for the prevention of hazards from dust fires and dust explosions during the grinding and polishing of aluminium and its alloys' (ZH 1/32, now BGR 109) which were published in April 1981. Extensions to the scope (e.g. 'brushing') and further revisions followed.

The 'Construction and equipment' section of these guidelines deals essentially with various methods to prevent the occurrence of aluminium dusts and measures to exclude ignition sources. The 'Operation' section is concerned with the organisational protective measures to be taken by the operator.

A special focus of the accident-prevention programme was support in the practical implementation of the newly devised guidelines on the shop floor. In another concerted effort of the State inspection services and BGs, all affected businesses in Germany were advised by the agencies involved. By contacting employers, employees and industrial OSH professionals, it was possible to explain the content of the new guidelines, to highlight the advantages and to motivate practitioners in the industry to apply them.

Further, special attention was drawn in BG publications on the existing problems in aluminium grinding shops and on the newly published guidelines. Although there had already been generally applicable rules and regulations before publication of the guidelines from which explosion-protection measures could be derived, there had been no concise aid to businesses focusing on the specific situation in aluminium grinding shops. These new guidelines were quickly accepted by the industry, undoubtedly because they filled this gap.

### Experiences gained and effectiveness

This did not go without some problems. Although the guidelines contain possible alternatives for the removal of dusts, the demanded protection measures generally imposed a financial burden, which could be heavy on small and specialised businesses. Consequently, they were concerned that their competitiveness would be further jeopardised. In spite of the special motivational and educational actions by the BGs and labour inspectorates to encourage the practical implementation of the guidelines, implementation in certain cases was only possible with penalties for non-compliance.

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*The inspection bodies have been instrumental in ensuring that the specifications of ZH 1/32 have been consistently implemented in industry. In some cases, individual operators showed exceptional reluctance, which in one case resulted in proceedings before the administrative court.*

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H.-D. Schommer (Ministry of Labour, Health and Social Affairs of North-Rhine/Westphalia)



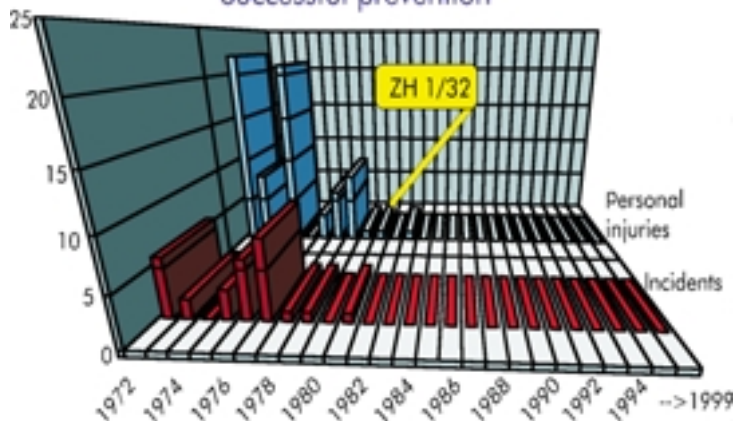
The overall results were good. The BG Institute for Occupational Safety (BIA) compiles documentation about dust explosions in which reports on such incidents in Germany are collected and evaluated with the aim of ascertaining the accident causes. For the assessment of the long-term effectiveness of the accident-prevention measures described, the statistical data on the incidents were compared before and after publication of the guidelines. Since dust explosions are relatively rare events, a conclusive assessment of effectiveness is only possible after a relatively long period. After the high accident frequency recorded in the relevant branch of the industry in the 1970s, no dust explosions in aluminium grinding shops — with the exception of an incident in 1983 with one injured person — have come to the documentation centre’s knowledge. This applies up to and including 2000.

*As our dust explosion documentation shows, dust explosions in aluminium grinding shops declined shortly after publication of the guidelines.*

Dipl.-Ing. H. Beck (BG Institute for Occupational Safety — BIA)

### Dust explosions in aluminium grinding shops

Successful prevention



Because of their frequent severity, aluminium dust explosions usually attract major media coverage. It can therefore be assumed that accidents of this type rarely go unnoticed and consequently the number of unreported incidents should be very low — a fact which underlines the success of the programme further still.

In an overall assessment of the campaign, it should be considered that the number of comparable businesses has declined sharply in the last few years. It is estimated that in the area served by the mechanical engineering BG in Düsseldorf, the figure has fallen by approximately 30%.

In addition to the impressive quantitative success of the campaign, an enhanced risk awareness among everyone concerned (operators, employees and public authorities) has been noted as well as the large-scale adoption of the safety strategies laid down in the guidelines for this type of business. Other commercial/industrial sectors, and particularly in the metalworking sector, frequently comply with the specifications of ZH 1/32, as the problem of dust-

explosion hazards is often similar in other areas. Overall, the expectations as to the success of the campaign have been far exceeded.

The risk awareness of operators, employees and public authorities has been enhanced by the 'Guidelines for the prevention of hazards from dust fires and dust explosions during the grinding, brushing and polishing of aluminium and its alloys' — BGR 109 (formerly ZH 1/32).

### Effectiveness

Basically, the campaign described here is a prevention programme, which has demonstrated its long-lasting impact for many years. Key factors to this success are to be found in the programme design and in the special joint campaign conducted to implement the guideline requirements.

The effectiveness of accident prevention is frequently assessed solely on the basis of short-term success, while only secondary importance is attached to efficiency and sustainability, which are essential for a lasting improvement in the occurrence of accidents. Since serious accidents like dust explosions occur less frequently than other accident types, the success of prevention campaigns can generally only be ascertained after a number of years. The long-lasting success of the programme to prevent dust fires and dust explosions is thus all the more visible. This success can be attributed essentially to the practical programme design which sought, on-site and in-dialogue with all parties concerned, to give equal consideration to the demands of OSH and the needs and capabilities of businesses and to convert the findings into practicable safety strategies.

The second central key to success is — as described above — the joint, targeted campaign by the BGs and labour inspectorate for guideline implementation.

The guidelines have also succeeded in jointly defining the requirements to be met by manufacturers and operators in a single set of rules, which represent an ideal improvement in both fields.

As an additional contribution towards the prevention of dust explosions, the BG Institute for Occupational Safety (BIA) started, back in 1980, to publish the characteristic combustion and explosion data for dusts. Since the beginning of 2001, this collection of data on well over 4 000 dust types has been available on the Internet.

### Transferability

The basic strategy of the accident-prevention programme presently described is transferable and can be applied in principle to other sectors of the industry and workplace risks. Manufacturer requirements today, however, fall exclusively within the domain of European directives (and 94/9/EC in particular) and must no longer be specified at the national level. What is nevertheless conceivable, based on the above approach, is the drafting of practical guides for certain sectors of commerce or industry to enable hazard appraisals and risk assessments to be carried out and protection measures to be selected.

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*We estimate that in the area served by our Düsseldorf district offices, the number of aluminium grinding shops has fallen by approximately 30%. This can mainly be attributed to strong competition in this industry.*

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J. Wassenhoven (Mechanical Engineering, BG, Düsseldorf)

### Further information

Dipl.-Ing. Hartmut Beck  
Berufsgenossenschaftliches Institut für Arbeitssicherheit (BIA)  
Alte Heerstraße 111  
D-53754 Sankt Augustin  
Tel. (49-2241) 231 25 85  
Fax (49-2241) 231 22 34  
E-mail: [h.beck@hvbv.de](mailto:h.beck@hvbv.de)  
Internet: <http://www.hvbv.de/bia>

# 3.10 PREVENTION CAMPAIGN IN THE TEXTILE AND CLOTHING INDUSTRY IN PORTUGAL



- Campaign supported by social partners and incentives for social dialogue
- Use of network concept and partnership played a major role

## Background

This campaign concerns the improvement of working conditions in the textile and clothes-manufacturing industry in Portugal (cotton, wool, knitwear, etc.) and the promotion of general awareness of prevention. A prevention campaign had already been carried out for the agriculture and building sectors. Good results were obtained and experience was acquired. This is the first real campaign specifically addressing a whole industrial sector. Its instigator is the Instituto de Desenvolvimento e Inspeção das Condições de Trabalho (IDICT). The campaign, which began in June 1999 and is due to end in January 2002, has a budget of € 2.5 million.

Textiles and clothes manufacturing are the largest sector of industry in Portugal. They account for 21% of the firms and 29% of total employment in the secondary sector, with around 8 000 firms and 260 000 employees in 2001. Portugal is the seventh largest European producer in this area. This sector consists mostly of small and medium-sized enterprises and very small enterprises. Portugal accounts for 13.5% of jobs in the textile sector at the European level, with a production equivalent to 4.5% of European production. These figures show the relatively low productivity of this industry.

If the textile sub-sector can be described as being capital-intensive, clothes manufacturing is a labour-intensive sub-sector. In the recent past, a major effort has been made to invest in technology, but rather little effort has been made for training. This, therefore, also explains the relatively low productivity rate observed. This situation had a number of characteristics pointing to it as being an ideal sector for action for occupational risk prevention, which would at the same time be a locomotive for social dialogue.

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*The objectives defined for this campaign translate the sector's needs. It should encourage broad discussion and extensive thinking among all participants in the campaign so that suitable solutions may be found to the questions raised in the sector.*

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(Citeve — Technological Centre for the Textile and Clothing Industry)

All the social partners who at that time committed them, in a public statement, to take measures to ensure its success signed a protocol launching this campaign on 18 May 1999. It specifies that the campaign addresses firms, managers, workers, the manufacturers and distributors of machines, chemical products and all equipment for the sector, vocational training centres for the sector and also public opinion generally.

#### Key points:

- Goal of creating a general culture of occupational risk prevention while carrying out a specific initiative in the textile industry.
- Policy of prevention of occupational risks, aimed at reducing the number of occupational injuries and diseases and encouraging social dialogue.

### Occupational safety and health objectives

The campaign has two complementary levels of objectives.

The general objectives are to:

- improve working conditions and reduce the number of occupational injuries;
- reinforce the capability for intervention of the social partners and the scientific and administrative community in the field of OSH;
- promote awareness in the industrial world and among general public of the importance of prevention, the improvement of the quality of life and on corporate competitiveness.

As regards specific objectives, priority was given to the prevention of risks associated with physical factors such as noise, chemical products, manual handling of loads, and work equipment. These specific objectives also concern new risks such as intensive, repetitive, monotonous work. The last point concerns the need to inform the sector and provide it with information regarding the prevention of occupational risks.

### Design and implementation

The entire operation was carried out in the form of a partnership around the IDICT, with the cooperation of seven trade associations, two trade union federations, the General Department of Industry (Ministry of Economy) and the Citeve (Technological Centre for the Textile and Clothing Industry in Portugal).

This campaign should also be considered as the framework within which social dialogue was maintained and developed during the phase of evaluation of this action for occupational risk prevention, a subject on which management and organised labour are in agreement. The programme of action for the campaign was drawn up jointly, with strong involvement by the IDICT to encourage exchanges and stimulate the partners.

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*The culture of occupational hygiene, health and safety is an ideal which should be shared by all the players (in the campaign), knowing for sure that this is the way to reduce the number of occupational injuries and diseases and the level of absenteeism and to permit improved productivity within the enterprise.*

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(ANITT-LAR, Employers' Federation)

To ensure follow-up and satisfactory implementation of the campaign, a standing consultative council, bringing together representatives of the four categories of players mentioned above was formed. This committee, having its specific mode of operation and regulations, meets when it wishes in premises which are designed for it and which can be considered as the head office of the campaign.

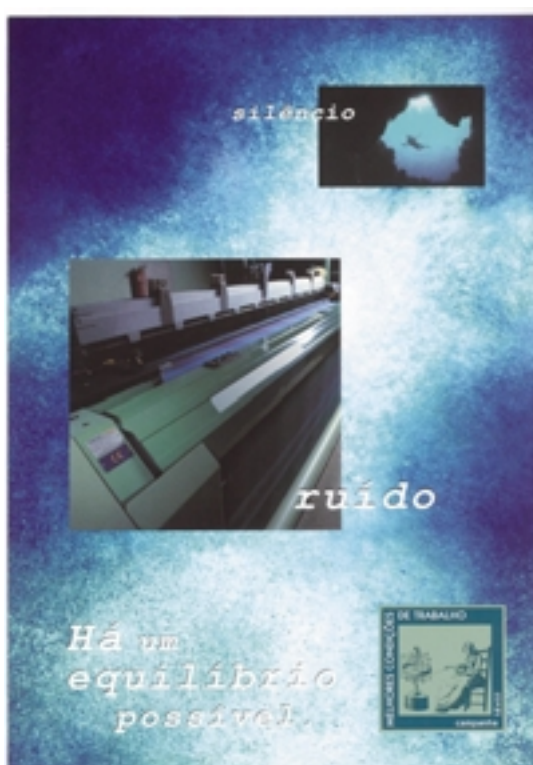
To this may be added a project group, internal to IDICT, which has devoted itself full-time to the finalisation, satisfactory implementation and coordination of the campaign. This group consists of the regional representatives of regions in which the textile industry is geographically concentrated. This project group developed the internal action plan, and notably in-house training for the IDICT staff responsible for the programme's operation. In all, 105 people — labour inspectors and technicians — were thus trained in the specific aspects of the textile campaign.

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*The pivotal role played by the IDICT should be considered as a revitalising factor and not an arbitration factor.*

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(Campaign Coordination, IDICT)



### *Implementation*

As already mentioned, the campaign had premises and a special team. The players were all strongly identified with the campaign, giving it a fairly personal aspect. The correspondence required for this campaign was written on special letterhead paper.

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*The textile and clothes-manufacturing industries in Portugal form a sector involving risks to which the operators have not always paid appropriate attention. These risks by themselves justify this campaign. To this should be added the shortcomings or deficiencies observed in general working conditions, that should be improved urgently. Promoting awareness of this need and of the indisputable right of employees to defend this subject will be a crucial aspect and will even be the prime objective.*

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Sindetex (Workers' trade union)

To be able to attain the objective of stimulating the social partners, the IDICT provided, at the start of the campaign, training for instructors in the trade associations and employees' unions. Each association, moreover, relayed the subjects of this campaign internally, adapting the major subjects dealt with to its own specific features.

Posters, leaflets and stickers were produced dealing with the core messages of the campaign (monotony of work, chemical contamination, noise and dust), as a result of work performed jointly by the social partners.

Among the tools used, mention should be made of the liaison bulletin dealing with the campaign in general while providing specific technical solutions. In each issue of the bulletin is an insert dealing with a particular technical question. The risk is analysed and solutions are proposed. The first issue dealt with the manual opening of cotton bales.

Five prevention manuals are being prepared. They are specific to a precise activity: wool, cotton, stitch, clothes manufacturing and cordage. The first manual (for wool) is currently being printed. Each manual deals with the occupational risks specific to its field and is presented in the form of sheets. For each operation there is a sheet in which the characteristics of the risk are described together with the appropriate preventive measures. All stages, from processing of the raw product through to the finished product, are analysed from the viewpoint of occupational risk prevention.

One of the original aspects of this campaign was the use of national newspapers. First to advertise this campaign and then to present invitations to tender for the material aspects of the campaign. This concerned the preparation of information and training seminars and the production of training brochures and CD-ROMs. But these invitations to tender inserted in the general-public press also concerned scientific studies and research on topics relating to the prevention campaign in the textile industry. This made it possible to extend the field of competencies, to meet the immediate needs of the campaign, but also to promote awareness in the scientific and university community of research in the field of occupational health and safety. All this work was co-financed by the IDICT and the project promoter.

As regards promoting general awareness of prevention, TV advertising spots were produced and disseminated on public and private channels at peak viewing hours.

### Experiences gained and effectiveness

The campaign design posed no particular problem to the extent that it was based on a strong consensus.

One of the difficulties encountered was the uneven distribution of technical competencies. The projects of the developers replying to the invitations to tender were therefore worked out with government help. This situation led the social partners, on both the employer and employee sides, to ask the government for training for instructors in the field of occupational risk prevention.

The most important aspect is the working out of over 100 projects — studies and research, training and awareness promotion actions, training of experts and corporate executives — which accompanied this campaign and gave it its current dimension.

The initial results of this campaign are due to be presented at an event held on 21 June 2001. At this event, the products, tools and initial publications (prevention manual for wool) which are the tangible results of this campaign will be presented. Demonstrations will be made of the practices developed, in particular a machine to automatically detect defects on fabrics.

This event will also be an opportunity for enterprises to present examples of good practices and to explain how they proceeded to put in place prevention actions.

### *Effectiveness*

The involvement of the social partners, from the outset, contributed strongly to the success of this action, which was supported not only by management and organised labour, but also by the technical and scientific community and all the stakeholders in this matter. The promotion of general awareness of the prevention of occupational risks had the effect of stimulating research by the scientific and university world in the area of occupational risks. Prior to that, there were few studies and little research on this subject; now, an impetus has been lent to this campaign.

This methodology encourages social dialogue and integrates occupational risk prevention into corporate management and production processes. The textile sector has thus seen strong development of social dialogue in its enterprises and extensive discussion of work organisation.

Revealing the issues involved in prevention, the campaign introduced a network concept and an integrated view of partnership between the players implying co-empowerment of the employees.

The method is considered transferable as soon as social dialogue is functioning.

### **For further information**

Mr Paulino Pereira  
Head office of the textile campaign  
Av. da Boavista, 1311 — 6°  
P-4149-005 Porto  
Tel. (35-22) 606 09 15  
Fax (35-22) 606 09 16  
E-mail: campanha.textil@idict.gov.pt

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*This action is of strategic interest. If all its objectives are attained, workers will obtain better working conditions with fewer occupational injuries and diseases and less absenteeism. The firms will have more highly qualified workers, who are more motivated and better informed. A better work environment will thus be created, and both quality and productivity will be improved. The challenge is exciting and it must be hoped that there is a real desire to take up this challenge.*

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FESETE (Workers' trade union)



# 4.

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## ACTION TAKEN AT THE ENTERPRISE LEVEL

# 4.1 PREVENTING NEEDLE-IN-FINGER INJURIES IN THE CLOTHING AND TEXTILE INDUSTRY — THE CASE OF WILLIAM BAIRD

- Ergonomic design of guard
- 90% decrease in accidents
- Saving over € 100 000 yearly



## Background

In 1996, the clothing company William Baird — United Kingdom — reviewed the costs associated with compensation claims for needle-in-finger injuries during sewing operations. The previous year, there were around 250 claims and about 500 incidents. At the time, the standard guarding for sewing machines did not fully protect the operator. As a result, it was common for operators to occasionally run their fingers under the sewing machine needle, while manipulating cloth for stitching. While few reportable injuries resulted, such accidents often led to civil compensation claims. These claims were costing the company around GBP 120 000 per year (€ 195 000).

The company employed around 6 000 employees, a large percentage of which were sewing machine operators. Within clothing manufacture, sewing machines are a key piece of equipment, so preventing these types of accidents had a major benefit for the whole industry. In the UK, around 250 000 people are employed in the clothing and textile sector. However, in other sectors, such as furniture and upholstery manufacture, sewing machines are used in parts of the process. Hence, improving the existing guarding for sewing machines would have benefits for any operation where such machines were used.

In the UK, the large-scale manufacture of clothing has been in decline for several years. However, small-scale operations have been growing with the increasing demand for designer garments. Also, many individuals will use sewing machines to make or repair their own clothes or other materials, i.e. curtains. So, an effective guarding solution would have a major impact on the safety of sewing machines in operation.

**Key points:**

- Many painful and costly accidents were almost eliminated by a small item designed in cooperation by the social-partners.
- This item was promoted by the unions and it is now widely used by the clothing industry and all industries using sewing machines.
- This concept has been the basis of a new sewing machine safety standard adopted by CEN.

**Occupational safety and health objectives**

Needle-in-finger injuries are not usually reportable to the enforcing authority. In most accidents, the needle punctures the skin. Occasionally, the needle may lodge in the bone of the finger and have to be removed by a doctor. So, from an industry point of view, these are not usually taken as a serious safety problem. However, they represent about 25% of accidents needing first aid treatment. It should also be recognised that when such accidents do occur, they are very painful for the person involved.

The company decided to initiate action because for many of these types of accidents, the GMB Trade Union supported civil claims. For each accident that led to a claim, it cost around GBP 500 (€ 810) to settle. In 1995, these accidents cost William Baird about GBP 120 000 (€ 195 000).

The company had informally approached the GMB about taking an initiative to reduce the occurrence of such accidents. During these discussions, the redesign of existing guarding standards was one of the options considered. The company then set out to design a guard that would:

- effectively protect operators' fingers from being punctured by the machine needle during sewing operations;
- be practical from the operators' working position and not hinder sewing operations;
- lead to a reduction in accidents and civil claims.

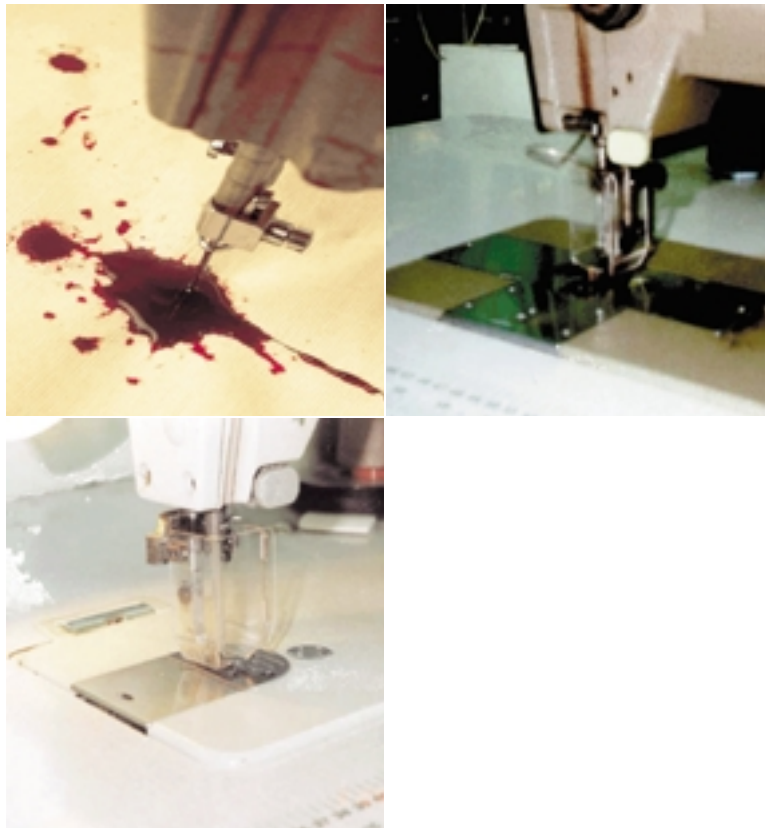
This approach differed from many others in the industry in that modifying equipment was being considered. Often, the view of many employers was to increase awareness of operators, yet do nothing about the machine.

**Design and implementation**

The previous standard guarding for sewing machines involved a wire arrangement that provided a barrier between the needle and finger. However, the wire could often be easily bent under industrial use; it often left a gap when the needle was in the highest point of operation; and had to be aligned correctly. The company decided that this guarding should be redesigned.

Rather than look at a national project, the company identified a factory that had the highest incidence of needle-in-finger injuries. The local safety committee was asked to develop a suitable guard. As the GMB are organised in William Baird factories, the local GMB safety representatives became involved in the project.

A small team was established in the factory and included two GMB safety representatives, an engineer and a supervisor. The engineer developed ideas into practical guards, which were then tested on production machines. This process involved a number of failures because the guard not only had to protect people, it could not interfere with the stitching operation. It took six months of modifications to achieve the first prototype guard.



The prototype guard encapsulated the needle and could be easily opened. As shown in the photograph, it allowed the operator to see the needle in operation but did not allow any access to the needlepoint. It was easily opened and meant that threading the needle was also easy. Hence, it met the safety requirement of safe operation in objective (a). It allowed the operator to maintain the productivity, thus meeting objective (b). Objective (c) could only be met once the guard programme was implemented.

### Implementation

Once the development team was satisfied the guard was effective, several machines were fitted with them. These were then evaluated under production conditions. The key problems were:

- The guard needed to be fitted correctly. Hence, engineers were trained to ensure it was properly set up.
- As the material was Perspex, some operators experienced glare from the surface of the guard. This meant they could not see the needlepoint and interfered with the operation. Lighting was changed or the guard was modified to allow the operator to see the needle directly, without their finger being in contact with the needle. The modification was usually to cut a 'V' into the guard that allowed the operator to see the needlepoint but not allow the finger access.
- Operators were wary of the guard initially.
- The company had several thousand sewing machines and guards needed to be made for them. However, there were different types and one guard would not fit all machines.

The company then took the prototype guard to a local engineering company and asked them to manufacture it. This they did and they also became involved in modifying the prototype to fit other types of sewing machine.

At this time, the GMB agreed with William Baird to promote the guarding solution within the industry. In 1998, the Union launched its 'Stitchy finger' campaign, highlighting the injuries caused by sewing machines (see photograph). The GMB encouraged all safety representatives in the clothing sector to use the guard. Seminars were arranged during which videos of existing guards compared to the new one were shown, and the Health and Safety Executive also started encouraging its use.

However, the problem for the enforcing authority was that the encapsulating guard was not in the CEN standard for sewing machines, therefore they could not compel companies to use them. Nevertheless, in 1998, they did send a letter to 'Sewing machine suppliers' identifying the weakness of existing guards and pointing out the legal duty on suppliers to provide adequately guarded machines. As the HSE stated:

- 'The case for requiring needle guards is amply demonstrated by the high incidence of needle injuries to machinists. The majority of these are caused by inadvertent contact with the needle during sewing, but accidents also occur during threading or changing needles, and when needles shatter.
- Industrial sewing machines should be supplied with a guard, which prevents the operators' fingers from passing beneath the needle point, both from the front and sides. The guard should be robust (some existing bent wire guards are flimsy), and should be suitable for the range of work likely to be carried out on the machine. Poorly designed guards will most likely be discarded, or may actually increase the risk of injury. Thus, guard design should take account of the needs for access during threading up, for good visibility, for

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*The original guard has been a great success. However, it has led to other guarding variations that have been equally successful. This project has demonstrated that when employers and unions work together seriously about solving problems, effective solutions can be found.*

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Nigel Bryson (Director of Health and Environment at the GMB Trade Union)

adjustment for finger size and for accessories which may be supplied with the machine or fitted to it.'

This actually contributed to the take-up of the encapsulating guards. The main UK clothing companies in the sector started fitting encapsulating guards to their sewing machines. In some companies, such as Courtaulds, they designed their own guard that encapsulated the needle but with a robust metal framework. The GMB have continuously promoted the guarding options and many thousands have been fitted.

#### *European standard*

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*The project was also a success for communication and cooperation in that the development work was all done at factory level. Prototype guards were designed and made by on-site engineers. They worked with machinists who were involved with testing the prototypes and giving feedback on their use under production pressures. Allen Jones (Group Risk Manager for William Baird)*

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During this period, a draft standard was being developed for sewing machines (prEN ISO 10821 'Industrial sewing machines – Safety requirements for sewing machines, units and systems'). William Baird and the Health and Safety Executive, with support from the GMB, sought to adopt the encapsulating guard in the new standard. They were successful in this, and so the new standard requires that guards encapsulate the needle and most of the previous wire guards have been deleted.

As the CEN standard is adopted, new sewing machines will have to have an encapsulating guard. The material may not necessarily be Perspex and manufacturers may come up with other options. However, the key feature is that a guard developed in a William Baird factory, involving GMB machinists, has become the basis of a European standard. It provides an excellent example of effective solutions being found by involving people using equipment in the design of guarding.

#### *Experiences gained and effectiveness*

This guard is a major improvement in the field of occupational health prevention. The importance of workforce involvement was a key to success. The following have been they key experiences in the initiative:

- Involving people who work on the machines with those designing the guard led to an effective solution that everybody was happy with.
- The guard almost eliminated needle-in-finger injuries and significantly cut civil claim costs.
- The original direction was to address the problem by redesigning the machine. Many companies would start by trying to change the behaviour of the operators.
- Once a guarding solution was found, demand was created not only in William Baird but also within the whole clothing sector — indeed, where any sewing machines are used.
- Once the concept of an encapsulating guard was created, other designs were developed. The Perspex guard cost about GBP 28. More recent metal designs are being quoted at GBP 3 (€ 4.87). Once manufacturers incorporate the principles of encapsulating guards at the design stage, the cost is likely to reduce further.

### Effectiveness

In William Baird, the introduction of the guard was phased in. Up to the year 2000, where the guards had been fitted, there were no first aid treated accidents where the machine was under power. There were some accidents where the operator caught the needle point when they were changing the thread. However, the key success was almost eliminating these accidents when the machine was in operation.

The guard developed by William Baird was a success as the objectives set out originally were met. Also, the involvement of GMB machinists at the local level, the GMB nationally and at the European level, did help to increase the take-up of the guards and their adoption within the standards setting process.

The numerical results are impressive. The guard prevented literally thousands of accidents, saving GMB members a very painful experience, whilst at the same time saving William Baird over GBP 100 000 (€ 162 400) since the start of the programme fitting the guard. Within the first year of fitting guards, the company's insurance premium was cut by 50%. Within two years of the first guard being fitted, needle-in-finger accidents dropped from around 500 to 40. Where guards were fitted, no needle-in-finger accidents have been recorded.

The guard has an additional benefit as it provides a barrier when, on occasions, needles shatter. Thus, additional eye protection was achieved with the guard.

Finally, it was the basis of the new CEN standard for sewing machines, which will eventually be adopted across Europe.

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*These guards have been very successful in reducing injury to our machinists. The company [William Baird] has made a real improvement in health and safety by this development.*

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Sheila Bearcraft (President of the GMB Clothing and Textile Section)

### Further information

John Wilson  
Guard – User Contact  
Director of the British Clothing Industry Association  
5 Portland Place  
London W1N 3AA  
United Kingdom  
Tel. (44-20) 76 36 77 88

Nigel Bryson  
Director: Health and Environment  
GMB Trade Union  
22–24 Worple Road  
Wimbledon  
London SW19 4DD  
United Kingdom  
E-mail: [nigel.bryson@gmb.org.uk](mailto:nigel.bryson@gmb.org.uk)  
GMB web site: <http://www.gmb.org.uk/health&safety/>

## 4.2 NAVIGABLE INLAND WATERWAYS IN BELGIUM: CUTTING ACCIDENT RATES BY IMPLEMENTING A SYSTEMATIC SAFETY POLICY

- Accident prevention policy in the public sector
- Improvements have been observed during more than 10 consecutive years
- Lost-time injuries decreased by more than 60%.

Dienst voor  
de Scheepvaart



### Background

The legislation on safety at work in the public sector has a shorter history than in the private sector. Extension of legislation to the public sector in Belgium started in 1985. The Dienst voor de Scheepvaart (Navigation Office), as a part of the public sector, started an active safety policy in 1989. In 1996, additional legislation came into force, which made it compulsory for work organisations to implement a dynamic risk-management system of which a prevention plan had to be part of.

The activities of the Dienst voor de Scheepvaart comprise inspection, maintenance and exploitation of inland waterways in northern Belgium. That includes riverbanks, bridges and sluices. The working area is vast (about 300 km of canals, 6 districts, 120 different working places) and local sites are scattered over the area. Some of the work is carried out at the workshops, but most of it is done on the spot in the open air.

The main risks of these activities are:

- falling, slipping, stumbling;
- being wounded while using tools or equipment;
- assaults and violent acts by the public.

In this sector, about 500 workers are employed by the Dienst voor de Scheepvaart. The number of staff has remained nearly constant during the past 12 years.



**Key points:**

- In 1989, the public Service for Inland Waterways had to set up and implement an accident-prevention policy according to new national OSH legislation.
- During more than 10 consecutive years, safety at work has been improved
- The accident index (lost time injuries) has dropped significantly over 60%.
- The severity rate of the accidents shows a relative constant level after 1991.

**Occupational safety and health objectives**

The main objectives were:

- to implement a safety policy, as a consequence of new legislation on health and safety;
- to promote safe working conditions, as an independent goal regardless of new legislation;
- to reduce accident frequency and severity rates by improving working conditions.

Part of the programme was to set up a consultation committee on prevention and protection with representatives of employers and employees (unions). An independent safety consultant supported the committee. Between 1985 and 1989, a safety consultant was selected, appointed and trained. The main activity of the committee was to collect accident figures, investigate the causes and take measures. From 1996, the independent safety consultant had to be part of an internal or external service for prevention and protection. These services were set up all over the country. For the public sector internal services had to be set up.

Throughout the years, accident figures have been monitored and the registration system has gradually improved (e.g. introduction of computer software).

**Design and implementation**

The design of the registration system required several questions to be answered:

- How to produce statistics (what information is needed).
- How to investigate accidents (e.g. investigation report).
- How to learn from accidents (reports and statistics).

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*Safety is everyone's business. It requires time and attention, it needs follow-up and a straightforward approach. As a consequence of the wide scope of hazards in our working environment we need a higher safety knowledge and safety awareness of everybody in the workplace.*

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Luc Verkoyen (ACOD — General Union Public Service)

The basic idea was that if one succeeds to make a correct analysis of an accident, one could take the appropriate measures. The statistics will then serve as a performance indicator. This policy is based on the 'Deeming circle PDCA' (plan, do, check, act). The design of the programme took a lot of effort. A committee had to be set up. Although the main objectives were clear, a great organising power was needed. The employees' organisations contributed to the implementation of the obligations.

#### *Information needed*

As far as statistics are concerned, the method of gathering data is adapted from prescribed methods. The accident report form contains personal data about the victim and the employer. The important part of the form is the standard fill-in form, where many indicators such as date, time, circumstances, weather conditions are recorded.

The main items for accident investigation are:

- nature of the injury;
- part of the body affected;
- description of the event or exposure;
- likely cause or source.

Every six weeks, the committee (CPP) meets according to a fixed schedule. The accidents are discussed. Furthermore, the committee visits all the spots (once every one or two years), which represents eight workdays a year altogether. The results of the inspection reports are part of the agenda of the meeting.

#### *Definitions of accident figures*

The figures to be reported are prescribed by the Ministry of Labour and hence to be produced by all working organisations in the public and private sector in Belgium.

##### Accident

An accident that leads to physical or mental injury, and consequently prevents the employee from working; fatal accidents are separately counted. This figure is similar to the definition of lost-time injuries (LTI) known in related literature.

##### Accident frequency rate

Number of injuries incurred during a given time period x 106 / hours worked by all workers during that period (e.g. a month or a year). This figure corrects the number of accidents at the time of exposure to risks (work). When the numbers of employees and working hours stay the same during a period of time (several years), the figure is directly proportional to the number of accidents.

##### Severity

Number of lost calendar days x 103 / hours worked by all workers. (Note: two entities are being used here: calendar days and hours worked.)

There were some drawbacks in the work of the committee. In particular, the large number of contractors and the vast area over which inspections and surveillance had to be carried out.

Selection of items to be registered

The starting point for the collection of data is a good form in which the intended implementation is reflected.

The following table gives the main structure of the occupational accident report.

Part I has to be filled in immediately by a superior or safety officer. Part II will be completed at a later stage. The classification system has not been the same through the years. For example, 'falling' is now divided into two categories:

Page	Section	Items
Part I	Employer	Personal data
		Victim
	Accident	Day/hour
		District, place
		Activity, type of work
		Circumstances
		Medical care
		Other party (liable)
		Witnesses
		Part II
		Number of employees
		Days worked so far (calendar year)
	Victim	Years employed
		Function
		Hours to work that day
	Causes/prevention	Type of incident
		Type of injury
		Part of the body
		Consequences
		Proposal of measures

'falling from a height' and 'falling at ground level'. In 1993, the computer took over all the handwork for registration and calculation.

Accident analysis report

The prevention consultant has to fill in a risk analysis Form in which the probability (P), exposure (E) and consequence (C) are assessed. The total risk is defined as:

$$\text{Risk} = P \times E \times C$$

There is a similarity, but no equality, between consequence and severity. The consequence factor is established during the assessment. It should be borne in

mind that severity (days) can only be established after the employee has started work again. It takes account of what has actually happened in terms of days lost. Consequence also includes what might have happened. Based on this analysis a specific measure is proposed and discussed in the meeting. The Dienst voor de Scheepvaart decides what measures will be taken.

Measures fall into one or more of the following categories (statistical report): workplace (improvement), learning skills, review of instructions, (increased) monitoring, inspection, maintenance, and protective equipment.

### *Results*

The following conclusions on the safety situation at the Dienst voor de Scheepvaart were made after a careful analysis of all the data:

- insufficient awareness and commitment at management level;
- insufficient awareness at worker level;
- need to build up (more) safety routines;
- need to increase safety on board of vessels.

The committee recognised these conclusions and incorporated them in the safety policy.

The prevention policy consists of the following elements:

- training and education on first aid, heavy loads, electricity, carpentry;
- use of life belts and other safety equipment;
- focus on alcohol and work;
- attention to greater psychological effects of stress;
- implementation of tasks, responsibility and competence for the managers.

The effectiveness of the safety policy is dependent on the willingness and the commitment of the parties. The driving force of the safety consultant highly contributes to the positive effect.

Therefore, the role of the safety committee, together with the safety consultant, appears to be very important. The reduction of accident figures is mainly due to increased attention at all organisation levels. The function of the safety advisor is complex and plays a big role in the awareness operations:

- organising safety meetings (toolbox meetings);
- acting as a focal point for information and consultation;
- spreading flyers on safety;
- carrying out inspections;
- charging the hierarchic line for failures.

The committee has also taken many concrete measures on the improvement of working conditions:

- Introduction of collective and personal protective equipment:

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*The initiation of a specific safety committee, separate from the general bipartite consultation committee, has proven to be beneficial.*

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Leopold Fransen (Safety consultant)

- Special equipment has to be worn to prevent falls from a height when working in sluices. When sluices are emptied out in order to carry out maintenance, there is a severe risk of falling from a height (10 m or more).
- Saw-trousers must be worn when using a chainsaw.
- Increased surveillance of the working place. The public is kept out by fences. Camera surveillance has been introduced.
- Improvement of machinery and equipment:
- All machinery and equipment has been adapted to the 'Machinery guideline'. For instance: emergency stops and zero voltage connections have been installed.

Places where there is cutting and squeezing danger, such as the screening of cogwheels, have been safeguarded.

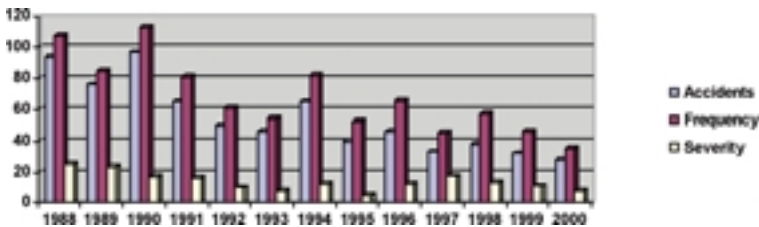
### Experiences gained and effectiveness

The systematic approach of the committee has led to a decrease in the total number of accidents as well as in their frequency and severity.

The graph shows the number of accidents (all non-fatal) per year, their frequency rate (number of accidents related to total working hours) and their seriousness (lost days related to total working hours). To improve the readability, the severity figures in the graph are multiplied by 10.

Table 1. Occupational accidents (injuries)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Accidents	94	76	97	65	50	46	65	40	46	33	38	32	28
Frequency	107.6	84.9	113.2	81.3	60.7	54.6	81.7	52.7	65.4	45.7	57.4	46.4	35.4
Severity	2.53	2.37	1.68	1.61	1.02	0.80	1.27	0.54	1.23	1.74	1.37	1.12	0.79



The anomalies, such as the high severity rate (47%) in 1997 can be easily explained. This figure is mainly due to two accidents. The first one concerned a lock keeper that had been mobbed and robbed (236 days) and the second was due to a severe fall from a height (227 days).

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*Each level of the hierarchy, from chief executive to supervisor, needs to contribute to the implementation of our safety policy as updated in 1996. Keywords are responsibility and delegation.*

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Ir. J. Tielens (Administrator General)

It has to be mentioned that the robbery accident was very situation-related. Last year, the fare for sluices was cut by 90%, so the amount of cash money available is now very low and robbery is not likely to happen anymore. The problem with statistics is proving that there is a causal relationship. Continuous attention to the safety problems leads to the improvement of working methods, of tools, equipment and machinery. So the work environment becomes gradually safer. Other factors are also involved. The number of employees has been nearly constant; the amount of work is difficult to assess. If the working method is improved, but if the workload increases, the work-related stress will be heightened and consequently so will the risk factor. The net result however would be a decrease of the accident frequency.

Social factors are changing. The aggressiveness of people in traffic is increasing. Drivers show a more aggressive behaviour than a few years ago when the sluice or bridge closes to traffic to let the ships pass. The same happens at roadblocks, where roads have to be closed temporarily in order to carry out maintenance. This causes mental stress in the first place. It is not shown in the lost time injury figures for the moment.

Workmen carry out the most risky jobs, which is reflected in these figures. The threshold of resumption is low for operators but high for workmen. The type of injury almost predicts the lost time. Cutting wounds will take a few days, an eye injury one or two weeks, bone fractures more than four weeks.



Breakdown of accident figures

Since a lot of items are being recorded, it is possible to correlate each item with the number of accidents or the severity. e.g. a distinction is possible according to the month of the year, day of the week, hour of the day, civil status, years of service or district.

The biggest district is also known to perform the most hazardous activities. It shows the highest accident figures. Moreover, it is shown that Mondays show

higher frequencies, as does the month of June. Three o'clock in the afternoon shows the highest frequency rate. Fridays are low. It also might be shown that unmarried people are more vulnerable to accidents than married people.

These facts might be explained as follows: in June, the biggest repairs are carried out. Caution and prudence decrease near the end of the workday. On Friday, people work only in the morning. The rest of the day is devoted to cleaning up the site. An unexplained rise in figures however took place from 1995 to 1997.

### Further information

Leopold Fransen  
Consultant and Safety Inspector  
Dienst voor de Scheepvaart, Noord België  
Tel. (32-8) 946 25 60  
E-mail: leopold.fransen@pi.be

*Source:*

Veerle Woestenburg (1999), 'The occupational safety policy of the service Dienst voor de Scheepvaart', *Annual report on accidents of the service Dienst voor de Scheepvaart*, 2000.

# 4.3 LONG-TERM ACTION FOR OCCUPATIONAL SAFETY AND HEALTH: TITAN

- Preventive actions since 1970
- Emphasis on the transfer of experience between senior and junior employees



## Background

This action has been initiated in 1970, a milestone year for the company. Since then, the company has constantly and regularly been applying the programme for the prevention of occupational hazards to all of its activity centres.

The existence and the development of such an action was based on the management’s decision to support the occupational health and safety sector, given that when the action began, there were no substantial commitments deriving from the national or Community legislation.

National legislation was antiquated, while Community legislation (at least at the institutional level) did not even exist. Moreover, Greece had not become a Member State of the EEC until 1980. From this point of view, the action taken was very innovative taking into account Greek reality at the time.

TITAN Cement Company was founded in 1902 and is now the leading Greek cement producer. The group’s current annual production capacity is about 11 million tonnes, and it operates four plants located in Greece and four plants abroad. TITAN Group today controls in total over 30 companies, and is the largest producer of ready-mixed concrete as well as the largest quarry operator in Greece. 8.4 million tonnes of cement, 8.1 million tonnes of aggregates and 1.5 million cubic meters of ready-mix concrete were sold in 2000 for an amount of more than € 6 220 000 of consolidated sales.

Following the gradual development of TITAN it expanded its activities beyond its main activity — the manufacturing of cement — into areas such as quarries,



ready concrete, mortars, transport, etc. The action positively affects the company's 2 500 employees and approximately 1 500 regular collaborators that perform their activities in the work areas, such as contractors, contractor staff, transporters, etc. Safety training is also provided to company contractors.

#### Key points:

- Minimisation of occupational hazards to the benefit of the employees as well as society in general.
- Special emphasis on the motivation of employees for safe and healthy work.
- The necessary measures for 'technical safety'.

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*The minimisation of occupational hazards within the work environment is the executive's primary obligation, this concept however, needs to be embraced and supported by all the employees of the company.*

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E. Paniaras (General Manager)

### Occupational safety and health objectives

At the beginning of the action, the total number of accidents per year in the company was 165, with a frequency indicator of 58. The number of days off, due to these accidents, was 7 325 and the severity indicator was 2.56.

As expected, the initial measures had focused on the realisation of technical safety works such as staircases, rails, racks, lighting etc., aiming to meet the easily noticed needs and rendering the work environment as safe as possible. Particular emphasis was also placed on the means of personal protective equipment (PPE — helmets, goggles, safety shoes, etc.).

As shown in the frequency indicator evolution graph, the said indicator dramatically dropped, but despite this improvement it still remained at relatively high levels. This event led to an innovative approach of the problem, the human resources playing the leading part. This approach consisted in the motivation of employees to get interested in safe and healthy work.

Actions to motivate employees, through their active involvement, gave this action a new impulse and led to a further drop of the frequency indicator of accidents at work, as it is shown in the aforementioned graph for the period from 1974 until the mid-1980s. During this time, practices and methods were developed that gradually led employees to an active participation in the evolution of the action. The frequency indicator had started to decrease, and since the end of the 1980s it has remained stable below 10 (one-digit number).

### Design and implementation

In order to meet the requirements and the needs pertaining to the action, a central staff service was set up in the company's head office in Athens; while at the factories, technicians responsible for meeting the requirements of the action were appointed. Furthermore, a doctor was recruited for each unit in order to meet the requirements of occupational medicine.

Towards the end of the 1970s, the experience and knowledge gained led to the creation of committees the purpose of which was to study and face problems

*The continuous efforts and accomplishments of TITAN Cement Co. SA. regarding the improvement of the working environment and the prevention of occupational accidents, prove that competitiveness and good working conditions are totally compatible and achievable targets.*

N. Analytis (Vice President of Federation of Greek Industries)

relating to occupational safety and health. These committees consisted of unit executives, employers and employees nominated by the union of the factory workers.

Thus, it becomes clear that the organisational standard was gradually being implemented in TITAN S.A., which was then institutionalised by Greek law and later in 1989 by Framework Directive 391/EEC.

The following were carried out for the action to be applied:

- Executives are offered the possibility for continuous training so that they are capable of meeting the ever-increasing requirements and obligations.
- Training seminars are organised for its employees. These seminars are enhanced by audiovisual material and are supported by over 200 special company publications in the form of leaflets, posters and books. The annual proportional indicator of education is 2, which means that each employee in the company participates in two hourly educational seminars concentrating on occupational safety and health.
- Prizes are gifts for safety at work are established and awarded to employees after a certain time period has elapsed without any accident occurrence.
- Poster and motto contests for employees, to which the members of the employees' families may also participate.
- Prizes are awarded to the company's plants with the lowest annual accident frequency — severity indicator.

*The programme that has been established by TITAN Cement Co. S.A. to prevent occupational hazards and accidents, is a pioneering and successful practice which improves the safety and hygiene conditions in the work environment.*

B. Makropoulos (EL.IN.Y.A.E. — President.)



The above-mentioned actions along with the professional specialisation of all employees result in the awareness of the importance of safe work, which is an indispensable condition for the safe performance of their duties.

### Experiences gained and effectiveness

Special emphasis must be placed on the fact that the company's actions have been accepted and supported over time by the unionists, as well as by the OSH committees.

Strong emphasis is also placed on the transfer of experience and mentality which naturally occurs among senior and junior employees, which explains the ongoing downward course of the accident-frequency indicator, despite the changes in people and employees generations.

### Transferability

Thus, the long-term action of TITAN S.A. for the prevention of accidents at work became widely known to the business world, providing businesses with opportunities to apply similar policies. The successful model of the company can be adapted by other companies, provided that the particularities of the given sector and the individual companies are taken into consideration.

Finally, it should be stressed that the company's objective to reduce accidents at work has been achieved to the best possible extent, while at the same time the concept and awareness of occupational safety and health was promoted.

### Further information

TITAN CEMENT Co. S.A.  
22A Halkidos str.  
EL-11143 ATHENS

Mr Spyros Xenos  
E-mail: [smx@titan.gr](mailto:smx@titan.gr)

Mr Dimitris Tzavaras  
E-mail: [tzavarasd@titan.gr](mailto:tzavarasd@titan.gr)

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*In its attempt for zero accident conditions the administration of TITAN S.A. has shown that collaboration with its employees has proved to be a good strategy. Policies that TITAN S.A. enforces for the prevention of occupational accidents are wholly accepted by the employees of the company since they too have actively participated in setting them up. The employees' motivation and interest in occupational safety and their observation of safety regulations has made a reduction of occupational accidents possible. Particularly, this has created a 'safety culture' necessary for safe practices by all employees.*

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Stelios Kahris (President of the Greek Federation of Cement Workers)

# 4.4 SAFETY MANAGEMENT IN THE STEEL INDUSTRY: ARBED

- A change of culture and individual behaviour
- A decrease of over 70% in accident rates
- The new safety initiative promotes the total quality philosophy



## Background

During recent years, the steel industry demonstrated that it is possible to significantly reduce work-related incidents and accidents. The ARBED operations in Luxembourg have also been strongly committed to improving occupational health and safety. Performances have constantly improved over the years, but not at the same rate of progress achieved by other steel companies inside and outside the ARBED group. ARBED general management in Luxembourg therefore decided in 1997 to intensify their safety management. With the assistance of a consultant, a new safety initiative called 'ESPRIT 2000' started in the autumn of 1997.

**E**xcellence in  
**S**afety through  
**P**articipation  
**R**esponsibility  
**I**deas  
**T**ogether with all employees

ARBED operations in Luxembourg consist of several business units in the steel sector such as steel plants, continuous casters, hot and cold rolling mills and maintenance shops. The workforce of the different locations varies from about 100 to more than 2 000 employees. Every plant has developed its own culture and its own way of thinking and executing tasks over time.

Because of the globalisation of the steel industry and declining demands, the workforce decreased during the past 20 years from approximately 28 000 in 1975 to about 5 600 employees in 2000. Employees were encouraged to leave the company and very few new employees were hired so that the average age went up to 49 years.

#### Key points:

- High levels of safety awareness and behaviour must become a condition for employment.
- Enhanced safety awareness also positively affects quality and workplace efficiency.

### Occupational safety and health objectives

Anyone who has ever worked in the steel industry is aware of the high level of risk to which employees are exposed. Yet, many steel companies have demonstrated that an accident-free environment is a practical and achievable goal. This evolution was not only the result of a greater awareness of a moral obligation or the fact that the legal requirements became more and more stringent. Another strong argument was the realisation that safety excellence will act as a catalyst for better overall corporate performance.

Considering the direct and indirect costs of work-related accidents in Luxembourg and the high number of injuries, every manager should be convinced of the economic benefits of safety excellence. The average cost of an accident in Luxembourg is about € 25 000.

Managers and supervisors still tend to focus on traditional problems such as production incidents, electromechanical failures, quality downgrades, inadequate customer service, etc., but do not consider an accident as a dysfunction at the same level of importance.

Integrating safety into all aspects of the business is a part of the 'total quality' approach and a measure of the overall corporate performance and therefore an indicator of the management performance. These reflections about safety are not new. Werner von Siemens explained this philosophy more than 120 years ago.

The essential objective of ARBED's safety programme, which is designed as a continuous improvement process, was to create an accident/incident-free working environment. Before 1997, the company's safety efforts were mostly directed towards creating safer working conditions, improved technical equipment and increasing employee competence through training.

With the new safety initiative, the efforts still continue in this direction, but special emphasis is also put on safety awareness and motivation of all employees. Enticing them to accept their responsibilities should lead to higher levels of awareness and safer behaviour. The message that employees had to

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*Safety excellence acts as a catalyst for better overall performance.*

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J. Egbers (Safety Adviser)

change their mindset and behaviour had been brought to all organisations. But changing culture and individual behaviour is a long-term process.

When the programme started in 1997, safety performance was as shown:

Safety performance in 1997	
Number of accidents with lost time	429
Frequency rate	46.0
Number of accidents with more than 21 days lost	99
Severity rate	1.24
Definitions	
Frequency rate: Number of accidents with lost time per million worked hours	
Severity rate: Number of lost days per thousand worked hours	

*Safety should not only be considered as a legal obligation, but as everybody's duty to protect human life and as an economical evidence. 1880 — Werner von Siemens.*

### Design and implementation

The first and most important step at the start of the Esprit programme was to ascertain the strong and visible management commitment from corporate management down. From the beginning of the safety initiative, it was possible to develop constructive and positive relations with all unions, because of the common objective of enhancing the protection and working conditions of all employees.

A new health and safety policy was written, approved and issued by the company management. The philosophy of the new policy was then explained to all the employees. Though it was not always easy, the line organisation could be convinced to accept responsibility for safety performance. This was sometimes difficult, because this group tends to see the safety professionals as the only people responsible for safety. Safety professionals are now coordinators, consultants, interpreters of legislation, etc.

A structure of safety committees was established to ensure mutual understanding. Regular audits and feedback tours are organised to monitor how well the safety system is understood and executed. Accident and 'near-miss' incident investigations helped to learn from the past and avoid the recurrence of the same errors. Different levels of safety performance and safety management on the same site were eliminated with the requirement that external contractors working in the different plants be obliged to maintain the same safety standards as ARBED's own employees.

While not aiming for an external certification such as BS 8800 or OHSAS 18001, an internal safety assurance system was implemented following the requirements of these standards. Setting ambitious goals is very important to motivate employees, but it is even more important to define ways and actions on how to reach them. Consequently, planned actions and activities were clearly identified with a required time schedule to ensure continuously good safety results.

Special intensive training programmes were designed and regularly implemented to achieve an advanced safety culture.

### Experiences gained and effectiveness

Although implementation plans appear to be evident and easy, the reality is often much more complex and problematic. Every new idea or change creates resistance and scepticism among employees. Safety was the high priority in the beginning of the initiative, but priorities tend to change with time. It is often difficult, and a lot of persistence is required to keep the momentum going. Even after three years of intensive work, there still are some managers and line supervisors that do not give the right priority to safety or do not support it with heart and mind.

As most of the employees and managers are technically educated, they tend to solve safety problems with technical solutions. Unions' are inclined to react in the same way because it is easier to solve technical problems than to correct the awareness and behaviour of the employees that elected them.

Yet, experience has shown that even with the best technical equipment and the most complete procedures, it is impossible to achieve an accident-free workplace. Mindset and behaviour are the key factors to preventing accidents, at work, on the road and at home. Investigations and audits must focus on activities and not on persons. But it is important to remember that unsafe behaviour is not only essential for employees on the work floor, but also for office personnel and managers.

In spite of all these barriers, many improvements have been achieved during the past three years. But the efforts must continue, focussing especially on the human aspect and above all on the complexity of human behaviour.

The positive development of the achieved safety performance can be summarised as shown:

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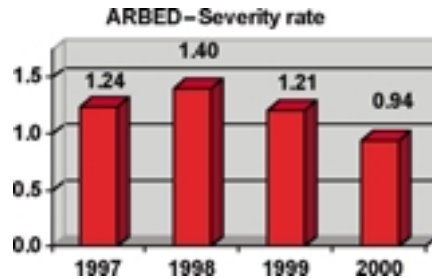
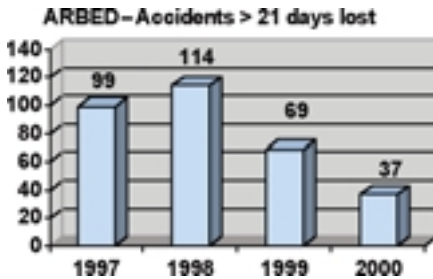
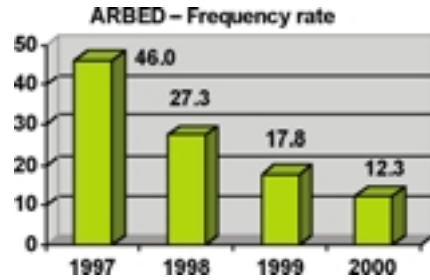
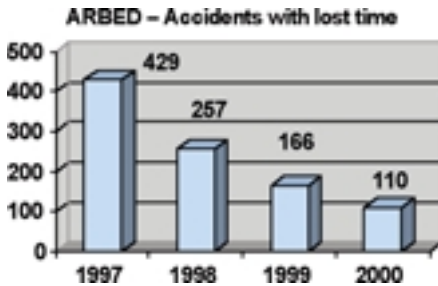
*Mindset and behaviour are the key factors to prevent accidents.*

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Paul Weber (Luxembourg Labour Inspectorate)

Safety performance	1997	2000	Improvement
Accidents with lost time	429	110	74.3%
Frequency rate	46.0	12.3	73.2%
Accidents with more than 21 days lost	99	37	62.6%
Severity rate	1.24	0.94	24.2%

More details are shown in the following graphs.



As a result of the safety initiative, most performance indicators improved by 70% over a period of three years.

The only exception is the severity rate, which increased in the first year. But the constant decrease of accidents and especially of severe accidents (( 21 days lost) shows that with a certain time lag, the severity rate also continues to decrease. For the first three months of 2001, an additional improvement of 28.7% was achieved.

Severity appears still to be at a high level, compared with other companies and countries, but this is greatly influenced by relapses: 26% on average during recent years and even more than 45% in 2001. Compared with other countries, this is an abnormal situation.

Enhanced safety awareness also positively affects quality and workplace efficiency while adopting a safety mindset at work positively influences safe behaviour at home and on the road where the accident rates are much higher.

Employees and company morale improved with the decrease of injuries and especially severe injuries. Management and employees demonstrating that they were able to work together for human wellbeing and the avoidance of human suffering was a key to success.

Management is satisfied because, besides the prevention of legal problems when accidents occur, the new safety initiative promotes the philosophy of total



quality. Work ambience improved because employees noticed that management really wanted to achieve a better work environment. Involving employees on the work floor in the writing and modification of procedures and rules and demonstrating that their opinions are respected enhanced motivation. Once employees accept the priority of safety at the workplace, they will not forget this mindset at the plant gate.

The steel industry, once considered such a high-risk industry that accidents were believed inevitable, was able to dramatically improve safety performance by giving the necessary priority to safety. The results and higher awareness influenced other companies in Luxembourg to also strive for safety excellence. Even though the Esprit initiative was initiated and coordinated by the professional safety staff, every business unit, regardless of its operation or size, is now accepting its safety, health and environmental responsibilities and manages this parameter of performance independently and in its own way.

Good improvements have been achieved until now. Yet, this is just the beginning of a long process. Great efforts will have to be made in the future to involve more and more employees and to enhance a safe working environment. High levels of safety awareness and behaviour for all employees must become a condition of employment, if the ultimate goal of an incident-free work environment is to be achieved.

### Transferability

The implementation of the safety initiative shows that it is easily transferable to other companies. It is basically a question whether the management wants to give safety the right priority and the appropriate means. Any company will thus be able to improve its safety performance. This idea is reflected by the fact that the Luxembourg government not only recognised the ARBED safety improvements, but also encouraged other companies to manage safety in the same way.

### Further information

Gilbert Hoffmann/Marc Hatz  
ARBED Luxembourg  
Plant of Esch-Belval  
Safety Department  
L-4008 Esch-sur-Alzette  
Tel. (352) 55 50-2914  
Fax (352) 55 50-34 86  
E-mail: gilbert.hoffmann@profilarbed.lu  
E-mail: marc.hatz@profilarbed.lu

# 5.

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ACTION BY USING  
STANDARDISED INSTRUMENTS

# 5.1 SAFE AND PRODUCTIVE WORKING HABITS: TUTTAVA

- Good work practice is performed with an increased frequency of 20–40% after implementing the Tuttava programme
- The number of accidents can be reduced by over 25%
- Accident rates fall more than can be explained by better housekeeping alone



## Background

The process for improving housekeeping in companies was developed in the mid-1980s in Finland and is called 'Tuttava'. In Finnish, Tuttava means acquaintance and is an acronym for the Finnish words 'safe, productive working habits' (1). The development of Tuttava is based on studies where the use of an American behavioural safety approach was tested in the Finnish industry. This approach suggested that unsafe behaviour is largely responsible for occupational accidents.

In fact, 98% of all undesirable consequences (fatality, lost workdays, recorded injury, first-aid case, near miss and property loss) are caused by unsafe behaviour. In fact, safety statistics suggest that 85% or more of the above consequences can be attributed to unsafe behaviour alone (2).

Through a series of experiments, Tuttava developed into its present form as a participatory programme using positive feedback and focusing on the improvement of order of tools and materials in workplaces. Tuttava aims at making employees, together with their superiors, analyse workstations and jobs. In Finland, Tuttava has been implemented in numerous — probably more than a thousand — companies, ranging from construction to electronics, from retail stores to university laboratories (3).

## Health and safety objectives

The Tuttava programme was planned to improve physical order in the workplace. In relation to occupational safety and health, good order will promote:

(1) Laitinen H., Kuusela J., Saari J., 'The effects of the Tuttava programme on order and tidiness in a metal workshop', proceedings of the 13th Triennial Congress of the International Ergonomics Association, Vol. 3, Tampere, Finland, 1997, pp. 252–254.

(2) Watson, C. E., Does behaviour based safety management work?, 1986.

(3) Saari, J., 'Scientific housekeeping studies', in Bird Jr., F. E., Profits are in order, International Loss Control Institute, Atlanta, 1992, pp. 27–42.

- a better working environment;
- better safety, including less accidents;
- better fire prevention.

#### Key points:

- A participatory programme using positive feedback as an instrument.
- Focus on good housekeeping, order and tidiness.
- Experiences show that the accident rate falls when the programme is implemented.

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*Safe work requires tidiness and good order. It is a concern of everybody. It gives employees the possibility to influence their own working environment. Everybody needs to be involved in order to be able to maintain tidiness and good order.*

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Mr Juha Pesola (Metali — Finnish Metalworker's Union)

Experiences show that the frequency of all kinds of accidents is reduced when implementing the Tuttava programme, not only those directly related to housekeeping.

Other benefits include improvement in:

- productivity;
- quality;
- inventory control;
- morale;
- working conditions;
- company image;
- cooperation between management and workers.

### Design and implementation

The Tuttava programme is based on four key issues:

- employee participation;
- management/employee support;
- systematic approach;
- positive feedback.

Tuttava consists of several steps (see Figure 1). It addresses the three main needs of improvement: improvements in technology, knowledge and motivation. Tuttava is designed for areas where 5 to 30 employees work under the same supervision<sup>(4)</sup>. Experience has shown that in larger organisations, Tuttava should first be introduced in one or a few areas with this number of employees. Initial areas to be selected should be based on reasonable criteria, such as the most hazardous area on the site, most critical production areas, etc. In small organisation one team is usually adequate.

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(4) Internet: <http://www.curtin.edu.au/conference/cyberg/centre/paper/saari/paper.html>



*From disorder to order*

The implementation takes about four to six months if everything goes smoothly. Companies seem to have different implementation strategies. However, practically every company prefers internal implementation, i.e. consultants only have an advisory role. The implementation teams do most of the work, which is important for the best results, as one purpose is to make employees analyse their workstations and jobs.

**Step 1:** Forming an implementation team consisting of a worker representative(s), a supervisor and a management representative. The composition of the team varies from application to application, but in general it will consist of three to five people. For a successful implementation of Tuttava, a strong support and involvement from all levels of the organisation is required. Initially, general information should be provided to all employees affected by the Tuttava programme, including temporary workers and maintenance staff.

**Step 2:** Setting up specific housekeeping standards — which can be called ‘performance standards’ too — through a brainstorming session, collecting as many characteristics of good housekeeping and order as possible related to the location in question. Interviewing employees, walking through the plant, observing conditions and asking questions are additional data sources. A review of accident data and other performance-related documents will also help identify areas of concern. The result is a list of 10 ‘good working practices’. These are standards defining the proper ways of handling materials and use of tools in the workplace. Examples are: ‘store materials on undamaged pallets’, or ‘remove oil and water spills immediately from floors’.

Figure 1. The steps of Tuttava (5):



The standards developed should be 'SMART', which means that the requirements are:

- Specific
- Measurable
- Attainable
- Realistic
- Trackable

The discussion should also help the team identify the obstacles which make the use of some work practices impossible. For example, the strength of pallets may be insufficient for a specific purpose, thus making many pallets defective. The team lists these kinds of technical obstacles and initiates the process of removing them. The obstacles can also be organisational in nature, for example unclear job specifications, etc.

**Step 3:** Ensuring that the obstacles identified in the previous step are removed. If the identified obstacles are complex or expensive to solve, these problems should be noted for later resolution, setting target dates and responsibilities, but should not delay the implementation. Smaller obstacles, such as things or conditions not in place could for example be solved by providing a cabinet for storing tools, a shelf for materials, waste containers, removing items not necessary in the work area, etc. Other obstacles should be solved by making agreements with supervisors and workers in the area, for example agreements about locations for storage, procedures for how scrap or waste will be removed

(5) 'A programme to measure and motivate good housekeeping at work. Workbook for team members', Tuttava Centre, Institute of Occupational Health, Helsinki, Finland, 1996.

and by whom, etc. The standards should be revised if solutions cannot be quickly implemented.

**Step 4:** Making an observation checklist to measure the extent to which the good work practices are in use. It consists of a large number of questions, usually over 100, which can be answered only by 'correct', 'incorrect' or 'cannot be observed'. These questions refer to the list of good work practices. The questions refer to physical conditions, not to the respective behaviours causing the condition. If a good work practice is 'put waste material into the waste container', a question in the checklist would be 'is all the waste material in this workstation in the waste container?'

**Step 5:** Determining the existing level of housekeeping and order before implementing Tutava. After an observation trip in the area, the percentage of 'correct' answers yields a performance index, the so-called 'housekeeping index'. The implementation team makes an observation trip once a week for 4 to 10 weeks. Studies have shown that the baseline scores should be in the range of 50–60%. This level allows room for improvement while still providing some immediate positive feedback about the existing level of housekeeping. If the first or two first tours do not measure in this range, the standards should be adjusted. The results are presented in the figure below.

The housekeeping index is calculated as:

$$\text{Housekeeping index} = \frac{\text{Number of acceptable targets}}{\text{Number of targets}} \times 100\%$$

**Step 6:** All the employees in the area attend a meeting in which the implementation team:

- explains the goals of good housekeeping;
- presents specific housekeeping standards;
- presents slides taken during the baseline observation trips exemplifying correct/incorrect work habits;
- explains the observation method;
- shows the baseline performance;
- explains the housekeeping index.

It is important to train everyone in the area covered by Tutava in order for them to know what the process is, why it is important and what benefits they will achieve from participating in the programme.

**Step 7:** After the meeting, the implementation team places a large feedback chart on a wall in a highly visible spot. Then, they post the result of each weekly observation trip in the chart. The results show the percentage of correct actions related to all the actions measured regarding the housekeeping index. The observations are continued weekly for two to three months.

**Step 8:** The observation tours are continued every three months for at least a year to ensure improvements are permanent. Also, the follow-up should ensure that new employees are told about the Tuttava programme and good housekeeping standards.

### Experiences gained and effectiveness

Potential reasons for failure are that the implementation team is unable to work together or that the time set aside for the programme is insufficient <sup>(6)</sup>. In some cases, the participatory teams may be considered as a potential danger for the fragile equilibrium of the company's hierarchical organisation. Therefore, this kind of participatory programme needs the full adherence of the management and of the employees. The implementation team needs to have a mandate from both the management and the employees. Management and/or employees may be reluctant, because of the company's history, to engage them in a constructive dialogue.

Nevertheless, the Tuttava programme has yielded very good results. Experiences show that the positive changes occur in a couple of weeks after the feedback phase has started. People start to keep the work site in visibly better order. A typical change is from housekeeping index 50–60% to 80–90%, which means that good work practice is performed with an increased frequency of 20–40% after implementing the Tuttava programme. The developers of the programme have acquired much experience with the programme and state that if the instructions are followed, the programme will succeed almost without exception.

The Tuttava method is effective and this has been demonstrated by its wide use (probably implemented by more than 1 000 Finnish companies). These companies range from construction to electronics, from retail stores to university laboratories. Regardless of whether housekeeping was initially good or poor, Tuttava has in all cases resulted in better housekeeping performance.

One of the most outstanding observations is that accident rates fall more than can be explained by better housekeeping alone. According to the developers of the programme, the reason is that the positive approach applied in the programme, the good result obtained, and the team spirit created during the programme, prompt further actions that were not possible before these experiences.

The effect has been documented in quantitative terms in a number of companies. At a shipyard employing about 2 000 people, the number of accidents was reduced by 70–90%. The effect on accidents persisted for the three-year follow-up period.

The accident rate (all registered accidents / 106 hours worked) at the shipyard as a whole decreased from the year – 3 to the year + 1 by 25%. The rate of accidents

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*The inspectorate has noted that this method has achieved excellent results in companies. It has been developed in the mid-1980s and has been further developed after that. It has now become a part of all the various methods used to improve working conditions in Finland.*

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Erkki Yrjänheikki — The Finnish ministry of social affairs and health — Dept of OSH.

<sup>(6)</sup> Saari, J., Laitinen, H., Leivo, A., Kivistö, M., 'Tuttava/good workdays programmes — the use of feedback in enhancing organisational performance', Action Research in Finland, edited by Kauppinen, T. and Lahtonen, M., Labour policy studies 82, Ministry of labour, Helsinki, 1994, pp. 193–212.



*The changes make working easier and improve job satisfaction. The programme has contributed to a considerable decrease of accidents at work in many companies. The Finnish trade union movement has supported the use of Tuttava at working places from the very beginning. Employees must be closely involved in it from the very start, otherwise it will not succeed.*

Mr Juha Pesola (Metali — Finnish Metalworker's Union)

**Table 2. Example on the Tuttava programme's impact on accidents**

	Shipyard hall No.	Years before and after the Tuttava training seminar					
		-3	-2	-1	+1	+2	+3
Number of all registered accidents	A	21	16	18	5	1	8
	B	16	17	11	4	4	1

leading to over three days of sick leave decreased by 30%. During the three follow-up years, the overall accident rate remained practically the same (?).

There are two main criteria for a successful implementation of the Tuttava method in a traditional hierarchical organisation. Firstly, workers have to learn to act as representative workers and other workers have to learn to accept the representatives as links between themselves and the implementation team. Secondly, a participatory approach does not mean that the management is losing its power but it should be considered as an instrument for making more informed decisions.

### Transferability

The programme has been transferred to several countries and the manual exists in eight languages. The programme is deemed to be suitable for both small and large enterprises.

Experimental projects are prepared with the aim of expanding the scope of Tuttava to other aspects of human and organisational performance, i.e. to improve strenuous work by means of changes in methods, working tools, equipment, etc. Expanding the scope to other aspects relevant for both employees and management seems quite feasible, because the programme improves industrial relations and promotes team spirit among supervisors and workers. The improved industrial relations, obtained as a spin-off of the programme, should constitute a good basis for improving other concerns than housekeeping.

### Further information

Jorma Saari  
 Tuttava-Centre  
 Institute of occupational Health  
 Topeliuksenkatu 41 a  
 FIN-00250 Helsinki  
 Tel. (358) 474 71  
 Fax (358) 890 713  
 E-mail: Jorma.Saari@occuphealth.fi

(?) Saari, J. and Näsänen, M., 'The effect of positive feedback on industrial housekeeping and accidents: a long-term study at a shipyard', *International Journal of Industrial Ergonomics*, 4: 1989; pp. 201–211.

## 5.2 THE WASP METHOD — WORKGROUP ANALYSIS FOR SAFETY PROMOTION



- Systematic use of workers' knowledge
- More realistic preventive measures
- Substantial increases in risk consciousness
- Safe working practices and use of PPE

### Background

The basic element in WASP is that unsafe work practices are being analysed by the workers themselves. They discuss causes of their own 'improper' behaviour and identify workplace characteristics that provoke human errors and encourage risk taking. The workgroup suggests means to be taken by the management to promote behavioural changes. The basis for the discussion is their own description of present unsafe behaviours, generated from questions about behaviours in specific hazardous situations.

The WASP method has been designed at the National Institute for Working Life. It is a further development of its forerunner named ERFO, initiated by CLIMA Consult AB, Sweden. Modifications are based on gathered experiences from using ERFO.

ERFO was tested and evaluated in Sweden in the early 1990s. During that period, a number of pilot studies were conducted in Sweden and Denmark within the electrical power distribution sector, the steel sector and the packing industry. The philosophy behind the development of the method is that two sources of knowledge have to be exploited if a relevant and realistic prevention programme is to be created:

- expert knowledge of occupational health and safety professionals;
- shop floor-specific inside expert knowledge of the workers exposed to the actual risks.

Channels for communicating the former are relatively well established. Methods for a systematic use of the workers knowledge are not. WASP is designed to meet this need by systematically involving the workers in prevention activities. Its aim is furthermore to extend the arena of discussion about hazards and preventive measures from safety committees alone to the workers who are actually exposed to the risks. The fact that the group's own

behavioural norms are challenged has an impact on the individual's risk perception and risk behaviour.

The method is based on survey procedures, feedback and group discussions. Some of its features have been borrowed from quality circles, near-accident reporting and feedback techniques.

**Key points:**

- WASP is a participatory programme using survey procedures, feedback and work group dialogue as instruments.
- It brings unsafe work practices up in an open dialogue.
- It identifies conditions that encourage unsafe behaviour.
- It fights the 'It won't happen to me' attitude.

**Occupational safety and health objectives**

The aims of the WASP are:

- to identify workplace characteristics that provoke unsafe behaviour;
- to displace matters of unsafe work practices from the hidden agenda to an open dialogue;
- to create realistic prevention programmes (actionable knowledge);
- to challenge the 'it wont happen to me' mechanism.

The objectives of the researchers were:

- to create a means to focus on human behaviour without blaming the victim;
- to find a more effective way to influence workers' risk-perception (compared to traditional risk information);
- to merge different knowledge from the professional safety expert and the shop floor expert the worker.

The rationale to improve the method was primarily its visible potential in the pilot study of four cases. Furthermore, the method was firmly anchored in scientifically generated knowledge (it combines basic know-how within learning, communication, risk perception, and decision theory). There was also an outspoken demand from companies for a tool to handle unsafe work practices in a systematic and constructive way.

The rationales for the companies involved to test the method were primarily that:

- unsafe work practices were frequently involved in the accident events;
- safety professionals of the companies had come to a dead end concerning behavioural aspects of safety;
- safety professionals (supported by upper management) wanted to abandon the 'top down' and 'too much lecturing' approaches in favour of involving the workers in the process of prevention.

## Design and implementation

The WASP procedure is run with a system of loops. The first loop is more extended than the subsequent loops, since it incorporates preparations and construction of a questionnaire.

### *Anchoring*

The WASP procedure starts with anchoring efforts. Information about aim and procedures are distributed to all concerned (preferably orally since that gives opportunity to clarifications and to meet worries).

### *Construction of a questionnaire*

A work group (three to four persons) consisting of representatives from the target groups, management and department (if any) select the questions. The questions are based on incidents, accident reports, documents of safety rules, work instructions etc., and cover behaviour in specific hazardous situations. Answers are to be given on a five-point scale, ranging from 'never' to 'almost always'. The questions are tested on a few individuals from the target group. The questionnaire consists of 10–15 'bad' behaviours. The questions have to be adapted to the target group. It is an advantage if the behaviour has contributed to a real accident.

### *Answering the questionnaire*

In a group setting, employees individually and anonymously answer the questionnaire.

### *Feedback of graphic profiles*

The responses are then fed back to the group as easily understandable graphic profiles. These profiles represent group mean values from which one can easily see where the group is 'good' and where it is 'bad'.

### *Group dialogue*

The group meets and a person from the group or an external trusted person acts as a discussion leader. No supervisor or other representative from management is allowed. The task for the work group is to:

- identify the causes of its own errors or risk-taking behaviour, as demonstrated by the questionnaire results (graphic profiles);
- identify barriers for safe behaviour;
- list actions to be taken by the employer to overcome the barriers;
- discuss actions to be taken by the group members themselves;
- come up with proposals for measures necessary to achieve behavioural changes;
- make priorities among proposals and present a list of measures to the management, which decide upon an action plan.

### *Management meeting*

The list is presented to the management at a meeting. Management decides upon an action plan.

### *Answering the questionnaire*

After some months, employees individually and anonymously answer the same questionnaire once again. The loop is closed.

The procedure (loop) is repeated from this point as long as the participants wish to continue. The result profiles are compared over time.

### *Estimated costs*

The cost of carrying out the process can be calculated on basis of:

- hours required for an in-house workgroup for construction and testing of the questionnaire (e.g. safety expert, safety representative and an operator);
- hours required for an in-house coordinator to administrate the questionnaires, and act as a supporter;
- hours required for each delegate (three to four hours per loop);
- hours required for feedback of response profiles, and the group discussions;
- costs for discussion leaders (if someone outside the working group is chosen).

### *Experiences gained and effectiveness*

WASP has taken care of the unexpected problems encountered in the first ERFO version. However, problems might still endanger the process, e.g.: practicalities such as reaching all delegates, finding times for group discussions, suspicions that there might be a hidden agenda, a discussion leader not fit for his task and an inadequate response from management on the proposed measures.

The method's results have been evaluated using four experimental groups consisting of 7 to 12 delegates. The results of these pilot cases have been compared with the outcome for 24 control groups where the method was employed without the external involvement and support from the researchers (except for the administration of the evaluative questionnaire).

Opinions about the method have been collected through interviews with delegates and by questionnaires to safety representatives. The methods were deemed successful: for example, if the company wishes to go on with additional loops, or recommends the method to colleagues and other companies. Statistical analysis of significant changes in accident rates are not used as a success criterion due to reorganisations of the companies or too low baseline rates (between 5 and 10 accidents per year), which makes statistical analysis meaningless.

The results of the evaluation of the four pilot cases show that the method was successfully implemented in three of the four groups. Those three groups wanted to go on using the method. The fourth group found that the method offered too little in relation to time and effort spent. Also, the management representatives were positive about method and stated that they had considerably increased their knowledge about work safety problems.

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*We wanted to try something new. To leave the 'too much lecturing' attitude in favour of a bottom-up approach. ERFO was perfect for this. We got a vital dialogue on safety matters that engaged the workers and we got new ideas on how to promote safety. And we could keep our good injury record.*

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Lars Wenner (Risk Manager —  
Sydkraft, Sweden — September 1991)

One output of the process was that more realistic (compatible with the everyday production demands) prevention measures had been suggested and implemented in the pilot companies.

The experiences showed that new proposals for safety measures were presented during the process. In general, however, these were old demands that had yet again come up for consideration. But, the pressure on the employer to implement the proposals has increased since they are now documented in writing and the entire group is united behind them.

The group discussions were stated as the method's most important component in terms of achieving behavioural changes among the participants. The group's joint analysis of low scores in the result profiles ('bad' behaviour) gives rise to a process whereby the individual 'ransacks' his/her own work practices.

Furthermore, the discussions create an educationally effective situation in which the participants learn from each other's experiences. Within the group, an exchange of knowledge and experience takes place, concerning work methods and equipment, routines and safety regulations.

Discussions of causes behind actual accidents and near-accidents provide for the exchange of negative experiences of risk-taking. In all groups, stories about own near accidents due to own 'bad' behaviour were told. This is particularly important as the participants usually have perceived and experienced their own risk-taking as rewarding; for example, they have saved time, money or energy without sustaining an injury. Here, it is brought to their notice that hazardous work situations, which they believe they can handle by virtue of their own skill, have proved to be harmful even for the most highly skilled. The 'It won't happen to me' attitude is hereby challenged, requiring a change in risk awareness in order to succeed. Enhanced individual safety consciousness is reported as a result of the discussions.

Evaluation data from the 24 control groups confirmed results from the pilot study: 23 out of 24 safety stewards would like to recommend ERFO to their colleagues. Increased risk consciousness was reported from 22 groups, safer working practices from 21, an increased use of personal protective equipment from 21, and an increased pressure on management to take actions from 19 out of the 24 groups.

### *Effectiveness*

As with other methods of a similar nature, the method takes time, patience and mutual trust to reach the goal. The use of the method has to be officially approved by higher management, and resources for implementation must be allocated. Without preparation from the senior management to seriously consider safety proposals, the effects can be lower than planned or hoped for. Also, there must be a certain level of openness in the organisation. Workers unaccustomed to being asked questions and listened to will hardly dare to use the opportunity to make an input.

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*Keeping risk consciousness on a high level is an ongoing challenge for the company. The loop-procedure of ERFO offers an opportunity for an ongoing process instead of a one-shot activity. And it creates a basis for follow-up.*

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Henry Ljungberg (Safety Manager — Swedish State Power Board — May 1993)

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*For the first time we got the opportunity to sit down and have an open discussion about why we cut corners. It gave us all something to reflect on. The best direct outcome of our analysis is an ongoing re-design of test equipment to make it more user friendly.*

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Bernt Bergkvist (electrician — Power distribution — May 1999)

To summarise, the most prominent effects of the method were:

- a more systematic way of taking care of proposals and demands from the working group: beside several new suggestions for measures, old suggestions that had never been handled by management were considered;
- the creation of a superior educational setting: answering the questionnaire, discussing the profiles and exchanging of experiences from behaviours involved in near accidents offered an unique opportunity for self scrutiny and paved the way for identification and learning;
- new knowledge about risks was transferred to management.

### Transferability

As is common in pilot intervention research, those companies involved have already 'seen the light' and are usually prepared to take care of the practicalities connected with administrating the method. Very positive responses have been received from the pilot companies, and the method and process are deemed to be transferable with the necessary case-specific adaptations as, for example, through the preparation of the questionnaire.

### Further information

Carin Sundström-Frisk  
National Institute for Working Life  
S-112 79 Stockholm  
E-mail: frisk@niwl.se

# 5.3 PREVENTION CONTRACTS FOR SMES BASED ON SECTOR AGREEMENTS IN FRANCE



Caisse Nationale de l'Assurance Maladie  
des Travailleurs Salariés  
Direction des Risques Professionnels

- Over 14 000 prevention contracts have been established
- Effect mainly on the severity rate of accidents and the costs involved (– 40%)

## Background

Since 1947, risk rating for occupational injuries has been a financial lever in France, creating incentives for the prevention of occupational risks. Under this system, there is a direct link between the level of the contribution to be paid by the enterprise and the cost of occupational injuries and diseases occurring in that enterprise. This principle is valid for enterprises of a certain size (more than 200 employees), but for obvious reasons, it cannot be applied as strictly to medium-sized enterprises, and even less to small enterprises.

However, a number of additional tools providing incentives for prevention have been developed, so as to supplement the specific risk-rating incentive system along three main lines:

- Reduction in the contribution rate ('rebate') for enterprises which have made a special effort at prevention, with regard to occupational injuries and diseases on the one hand and travel injuries on the other.
- Increase in the contribution rate to cover exceptional risks observed in a plant.
- Since 1988, a contractual policy aimed at small and medium-sized enterprises which enables them, within the framework of agreements on objectives established on a joint representation basis at the national or regional level fixing specific prevention action programmes by branch of activities, to have access to financial advances. At the level of the enterprise, this system takes the form of a prevention contract setting out a prevention programme and actions to be performed. These provisions offset the observed limited effect for small and medium-sized enterprises of incentives to prevention provided by risk rating of occupational injuries.



**Key points:**

- Joint commitment by the social security system and an occupational sector to aim at better occupational hygiene, health and safety, expressed in an agreement on objectives and applied at the enterprise level via the prevention contract. This is established between a CRAM (regional health insurance fund) and the enterprise.
- Involvement of management and organised labour in this approach.
- Helping enterprises with less than 200 employees go beyond the regulatory obligations by financial aid granted on the basis of precise specifications.
- Financial advances which can be transformed into subsidies depending on the results.

**Occupational safety and health objectives**

Small and medium-sized enterprises are generally not very well covered by prevention campaigns, whereas they account for 99% of enterprises and plants and 70% of employees under the general social security regime. Since they do not, like large enterprises, have specific structures to combat occupational risks, these small and medium-sized enterprises are very keen to receive aid and need specific tools. Moreover, since they often have limited financial resources, they are the first ones interested in financial incentives to prevention. The agreement on objectives at the national level deployed at the enterprise level by the prevention contract is an approach which is especially well suited to them.

**Design and implementation**

This approach first involves working out an agreement on objectives at the national level between the national health insurance fund for salaried workers (CNAMTS) and the occupational branches. The agreement on objectives is thus an act by which an occupational sector agrees to preserve and improve the health and safety of the employees it hires. The CNAMTS agrees to provide technical and financial aid to the enterprises represented by the occupational branch, which wishes to subscribe to the agreement on objectives. The CNAMTS can use 0.6% of the amount of contributions paid by all enterprises for occupational injuries and diseases. This corresponds to slightly more than € 38 million per year.

Each agreement contains a programme of prevention actions specific to the branch of activity concerned. These agreements on objectives contain general guidelines; they define the main objectives for occupational injury and disease prevention and for improvement of working conditions, the subjects on which they take action and the administrative conditions. To prepare the agreement, management and organised labour and the National Fund establish a dialogue.

In particular, this dialogue concerns analysis of the results of the activity considered from the statistical viewpoint (number of accidents causing work stoppage, causing permanent disability, fatal accidents, occupational diseases and the cost represented by all these statistics). Analysis can show whether the sector in question represents a high risk and whether it is necessary to carry out prevention actions in the sector for which financial aids will be provided on a priority basis. It is on the basis of the diagnostic of occupational risks detected that one will determine the objectives to be proposed to the enterprises in the sector. Objectives regarding capital investment and training resources will be proposed, as well as objectives for results in the form of lower thresholds of exposure, limiting values and improvement of safety.

Once these objectives have been determined, the agreement is signed between the CNAMTS and the occupational branch, after approval by the National Technical Committee — CTN <sup>(1)</sup> — concerned and the Ministry of Social Security and Labour. The agreement has a general term of validity of four years. It lays down the financial contribution that may be granted by the fund, namely a participation ranging between 15% and 70% of the cost of capital investment. This participation is on average 22% for all contracts.

### Implementation

This policy materialises in the signature of prevention contracts between the funds and those enterprises which ask to benefit from them. The enterprises concerned are those with less than 200 employees and belonging to a sector of activity for which an agreement on objectives has been signed at the national level. Experience shows that the enterprises benefiting from these agreements seldom have more than 50 employees.

The prevention contract is established in accordance with an initial analysis of risks encountered in the enterprise. The analysis is performed jointly by the Prevention Department of the Regional Health Insurance Fund (CRAM) and the



Example of a dust-sucking and cleaning device co-financed by a CRAM in a crushing centre for the cleaning up and recycling of metals.

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*The system of agreements on objectives and of prevention contracts obviously represents for SMEs of less than 200 employees the smartest and most productive financial incentive, since 1947, in the field of occupational risks prevention, and in a general way for the improvement of the working conditions. This is based on a real contractual partnership between the regional health funds and the companies.*

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Mr J.-P. Peyricol (MEDEF — President of the Occupational Accidents and Occupational Diseases Commission)

<sup>(1)</sup> There are 15 CTNs in France, covering the enterprises governed by the general social security regime.

Prevention contracts on the 31 December 1999 — National total per national technical committee

National Technical Committee	Number of contracts	Amount of contracts (€)	% of the national total number of contracts	% of the national total amount	Average amount per contract (€)	Contracts average amount in % of the global investment of companies	Average number of employees per contract
01 — Metallurgical industry	4 543	127 725 260	32.45	34.08	28 115	21.81	34
Excluding repairs and autos sales	2 741	102 809 809	19.58	27.43	37 508		
02 — Construction	4 129	77 126 960	29.49	20.58	18 679	24.44	30
03 — Wood	1 142	35 135 066	8.16	9.38	30 766	22.86	43
04 — Chemistry	233	10 043 671	1.66	2.68	43 106	21.77	62
05 — Stone and heat-resistant earth	695	21 386 140	4.96	5.71	30 772	21.75	37
06 — Rubber, paper, cardboard	190	9 012 286	1.36	2.40	47 433	20.30	92
07 — printing	228	8 281 815	1.63	2.21	36 324	23.10	44
08 — Textiles	114	6 709 557	0.81	1.79	58 856	19.30	90
09 — Clothing	28	1 122 239	0.20	0.30	40 080	17.59	44
10 — Leather & craft	98	2 083 155	0.70	0.56	21 257	24.38	92
11 — food trade	947	29 862 742	6.76	7.97	31 534	20.07	44
12 — Transportation and Handling	800	24 336 421	5.71	6.49	30 420	14.09	50
13 — Water, gas, electricity	0	0	0.00	0.00	0	—	—
14 — Non-food trades	90	1 550 364	0.64	0.41	17 227	18.31	35
15 — Others	666	16 523 729	4.76	4.41	24 810	25.61	84
DOM (outside Europe)	98	3 059 385	0.70	1.03	39 382	21.07	56
<b>Total</b>	<b>14 001</b>	<b>374 759 094</b>	<b>100.00</b>	<b>100.00</b>	<b>26 766</b>	<b>21.62</b>	<b>42</b>

enterprise, and it implies compliance with the general work organisation and sometimes obligations to change the layout of the workplace. An action plan over three years, coming within the framework of the objectives, priorities and themes of action adopted by the agreement on objectives, is included in the contract.

This plan specifies the intermediate stages and deadlines, and the final objectives aimed for. While the analysis takes into account the risks listed in the agreement on objectives applying to the enterprise, this does not prevent the CRAM from extending its action to other risks specific to the enterprise.

The staff representatives, the regional director of labour and the CNAMTS conclude the contract after approval by the CHSCT (Corporate Committee for Health, Safety and Working Conditions) or, failing that, by the staff representatives. It provides for the conditions of financial participation by the fund and the conditions of definitive granting or reimbursement of those sums upon expiry of the contract.

The contracts, having a term of three to four years, shall include:

- a report on the initial risk situation;
- the prevention programme;
- intermediate reports for short-term objectives;
- a final situation report at the end of the contract.

The funds are paid first in the form of an advance, possibly staggered in several payments, depending on the state of progress on the planned actions.

The CRAM performs a regular follow-up of progress on the contract, and final evaluation of the system is performed by the enterprise. In the light of this evaluation, the financial advance is kept permanently by the enterprise, or else is reimbursed in full or in part, with payment of interest when all or some of the objectives of the contract have not been achieved. In 98% of cases, the objectives have been achieved and there are no grounds for a reimbursement.



*Example of a working station laying-out co-financed by a CRAM. It is about cardboard cutting with a protective device consisting in a mobile wire fenced casing associated to a sensitive bar and a lifting table for the handling of cardboard at a constant height.*

*The technical competence of the CRAMs seems to be greatly appreciated, and one observes that the financial question, which serves as a lever at the start of a contract, takes second place behind the assistance of specialists.*

J.-P. Cazeneuve (CNAMTS)

### Experiences gained and effectiveness

All the agreements signed at the national or regional level cover most ordinary risks. Since 1988, more than 14 000 prevention contracts have been signed for a total amount exceeding € 375 million. It is in the metallurgy, timber, food and transport industries that the most contracts are found. In 1999, 1 465 contracts were signed, worth around € 36 million. The main types of risks and nuisances covered by the contracts in 1999 were handling and traffic, chemical nuisances and physical nuisances.

One of the strengths of this system lies in the involvement of management and organised labour, both at the national level and at the corporate level, but, for enterprises, the conditions of eligibility appear rather unclear. For their part, the staff of the 'institution' regret that they do not have a larger budget to carry out larger-scale actions.

The enterprises also regret that the system is cumbersome to manage and that the procedures are lengthy. Once the contract is completed, the enterprises want to be able to maintain close ties with the CRAM, which is not always possible. The CNAMTS is considering a light follow-up structure to maintain contact with the enterprises.

#### Breakdown per type of risk or nuisance

Risks nuisances	Mechanical risks	Handling circulation	Other risks	Physical nuisances	Chemical nuisances	Ergonomics	Training	Total
% of CRAM participation	10.33	35.47	3.14	14.64	23.39	7.35	5.68	100.00

NB: From 1988 up to the 31 December 1999; CNAMTS/DRP figures.

Risks nuisances	Mechanical risks	Handling circulation	Other risks	Physical nuisances	Chemical nuisances	Ergonomics	Training	Total
% of CRAM participation	8.17	43.69	2.35	11.84	19.19	8.30	6.46	100.00

NB: For the year 1999; CNAMTS/DRP figures.



Example of a closed blasting cabin co-financed by a CRAM. Use of water-based cleaning product with a closed circuit recycling system.

### Effectiveness

A quantitative study carried out in 1998 on a sample of 69 enterprises having applied a prevention contract through to expiry shows that the trend in the 'average cost' of occupational injuries, with work stoppage over a period of five years, is clearly downward (40% decline). This also holds true in comparison with the national average for occupational injuries and with the national average for the risks selected for the sample (by risk number). The slight fall in the number of occupational injuries with work stoppage, concomitant with this reduction in the average cost of accidents, leads to the conclusion that the severity of occupational injuries in the sample has been attenuated.



Example of a working station in a transportation company co-financed by a CRAM: platform able to adjust itself to the various type of trailers.

This approach to prevention broadens the panel of competencies of the CRAMs by bringing them closer to the enterprise. The contractual approach leads the enterprises, with the help of the CRAM, to trigger an overall evaluation of risks and drive a veritable prevention action in the enterprises. It has often been observed that enterprises wishing to benefit from this aid had a prevention project which was precise but which did not take into account all aspects of the question. Joint examination of the project by the enterprise and the CRAM experts permits more general thinking on safety. This dialogue makes it possible to go beyond the initial framework of the project and helps the enterprises move forward. The CRAM departments thus appear as reliable, competent technical partners. These departments see a change in their role, from controller to counsellor facilitating discussions, listening and knowledge of one another.

The enterprises also profit from this approach, which enables them to go further in their prevention project. An initial satisfaction survey carried out in 1992 had established that 86% of the signatory corporate managers were satisfied with the approach. In general, the financial aid provided to the enterprise enables it to go further with its original plans. Some enterprises may remain in contact with the prevention departments of the institution for other projects without having to apply for further financial aid. This initial approach

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*The contractual policy towards SMEs, initiated by the Occupational Accident and Occupational Diseases Commission, with the system of agreements on objectives and of prevention contracts shows a triple interest:*

- *it stimulates and encourages a preventive approach by involving social partners in it (CHSCT or employees representatives — employers);*
  - *it brings the CRAM prevention departments closer to companies by enhancing their consulting role;*
  - *this mutual fund is the expression of the solidarity between companies.*
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Mr J.-M. Thomas (Force Ouvrière Union  
— Vice President of the Occupational  
Accidents and Occupational Diseases  
Commission)

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*After a positive experience lasting for more than 10 years, one must perpetuate these measures to boost a real prevention culture among SMEs. However, as in any plan, it is necessary to improve these measures, to make them more attractive by reinforcing the employees' participation and the one of their representatives at the prevention contracts' level and by simplifying all the procedures for the companies.*

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Mr J.-M. Thomas (Force Ouvrière Union  
— Vice President of the Occupational  
Accidents and Occupational Diseases  
Commission)

can have spin-off effects, because the enterprise undertakes other prevention measures.

The trade union organisations are satisfied to be able to take part in working out the national agreement on objectives, even though they cannot act on the implementation of these agreements to which they are not signatories. At the level of the prevention contract, they regret the weak involvement of the employees. At the level of industry organisations, the few units providing aid for arranging and following up cases have given good results.

### Transferability

This financial incentive tool is fully transferable on condition that a large budget is devoted to it, but the essential factor will be the existence of a good prevention culture and a technical culture. This approach implies the collective support of an employment sector.

### Further information

Mr Jean-Pierre Cazeneuve  
Direction des Risques Professionnels  
CNAMTS  
33 avenue du Maine  
F-75015 Paris  
Tel. (33-1) 45 38 60 24  
Fax (33-1) 45 38 60 70  
E-mail: [jp.cazeneuve@cnamts.fr](mailto:jp.cazeneuve@cnamts.fr)

# 6.

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## CONCLUSIONS



# 6.1 QUANTITATIVE ASSESSMENT OF THE CASES

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## Lower accident frequency rates

This report includes many indications of the positive effects of the described intervention programmes with respect to the frequency of work accidents. Although the type and the level of intervention varies substantially, it seems that the more direct contacts with a specific target group the higher the impact of the intervention.

The Austrian national awareness campaign on the prevention of falls at the workplace using an advertising and PR campaign reduced falls at the workplace by almost 10%. Interventions by public authorities such as the UK's Health and Safety Executive in the 'Recipe for safety' campaign in the food and drink industry, aiming to increase safety awareness resulted in a decrease of about 13%. An awareness raising campaign in Alsace-Moselle on scaffolding safety resulted in a reduction in accident rates of almost 10%.

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*Interventions at national or regional level including direct contact with companies show that more impact can be obtained.*

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Interventions at national or regional level, including direct contact with companies, show that more impact can be obtained. The case of Programma Aragón shows that action by regional inspectorates can help to reduce accident rates by more than 25% in 'high-risk companies'. Other regional Spanish inspectorates have had similar experiences. In the 'Recipe for safety' campaign by the Health and Safety Executive a reduction of 33% has been obtained when they focused on 19 companies or 'black spots' with injury incidence rates more than three times the average for the food and drink industry.

Intervention programmes initiated by sector organisations also generally have high impact. An intense campaign on falling from heights in the construction industry (Germany) that included the introduction of some accident prevention regulations and reaching out to all stakeholders obtained a reduction in the accident rates of about 30%. A campaign organised by the security industry in Germany obtained an accident rate reduction of about 37% in the companies involved. Another initiative in the farming sector in Denmark focused on a specific group. This group was 'exposed' to safety checks at the farm and behaviour training. This initiative managed to cut accident rates by over 40%.

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*Prevention programmes designed to cut accidents in specific companies often report quite dramatic cuts.*

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Prevention programmes designed to cut accidents in specific companies often report quite dramatic results. Reductions of over 50% are possible if the specific issues with the working environment are dealt with systematically. But also more general methods such as Tuttava - focussing on tidying up the workplace - seem to be able to cut accidents by about 20-40%.

Further, safety can be improved substantially in major infrastructure projects such as building bridges and making tunnels for high-speed railways by taking special safety measures or through campaigns.

### Reduced severity rates

In most cases information was included about changes in the severity of the accidents – the severity rate, which is reflected by the length of absence of work. Often the severity rate goes in line with the reduction in the frequency of accidents. Although there seem to be exceptions:

- in the Belgium case on navigable inland waterways there was little decrease in the severity rate in spite of a strong decrease in the frequency;
- in the French case on prevention contracts there was severity rate a substantial decrease in the severity, as indicated by about 40% lower costs per accident, but the decrease in frequency was apparently not substantial.

### Reduction in fatal accidents

In some cases information on the number of fatal accidents has been included. This indicator follows the trend of the accident frequency rates mentioned before; although fatal accidents seem to be reduced relatively more strongly:

- in the scaffolding case (Alsace-Moselle) the number reduced from 4 to 1 per year;
- in the Austrian campaign to prevent falls at the workplace this was - 18%;
- in Ireland it reduced from 19 to 15 per 100.000 at work in the construction sector.

In some cases where complicated infrastructure works are carried out such as the Øresund bridge and the high-speed railway between Florence and Bologna this indicator is also used. Both projects have had considerably lower rates than other previous infrastructure works.

### Positive cost-benefit ratios

In some cases it was possible to calculate a cost-benefit ratio. The ratio for the Austrian case on preventing falls at the workplace is 1: 6. That means that every euro invested is returned six times. In the case 'Recipe for safety' – Safety in the food and drink industry – this ratio was 1:4-1:5.5. In the case of the security industry in Germany it was pointed out that the safety measures introduced paid for themselves within three years.

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*Often the severity rate goes in line with the reduction in the frequency of accidents.*

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*Safety measures introduced paid for themselves within three years.*

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## 6.2 QUALITATIVE ASSESSMENTS OF THE CASES

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The cases described in the previous chapters contain several features that have contributed to the success of the action and can be considered as essential elements in good practices aiming to cut accident rates.

### The importance of a monitoring system

All the cases showed the need for an effective assessment of analyses of the risks, whether at a sector level or in the individual workplace, and a well functioning monitoring system appears to be an important input into this process. Many cases show that monitoring systems that contain statistical information were used as a tool to identify and assess problem areas. This information could then be used to make a more in-depth analysis. In many cases, such as ‘Cutting accident figures’ as well as ‘Programa Aragón’, use was made of existing data to enable actions to be targeted at specific companies or workplaces. In ‘Farm accidents’, all accidents were systematically recorded and post-accident interviews were conducted. In ‘Preventing hazards from fires and dust explosions in the aluminium industry’, all accidents in the sector were investigated over a period of several years. In ‘Recipe for safety’ — Safety at work in the food and drink industry, statistical data analysis enabled the identification of two major causes of accidents: injuries from manual handling, and slips or trips. Consequently, the prevention campaign was targeted on these risks.

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*The process of identifying problems, assessing and subsequent formulating and implementing prevention programmes relies largely on a well functioning monitoring system*

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The process of identifying problems, assessing and subsequent formulating and implementing prevention programmes relies largely on a well functioning monitoring system that provides sound statistical information about possible priority areas. This is then often used as an input to more in-depth risk assessments and analyses.

### Preventing risks at source

In some cases, such as ‘Scaffolding action in the construction sector in Alsace-Moselle’ and ‘Preventing needle-in-finger injuries — William Baird’, it is shown how technical measures can control and sometimes even eliminate risk at its source. Scaffolding that can be set up and used safely and finger protection guards that can be installed on new or old sewing machines are examples of actions to overcome risks by technical solutions. However, their use by other companies still has to be promoted. Such devices are a first step towards greater safety at work, as new technology often also requires training, advice, new working methods and financial resources.

## Social dialogue, partnership and workers' involvement

Social dialogue between employers, employees or their representatives at the enterprise level, and unions and employers' associations at the sector, regional or national level, is an important condition for success. This is illustrated by the case 'Prevention campaign in the textile and clothing manufacturing sector', where the aim was to create a general awareness of safety and health to serve as a basis for further action. Agreement on a safety and health subject turned out to be an important means of promoting dialogue between the social partners.

In Ireland, in response to a bad occupational accident record, a partnership agreement was signed between government, employers, employees and the institution in charge of occupational risk prevention. The objective of this partnership action was to promote a culture of safety in the construction sector. Each player has its own role to play in the partnership. In 'Recipe for safety in the food and drink industry', employers and the employees' unions in this industry agreed on a 'common strategy' document. This agreement incorporates a commitment by each partner, and also lays down actions for each of the parties, including the institution in charge of occupational risk prevention, covering all stages of the campaign. 'Preventing needle-in-finger injuries — William Baird' is another example of cooperation where action started with a corporate initiative. The aim was to develop a safety device for the company's own use. Once the device was shown to be effective, and with the company's agreement, it was promoted within the industry by the union with the help of the institution in charge of occupational risk prevention. The device has been widely accepted and the concept has been integrated into a CEN standard.

'Tuttava — Safe and productive working habits' and the WASP method illustrate the benefits of involving employees and all levels of management in the prevention process. Consultation of employees was also an essential factor in 'Safety management in the steel industry — Arbed'. Finally, the importance of employee involvement is made clear in the case of 'Long-term action for occupational safety and health — TITAN'.

## Measures have to be appropriate: not too complex or expensive

Enterprises must be able to implement the proposed measures. Measures therefore have to take into account the enterprise's needs and means. Measures have to be appropriate: not too complex or expensive. This also implies that sometimes enterprises may have to be assisted with financial support or grants, but help can also consist of technical advice or training. Prevention contracts for SMEs based on a sector agreement illustrate this. Within the framework of a national sector agreement, a contract can be signed between the enterprise and its regional accident insurance fund. These contracts set objectives to be implemented at enterprise level that are in principle already agreed at the national level. Experience shows that this is one way of helping enterprises to design prevention measures that often go further than their original plans and the legal requirements.

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*Means and capabilities of the enterprise or sector*

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# 6.3 ASSESSING THE ACTIONS

Many of the case descriptions include some information on the quantitative and qualitative effects of the intervention. This information is summarised in the table below. It also includes some information about the potential relevance for other enterprises, sectors, regions or countries.

Case	Assessment of the impact	Relevance for others
Safety during the building of a high-speed rail between Bologna and Florence.	A regional authority initiated this action. The aim was to bring all the companies involved in the project towards a high level of safety. The works started in 1996 and are still ongoing. The observed average number of fatal accidents in such a construction site is one fatal accident per kilometre. After 50 kilometres completed only two fatal accidents have been recorded.	Even on a complex and large construction site safety is possible, due to a strong commitment from authorities and all other partners. Means and infrastructures were provided. This scheme can be applied to any large construction works where many different trades are working together. Involving all the players in OSH from the very start of the project is one way to reduce the number of accidents.
Scaffolding action in the construction sector in the Alsace-Moselle region.	This regional action started in 1994 and is still ongoing. The frequency rate fell from 11.35 in 1994 to 10.45 and the severity rate from 0.76 to 0.68 from 1994 to 1999.	A joint action undertaken by all stakeholders in the construction sector resulted in a noticeable reduction of the number of falls from heights by using adequate scaffolding. The association of manufacturers of scaffolding had a key role in the action.
The Øresund fixed link: safe procurement in the constructions sector — the Danish landworks.	The action described was implemented during the construction of the Øresund fixed link, which started in 1993 and was finalised in July 2000. The Danish landworks represented approximately 4.6 million working hours.	The same initiatives may be applied in relation to other large construction projects in particular, but also smaller projects could benefit from using the scheme.
Safety with every step — a national Austrian campaign to prevent falls in workplaces.	This action was undertaken at the national level in 1997 and 1998 and was targeted at over 2 750 000 persons. It has been estimated that the number of falls decreased by 9.3%, costs were reduced by 5.7% and working days lost by 4.4%.	Falls are the most frequent cause of accidents and they are often underestimated. This campaign showed that when awareness is raised behaviour changes and positive results are reached. The information material produced is suitable for other areas.
How to reduce accidents in high-risk companies by using a targeted inspection campaign: Programa Aragón, Spain.	Accident rates decreased by more than 25% in targeted groups with a higher than average number of accidents.	This scheme can be applied in other regions or Member States if the underlying information about accidents is available.
Falling overboard in the maritime and fishing sector.	The goal of this campaign is to alter the behaviour of seafarers and change their attitude so as not to consider wearing personal protective equipment (PPE) as abnormal. So far, no quantitative data have been made available, although it is believed that the awareness of the risk has increased.	This national campaign for preventing the risk of drowning aimed at the occupational safety of crew in the fishing, commercial shipping and fish-farming businesses by using adequate PPEs. This awareness campaign can be implemented in the same sector in other countries as well.

Case	Assessment of the impact	Relevance for others
Prevention strategy for the security industry in Germany.	This action was developed between 1990 and 1996 in a fast-growing service sector suffering from many accidents. In the companies taking part in the programme, the accident rate fell by 37%; it fell by 25% in the whole security industry.	Many companies entered the programme on a voluntary basis and this well-targeted action was effective as it offered a catalogue of measures adapted to the sector. The close cooperation between the trade association and its accident insurance organisation led to broad acceptance by the companies and their employees.
Farm accidents in Denmark: a model for prevention.	Many accidents occur in the farm sector. A regional programme based on discussion, demonstration of good practice and exchange of experience led to a decrease in accident rate of over 40%	Systematic risk analysis can be undertaken at sector level. Detailed knowledge of the working conditions is crucial to design an effective prevention programme. This scheme has been designed for small farms and could also be transferred to other areas or activities.
The 'Recipe for safety' campaign — Safety at work in the food and drink industry in the United Kingdom	This campaign started in 1990 and was targeted at all food and drink factories. These targeting and joint efforts by stakeholders proved effective as the injury incident rate fell by 13% and the number of fatal injuries by 39%.	Specific guidelines are developed and distributed to enhance awareness about risks. This type of action can be applied by industries where there is intensive manual handling, hand carrying, loading and unloading, storing and delivery.
Accidents in the German construction industry involving falls from heights.	This action was started in 1993 by the institution responsible for statutory accident insurance. Around 352 000 companies and 3.6 million people were concerned. A survey conducted in 1996 indicated that the number of falls from heights had reduced by 30% between 1990 and 1996.	An analysis of the causes of all accidents' led to the modification of existing regulations; at the same time, more stringent technical rules were applied. The availability of suitable equipment allowed the companies to meet the new regulations. A well-targeted action had positive results.
Preventing road accidents in the Italian Highway Police force.	A five-year study (1993–97) was undertaken into the relationship between road accidents and sleep patterns. An awareness campaign aimed at officers in the Highway Police force was launched in 1999. Increased awareness and more openness to the issue has been observed.	It is crucial to make workers more aware of the basic rules of 'sleep hygiene' (e.g. importance of the signals that announce sleepiness, etc.). Sleep disorders are a risk to workers and for any company that have shift workers or workers involved in transportation.
The Irish construction safety partnership.	The action started in 1999 and is still ongoing. It was initiated in reaction to a sharp rise in the number of fatal accidents in the construction trade.	Joint actions by the stakeholders in a specific sector can give good results and can be initiated in any other well-organised sector.
The invisible co-driver, an alcohol awareness programme for truck drivers.	This action initiated by a preventive service consisted in amending and implementing an existing programme, tailoring it to this sector.	Participation in this programme is on a voluntary basis. The participants are looking for support and are satisfied to see their problems recognised.
Preventing hazards from dust fires and explosions.	This action was conducted in the 1970s when many dust explosions in aluminium grinding shops occurred. The partners carried out an analysis of accident causes and technical guidelines were developed. No explosions have been recorded since 1983.	Guidelines were issued after a systematic investigation of all accidents and contain practical and inexpensive measures that companies are able to adopt. Support is also provided to companies to implement these measures. The inspection bodies enforce these rules.
Prevention campaign in the clothing industry, Portugal.	This action started in June 1999 and is ongoing. It aims to develop general awareness about safety at work. This should also create a background for further specific and targeted actions in Portugal.	Occupational health and safety is sometimes one of the few issues where social dialogue is possible. This scheme can be applied to any sector where the safety culture is weak.

Case	Assessment of the impact	Relevance for others
Preventing needle-in-finger injuries in the clothing and textile industry — William Baird.	A clothing company looked together with a workers representative for modifications at their production machines in order to reduce the number of accidents and financial claims. After the introduction of the modification accidents fell by 92% and their costs decreased by more than € 160 000 in two years.	A team designed an economic, but highly effective guard in a few months. Action to improve the safety of work equipment can be applied in any industry where small but numerous accidents are common. The effective co-operation with social partners was a key to success.
Cutting accident figures by implementing a systematic safety policy.	Dienst Scheepvaart (Belgium) introduced an accident-prevention policy in 1989. The frequency rate fell from 107.6 in 1988 to 35.4 in 2000. During the same time period, the severity rate fell from 2.53 to 0.79.	The systematic recording of accidents by a safety committee made it possible to analyse the causes of accidents. On the basis of this information, as well as visits on the spot, preventive measures were taken. This example is about a public organisation, but can easily be transferred to other public services with many different work locations.
Long-term action for occupational safety and health —TITAN Cements Co.	This action started in 1970 and is still ongoing. The accident frequency rate fell from 57.07 in 1970 to 6.54 in 2000. A sharp decrease was observed in the first years when the rate fell to 23 in 1979 and is permanently under 10 since 1988.	The willingness of the management to create a safe working environment and support by the unions of the measures taken created the conditions for a considerable decrease of accident rates over the years while preserving competitiveness.
Safety management in the steel industry: ARBED.	Special prevention efforts were undertaken by the end of 1997. The accident frequency rate fell from 46.0 in 1997 to 12.3 in 2000; the severity rate fell from 1.24 to 0.94 over the same time period.	A safe working environment can be part of a 'total quality' scheme. Commitment from management and workers towards a safe working environment is not limited to technical issues but must also deal with behavioural and motivational issues.
Tuttava: safe and productive working habits.	This tool was developed in the 1980s and has been used in more than 1 000 companies, in several countries. It is based on four elements: employees' participation, strong involvement of management and employees, systematic analysis and feedback. Experiences show that accident rates are reduced with about 20 to 40%.	This Finnish participatory programme or tool deals with behaviour and it can be applied in most companies.
The WASP method — workgroup analysis for safety promotion.	This method is a further development of the ERFO method (Sweden). It is a method where unsafe work practices are analysed by the workers themselves.	The method is based on behavioural change. The assumption is that prevention is more effective if the employees become aware of the risks and contribute to possible ways to avoid them.
Prevention contracts for SMEs based on sector agreements.	This action was initiated in 1988 and has been designed for SMEs employing less than 200 employees. Up to now, more than 14 000 contracts have been signed for a total of € 375 million. The reduction of the average cost of occupational injury gives an indication of its effectiveness.	The programme is designed at the sector level and implemented at the company level with technical and financial support.

# APPENDIX 1

## METHODOLOGY AND DATA COLLECTION

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A project team was created consisting of the following persons: Jean-Loup Wannepain, Marie-Chantal Blandin and Catherine Lecoanet (all Eurogip), Ina Neitzer and Dietmar Reinert (BIA), Robert Hitjmans (TNO) and Owen Tudor (TUC). This project team met in Brussels for a kick-off meeting on 1 March 2001, where the working method proposed to the Agency was discussed in more detail.

A first selection of cases was made according the criteria listed by the Agency. For most Member States, several cases were available. The most important criterion for selection was to include only cases that have demonstrated to be effective occupational accident campaigns. The transferability of the method was also of interest for the project team. Finally, the whole set of cases should cover a broad range of subjects.

The data collection and descriptions were made using a checklist prepared by Eurogip. Face-to-face interviews and telephone interviews were also conducted.

All the draft case studies were approved by the local contact person before being forwarded to the Agency. The Agency consulted all the national focal points about the case studies originating from their Member State.



# APPENDIX 2

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