

ACTIONS TO IMPROVE SAFETY AND HEALTH IN CONSTRUCTION

7

Magazine of the European Agency for Safety and Health at Work

magazine



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Foreword

Construction is one of Europe's largest industries, with an annual turnover in excess of EUR 900 billion ⁽¹⁾ and nearly 13 million employees in the EU-15 Member States alone ⁽²⁾.

Unfortunately, it is also one of the most dangerous. More construction workers are killed, injured or suffer ill-health than in any other industry ⁽³⁾.

Every year:

- more than 1 000 workers are killed ⁽⁴⁾;
- over 800 000 workers are injured, many seriously ⁽⁵⁾;
- nearly 600 000 workers work on sites where asbestos fibres are present ⁽⁶⁾;

⁽¹⁾ FIEC website <http://www.fiec.org/main.html> *Construction in Europe — key figures*.

⁽²⁾ Sectoral profiles of working conditions; European Foundation for the Improvement of Living and Working Conditions, *Third European survey on working conditions 2000*, ISBN 92-897-0130-7.

⁽³⁾ 'The state of occupational safety and health in the European Union — Pilot study', European Agency for Safety and Health at Work, 2000.

⁽⁴⁾ Eurostat, 1999.

⁽⁵⁾ Eurostat, 1999.

⁽⁶⁾ *Occupational exposure to carcinogens in the European Union 1990-93*, Carex, International information system on occupational exposure to carcinogens, Finnish Institute of Occupational Health, Helsinki 1998.

- nearly half of all workers report some sort of muscular problem (backs, necks and shoulders), and noise-induced hearing difficulties are prevalent ⁽⁷⁾.

Although significant progress has been made in improving the industry's occupational safety and health (OSH) standards over the years, as these figures show, the number of deaths, injuries and cases of ill-health are still unacceptably high. The pain and suffering of those directly affected — the individuals, families, friends and colleagues — is self-evident. However, for the industry, accidents and ill-health also have a huge financial cost, which makes for a compelling business case for improving safety and health.

Action is required by all involved: employers both large and small, employees, unions, clients, architects, designers and contractors. This action needs to be applied at all stages of a construction project: from the design and planning to the construction site and to subsequent maintenance.

This year's European Week for Safety and Health at Work is designed to help all stakeholders in the industry work together to raise OSH standards and build a safer, healthier and more productive working environment. Under the slogan 'Building in safety', the campaign is backed by all Member States, EU acceding, candidate and EFTA countries, the Irish and Dutch Presidencies, the European Commission and Parliament, trade unions and employers' federations.

It is the fifth European Week to be organised by the Agency, and the first aimed at one specific industry sector. It will take place from 18 to 22 October 2004, but events are being carried out throughout the year, in over 30 countries.

The Agency is working, together with its campaign partners, to promote and improve the management of risk on all types and sizes of construction projects. Details can be found on a dedicated European Week website at: <http://ew2004.osha.eu.int>.

In addition, a good practice awards competition will provide recognition for companies or organisations that have made outstanding contributions to the prevention of risks in the construction industry.

The campaign promotes the exchange of information and good practice. This practical information is provided for the key players in the construction industry: the clients, designers, architects, engineers, employers, employees and contractors. These key players make important decisions at procurement, planning, during construction and after completion. These decisions can result in action being taken to reduce risks, and make the construction industry safer and healthier.

Providing this information is a main priority for the Agency. The website provides links to documents, and providers of good practice where more information is available. This includes information from Member States on strategies and programmes being used by enforcing authorities and other key players in the industry to improve safety and health. This can be used by political decision-makers and social partners to adapt and develop existing policies.

This magazine brings together articles from a variety of sources which demonstrate action at European and national level. The information highlights the scale of the problem, but also how, with action by all parts of the industry, the situation can be improved.

⁽⁷⁾ European Foundation for the Improvement of Living and Working Conditions, *Third European survey on working conditions 2000*, ISBN 92-897-0130-7.

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A statistical portrait of health and safety at work in the construction industry

Overview of the construction sector

In 2002, the construction industry (NACE sector F) contributed EUR 470 billion to the EU-15 economy calculated as gross value added at basic prices. This equals 5.6 % of the total of all NACE branches, or 5.2 % of the gross domestic product of the EU-15. This contribution was created by some 1.9 million construction enterprises. According to the Labour Force Survey 2002, the sector employed 12.7 million workers (7.9 % of the total EU-15 workforce) of which 91 % were men. Since the previous EU enlargement in 1995, the construction workforce has increased roughly at the same pace (9 %) as employment overall (10 %). The share of construction workers of the overall workforce ranges from 5.5 % in Sweden to 12.7 % in Portugal (Table 1).

Table 1. Proportion (%) of construction workers (NACE F) of the total workforce in 2002

Country	% of construction workers
EU-15	7.9
BE	6.6
DK	6.6
DE	7.6
EL	7.6
ES	11.9
FR	6.6
IE	10.6
IT	7.9
LU	9.1
NL	6.5
AT	8.9
PT	12.7
FI	6.3
SE	5.5
UK	7.4

The statistical evidence indicates that the situation of health and safety at work for salaried workers, workers in large companies, full-time workers and workers with an unlimited contract may be, on average, better than for self-employed workers, workers in small companies, part-time workers or workers with a limited duration of contract. Construction workers seem to be in a somewhat unfavourable situation concerning its distribution according to most of these variables. In comparison to the workforce overall, construction

workers are more often self-employed or other non-salaried workers (23 vs. 15 %), they work more often in local units of less than 50 workers (82 vs. 63 %) and the salaried workers in construction have, less often, an unlimited duration of contract (80 vs. 86 %). On the other hand, construction workers are more often in full-time employment than are workers overall (95 vs. 82 %). The latter difference results mainly from the fact that part-time employment is six times more common among women than among men and, in construction, most workers are male.

According to the European Survey of Working Conditions (ESWC) of 2000, construction workers report an average of 7.3 days of illness absence from work during the year, of which they report that 32 % are due to accidents at work, 28 % to non-accidental work-related health problems and 40 % to non-work-related health problems. If applied to the 12.7 million workforce in construction, these figures mean that 30 million days are lost each year because of accidents at work and 26 million days due to other work-related health problems.

Safety at work

The preliminary 2001 data from the European Statistics on Accidents at Work (ESAW) show that there were about 822 000 accidents at work with more than three days lost, and about 1 200 fatal accidents at work in construction in the EU-15. These figures represent 18 % of non-fatal and 24 % of fatal accidents at work recorded by the national authorities of the EU-15 that year. Even though not all national data collection systems cover all sectors fully (such as the public sector), all occupations (military personnel) or all categories of professional status (self-employed or family workers), the share of construction is much higher than its share of the workforce.

Many more accidents occur in construction per every 100 000 workers than overall in the workforce.

In 2001, there were 7 200 non-fatal accidents at work per 100 000 construction workers covered by the national data collection systems, as compared to 3 800 accidents per 100 000 workers for the total of the nine NACE branches for which comparable statistics exist.

The incidence rate of non-fatal accidents at work was nearly two-fold in construction as compared to the average.

For fatal accidents at work the difference was even greater. There were 10.4 fatalities per 100 000 workers in construction and 4.2 per 100 000 overall.

Since 1994, there has been a steady decline in the incidence rate of both non-fatal and fatal accidents at work, both in construction and in the nine NACE branches overall (Table 2). The decline has been faster for fatal than for non-fatal accidents at work.

In the construction sector, the incidence rate (EU-15 + Norway) of non-fatal accidents at work is the highest in small and medium-sized local units: 9 000 per 100 000 workers in units with 1–9 workers, 9 500 in those with 10–49 workers, 6 300 in those with 50–249 workers and 5 000 in those with at least 250 workers. These differences could reflect differences in the resources available to maintain and develop work safety, although it is also possible that the smallest companies operate in sub-sectors where the overall risk of accidents is higher.

Table 2. Incidence rate of non-fatal and fatal accidents at work in construction and in nine NACE branches (*) 1994–2001, EU-15

Year	Incidence rate (per 100 000 workers)			
	Non-fatal		Fatal	
	Construction	9 NACE	Construction	9 NACE
1994	9 014	4 539	14.7	6.1
1995	9 080	4 266	14.8	5.9
1996	8 023	4 229	13.3	5.3
1997	7 963	4 106	13.1	5.2
1998	8 008	4 089	12.8	5.0
1999	7 809	4 088	11.7	4.8
2000	7 548	4 016	11.4	4.6
2001 (*)	7 213	3 830	10.4	4.2
Change in 1994-2001	- 20 %	- 16 %	- 29 %	- 31 %

(*) 9 NACE = agriculture, manufacturing, electricity, gas and water supply, construction, wholesale and retail sale, repairs, hotels and restaurants, transport and communications, financial intermediation, real estate and business activities.
 (*) For 2001, the data are from 2000 for Portugal and 2001 for the other Member States.

Recognition of the safety risks of work is the prerequisite for effective prevention. According to the 2000 ESWC, construction has the highest prevalence of workers feeling that their health is at risk of injury because of work (19 %) as compared to about 7 % of all workers feeling so. According to the same survey, construction has the highest prevalence (48 %) of workers reporting that they wear some personal protective equipment half of the time or more at work, as compared to 25 % of all workers reporting so. But it is difficult to judge whether the percentages would need to be even higher in construction in view of the well-known risks inherent to construction work. Construction has a slightly lower than average prevalence of workers feeling they are well informed about the risks of work (37 % in construction, 41 % overall). Only agriculture has a lower prevalence (30 %).



Work-related health problems

The assessment of the non-accidental work-related health burden is rather complicated. The national recognition systems for occupational diseases are at least indirectly linked to the social security systems and they differ much more than the national data collection systems for accidents at work. On the other hand, surveys assessing work-related health problems can be performed in a harmonised way, but they need to rely on the respondent's own assessment concerning the work-related causality of the health problem.

The 1999 Labour Force Survey ad hoc module assessed the prevalence of self-reported health problems caused or made worse by work. The prevalence rate per 100 000 workers was slightly lower in construction (5 000) as compared to all sectors (5 370), while it was slightly higher for the more severe health problems causing at least two weeks of absence from work (1 950 in construction, 1 750 overall). Of the three main types of such health problems, construction had a higher prevalence for musculoskeletal problems (3 160 in construction, 2 650 overall). The prevalence was lower for stress, depression or anxiety (480 in construction, 1 180 overall) and there were no clear differences for pulmonary disorders (290 in construction, 300 overall).

Sources of data

1. Eurostat, New Cronos database. <http://europa.eu.int/newcronos/>
 - Theme 4/Structural business statistics/Annual enterprise statistics
 - Theme 3/Labour Force Survey
 - Theme 3/Health and safety/Health and safety at work/Accidents at work
 - Theme 3/Health and safety/Health and safety at work/Work-related health problems
2. *Third European survey on working conditions*, European Foundation for the Improvement of Living and Working Conditions, Dublin. <http://www.eurofound.ie>

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Coordinated action in the European construction industry

The Senior Labour Inspectors' Committee (SLIC)

The SLIC was officially set up in 1995 by Commission Decision 95/319/EC.

Its role is to assist the Commission by issuing opinions, either at the Commission's request or on its own initiative. These opinions concern all questions relating to Member States' application of Community law on health and safety at work, with a view to ensuring that it is enforced effectively and consistently throughout the European Union. The SLIC also gives its opinions on the application of other European legislation which has an impact on health and safety at work.

The SLIC was assigned various tasks and objectives, which are set out in Article 3 of the above Commission decision. These are as follows:

- defining common principles of labour inspection and developing methods of assessing the national inspection systems in relation to the application of these principles;
- promoting improved knowledge and mutual understanding of the different national systems in place;
- facilitating exchanges of labour inspectors between Member States and setting up training programmes for inspectors;
- promoting and developing exchanges between national labour inspection services of their experiences in monitoring the enforcement of secondary Community legislation;
- drawing up and publishing documents to facilitate the activities of labour inspectors;
- developing a system of rapid information exchange between labour inspectorates on all problems encountered in enforcing Community legislation in the field of health and safety at work;
- working together with third-country labour inspectorates, sharing with them the work done by the Community in this field (Community *acquis*) and assisting in resolving any cross-border problems;
- studying the impact of other Community legislation on health and safety at work.

The recent inspection campaigns in the construction sector and the Asbestos Conference are fully in line with the SLIC's terms of reference.

They also correspond to the objectives set out in the SLIC resolution (November 2002) concerning the part it intends to play in the Community strategy on health and safety at work 2002–06.

Moreover, the SLIC's construction campaign and Asbestos Conference are in keeping with the SLIC's long tradition, the origins of which date back to 1982.

Indeed, several campaigns, conferences and courses had already been carried out previously by the SLIC, such as the European agricultural inspection campaign (1999), which was very successful and provided experience which was very useful in the recent construction industry campaign.

The construction campaign was meticulously prepared by an ad hoc working group within the SLIC; this was the first time that Member States took a truly harmonised approach to inspections.

For the campaign it was agreed to have the same timetable, the same information campaign using the media and the press to raise awareness in the construction industry, the same inspection methods, and the same issues to be addressed.

The inspections were carried out using a standard questionnaire (checklist) and focused on two main aspects:

- preventing the risk of falls from height, in order to reduce the worrying number of serious and fatal accidents in this sector;
- monitoring the appointment of a site coordinator and of the role actually played by him.

This campaign, the results of which will be assessed by the working group which set it up, will be repeated in most Member States in 2004.

Following several European conferences and seminars organised by the SLIC, such as those concerning the textile industry (1998) and the car industry (1996), the asbestos seminars (2000, in France, Sweden, Spain, and the United Kingdom) paved the way for a good practice guide for workers and a training module for labour inspectors responsible for monitoring asbestos removal sites.

The recent European conference on asbestos, which was held in Dresden, Germany, from 3 to 6 September 2003, is in a way the culmination of all the work done within the SLIC on this subject. It was very timely in view of the forthcoming publication of the asbestos directive, 2003/18/EC, in the Official Journal.

This conference was felt to be very successful by the participants, who concluded their work with a declaration known as the Dresden Declaration on Asbestos.

By making this declaration, the conference confirmed the central role to be played by the Commission and the SLIC in the prevention of occupational diseases caused by asbestos, which is one of the most dangerous carcinogenic agents.

It formally calls upon the SLIC to take or to continue the following measures:

- produce guidelines which:
 - ensure consistent implementation of the legislation and comprehensive monitoring by the competent authorities, including prevention of imports of materials containing asbestos from non-EU countries;
 - help identify asbestos and asbestos products during use, maintenance and servicing of plant, equipment and buildings and raise awareness of their presence;



Labour inspector stopping dangerous work at height

- describe good practice on how to remove asbestos (*inter alia*, by dust suppression, enclosure and protective equipment) and how to handle asbestos-cement products and wastes;
- encourage an approach to protective equipment and clothing which takes into account human factors and individual variability;
- help share experience and bring greater consistency to medical surveillance (taking into consideration the existing approaches in Member States); and in particular to promote continuing medical surveillance after exposure stops and the establishment of national

registers. In the context of the improvement of the European List of Occupational Diseases, guidance should be given on the recognition of asbestos diseases;

- disseminate the existing guidelines prepared by Commission working groups on the training of asbestos operatives and of labour inspectors, and implement their recommendations by 2006;
- review the economics of asbestos removal, and discourage the payment of 'danger money', which undermines effective prevention;
- initiate, with the social partners, a European campaign in 2006 to support the implementation of the directive;
- stop the export of waste contaminated with asbestos to third countries.

The fact that the conference took this step shows the extent to which the scientific community, the social partners and national policy-makers have valued the committee's work to date and their hope and expectation that its role will be strengthened in future. Indeed, if European legislation is to be applied consistently across all Member States while responsibility for monitoring and inspection remains with the national authorities, there is no doubt that coordinated actions and benchmarking of inspection methods and procedures are indispensable.

By increasing exchanges of experience, comparing results on a voluntary basis and, in the near future, using the quality and performance indicators currently being studied within the SLIC, Europe can aspire to meet the objective it has set: achieving the highest level of protection of the health and safety of all workers in Europe.



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European construction campaign, 2003–04

The labour inspectorates of the 15 EU Member States, together with Norway and Iceland, carried out a mass inspection campaign into working conditions on building sites in June and September 2003. The coordinated campaign was part of an intensive European campaign in the construction sector that was commissioned by the Senior Labour Inspectors' Committee (SLIC) during the Dutch presidency. The most important starting point for the development of the campaign was the added value to be gained from a European approach.

On the basis of the initial reports on the inspection period in June 2003, it can be stated that the inspection campaign has had a fantastic result. Around 16 200 building sites were visited. It was the first time that such a coordinated inspection campaign had been carried out on such a massive scale within Europe by the labour inspectorates. However, the initial results of the inspection campaign also reveal that the campaign was certainly needed. The alarming number of dangerous situations meant that strict and assertive action had to be taken. For example, in 1 510 cases, work was halted due to seriously dangerous situations. In 189 cases, legal proceedings were instituted. A total of 12 051 fines were handed out and 32 269 warnings were issued.

The construction campaign covers the years 2003 and 2004. The main objective is to prevent people falling from heights. The inspection campaign was carried out in all Member States over two periods in 2003. The fact that Norway and Iceland joined in with the SLIC initiative meant that 17 countries took part in the joint inspection campaigns. The inspection campaign is to be repeated in 2004, again being spread over two periods.

One of the goals of the SLIC is to ensure harmonisation of compliance with and enforcement of the joint European regulations. This underlines the importance of the joint inspection campaign, which is, after all, a first step on the way towards such harmonisation.

A publicity campaign, linked to the inspection campaign, was implemented in various Member States. This too has been a major success. A great deal of media attention was paid to the campaigns. After expansion of the European Union, the inspection campaign is proposed to be extended into the new Member States, possibly starting in 2005. The construction sector in those countries first has to adapt somewhat to the European regulations.

Object and target groups

The umbrella theme of the European construction campaign is the safety of workers on construction sites. A common European basis was found in Council Directive 92/57/EEC of 24 June 1992 on the implementation of minimum safety and health

requirements at temporary or mobile construction sites. The important elements of this directive are prevention, cooperation and coordination. These elements from the directive are linked in the inspection campaign to the problem of people falling from heights. The danger of falling is one of the most important causes of accidents in the construction sector. Every year, thousands of employees in this sector in the EU countries become the victims of such accidents, of which more than 1 300 are fatal. Many accidents are due to the temporary and mobile nature of the building site or are attributable to insufficient prevention, cooperation and coordination. These elements therefore form the basis for the campaign. In anticipation of, and in connection with, the inspection campaign, a publicity campaign has been implemented in a number of countries. The publicity campaign focuses on the entire construction chain from the customer via the architects to the construction company carrying out the work and lastly the employees and their environment. The focus of the inspection campaign is primarily on the situation at construction sites.

The publicity campaign

Within the framework of the publicity campaign, the participating Member States were able to choose from the various options that became available during the preparation phase. A large quantity of information material was developed and published in the form of brochures, posters, leaflets, etc. Articles were published in specialist publications and more modern media forms were also used such as CD-ROMS, which were distributed on a wide scale, and TV and radio adverts.



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The publicity campaign was funded partly by a subsidy from the European Commission. Social partners were involved as much as possible in the development and execution of the campaign. This substantially increased the basis of support for the campaign. In many cases, the logo was used that had been developed at European level and this gave the campaign an additional European touch.

Attention was paid to the dangers and the possible consequences of accidents and employee absenteeism and the associated personal suffering. On the other hand, care was also taken to focus on good practices and prevention.

Besides approaching individual construction companies with information material, sector and branch organisations of both employers and employees were visited and involved in the initiative. Contacts were also established with customers and architects and their organisations. In short, the attention of the entire construction chain was drawn to the importance of health and safety on building

sites and to the inspection campaigns. The written press, as well as radio and TV, paid a lot of attention to the campaigns. The result is that, throughout the whole of Europe, every construction company and almost every construction worker is, in principle, aware of the campaigns and should therefore be receptive to working in a healthy and safe manner.

The structure of the inspection campaign

The important elements of the European directive on temporary and mobile construction sites are prevention, cooperation and coordination. These elements from the directive are linked in the inspection campaign to the concrete problem of people falling from heights. Construction sites of differing sizes were visited and a uniform inspection list was used in each case. The inspection campaigns took place over two periods of two weeks in 2003 and are to be repeated in 2004.



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Three issues are central to the inspection campaign and have a fundamental influence on the health and safety of employees in the construction sector, as follows.

- Has an inventory been properly drawn up of the dangers of falling from high-level work and have the necessary preventive measures and provisions been taken?
- Have the right choices been made with regard to materials and facilities and are these materials and facilities being used and maintained in the right way?
- Are the coordination obligations being applied properly and are health and safety aspects taken into account when selecting contractors and subcontractors?

The extent of compliance with the abovementioned requirements was recorded using a four-point score list. In addition, an inventory was drawn up of the extent to which obligations from the directive are being complied with as regards the presence of coordinators, health and safety plans, prior notification and so-called dossiers. Lastly, an assessment was made regarding the means used to enforce or encourage compliance with the obligations. At the end of the campaigns, the results will be analysed in more detail. The level of compliance will be recorded together with the means used to bring about compliance and more detailed conclusions will be drawn for building sites of particular size ranges. Although inspection practices and culture in the construction sector will differ from country to country, the approach using the uniform inspection lists will nevertheless give a realistic picture of the situation with regard to compliance with the obligations of the directive on temporary and mobile building sites and the extent to which the danger of falling is prevented as much as possible.

Initial European results

On the basis of the first reports from 15 of the 17 participating countries on the first inspection period in June 2003, it can be stated that the inspection campaign has produced a fantastic result. Some 16 198 building sites were inspected and, on this basis alone, this campaign can be declared a major

success. Never before have inspections been carried out in Europe simultaneously using a jointly drawn up uniform inspection list. The scale on which this has now taken place and the enthusiasm with which this was greeted within the inspectorates is impressive. Companies and social partners were also very enthusiastic, despite the large number of violations that were observed and the repressive measures that followed. The initial results show that a great deal of work still needs to be done by employers and governments to make building sites safer.

- From the 16 198 building sites visited, 8 708 verbal warnings were given and 23 561 written warnings and recommendations were issued. In 1 510 cases, work had to be stopped. In countries that have an administrative fine system, 12 051 fines were imposed. Lastly, legal proceedings were initiated in 189 cases.
- With regard to the inventory of the dangers of people falling from heights and the necessary preventive measures and provisions, the level of compliance was declared insufficient in 7 230 cases. With regard to the choice of materials and facilities and the use and maintenance thereof, the level of compliance was declared insufficient in 6 551 cases. Finally, with regard to the observance of health and safety aspects in the choice of contractors and subcontractors, the level of compliance was reported as being insufficient in 6 740 cases.
- The obligations, in so far as applicable with regard to the appointment of coordinators, were not complied with in 1 393 cases (approx. 11 %), the obligations relating to the health and safety plan in 1 817 cases (well over 13 %), the prior notification obligation in 2 273 cases (well over 17 %) and the obligation relating to the health and safety dossier in 5 311 cases (well over 41 %).

Conclusions

On the basis of the classification according to size range, one can conclude that the assumption that larger building sites ought to achieve much better scores than the smaller ones is true only to a limited extent. With regard to compliance with the so-called system obligations from the directive (compliance with the coordination obligation, health and safety plan, prior notification and health and safety dossier), one can conclude that the larger building sites (> 50 employees) do clearly achieve much better scores. The safety situation at the larger building sites may well be better than at smaller building sites but the level of compliance at 20–30 % of these larger sites is insufficient (compared to 40–50 % of the smaller building sites). With regard to the obligation in respect of the health and safety dossier, the question is to what extent this obligation has sufficient support and should the obligation be reconsidered or given a different form.

The results of the various countries reveal a considerable spread of non-compliance:

- with regard to the appointment of coordinators: approx. 11 %, spread with a minimum of 2.71 % and a maximum of 44.43 %;
- with regard to the health and safety plan: well over 13 %, spread 3.67 to 64.41 %;
- with regard to prior notification: well over 17 %, spread 7.20 to 61.82 %;
- with regard to the health and safety dossier: well over 41 %, spread 10.61 to 73.68 %.

In addition to considerable differences in compliance, it is also noticeable that major differences exist with regard to the use of means of enforcement, which may be due to differences in inspection practices and culture. For example, work was stopped — depending on the country — in 0.1 to 68 % of cases. Verbal warnings were not used in half of the countries. The spread is also enormous as regards the use of fines. Harmonisation will only be possible once the

enforcement efforts and culture have become a lot more uniform. The information gained from the campaign can serve as a first step in that direction.

The initial results of the inspection campaigns reveal that the campaign was badly needed and reconfirm the fact that the labour inspectorates need to focus on working conditions in the construction sector in Europe as a whole. The initial results easily justify the decision to repeat the campaign in 2004 and investigate whether the sector has learnt anything from the findings of the initial campaign.

The intention to carry out the inspection campaign in the new Member States as well offers interesting opportunities to place the same issues firmly on the agenda in those countries. The campaign will show the extent of compliance with European and national obligations in Europe as a whole and in the various countries. The level of compliance clearly needs to be improved considerably in all countries. Companies are being given extra encouragement to improve working conditions and fulfil their obligations, in the interests of good working conditions for all employees in the construction sector in Europe.

Plans for 2004 and beyond

The inspection campaign will be repeated in 2004. Both before and after the summer, construction sites will be visited in almost all Member States during two-week periods. To that end, the inspection lists used for the campaigns in 2003 will be extended to include questions on the prevention of getting struck by falling objects and of traffic accidents at sites.

After the EU has been enlarged to include 10 new Member States, a start will be made on preparing a repeat of the campaigns, with the focus being primarily on the construction sector in the new Member States. It will not be possible to carry out inspection campaigns in those countries until 2005 at the earliest. The construction sector in those countries first has to adapt somewhat to the European regulations. As far as the current Member States are concerned, the European Week of Health and Safety at Work (which in 2004 will be devoted entirely to the construction sector) constitutes the conclusion of the European construction campaign. This Week can also serve as a point of departure for the inspection campaigns in the new Member States. The information material developed may be extremely useful as regards the setting up of publicity campaigns in the new Member States as well — all with the aim of making European construction safer.

European construction campaign 2004

The repeated campaign for 2004 will focus on a range of issues crucial in ensuring better compliance with legislation, and consequently better standards of safety and health found on construction projects. All the labour inspectorates throughout the EU will be checking compliance with:

- falls from height;
- workplace transport;
- lifting operations;
- issues concerning appointment of coordinators and provision of a health and safety plan.

This, as in 2003, will enable the results of the campaign to be analysed consistently throughout the EU. The coordinated EU action is illustrated in the standard reporting form (Figure 1), and risk control indicator (RCI) (Figure 2) which will be used by all Member States.

Figure 1. Reporting form

1. Report period (spring 2004 or autumn 2004)	
2. Results of Member State	
3. Size class of the site (1–5, 6–20, 21–50, > 50)	
4. Number of sites in this size class	

	Full compliance	Broad compliance	Some compliance	Limited or no compliance	Not applicable
Falls from height					
5. Identification of risks, etc.					
6. Equipment selection, use and maintenance					

Workplace transport				
7. Safe site				
8. Safe vehicle				
9. Safe driver				

Falling objects/lifting				
10. Safe planning				
11. Safe operation				
12. Safe lifting equipment and machines				

	Yes	No	Not applicable
EU directive			
13. Appointment of coordinators			
14. Health and safety plan			
15. Prior notice given			

	Instruments	Sites
Number of enforcement instruments/sites		
16. No instruments used		
17. Verbal warning		
18. Written warning		
19. Cessation of work		
20. Fine		
21. Legal prosecution		

Figure 2. Risk control indicator guide

Falls from height				
a. Identification of activities and precautions involving falls from height	Risk assessment by the duty holder, hierarchy of fall prevention applied, communication of control measures to the workforce.			
b. Appropriate selection, use and maintenance of equipment	Consider all access equipment including mobile elevation work platforms (MEWPs), ladders, fall arrest and restraint, nets, edge protection, etc.			
Workplace transport				
a. Safe site	Risk from traffic management identified and addressed in the health and safety plan. Traffic management plan in place, well-defined traffic routes free from obstacles. Access routes suitable for site plant, i.e. absence of major potholes, steep gradients, open edges, blind corners, etc. One-way systems and effective segregation of pedestrians. Minimisation of reversing. Use of high-visibility clothing personal protective equipment (PPE).			
b. Safe vehicle	Selection of suitable plant for site, i.e. rough terrain vehicles, rollover protection (ROPS) size of 360-degree machines to allow safe slewing. Effective maintenance of steering, brakes, tyres lights and visibility aids.			
c. Safe driver	All vehicle operators are competent and are trained to appropriate national standard. Verification system in place. Supervision of driver including site induction, traffic management plan, and use of seat belts. Driver performance verified by observation of working practices.			
Falling objects/lifting				
a. Safe planning	Risk from lifting operations identified and addressed in the health and safety plan. Information provided by the client to allow adequate planning for safe lifting. Establish the competence of those involved in planning and undertaking lifting operations. System in place to ensure that the appropriate lifting equipment is being selected.			
b. Safe operator	All crane operators are competent and are trained to appropriate national standard. Verification system in place. Operator performance verified by observation of working practices.			
c. Safe lifting	Ensure lifting machines are appropriately maintained and inspected. Correct selection, use and maintenance of lifting equipment such as slings, chains, etc.			
Assessment scale				
Each risk control indicator should be assessed against the following 1–4 scale. A score of 1 must satisfy all the appropriate criteria of the risk control indicator in areas that matter.				
1	2	3	4	0
Full compliance	Broad compliance	Some compliance	Limited or no compliance	Not applicable

THE EUROPEAN CONSTRUCTION INDUSTRY FEDERATION (FIEC) THE EUROPEAN FEDERATION OF BUILDING AND WOOD WORKERS (EFBWW)

A description of the work of this committee

Social dialogue in construction

An overview of activities in the field of health and safety

The European social partners

The European social partners in construction are:
the European Construction Industry Federation (FIEC)
the European Federation of Building and Wood Workers (EFBWW)

With 32 national federations in 25 countries^(*), the European Construction Industry Federation (FIEC) represents the interests of construction firms of all sizes and all specialities. With 1.9 million enterprises — 97 % of which are SMEs — and some 11 million operatives, the construction industry is the largest industrial employer in Europe. Some 26 million workers in the EU depend, directly or indirectly, on the construction sector.

The European Federation of Building and Wood Workers (EFBWW) represents 51 member organisations in the construction and wood sectors from 17 European countries (EU, Switzerland and Norway) with a total membership approaching some 2.5 million workers.

An FIEC-EFBWW social dialogue group has existed since 1989. From the beginning, two specialist sub-groups on 'training' and 'health and safety' were organised.



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^(*) These include the 17 countries of the European Union and of the European Free Trade Association, Bulgaria, Cyprus, the Czech Republic, Hungary, Poland, Romania, Slovakia and Turkey.

The European social partners in the construction sector at the European level have so far achieved:

- an agreed position on social dialogue (1992);
- a joint position on the posting of the workers' directive (1993 and 1997), lobbying action and declarations relating to it;
- a joint position on the development of the social dialogue at Community level (1996);
- a joint declaration on employment;
- a joint position on two directives on the provision of cross-border services by third-country nationals (January 2000);
- a study on the vocational systems in the construction sector in the EU (2000).

In addition, the most recent joint actions include the *Guide to best practice on the coordination of health and safety in the construction sector*, published in April 2003. The aim of the guide is to help companies in the sector, and especially small and medium-sized businesses and their employees, by raising awareness of the risks of industrial accidents and by promoting a business culture in the field of health and safety to contribute to accident prevention.

The guide proposes a series of strategies for effectively coordinating safety on construction sites along with practical measures aimed at preventing certain specific situations when working. The guide is based on texts, photos and diagrams in order to ensure that it is clear and can easily be consulted on construction sites.

The guide consists of three parts.

- The first part includes a brief overview of European and international health and safety rules plus a summary of the activities of the European social partners in this field.
- The second part introduces a few good practices aimed at reducing the number of accidents on sites. These good practices are accompanied by basic information on the frequency of accidents and the occupational diseases found in the sector.
- The third part includes a whole series of photos illustrating the good practices developed in the second part, taking into account the specific features of the various construction methods and techniques used in Europe.

The guide is available in six languages^(*) from the FIEC website: www.fiec.org. People who are active in the health and safety field or closely involved in preventing accidents in the construction industry may send a request to FIEC or to the EFBWW for a printed version of the guide.

The production and printing of the guide was made possible thanks to the European Agency for Safety and Health at Work in Bilbao.

^(*) Danish, German, English, Spanish, French and Italian.

Joint declaration on the working at heights directive

The European social partners in the construction sector, FIEC and EFBWW, produced a joint recommendation aimed at facilitating the implementation of the working at heights directive (Directive 2001/45/EC, 27 June 2001). This directive should be transposed into the national legislation of the EU Member States by 19 July 2004 at the latest.

To respond to the problem of uniformity in the implementation of this directive, the social partners have agreed upon the expression 'competent person' and have drawn up certain recommendations. As a result, three checklists of skills required were made for distribution to the people mentioned in the directive: the people who are in charge of supervising the assembly work, the fixing in place and the users. All of these people need to be able to safely handle and use scaffolding.

During each of these three stages, the people in question must have a minimum knowledge of the safety instructions, so that they can properly assess the risks and know which safety measures are needed in relation to free circulation on the scaffolding, and that maximum permissible loads are complied with and any related or subsequent work on the site is taken into account.

This agreement was presented at a press conference held by the FIEC in April 2003 in Brussels. FIEC and EFBWW member federations at national level can use it on a voluntary basis, in order to assist the implementation and application of the directive on a uniform basis.

Research project on stress at work

Following the consultation by the Commission on stress at work, the EFBWW has made a proposal to FIEC to launch a joint research project on stress in order to better analyse this problem in the construction sector. This proposal was accepted by FIEC. The FIEC member federations who were consulted on this in their own respective sectors and countries have conceded a lack of information on the subject. The project aims to study the extent to which the construction sector is affected by stress. The interviews and writing-up of the study will be entrusted to a research institute.

Vocational training

Two projects began in March 2002. The first is aimed at encouraging young recruits to stay in the sector through developing tutorship schemes to improve the way in which they integrate during their early years into the enterprises (with the assistance of Leonardo funding).

A European study produced by EFBWW with the support of the European Commission in 1998 showed that the number of young people entering building schools was sufficient in most EU countries, but that a large proportion of them quit the sector, having worked for a few years. The departure of young recruits just a few years after they have been hired constitutes a considerable economic cost for companies. The tools chosen by the social partners to address the situation were tutorship schemes.

Other major concerns were also outlined by the social partners in 2001 and 2002: the sector's poor image, keeping older and experienced workers in the sector, the training of trainers, the use of new information technologies in the field of vocational training. Tutorship schemes could also help in addressing those concerns by maintaining ageing workers in the sector as well as re-skilling other workers who are not yet integrated into the enterprise or who do not feel at ease with changing technology.



© Floret Bernard/INRS, France

This project is a pilot project developed with the support of the European Commission within the framework of the upgrading of the Leonardo programme. It is based on two Leonardo projects on tutorship already implemented in the other sectors of the industry, together with other valuable experience proposed by the FIEC and EFBWW member federations. The results of this pilot project will be under scrutiny from the European Commission and will serve as a basis for upgrading the Leonardo databank to better disseminate all the best practices it contains.

The pilot project, achieved since December 2003, will provide the national social partners and firms in the construction sector with tools for assisting the development of the tutorial function in construction firms and, where these tools already exist, supplementing tutoring schemes by disseminating good practices.

This guide of best practices is available in French, English and German in FIEC and EFBWW and in their respective organisations and affiliates. The project partners have published tools on the websites of their organisations to facilitate downloading. In addition to this dissemination through the FIEC and EFBWW networks, the guide will also be made available to bodies and institutions active in the area of vocational training in the construction industry.

This guide is a specific tool that is easy to handle and which can be used at company level in order to develop a culture of dialogue with young workers in the enterprise. It is of particular use to SMEs, which may not always have the resources to develop such tools themselves.

Finally, a second pilot project on the transparency of qualifications is in the planning phase. The idea is to produce a 'transparency' document which will clearly and intelligently show the qualifications of a worker so that these can be recognised by an employer in an EU country other than that of the worker.

For further information about the work of FIEC and EFBWW in the European social dialogue in construction, please contact:

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GREG HAYWOOD

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Achieving excellence in construction procurement

Introduction

Good standards of safety and health on a construction project start with the decisions made by the client who procures the work. It is at this stage that the whole safety and health climate of a project is established. Too many contracts are awarded on the basis of lowest price tenders, only to see the final price increase significantly through contract variations, failure to meet quality standards or time deadlines. Contracts need to be awarded on value for money grounds, not lowest price tenders. Value for money means achieving, at the end of the construction project, something that is fit for purpose, fulfils user needs, and achieves a balance between quality and costs throughout its life. Additionally, costs arising from poor safety and health performance impinge on the client. Reputations suffer by being associated with construction companies that have a poor health and safety image. It is important that clients understand that having construction work carried out is the same as any other business investment. The client's business requirements are only successful if they can be operated without adversely affecting the safety and health of those who carry out the construction work, or occupy and use the finished building or structure.

It is therefore of fundamental importance to the client, when selecting contractors and others, to ensure that those appointed are able to carry out the work competently.

The UK government has recognised this and, through its Office of Government Commerce (OGC), has published a series of guides for government departments to use when procuring construction work.

'I passionately believe in the importance of tackling the industry's health and safety problems. Pre-planned, well-designed projects, where inherently safe processes have been chosen, which are carried out by companies known to be competent, with trained workforces, will be safe: they will also be good, predictable projects. If we are to succeed in creating a modern, world-class industry, the culture of the industry must change. It must value and respect its people, learn to work in integrated teams and deliver value for clients' money.'

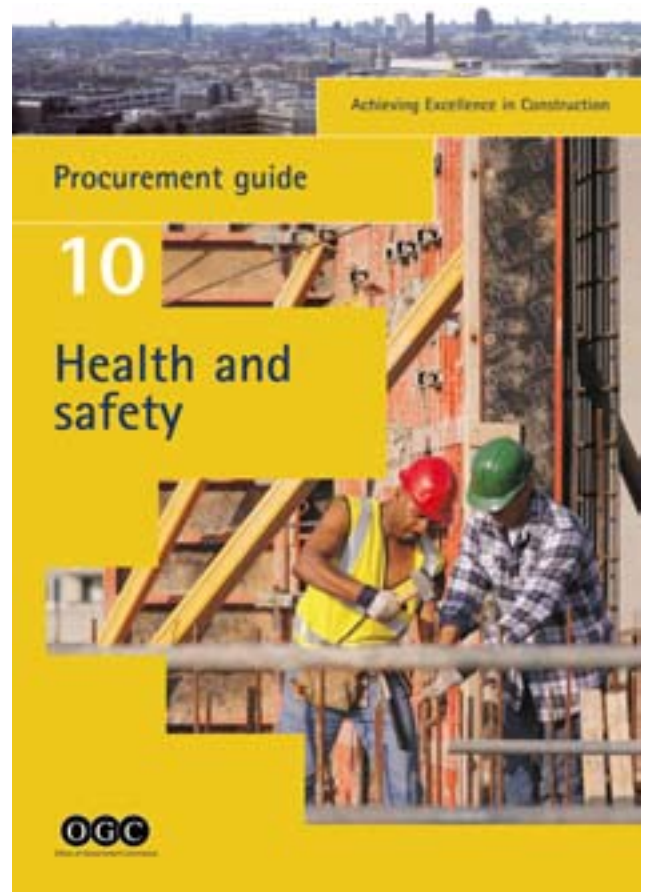
Sir John Egan, *Accelerating change*

The principle behind this government initiative is the strategy Achieving Excellence in Construction (<http://www.ogc.gov.uk/index.asp?id=218>).

The following summarises the strategy, and contains detail from the guidance available from OGC.

'Through the Achieving Excellence initiative, central government clients commit to maximise, by continuous improvement, the efficiency, effectiveness and value for money of their procurement of new works, maintenance and refurbishment.'

Achieving Excellence in Construction was launched in March 1999, by the Chief Secretary to the Treasury, to improve the performance of central government departments, executive agencies and non-departmental public bodies (NDPBs) as clients of the construction industry. It put in place a strategy for sustained improvement in construction procurement performance and in the value for money achieved by government on construction projects, including those involving maintenance and refurbishment.



Key aspects include the use of partnering and development of long-term relationships, the reduction of financial and decision-making approval chains, improved skills development and empowerment, the adoption of performance measurement indicators and the use of tools such as value and risk management and whole life costing.

The key thrust of Achieving Excellence is the delivery of best value for money. This is not the lowest cost but the best balance of quality and whole life cost to meet the user requirement.

Achieving Excellence guidance

The Achieving Excellence suite of procurement guidance supports the future strategy of Achieving Excellence. This series reflects developments in construction procurement over recent years and builds on departments' experience of implementing Achieving Excellence. The new guidance aligns with the OGC gateway process, the emerging lessons learned from gateway reviews and the 'successful delivery toolkit', of which it forms a key component. The suite consists of three core and nine supporting documents together with two high level documents, *Achieving excellence procurement guides*.



Courtesy of Berufsgenossenschaft Nahrungsmittel und Gaststaetten — BGN

Procurement guide 10 specifically deals with health and safety

The guide provides advice on how central civil government as a client of the construction industry can achieve excellence in health and safety.

Health, safety and welfare issues are integral to the project process. Health and safety issues are not confined to the construction phase of a project, but occur throughout a project or facility's life. Many of the common health and safety problems encountered during construction and operation could be avoided if due consideration and effort were invested during the project brief and design phases.

It is generally accepted that the construction industry needs to radically improve its performance on people issues. Improving the industry's health and safety performance is not a high-minded aspiration, it is a business necessity.

The government is committed to achieving excellence in construction. This requires departments to do more than the minimum required by statutory health and safety law.

Departments who are proactive in designing out health and safety issues before they occur will achieve performance significantly beyond statutory compliance and be well on the path to achieving excellence. They should benchmark their health and safety performance, by collecting and comparing information about their departmental track record against the best in government and industry-wide.

Client leadership is recognised as a crucial driver for improving health and safety performance throughout the supply chain. As major construction clients, central civil government departments (including their executive agencies and non-departmental government bodies) must commit to, demonstrate and achieve excellence in their procurement practices.

Too few clients view the design and construction of their project as part of their business, nor do they realise that the health and safety of people who construct and maintain, as well as those who subsequently work in, their buildings are their responsibility. The health and safety of all these people depend on the quality of the design and construction. Indeed, many of the difficulties faced by designers and contractors are the result of unreasonable pressure put on the price and time by the client.

A strong visible commitment is crucial for good health and safety performance. Top management must be seen as actively interested and committed. Where clients demand high health and safety standards on their projects, these standards are achieved. Such clients see *best value* (rather than lowest cost) and health and safety as integral to their projects.

Revitalising health and safety in construction

For more information

<http://www.ogc.gov.uk/sdtoolkit/reference/achieving/ae10.pdf>

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B uilding in safety

Introduction

Construction is a risky business. Some 43 % of construction workers think that their health and safety is at risk because of their work ⁽¹⁰⁾ and this concern is supported by statistics. The number of accidents in the construction industry is significantly higher than in other land-based sectors, with:

- double the number of reported accidents (where three or more days' absence occurs) compared to the all-sector average — over 7 000 per 100 000 persons employed as against 4 000 per 100 000 employed;
- over 10 workers per 100 000 being killed in construction as against five per 100 000 as the all-sector average ⁽¹¹⁾.

In addition to the high accident rate, construction workers may be exposed to chemical, biological and physical agents, as well as psychosocial and physical hazards. For example, nearly half of all construction workers report suffering from backache, and over half report being exposed to high levels of noise for part of their working time ⁽¹²⁾.

What information is available?

In line with the new Community strategy on health and safety at work ⁽¹³⁾, which identified construction as a priority sector, the Agency has increased the amount of practical information available on its website to help reduce the risk of accidents and ill-health in this work activity.

The Agency provides a wide range of good practice ⁽¹⁴⁾ relevant to construction, covering key topics such as:

- accident prevention, including:
 - workplace transport,
 - electricity;
- dangerous substances, including:
 - asbestos,
 - biological hazards;
- musculoskeletal disorders, including:
 - upper limb disorders,
 - back injuries;

⁽¹⁰⁾ European survey on working conditions (ESWC), 2000.

⁽¹¹⁾ Source: Eurostat.

⁽¹²⁾ ESWC, 2000.

⁽¹³⁾ Communication from the Commission, 'Adapting to change in work and society: a new Community strategy on health and safety at work, 2000–06'

⁽¹⁴⁾ http://europe.osha.eu.int/good_practice/



- psychosocial issues, including:
 - stress,
 - violence at work,
 - bullying.

However, making information available is only half the job. With European Week 2004 on Construction, the European Agency for Safety and Health at Work is looking to promote action in all 25 Member States. The Agency is providing information in 20 languages, working with employer, worker, and inspectorate organisations to get the message across to workplaces and intermediaries.

Accessing Agency information on construction

The Agency views construction in a broad way, wider than the specific construction sector. It includes activities such as building, works of engineering construction, demolition, maintenance of buildings (including the management of buildings containing asbestos), repairs to buildings, painting and decorating, renovation of ancient monuments, and road repair.

Information is available in both paper form and on the web. The Agency is publishing factsheets, a magazine, a report, as well as an information pack to raise awareness and give practical information on reducing risks in the workplace.

Online, a special web feature at <http://www.osha.eu.int/2004> is packed with information to promote action and to navigate users to the resources available. Specific information is available on:

- success factors for large construction projects;
- health and safety on small construction sites;
- safety in roof work;
- noise in construction;
- the risks of asbestos during maintenance activities.

As part of the week, the Agency is running a good practice award scheme to recognise enterprises and organisations that have been successful in implementing solutions to reduce the risks to workers in construction. Winning entries are publicised on the Agency's website, with the awards being presented at the week's closing event in November.

For whom is the information?

The Agency provides information for anyone who wants to know more about occupational safety and health. Some material is aimed at policy-makers and researchers, but most of it is targeted at people who are making things happen in the workplace where construction activity occurs, for example: managers of small and medium enterprises, workers, worker safety representatives, safety and health professionals, designers and architects, building and site managers, maintenance workers and building owners.

Construction: a three-phase activity

Construction may be seen as a three-phase activity.

- *Pre-build.* Research indicates that two thirds of fatal accidents occurring on building sites are due to decisions taken at the design and planning phase. Key players at this phase include architects, designers, contract managers and those procuring goods and services for the building phase.
- *Building phase.* During this time, safety and health coordinators, project managers and supervisors, employers, subcontractors and workers all have to cooperate to eliminate or reduce risks.
- *Post-construction phase.* Decisions made during the pre-build and building phase have a long-term impact on the health and safety of those who maintain and work in the building. The most obvious example of this are the consequences of using asbestos materials in buildings during the 20th century. At this phase, building owners and maintenance contractors are among the most important stakeholders.

How should information be used?

The information provided is in various formats. There are checklists that can be used as prompts for actions, and there are case studies that provide examples and inspiration for interventions to improve health and safety on site.

The first step in any action should be a risk assessment. There are many models of risk assessment, and the way it is done will depend on the type of construction activity. Whichever method is used, it is usually best to break the process down into a series of steps.



Pictured at the European Week launch in Dublin: Pat Cox, President of the European Parliament, An Taoiseach Irish Prime Minister Bertie Ahern, Hans-Horst Konkolewsky, Director of the European Agency for Safety and Health at Work, with David Byrne, EU Health and Consumer Protection Commissioner

1. Look for the hazards

Think about the work that is done and what materials, equipment, and chemicals are used. What can cause harm?

2. Decide who may be harmed and how

Think about everyone who may be hurt. This means not just employees, but also other workers on site and the public. Consider who and how many may be harmed, and how.

3. Evaluate the risks and decide on action

How likely is it that the hazard will result in harm or injury, and how severe is that injury likely to be? Are the control measures currently in place sufficient? The focus for cost-effective and sustainable risk management should be on collective protection and preventive measures. If someone is likely to be harmed, identify the action needed.

4. Communicate

Tell people what you are doing. Talk to the worker representatives. Involve them in the risk assessment process and tell them what you are doing to reduce risk.

5. Monitor and review the findings after taking action

It is important to perform an evaluation to see which interventions were successful and which not. Assess the effectiveness of the control measures. Ensure that the risks have been appropriately reduced and that other hazards have not been created. Ways of working, along with equipment and chemicals change. Ways of working change, and so do hazards and risks. When a significant change takes place, check to make sure that there are no new hazards that need addressing. Repeat the risk assessment when necessary.

What next?

The European Week 2004 on construction is a campaign to highlight the issues in this difficult work area. However, the end of the week will not mean an end to the focus on construction. The Agency will continue to work with the stakeholders in construction and to provide information on this priority topic.

EUROPEAN AGENCY FOR SAFETY AND HEALTH AT WORK

Promotion of action to improve safety and health with small construction companies (SMEs)

Small and medium-sized enterprises (SMEs) dominate the European construction industry. They include the small, self-employed worker, or micro-enterprises, carrying out small-scale work, often for domestic clients; small specialist firms carrying out specific construction tasks; and small construction companies who carry out work as sub-contractors for other contractors, often working on construction projects with multiple employers. These SMEs account for a significant number of the accidents and occupational ill-health in the construction industry. Unfortunately, it is also the most difficult part of the industry to influence and get action taken to improve safety and health.

Putting money into safety

When the European Parliament and the Commission decided to allocate funds, the Agency was only too happy to stimulate efforts to promote a culture of safety and good health in SMEs. And there is evidence of change in the industry — of a realisation that injuries and ill-health are not just human losses: they actually cost more money than it takes to prevent them. With an application of simple rules and common sense they can be avoided, and every well-conceived and well-executed project to get this message across does a little to turn the building trade culture in the right direction.

Since 2001, the Agency has funded more than 150 imaginative ideas to encourage good practices and reduce the risk of accidents and ill-health in the small businesses that make up the vast majority of building firms in the EU. The ideas came from government departments, public bodies, NGOs, private firms and social partners — anywhere as long as they involved SMEs and contributed to the overall aim of spreading good occupational safety and health (OSH) practices.

It is not really surprising that OSH in building construction has been the focus of so many funded projects carried out with small businesses since 2001.

The following contains brief summaries of a small number of these projects.

- In northern Sardinia a project aimed at training people working in the building trades. This training trained :

- the tutors, who could then take their new skills to SMEs and building sites;
- the employers, aimed at improving the management of risk;
- the employees, aimed at improving safe work practices.

In addition the project was able to demonstrate that when small firms carried out measures to reduce accidents at work, they benefited both in reputation and in financial performance.

- In the province of Treviso, in north-eastern Italy, the team awarded 'safe site' notices following inspections, in order to encourage



building firms to remember their good practices. Posters reading 'This building site works safely' were put up at sites that took part. This in turn attracted media coverage and reached a wider audience, including other building firms.

- Another project was an 'adoption scheme' in Scotland, where major employers were persuaded to engage with their sub-contractors and their supply chain to promote good working practices. This was done through information packs, workshops and seminars, plus the development and delivery of an online course.
- A project run by the Irish Congress of Trade Unions followed the well-worn path of using pilot seminars to feed into the development of a guidance manual that could then reach a wider readership. This also fed into a campaign that trained 500 health and safety representatives in how to organise proper consultation on site safety issues.
- In Wales, the Construction Industry Training Board carried out OSH training on an exceptionally large scale, awarding completion certificates to 1 126 workers from SMEs. The project especially targeted those site workers who were most often excluded from on-site training, but were the main casualties in construction accidents. They also piloted a 'good neighbour' scheme to encourage SME managers and workers to take part in training activities.
- A project unique in the French construction industry targeted the wives and partners of the bosses of very small companies (fewer than 20 people). This unusual approach was based on a recognition that, in small family firms, the women are often the ones who look after staff matters and take responsibility for their health and safety. In addition, those who run the family tend to feel the impact of occupational illness and work-related accidents the most.
- A second French project set out to promote work safety and health awareness following new national legislation requiring SMEs to make formal risk assessments. Their training courses taught a new method of risk evaluation to improve risk management. They also ran first-aid courses, focusing on how to get help, and how to examine, protect and help accident victims.
- The Chamber of Commerce in Ponta Delgada in the Azores worked with employers and unions and managed to get over 200 people to an OSH seminar. They followed this up by analysing sites for safety in some 35 SMEs.
- A current Belgian project is targeting SME managers in a wide range of OSH risks including safe handling of materials and preventing falls, landslips, electrocution and explosions.
- While accidents — above all falls from a height — are the most common cause of injuries and death in the construction industry, exposure to dusts and solvents are a significant hazard. Of these, asbestos remains the most deadly, despite recent European legislation virtually banning its use. It is still around in huge quantities and emerges during demolition, rebuilding and maintenance jobs. A project in Greece last year was aimed solely at raising levels of awareness of this one danger in the trade.
- A project on floor laying in Denmark took the new-technology route to reducing injury. Imagine what it does to your knees, not to mention your back, to spend the best part of the working day on all fours. This is what floor layers have traditionally

had to do. What a relief it would be to do the job standing up. Well, it can be done — with recently developed equipment and enough training in how to use it. A project team in Denmark trained instructors so that they could in turn teach floor layers in the regions. More than half the trainees subsequently said they could work faster in an upright position with the new tools, and even a short time later were reporting less pain from neck, shoulders, wrists, back and knees.

- One project spanned six countries and took a practical approach to sharing experience and promoting good practice across borders. Cooperation between unions in Denmark, France, Germany, Italy, Spain and the UK, with the help of a consultancy in Belgium and Luxembourg, produced a reference guide that was small enough to carry on site but robust enough not to fall apart in a few months.
- A Danish-Italian collaboration resulted in a website, in Danish, Italian and English, of good practices ranging from preventing traffic accidents on and between sites, to the erection and safe use of scaffolding.
- Among the current projects is a transnational one based in the Netherlands, developing a European code of practice for handling epoxy resin, one of the most dangerous substances in the building industry and a major cause of skin and respiratory diseases. This will include, wherever possible, recommendations on substitution by non-epoxy products.

Showing what can be done

These projects have only made a dent in what remains a huge problem. But they have shown what can be done. All were made possible through Agency funding. All have made a contribution to creating a more safety-conscious culture in the construction industry. And, all can be accessed on the Agency website at <http://sme.osha.eu.int/>.

Please look at the website, or contact the Agency. Read the project reports. Make it your business to benefit from the lessons learnt. Contact the projects that have the most relevance for your field and take this opportunity to reduce the risks of working in construction.



JIM HEFFERNAN

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Irish Health and Safety Authority recommends reform of Irish construction regulations to address concerns regarding the role of clients and designers

Recent research sponsored by the Irish Health and Safety Authority (HSA) highlights the important role of clients and designers in ensuring the health and safety of workers engaged in construction projects. Two reports ⁽¹⁵⁾ by Ms Marie Dalton of the Centre for Civil and Construction Engineering, University of Manchester Institute of Science and Technology, commissioned by the HSA, which analyse fatal accidents in the Irish construction industry over a 10-year period, indicate that at least 25 % of fatal accidents are directly attributable to the pre-construction stage of projects, with the figure being considerably higher when indirect factors are taken into account.

This research and the experience of the HSA's inspectorate in enforcing the current construction regulations and in investigating a number of serious incidents in recent years has led the HSA to recommend to the Minister of State for Labour Affairs amended regulations which, *inter alia*, place more detailed obligations upon clients and designers.

In her report *Fatal accidents in the Irish construction industry, 1991–2001: a survey of contributory factors*, Ms Dalton analyses the results of questionnaires completed by HSA inspectors who investigated fatal accidents during the period under review. Statistical analysis reveals a ratio of 2:1:1 for site management, headquarters (i.e. clients and designers) and injured party factors respectively. This replicates the results of previous research by the HSA and the United Kingdom's HSE ⁽¹⁶⁾. A factor analysis aimed at identifying underlying themes in the dataset identified three distinct factors accounting for 54 % of the variance in the dataset. The items that compose each factor are given in the table opposite.

The factors approximate to the headquarters, site management and injured party factors but the extracted factors do not follow the same pattern as that revealed for the contributory factors where site management is twice as important as either headquarters or injured party factors. The factor analysis identifies the headquarters items as the most predictive. That is, although inspectors identify site management factors as the major contributors, the pooled data reveal

Principal factors

Level	Factor 1 (accounts for 26 %)
HQ	Competence of duty-holders (PSDS, PSCS, designer, contractor)
HQ	Failure to take adequate consideration of design factors and features
HQ	Failure to learn lessons/be aware of spate of similar accidents
HQ	Failure to carry out hazard identification and risk assessment
HQ	Failure to develop adequate safety and health plan
Site	Failure to implement safe system of work (SSW)
Site	Failure to identify hazards on site
Factor 2 (accounts for 17 %)	
Site	Failure to communicate SSW to worker
Site	Failure to supervise employees
Site	Failure to supervise sub-contractors
Factor 3 (accounts for 12 %)	
Individual	Unsafe act/risk-taking behaviour because of inadequate SSW
Individual	Using initiative to solve problem (not trained/experienced for task)

that headquarters issues have more explanatory power suggesting that actions further up the organisational chain will have most impact on accident prevention.

The strongest factor, Factor 5, comprises a majority of headquarters items indicating failures that occur at the planning and design stages of the construction project. Such failures have substantial impact across the duration of the project. They dictate the safety structures and procedures that are inherited at the site management and individual levels. Failures in planning can filter through a project; for example, appointing an incompetent project supervisor for the construction stage (PSCS) can lead to poor coordination and supervision of contractors during the construction stage leading to unsafe behaviour on the part of individual workers. Two site management-related variables are clustered together with the five headquarters variables.

⁽¹⁵⁾ *An examination of duty-holder responsibilities: fatal construction accidents 1997–2002*, published December 2002 and *Fatal accidents in the construction industry, 1991–2001: a survey of contributory factors* published December 2003 are both available in PDF format on the HSA website, www.hsa.ie.

⁽¹⁶⁾ Whittington, C., Livingstone, A. and Lucas, D. A. (1992), *Research into management and organisational and human factors in the construction industry*. Health and Safety Executive Contract Research Report No 45/1992.

This highlights the links between activities at various levels. A failure to carry out adequate risk assessment at the design stage may lead to a failure in identifying hazards on site. The failure of the project supervisor for the design stage (PSDS) to produce a safety and health plan hinders the implementation of a safe system of work at site level.

Factor 2 comprises three items from the site management section of the questionnaire. The combination of these items describes deficiencies in on-site communication. This factor can be traced through the three organisational levels. Priorities and resources allocation set by headquarters determine the level of concern for safety on site. In turn, the level of safety supervision and communication on site will have an impact on individual safety behaviour.

Factor 3 comprises two items describing behaviour at the individual level, both of which relate to the absence of a safe system of work which would ensure that workers were properly trained and that procedures were in place to deal with most eventualities. Ms Dalton argues that the development and implementation of good procedures is generally beyond the control of the individual worker and that the unsafe behaviours described by this factor are, in part, the product of decisions further up the hierarchy.



Although the headquarters category does not make the largest contribution, the factor analysis indicates that it is the category with the most predictive power for the dataset, implying that improvements at this level will have the widest impact. The HSE report estimates that '60 % of fatal accidents are attributable to decisions and choices made before work began'. This interpretation is also consistent with Reason's theory of accident investigation⁽¹⁷⁾ which advocates the elimination of latent factors at organisational level as the most effective means of reducing active failures and subsequent accidents.

Ms Dalton proposes that, in line with modern theories of accident prevention which emphasise the importance of factors upstream of the accident event, future legislation and campaigns should focus on events and actors at headquarters level. The knock-on effect of failures suggests that remedial action at headquarters level could prevent errors further along the project train.

Ms Dalton's second report assesses the performance of duty-holder responsibilities in relation to fatal incidents in the period 1997 to 2002. The study questionnaire lists duty-holder responsibilities under the safety, health and welfare at work (construction) regulations, 1995. HSA inspectors were asked to indicate if a failure to fulfil any of these requirements made a 'possible' or a 'definite' contribution to the fatal accident they investigated. Inspectors attributed almost 50 % of all failures to contractors, 32 % to the PSCS, 14 % to the client while only 4 % and 3 % of failures were allocated to the PSDS and designer respectively.

This outcome appears to contradict the conclusions drawn above. However, Ms Dalton points out that the attribution pattern raises two issues. Firstly, the results mirror the structure of the regulations. Contractor and PSCS duties are many and detailed compared to those described for other duty-holders, hence the difficulty of identifying failures on the part of the client, PSDS and designer. Ms Dalton

recommends that the regulations should describe the requirements for all duty-holders at the same level of detail.

Secondly, the pattern indicates a lack of depth in accident analysis. Placing responsibilities with duty-holders upstream of the construction site was a major innovation of the 1995 regulations. However, this development is not reflected in the attribution of responsibility by inspectors. Ms Dalton recommends that further training should locate accident analysis within the framework of duty-holder responsibilities as set out in the regulations. Specifically, a standard methodology to facilitate the identification of root causes is required.

A further report⁽¹⁸⁾ from the HSA's inspectorate, analysing responses to an internal survey of the HSA's inspectors, indicates that, based on their dealings with designers in 2001 and 2002, less than 20 % of designers score higher than 5 on a scale of 1 to 10 in terms of their understanding of their duties under the safety, health and welfare at work (construction) regulations 2001, which implement the temporary and mobile sites directive. The situation is worse in terms of compliance by designers with the specific obligations placed upon them to design out hazards by applying the general principles of prevention⁽¹⁹⁾, with inspectors reporting that only 15 % of designers had in fact applied the principles and rated the efforts of less than 15 % of designers to positively influence safety at the design stage higher than 5 on a scale of 1 to 10. These figures indicate that designers, both architects and engineers, generally had a poor understanding of the issues pertaining to their responsibilities under the construction regulations and the main Health and Safety at Work Act and also of other persons' responsibilities, for example contractors and project supervisors for design and construction. The experience of HSA inspectors is that decisions taken by designers have resulted in dangerous situations arising on site. Some of these situations were considered so dangerous that all work was stopped until appropriate remedial action was taken.

⁽¹⁷⁾ Reason, J. (1990), *The contribution of latent human failures to the breakdown of complex systems*.

⁽¹⁸⁾ HSA (2003), *Report of visits to designers undertaken by HSA inspectors in 2001-02*, available in PDF format on the HSA website, www.hsa.ie.

⁽¹⁹⁾ Article 6(2), Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work, OJ L 183, 29.6.1989.

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Safe maintenance of work equipment in construction

Basis

The work equipment manual outlines a maintenance system for work equipment. In this context, a maintenance system refers to related activities that enable the quality of work equipment to be monitored. The system covers the entire life cycle of a piece of work equipment, from when it arrives in the construction company until it is removed from the construction company.

Work equipment means all tools and apparatus required to perform tasks within a work situation. Article 1(3)(h) of the 1999 Dutch Working Conditions Act ('the 1999 Act') defines work equipment as follows: 'any machine, installation, apparatus, means of transport or tool used in the workplace'. 'Work equipment' is a legal term that is seldom used on a day-to-day basis in the construction industry. 'Tools' or simply 'equipment' is more commonly used.

An employer who commissions the use of work equipment is first in line to ensure the safety of such equipment. In accordance with Article 7(3) of the 1999 Dutch Working Conditions Decree ('the 1999 Decree'), the employer must be able to demonstrate, by means of a risk inventory and assessment, that health and safety regulations are complied with when the equipment is in use. This inventory covers both the working environment and the equipment itself (Dutch standard NEN-EN 1050). The work equipment should be no less safe than when it was acquired. Article 7(4)(a) of the 1999 Decree states that work equipment subject to wear and tear must be inspected 'as often as is necessary to ensure it is in proper working order'. Under Article 7(5) of the 1999 Decree, efforts should also be made to prevent accidents from occurring as far as possible while the equipment is in use. The company should be able to demonstrate that it has exercised such due care.

The 1999 Act and 1999 Decree are formulated as objectives. The legislation and regulations refer to standards. There are policy guidelines governing the implementation of these objectives. For many companies, they can be obscure and difficult to grasp. Even specialists are often unsure how best to comply with these rules (IAVM discussion group). By implementing the manual and using the lists contained in the manual, a system is created whereby compliance with the due care required can be demonstrated. This means that the laws and standards in force must be implemented by the authors of the manual using verifiable, perceptible elements.

Equipment seems to account for 23 % of all accidents (*Veiligheid in de bouw* ['Safety in the construction industry'], EIB, April 2000). Improving care for work equipment is therefore a worthwhile task.

Management and care system

Management within an organisation occurs at three levels:

- At policy level, senior management decides on the objectives to be achieved within the organisation. Verification of the achievement of objectives also occurs at policy level. At the very least, reports should take the form of an outline. In most cases, the reporting of anomalies and corrective measures should suffice. For construction companies with relatively few staff, a decision should be taken at policy level as to the instruments to be used to achieve these objectives.
- At supervisory level, facilities should be created and help given to enable the objectives to be achieved. This involves reporting to senior management, including on any anomalies and corrective measures. Instruments to enable the objectives to be implemented should be selected and recommended to senior management so that a choice can be made.
- At implementation level, the primary task is performed. This is where the objectives are actually achieved. Use and, in the event of defects, accidents occur at this level. It is at this stage that the final preventive measures can be taken. This is where the achievement and impact of the objectives can best be assessed. The report on the outcome is transmitted using a bottom-up approach, that is, from the shop floor to policy level via the supervisory level. Both safety management systems and the authorities set great store by these activities ('Goed onderhoud moet aantoonbaar zijn' ['Good maintenance should be demonstrable'], *Arbouw Journaal*, 1998). Moreover, shop-floor staff are trained in how to identify defects using checklists.

These three management levels and functions are part of the system set out in the work equipment manual. Senior management at policy level should take the decision to implement the manual. Higher management and the occupational health and safety coordinator should prepare the decision-making process. These officials should also facilitate and steer events. They should present senior



management with a timetable for inspections and checks in the work station. They should also be responsible for devising a reporting structure and reporting it to senior management. At implementation level, the lists should be completed and the result reported.

Life cycle of work equipment and the care system

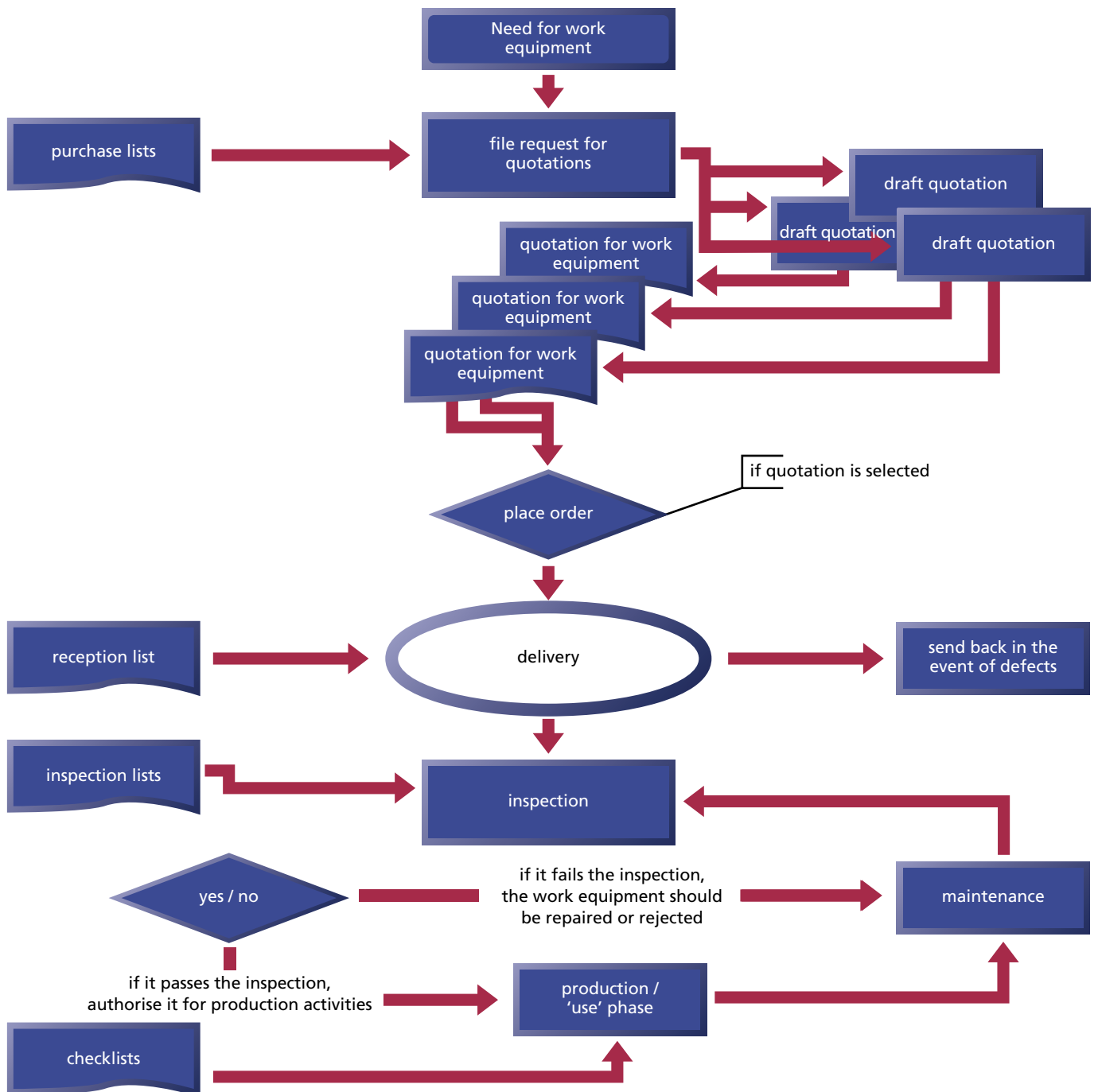
The work equipment manual describes the life cycle of work equipment within a construction company. This life cycle begins once a request for quotations has been filed. The request may involve purchasing, hiring or leasing a piece of equipment. The 1999 Act does

not distinguish between these forms. The cycle ends once the work equipment is disposed of.

The flow chart below describes the life cycle of a piece of work equipment. In the work equipment manual, the filing of a request for quotations, the delivery, inspection and use are considered critical stages. It is at these stages that attention should be paid to the impact of working conditions on the use of these tools.

This is expressed by devising measurable, perceptible quality criteria for the work equipment. These criteria are based on the aforementioned regulations and legislation and the standards in force. The description of the quality criteria must be suitable for the process, the user and the procedure applied at that particular stage in the

Flow chart showing life cycle of a piece of work equipment

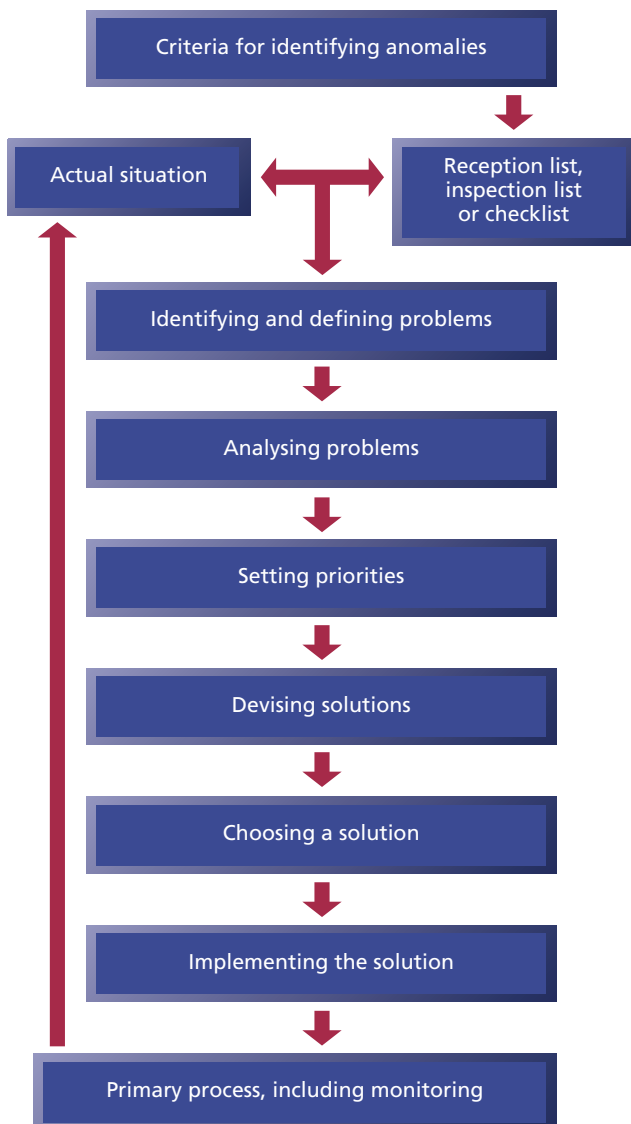


process. The manual provides tests for these stages, in the form of checklists.

These checklists provide a description of the optimal situation at the start of the problem-solving cycle, which the figure below applies to the principle in the work equipment manual.

The criteria are the times when, at policy level, the organisation or company sees that attention should be paid to the quality of the work equipment. The purchase list is not included in the figure below, as there is no real situation to reflect when working with the purchase list. For the inspection lists, the setting of priorities is simplified by adding a star to items which, with a negative score, have a direct impact on safety.

The first critical stage involves the drafting of specifications for the contractor's quotation. At the request stage, the contractor should be aware of the criteria to be used by the client to test the work equipment required. To that end, criteria are marked on the purchase



lists in the form of particular points of interest. These points of interest are used when filing the request for quotations to potential contractors.

The second critical stage occurs when the company receives the work equipment. The company must inspect the work equipment upon delivery to ensure it complies with requirements. The employee in charge of receiving the equipment uses lists to inspect the equipment.

The third critical stage involves maintenance and periodical inspections. At the end of the maintenance phase, or at regular intervals, it should be verified, using inspection lists, whether the work equipment still fulfils all the requirements. Article 7(4)(a) of the 1999 Decree states that the owner of the equipment is legally required to carry out such inspections. Under Article 7(6) of the 1999 Decree, the list is used by an employee assigned to this task by the employer. In accordance with the work equipment manual, workers are trained in carrying out these inspections with the help of lists.

The intervals between inspections depend on factors such as the intensity of use and the degree of obsolescence. In some cases, for example VCA certification, contractors may specify particular intervals. All repair or maintenance work should be followed by an inspection. The inspection lists or results of inspections must be archived in order to ensure they can be demonstrated. Following the inspection, the work equipment can be put to use, starting a new phase. Beginning this phase with an inspection guarantees that the equipment delivered is safe.

The fourth critical phase in the cycle is when the equipment is put to use. During this phase, the employee must decide, using checklists, whether or not the work equipment is safe to use (Article 7(5)(1) of the 1999 Decree). The checklists should reveal the degree of health and safety when working with the equipment.

Under Article 7(11)(a) of the 1999 Decree, the employer is responsible for the health and safety of his or her employees and is required to point out potential risks. The inspections make it easy to identify unsafe equipment or an unsafe work station. By carrying out inspections, staff are trained in how to identify defects.

The checklist must be completed by the employee using the work equipment. The intervals between completing the checklist depend on how often the equipment is used and the manner in which work equipment is handled in the company. The items on the list should be immediately obvious to all users. They should also be directly related to the safe functioning of the work equipment in the work station. In the event of a negative score, the equipment should be withdrawn from use and sent for maintenance. If the problem involves a defect in the work station, this must be resolved.

Using the purchase, reception, inspection and checklists, staff involved in the various phases can verify the safety of the work equipment while carrying out their task.

For the equipment listed in the manual, all inspections should be carried out by the company itself. As the work equipment is divided into risk classes, not all inspections must be carried out by companies themselves (*Goed Keuren? SZW op zoek naar een samenhangend keuringsbeleid* [‘The Ministry of Social Affairs and Employment seeks a coherent inspection policy’], 1996). Up to risk class 2, equipment can be inspected by the company itself. As a result, work equipment with a risk class higher than 2 is not included in the manual.

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An OSH website for micro-enterprises in Poland

National Research Institute

As of 12 June 2003, users of the Internet can make use of a new website, dedicated in particular to Polish micro-enterprises, containing sets of the most important information in the field of occupational safety and health at work for several sectors of the economy⁽²⁰⁾.

For the users' convenience, the new website (Figure 1) is functioning under two dedicated Internet addresses:

<http://www.bhpmikrofirma.pl>
<http://www.mikrofirmabhpl.pl>



Figure 1. OSH website for micro-enterprises in Poland (English demo version)

An English demo version of the website is accessible under Internet address <http://www.ciop.pl/6718.html>

The website is aimed mainly at employers and employees of Polish micro-enterprises, employing up to 10 workers. In view of the universal nature of the information published there, the website can also be helpful for bigger companies. It has been developed in order to make it easier for employers in the smallest and most numerous enterprises in Poland to have a quick and convenient access to the basic, necessary and, what is important, updated information in the field of safety and health protection in the working environment.

For the website to be able to perform practical information functions, it was developed in close cooperation with institutions supporting the

(20) The website for micro-enterprises described here has been developed by a group of employees of the Central Institute for Labour Protection — National Research Institute (CIOP-BIP): M. Drygala, A. Dąbrowski, M. Dąbrowski, A. Biernacki, A. Sychowicz, A. Szczygielska, J. Gierasimiuk, and the author of the entire project, B. Kędzia.

activities of Polish micro-enterprises in the field of occupational safety and health, and also directly with representatives of associations and owners of Polish micro-firms. An active part in developing it was taken, among others, by representatives of: the National Labour Inspectorate, the Central Statistical Office, the Social Insurance Institution, the Association of Polish Craftsmanship, the Polish Confederation of Private Employers, the Polish Agency for Enterprise Development, as well as employers conducting business activity in the following sectors: construction industry, wood processing, vehicle engineering, and food processing. On the basis of careful and detailed consultations, the information materials have been developed by an interdisciplinary group of employees of the Central Institute for Labour Protection, the National Research Institute (CIOP-BIP), experts in the field of legal aspects of occupational safety and health at work, safety engineering, fire fighting, consultants in the field of health protection in the working environment, and occupational safety and health management.

The basic principles

The website should compensate for the lack of self-educating materials for occupational safety and health, profiled according to individual types of business activity. It was developed, therefore, in the form of dedicated sets of information materials. For the convenience of users, information materials, carefully selected, have been presented separately for various sectors of the economy.

The information contained allows employers to get acquainted with the complete set of legal regulations (their full texts are published) and to assess the state of safety at work in the enterprise. The materials contain a discussion of the employer's basic legal duties, and also the consequences of failure to comply with the law. The OSH checklists, enclosed successively, make available specifications of potential hazards that can emerge in the enterprise of a specific sector, and indicate solutions relating to the methods for their elimination or reduction.

On the basis of opinions expressed earlier by representatives of cooperating institutions, a few sectors of the economy were selected for which the first information sets were developed. The criterion of choice was the frequency index for accidents at work, along with occupational hazards, and also the numerical strength of business entities functioning in the given sector.

Taking these criteria into account, these sector sub-websites were developed:

- construction industry;
- wood processing;
- repair and maintenance of cars .

In the dedicated information websites, it is easier to find the most important pieces of information:

- specifications and full texts of legal acts in force;
- specifications of the duties of employers connected with assuring occupational safety and health in the firm, in accordance with law;
- a timetable of employers' obligatory actions;
- pieces of information that are necessary for the fulfilment of the duties mentioned above;
- a choice of practical information and auxiliary OSH checklists that make it easier to assess the occupational risk at the work-stand and to reduce or eliminate occupational hazards;
- characteristics of the work connected with each of these sectors of business activity, with particular emphasis on the types of the hazards existing there, together with practical advice.

The services also contain auxiliary information that facilitates the contact with institutions supporting the activities of micro-enterprises. They ensure access to supplementary materials published on the Internet, and to broad information on, for instance, training, consulting, measurement, publications and services.

The structure of the service

In accordance with the principles adopted, the authors developed a structure for the website that makes it easier to present the available information in a transparent way. This includes a sub-website dedicated to construction sector micro-enterprises.

The information relating to safety and protection of people in the working environment was divided into eight sections that may be generally ascribed to two information groups.

GROUP I — sections with universal subjects. These contain pieces of information that are useful for all employers, no matter in what sector of the economy they operate, calling for an insignificant profiling only.

These are the following sections:

Employers' duties relating to occupational safety and health — a section which contains a detailed discussion of the most important duties of employers in ensuring, to employees, proper premises or another type of workplace, machinery and other equipment of work posts that ensure safety, obligatory benefits connected with OSH, encompassing appropriate training and medical examinations, ensuring relevant information on occupational hazards, provision of appropriate personal protective equipment and working clothes (as far as necessary), free meals and drinks to which employees are entitled, and appropriate fire protection. This section also contains a discussion of the post-accident procedure and the procedure connected with occupational diseases, and also certain consequences of failing to comply with the appropriate law.

A timetable of an employer's obligatory activities — a section containing a schedule for the actions connected with OSH that must be conducted at specific dates by every employer in the course of the year, along with information on the documents required (for instance: in Poland, Z-10 report, post-accident protocol, and statistical accident card) and on the institutions to which they must be sent, as well as on the period of their storage.

An assessment of occupational risk — a section containing basic information on the definition of an occupational risk and the general methods of its assessment and estimation, consistent with appropriate standards, and also the description of a simple method of assessing an occupational risk 'in five steps' at a specific work-stand.

The institutions — a section gathering the reference marks to Internet websites of the institutions supporting micro-enterprises in various aspects of their functioning, including those publishing pieces of information that are also useful in areas of their activities other than occupational safety and health.

The offer — a section containing pieces of information connected with a broadly-conceived offer of services in the field of occupational safety and health at work, for instance training, consulting, measurement information, and also information on the supply of personal protective equipment, publications, computer programmes connected with OSH, and tools available directly in the Internet network, necessary, for instance, to assess occupational risk, to select the proper PPE or to identify dangerous chemical substances.

GROUP II — sections for the information needs of a specific sector, taking account of the specificity of legal solutions, the occupational hazards there connected with the types of work carried out, and also detailed characteristics of the working environment there.

These are the following sections:

- regulations;
- occupational hazards;
- principles of occupational safety and health.

The content of the website

As mentioned already, the website contains detailed studies for the following sectors: construction industry, wood processing, and vehicle repairing and maintenance.

For each sector, next to dedicated sets of binding legal regulations, there is some general information on the most frequent occupational hazards and sets of practical advice concerning immediate methods of reducing an occupational hazard, generally presented in the form of checklists.

In addition, the section contains pieces of information closely connected with the types of typical work most often found in the given sector. It describes the occupational hazards existing there, and detailed rules of procedure, consistent with the principles of occupational safety and health.

The construction industry

The website dedicated to construction discusses the occupational hazards along with indications on how to reduce or eliminate them.

Occupational hazards and strenuousness

- the factors of occupational hazards — general information
- mechanical hazards
- noise and mechanical vibrations
- electric current
- fire
- explosion
- mental and physical strenuousness.

In addition, the section contains information on the desired preventive actions.

The principles of occupational safety and health at work

- earth work — excavations
- roof work
- bricklaying and plastering work
- carpentry work
- concrete and ferro-concrete work
- steel fixing
- finishing
- welding
- demolition
- impregnation and anti-corrosion work
- joinery work
- painting
- work at height.

The development of the website

The planned development of the website involves the improvement and updating of the contents presented and a gradual extension of its contents by adding series of information designed for successive sectors.

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The HSE compressed air tunnelling exposure database

Background and history

Compressed air has been used for over 150 years as a cost-effective ground stabilisation technique in tunnelling and caisson sinking in soft ground below the water table. Many major tunnelling and caisson sinking projects in Europe, the Middle East, Asia, America and Australasia have been driven successfully with the assistance of compressed air techniques.

It is generally accepted that the first application of work in compressed air was in 1839 by Triger in France. Its first recorded use in the UK was in 1851. The technique spread throughout Europe during the late 19th century, with records of its use in Antwerp in 1879 and in Germany in 1896.

In most countries, the legal maximum working pressure is around 3 to 3.5 bar. This is equivalent to 30 to 35 metres of water.

Physical principles behind the application of compressed air

Compressed air is normally applied to balance water pressure — either that in the tunnel face or in the ground at the base of the caisson. Balancing the water pressure controls water ingress. By controlling water ingress, ground stability can be controlled, thus preventing collapse of the face or invert and allowing construction to be carried out safely and with minimal settlement. It is the essential simplicity of balancing pressures which makes compressed air effective over a wide range of ground conditions.

Plant and personnel

A typical compressed air installation consists of a number of compressors or blowers feeding air through coolers to remove excess heat and filters to remove traces of oil. Airlocks are required to permit passage through the bulkheads of personnel, equipment and materials.

In the past, it was normal practice in compressed air tunnelling to pressurise most of the tunnel length, with excavation and lining erection taking place 'in air'. With tunnels now being driven mainly by tunnel boring machines (TBMs), only the plenum chamber behind the



General view of lock

cutter-head at the tunnel face requires to be pressurised. Typically, on a recent contract, the use of a TBM reduced the number of exposures to compressed air by over 98 % when compared with an adjacent similarly-sized tunnel, driven by hand under compressed air some three decades ago.

A number of key personnel are required to control compressed air working including, in most circumstances, medical lock attendants (MLAs) who are required on site to treat decompression illness.

Health hazards of compressed air working

The health hazard most commonly associated with work in compressed air (and diving) is decompression illness (DCI). During compression, the body tissues take up oxygen and nitrogen until they become saturated for the pressure to which they are exposed. On decompression the oxygen is rapidly given up or metabolised; however, the nitrogen takes longer to be released. Although many of the primary organs give up nitrogen quite rapidly, the release of nitrogen from fat tissue is extremely slow. Too rapid a return from higher pressures to atmospheric pressure results in bubbles of inert nitrogen being formed in the blood stream, which can lead to DCI.

DCI is the generic term which describes a range of medical conditions. The acute conditions include pain only or Type 1 decompression sickness, 'the bends', which manifests itself as pain normally in the shoulders, arms or legs. Occasionally there is a distinctive skin rash, usually sited on the trunk. Serious or Type 2

decompression sickness affects the central nervous system or brain and can result in paralysis, or in extreme circumstances, death. Barotrauma is an injury due to air under pressure, trapped in body cavities such as the sinus or ear.

The chronic form of DCI is dysbaric osteonecrosis (DON) which is a degenerative bone disease normally affecting the hips but which can also affect the shoulders. In both cases it causes serious disability.

Over the years, progressively more rigorous decompression procedures have been introduced in most countries to counter DCI. For example, in the UK the pressure from which staged decompression is required has been progressively lowered from 22 psi (~1.5 bar) in 1936 to 0.7 bar (~10 psi) in 2001. The most recent development in decompression practice in the tunnelling industry has been the introduction of oxygen as the breathing gas during the latter stages of decompression. This further reduces the risk of acute DCI and hopefully will lead to the elimination of DON.

Statutory requirements for reporting and record keeping

Compressed air working is subject to statutory control in most European countries. The first statutory requirement in the UK for the notification of DCI as an industrial disease was in 1937. Since then, there have been ever more rigorous requirements to keep exposure records. Currently a contractor undertaking work in compressed air and each employer of workers in compressed air must retain exposure records for 40 years. Individual workers are given a personal exposure record, but there is not yet a tradition in the industry to value such documents in the long term. DON is also a reportable industrial disease but its onset, often long after employment has ceased, means that few cases are reported. It normally becomes known from any compensation claim which might arise.

The information required to be recorded for a single exposure covers the identity of the individual exposed including occupation and national insurance number, date of exposure, time of start of compression, duration of exposure, maximum exposure pressure and details of the decompression. The individual's national insurance number was included so that individuals of a similar name could be identified across more than one contract. For research purposes, the

identity of the individual is not important, but occupation and employment history across contracts is of interest.

The Newcastle Registry

In the UK, discontent with the effectiveness of the then commonly used decompression tables and concern at the incidence of DON on a number of major sub-estuarine tunnelling projects led to the establishment of a national registry of compressed air exposure data. The Newcastle Registry, as it became known, was set up by the Decompression Sickness Panel of the Medical Research Council at the University of Newcastle upon Tyne in 1964. It eventually accumulated data on nearly 500 000 exposures from around 70 contracts covering the period 1948 to 1980. These exposures gave rise to 3 335 cases of DCI. Basic medical data on around 15 000 men were also stored. The registry closed in 1984. A major analysis of the data was undertaken in 1991, which examined the incidence of both DCI and DON. This analysis was used by HSE to inform the content of revised compressed air regulations which came into force in 1996.

The current HSE database

Around 1994, when the current UK regulations were being drafted, the value to hyperbaric research of electronic record keeping was recognised by HSE and the guidance accompanying the regulations was drafted accordingly. As MLAs already oversaw the keeping of paper records on site, it was relatively straightforward to have them input the records directly into electronic format, using a database layout prescribed by HSE.

On most sites, MLAs spend much of their time on standby so this was a cost-effective proposal. Contractors and their medical advisors could see the long-term benefits of this change and supported it with some enthusiasm. An indirect benefit of electronic record keeping has been the considerably improved quality of the records. All UK exposure data are now recorded electronically.

At the same time as electronic record keeping was introduced, HSE contacted all contractors recorded to have worked in compressed air at pressures over 1 bar, since 1981, to request copies of the relevant records from their company archives. Not all these contractors remained in business and some could not locate their records. The records which could be located were converted into the same electronic format under an HSE-funded research contract.

Currently in the database, HSE has information on 120 000 exposures to compressed air involving over 2 300 individuals and giving rise to 428 cases of DCI from over 30 contracts dating back to 1984.

Outcomes from the data

Traditionally, the incidence of DCI has been evaluated as a percentage of exposures. This is a crude measure of DCI incidence and does not reflect the risk to the individual or distribution of exposures in terms of pressure and time. In the analysis of the Newcastle Registry data, a new comparative measure of DCI incidence between sets of exposure



Tunnel boring machine (TBM) lock

data was developed — the standardised bends ratio. This measure is sensitive to both pressure and time of exposure. The analysis of data from the current database has led to the development of another measure — the single exposure risk factor which quantifies the risk to an individual from a single exposure of a given pressure and time. This is the measure which HSE currently finds most useful.

Additionally the information in the database has formed the basis for a number of major research projects. In 2001, in an attempt to reduce the incidence of DCI still further, the use of oxygen as the breathing gas during decompression became mandatory for all exposures over 1 bar, and the threshold for staged decompression was reduced from 1 bar to 0.7 bar. This change arose from analysis of the available data which showed that the incidence of DCI was considerably greater than previously realised and that the threshold pressure at which DCI was being reported had reduced in recent years.

A second study was into human factors which could give rise to susceptibility to repetitive DCI. If such factors could be identified, medical screening of potential workers in compressed air could be made more effective. Although no statistically significant factors could be identified, the power of the study was considerable because of the large amount of data available to the researcher.

A third study has quantified the recent incidence of DCI and is now looking to quantify the benefits from oxygen decompression. It is also examining a number of phenomena associated with compressed air working including acclimatisation, patterns of repetitive DCI across contracts and the worker response to DCI.

Trends for future research

In recent years, the number of exposures to compressed air has declined significantly and this trend will continue. Consequently it is

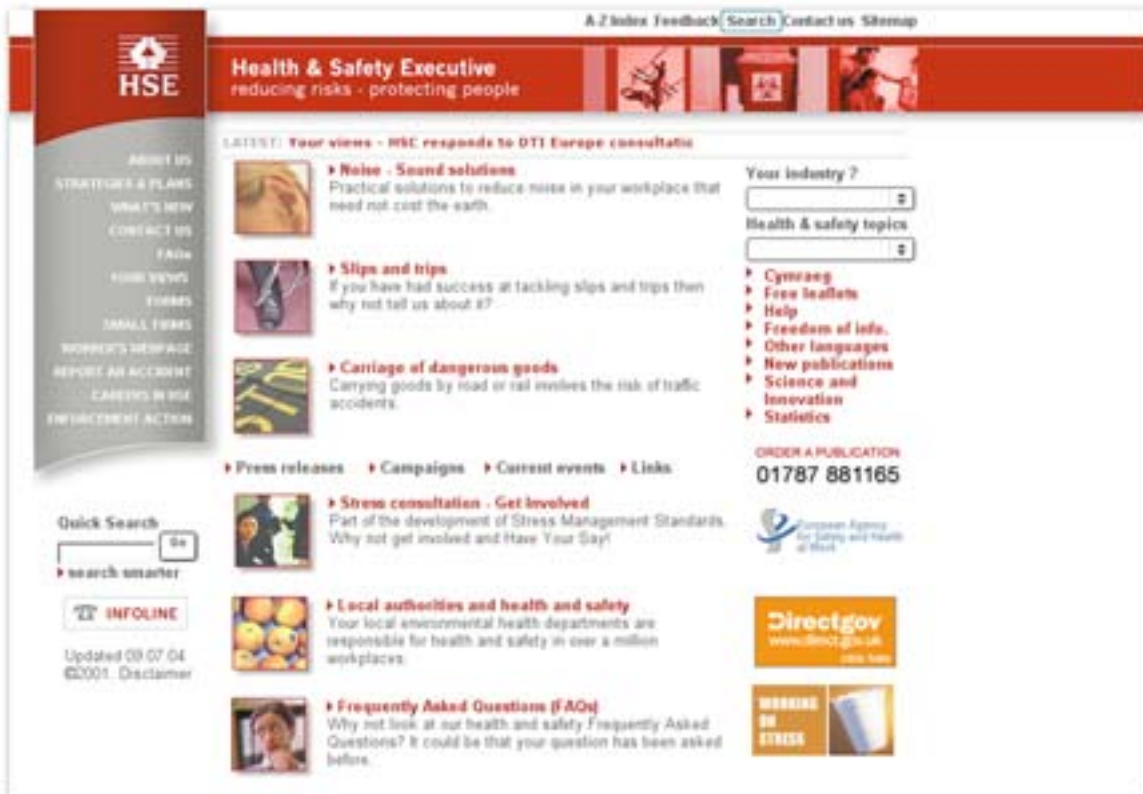
becoming increasingly difficult to acquire sufficient data to undertake meaningful retrospective studies of DCI incidence. HSE has recognised this and has been turning to mathematical modelling techniques in its hyperbaric research programme. Some work has been done to calibrate the model from the information in the database and more remains to be done.

HSE has recently undertaken a comparative study of a range of international oxygen decompression tables. This has been done using the mathematical model, but it would have been useful to have had access to other countries' data for validation of the theoretical study. At a recent international conference on compressed air work, delegates from France, Germany and the Netherlands, none of which have national databases, supported a call from the UK for the establishment of a Europe-wide tunnelling decompression database. Such a database would allow epidemiological research and comparative studies of different decompression tables to be undertaken.

As a further consequence of the lack of exposure data in the future, HSE is considering the use of real-time monitoring of workers after decompression using Doppler techniques, as a control measure for DCI. Again, the database will prove valuable in assisting in the validation of such techniques.

Conclusions

HSE has built up an extensive database of compressed air tunnelling exposure data, going back some 15 years, which has proved useful in informing both research in the topic and changes to regulation. HSE anticipates that its hyperbaric research programme will benefit from having further access to such data in the future.



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Construction logistics and coordination for safety and health matters

Introduction

Many professionals work together on a construction site: client, project supervisor, coordinator for safety and health matters, and contractors.

In a construction process, contractors deliver to the site many products, often heavy and bulky.

Admittedly, construction supply conditions are not always good, and for many reasons such as:

- ill-defined site organisation;
- delays in construction product selection;
- product manufacturing times unknown.

Improving supplies management would benefit the construction industry, knowing its difficulties in showing a profit, and given that:

- handling operations are numerous, not always justified, and responsible for a third of construction site occupational accidents and many occupational diseases;
- costs of non-quality are often related to poor organisation;
- waste management is still not rigorous enough.

Construction logistics

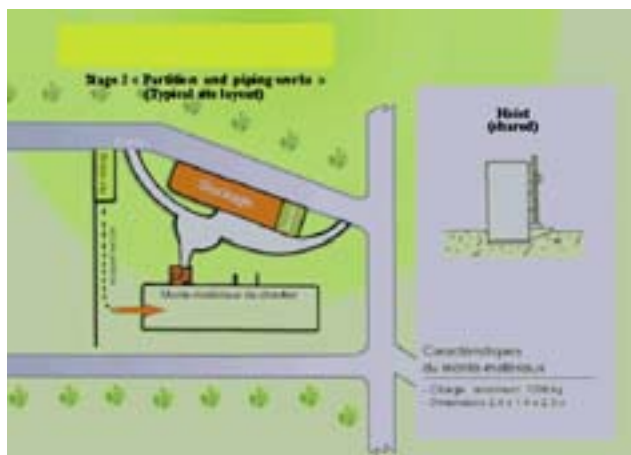
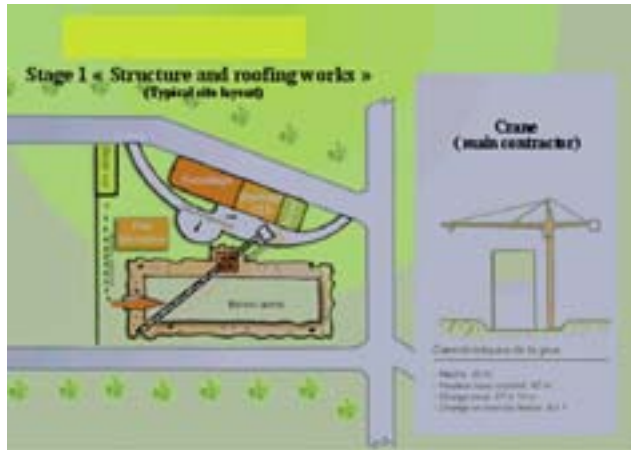
Logistics, originally developed for military purposes, is now a reality in the industrial sector. It is defined as the set of activities to supply, at the lowest cost, a specific quantity of products where and when a demand exists.

Firstly, it consists in identifying, then analysing, all product transfers made in the context of the contractor's activity, and then going over the same work for all actions triggering or resulting from product movements.

To optimise product and information flows, corrective actions are mainly implemented to remove useless operations, improve stocks or storage area distribution, optimise transports and enhance and speed up information and product movements.

To apply logistics to the construction industry, contractors require the following information before ordering products:

- exact definition of products for the construction; for example, delaying the choice of colours or product-exact references only disrupts the planned organisation;
- detailed works schedule; for example, in the industry, reducing stocks implies greater planning rigour;
- definition of shared construction site installations; for example, works and storage areas should always be accessible, especially in bad weather.



Without this information, orders are approximate and urgent; and deadlines prevail over delivery conditions. The chosen method of supply is then generally the manufacturer's or wholesaler's and rarely amended because it is always difficult to renegotiate an order.

Improving supplies to a construction site implies all people involved from design to execution.

Coordination for safety and health matters

Coordination for safety and health matters is a statutory requirement on building and civil engineering construction sites to prevent risks resulting from the various items or stages of work which are to take place simultaneously or in succession. It is also required to set out the rules applicable to the construction site, taking into account — where necessary — shared construction site installations such as access and various areas, plant and equipment, and collective protective equipment.

Coordination for safety and health matters must adopt logistics methods and principles to apply business logistics to construction sites and therefore optimise all supplies to the site.

From the project design stage, the coordinator for safety and health matters therefore draws up a health and safety plan outlining collective measures to be incorporated in the tender documentation, and related to the following items:

- the planning of the various items or stages of work;
- the determination of routes and areas for the passage and movement of plant and equipment, areas for the storage of various materials, etc.;
- the conditions under which various materials are handled (handling and lifting equipment, working platforms, removal of waste and debris, dangerous materials, etc.).

The general works schedule also includes a preparation period followed by the work execution period appended to the tender documentation.

The detailed works schedule breaks down the works for each contractor into elementary tasks. These tasks are 'critical' when they impact the final date of works if delayed, and 'non-critical' otherwise. These elementary tasks are 'productive' or 'non-productive' whether they correspond to an actual task or to waiting times, like for administrative authorisations, verifications or tests, and also product manufacturing and supplying, for example.

Optimising supplies is always based on the construction site installations. These must be designed to answer the needs of all the people involved, including the product manufacturers if they are involved in choosing delivery, storage, re-handling from storage area or on-the-job site delivery terms and conditions.

The main contractor generally implements installations at the start of construction, including powerful lifting equipment to move heavy and bulky material. Loads are often hooked and landed directly where they

are used. This contractor then disassembles part of his own installations when other contractors start working.

Without a new collective organisation, these other contractors usually face supply problems because they can only rely on their own means which are obviously limited, being dependent on the contract amount.

Shared arrangements for access and various areas, as well as handling and lifting equipment, are very highly recommended to avoid supplies being made in difficult conditions or with inappropriate equipment — carrying loads on stairs or on a person's back, for example.

These arrangements usually encompass access to the lower and upper floors of the construction.

In some cases, for fitting out and finishing works, workers can use lifting equipment included in the contract, such as lifts, operated before completion date.

A draft of the construction site layout, designed for each main stage of the work where necessary, incorporates these pre-contract decisions and puts forward to the contractors to share certain construction site installations.

This draft is updated as necessary by the contractors during the pre-construction stage before any execution of construction work and with no economic pressure on contractors as shared construction site installations were priced.

Construction site installations represent alone a construction operation requiring a works schedule and drawings even if these can be limited to a simple plan for the smaller constructions.

Conclusion

For good construction logistics, well-established habits between people involved must be questioned and the interest of new partners such as coordinators for health and safety matters and construction product manufacturers for the management of construction sites must be stimulated from the design phase.

In return, logistics removes useless work practices, optimises the use of construction site installations, and therefore increases productivity.

The primary beneficiaries of improved logistics are self-employed persons and small companies who can have no individual intervention on construction site management.

There are also benefits other than financial to be gained, namely a significant reduction in the number of accident risks, in particular caused by manual handling, a final structure of better quality, and a better brand image of the construction sector as a whole.

Further information at: www.inrs.fr/dossiers/dossier_btp.htm



European Agency for Safety and Health at Work
<http://agency.osha.eu.int>

The European Agency's objective, as set out in the founding regulation:

'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'.



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