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# Construction Health and Safety Management



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Safety Management**

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**Alan Griffith  
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## List of abbreviations

APAU	Accident Prevention Advisory Unit
BS	British Standard
BSI	British Standards Institution
CDM	The Construction (Design and Management) Regulations 1994
CHSWR	The Construction (Health, Safety and Welfare) Regulations 1996
CIRIA	Construction Industry Research and Information Association
COSHH	The Control of Substances Hazardous to Health Regulations 1996
DETR	Department of the Environment, Transport and the Regions
EC	European Community
ECI	European Construction Industry
EEC	European Economic Community
EMS	Environmental Management System
EU	European Union
HSC	Health and Safety Commission
HSE	Health and Safety Executive
H&SMSA	Health and Safety Management System Assessment
HSWA	The Health and Safety at Work, etc. Act 1974
IiP	Investors in People
IMS	Integrated Management System
IMSA	Integrated Management System Assessment
ISO	International Standards Organization
LFS	Labour Force Survey
MHSWR	The Management of Health and Safety at Work Regulations
PPE	The Personal Protective Equipment at Work Regulations 1992
QA	Quality assurance
QMS	Quality Management System
RIBA	Royal Institute of British Architects
RIDDOR	The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995
SHE	Safety, Health and Environment
TQM	Total quality management

## Preface

The management of health and safety is without doubt the most important function of construction management. Construction work is inherently dangerous. Injuries to persons on and around construction sites occur regularly. It is fortuitous that many injuries are minor, but, others are serious and some are fatal. The construction industry has over recent decades suffered a poor safety record. While the number of fatal accidents demonstrated a welcome decline in the 1990s this should not encourage complacency. Construction management has a perpetual and unswerving challenge to ensure a safe and healthy working environment.

The Construction (Design and Management) Regulations 1994, known as the CDM Regulations, introduced welcome and much needed legislation. It augments an existing framework of legislation for health and safety at work and brings a clearer vision for the management of construction safety, health and welfare. The CDM Regulations are concerned with the management of health and safety throughout the total construction process. Clear responsibility is placed upon clients, designers and contractors to be proactive in the planning, coordination and management of health and safety. The Regulations focus on identifying the potential hazards to health and dangers to safety during each stage of the construction process together with the assessment of their risk.

The CDM Regulations require the delivery of a project health and safety plan. Divided into two parts, the first stage focuses on the project evaluation and design processes with the objective of producing a pre-tender health and safety plan. The second part focuses on the production site processes with the objective to produce a construction phase health and safety plan. It is the essential element of planning which forms the basis for the management approach with risk assessment as its core theme.

Effective health and safety management systems and working procedures are the goal of the main parties to a construction project. The client's planning supervisor is charged with delivering the pre-tender health and safety plan, while the principal contractor is charged with delivering the construction health and safety plan. Moreover, the principal contractor must establish management systems and working procedures which ensure the maintenance of safe working conditions in and around the project site. Well formulated health and safety management systems will identify, assess and control risk both within

## **Construction health and safety management**

and across the professional boundaries of the various contractual parties. Feedback loops within the designer's and contractor's approach will ensure that information is directed not only within the span of control of the individual party but contributes to the management processes within other systems. Under the CDM Regulations, effective management will be evidenced in the production of the health and safety file – a complete profile of health and safety planning and management throughout the construction project. The CDM Regulations place a clear responsibility upon the principal contractor to develop, implement and maintain effective health and safety management procedures on its project sites.

This book focuses on the principal contractor. It is suggested in this book that the implementation of a well considered and conceived, formally structured and well organized health and safety management system is an appropriate way for a principal contractor to meet its responsibilities, not only within the scope of the CDM Regulations but also in meeting other current legislation. Such a system, supporting both the corporate and project-based organizations, will meet the requirements of BS 8800, the specification for health and safety management systems. Health and safety management systems (H&SMS) development is following much in the same way as quality management and environmental management with the rapid evolution of accredited certification schemes. There is little doubt that the health and safety management system will become an established and prominent aspect of construction management in the early part of the new millenium.

## Acknowledgements

The authors gratefully acknowledge *all* those persons who contributed to the production of this book.

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**Part A The nature of construction  
health and safety**

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# 1 Introduction

## **The hazardous nature of construction**

Poor health and safety management costs the construction industry millions of pounds each year. Across the UK economy the cost to business and commerce runs into billions of pounds annually. Yet, more fundamental and of greater importance, poor health and safety management costs lives. Construction continues to be one of the most hazardous industries within which to work. The Egan report *Rethinking Construction* (DETR, 1998) stated that 'the health and safety record of construction is the second worst of any industry' and suggested that 'accidents can account for 3–6 per cent of total project costs'. Injuries, accidents and dangerous situations are commonplace. Over the last 20 years the construction industry has suffered a poor health and safety record. While the number of fatal accidents declined throughout the 1990s this must not encourage any sense of comfort and complacency. 'The rates of death, serious injury and ill health are still too high' (HSE, 1997). The industry has a perpetual and unswerving challenge to deliver and maintain a safe working environment. Effective health and safety management demands a clear vision, a systematic approach and a sustained commitment to improvement.

## **Health and safety: a paramount consideration**

Health and safety is a paramount consideration for all construction industry professionals. It impinges upon the work of the planning authorities, clients, consultants, contractors – in fact anyone who works on or is in the vicinity of a construction project. Whereas in the past health and safety management has traditionally been perceived as a production site activity, it has now become a holistic consideration and integrated responsibility of duty holders across the total construction process. It has also become an integral part of the corporate organizational framework and structure as well as the operational management of many organizations who contribute to the construction process.

### **Awareness for construction health and safety**

The level of awareness and recognition for health and safety within the construction industry is increasing. Advances in health and safety management practices have been rapid following the implementation of the Construction (Design and Management) Regulations 1994, or CDM Regulations, (HSE, 1994), which came into effect in 1995. The CDM Regulations augment much additional legislation including The Health and Safety at Work, etc. Act 1974 (HSE, 1974), commonly referred to as the HSWA, The Management of Health and Safety at Work Regulations 1992 (HSE, 1992) and The Construction (Health, Safety and Welfare) Regulations 1996 (HSE, 1996). The CDM Regulations have made a profound contribution to the cultural shift in safety, health and welfare legislation which has evolved over the last 30 years.

### **The CDM Regulations**

The CDM Regulations apportion clearly the duties and responsibilities of clients, designers and contractors together with those of new duty holders – the planning supervisor and principal contractor. CDM also requires new documentation – the ‘health and safety plan’ and the ‘health and safety file’ – to be developed and implemented. It is clear, however, that the level of experience of construction professionals across the industry is currently limited. One would expect this and there is much learning to be absorbed before everyone becomes totally comfortable with the application of CDM.

While responsibilities for health and safety under CDM are shared more than they have been in the past, a weight of responsibility falls on the principal, or main, contractor. Many principal contracting organizations will realize that the concept and principles of good health and safety management are the same as effective construction project management. Moreover, they will recognize that successful project health and safety is supported by an effective corporate organization which shows commitment to strong health and safety policies, procedures and practices.

### **Health and safety management systems**

The key driver to achieving a safe and healthy working environment is to ensure that health and safety issues are assessed, planned, organized, controlled, monitored, recorded, audited and reviewed in a systematic way. An appropriate way for the principal contractor to address the legislative requirements, corporate business needs and practical project demands of health and

## Introduction

safety is to establish a health and safety management system within the organization. Such an approach can be a dedicated system or one which forms part of an existing organizational management system, such as a quality system. Through the establishment of a formal management approach to health and safety, the principal contracting organization will be well equipped to develop a strong and positive health and safety culture. It will be able to develop the policies, plans, management procedures and safe working practices essential to achieving successful construction health and safety management. Moreover, it will add value to its organizational culture, enhancing its ability to maintain its core business and to attract new business in the future.

## Structure of the book

This book is structured in three parts. Part A presents a comprehensive introduction to the nature and demands of construction health and safety, Part B presents the framework of health and safety legislation and Part C focuses on the development and application of effective health and safety management by the principal contractor. It does not intend to be prescriptive but to present key considerations. Compliance with current legislation is quite specific but the methods by which compliance is achieved is a matter for each principal contractor to determine. Construction health and safety management is, put simply, a paramount responsibility facing the principal contractor today and one that will increase in importance in the future as legislation becomes ever more stringent, customer perception magnifies and industry expectations increase.

## References

- Department of the Environment, Transport and the Regions (DETR) (1998) *Rethinking Construction*, Construction Task Force, HMSO, London.
- Health and Safety Executive (HSE) (1974) *The Health and Safety at Work, etc. Act 1974*, HMSO, London.
- Health and Safety Executive (HSE) (1992) *The Management of Health and Safety at Work Regulations 1992*, HMSO, London.
- Health and Safety Executive (HSE) (1994) *The Construction (Design and Management) Regulations 1994*, HMSO, London.
- Health and Safety Executive (HSE) (1996) *The Construction (Health, Safety and Welfare) Regulations 1996*, HMSO, London.
- Health and Safety Executive (HSE) (1997) *Health and Safety in Construction 1997*, HMSO, London.

## 2 Blackspot Construction

### Introduction

This chapter presents an overview of the Health and Safety Executive report *Blackspot Construction* (HSE, 1988). The report presents the findings of a study of five years' fatal accidents in the building and civil engineering industries. Although the study was undertaken in the early to mid 1980s it is *the* benchmark document for health and safety management in construction. It provides an essential foundation for understanding the nature of construction health and safety.

### ***Blackspot Construction***

*Blackspot Construction* (HSE, 1988) is considered to be the definitive report on the occurrence of accidents within the construction industry. The report, based on the detailed findings of a unique research study, analyses the circumstances leading to the loss of life of 739 persons within the building and civil engineering industries between 1981 and 1985. The overriding claim of the report is that these lives could have been saved by the better management of health and safety within the construction industry.

*Blackspot Construction* highlights unequivocally that the principal reasons for fatal accidents within the construction process result from fundamental lapses in attention to health and safety. These are: a general lack of foresight to danger; the absence of supervision; insufficient education and training for identifying and meeting potential hazards; and, a general lack of attention to detail.

The reasons underlying these tragedies should not in any way be rationalized by explanations founded in the difficulties and complexities of construction. It is well accepted that construction is overshadowed by a unique combination of circumstances: its temporary work site; the transient workforce; and, busy and often over-stressed management. The report clearly highlights that accidents in construction are avoidable. It should be clearly recognized that they are avoidable. Moreover, the construction process should be managed with an optimum awareness for, and the highest regard for, health and safety so that fatal accidents are inherently avoided.

## Blackspot Construction

The message in the 1988 report, from the Director General of the Health and Safety Executive, J. D. Rimmington, emphatically conveys the responsibility that the construction industry must bear with respect to health and safety:

Construction work needs to be organized in such a way that it does not continue unnecessarily to claim the lives of so many, including fit and experienced workers.

To all that plan, manage and supervise construction work he suggests:

Ask yourself; Could this happen in my company? Could this happen to one of our contractors? Could this happen to me? . . . and make sure it never does!

### The principal accident statistics

**The facts** The Health and Safety Executive determined that in the five-year period 1981–85, 739 accidents within the construction industry resulted in fatality. Of these, 561 were accidents involving employees and 120 involved self-employed workers, 94 of which were working as subcontractors and 26 working for themselves. Furthermore, 37 accidents involved members of the public and 21 involved children.

Table 2.1 presents fatal accident statistics for the five-year period. It can be seen clearly that the annual number of fatal accidents to construction employees had remained almost constant in each year ranging from 109 in 1981 to 113 in 1985. Greater variability can be seen in the other groups recorded. In the category of self-employed subcontract workers the number of fatalities doubled from 12 to 23 during the period, while the number of fatalities of children almost tripled from 3 to 8.

**Table 2.1** Number of fatal accidents in construction industry, 1981–85

<i>Group</i>	<i>1981</i>	<i>1982</i>	<i>1983</i>	<i>1984</i>	<i>1985</i>	<i>Total</i>
Employees	109	112	119	108	113	561
Self-employed working as subcontractor	12	18	23	18	23	94
Self-employed working on their own	7	5	8	4	2	26
Members of the public	9	9	8	5	6	37
Children	3	4	4	2	8	21
Total	140	148	162	137	152	739

*Source:* HSE (1988)

## Construction health and safety management

**Table 2.2** Number of fatal accidents in construction recorded by occupation, 1981–85

<i>Occupation</i>	<i>Employees</i>
Labourers and civil engineering operatives	193
Roofing workers	68
Painters	40
Drivers	47
Demolition workers	43
Managerial and professional status	29
Carpenters and joiners	30
Scaffolders	22
Steel erectors	20
Bricklayers	15
Plumbers and glaziers	10
Electricians	7
Other construction and non-construction occupations	37
<b>Total</b>	<b>561</b>

Source: HSE (1988)

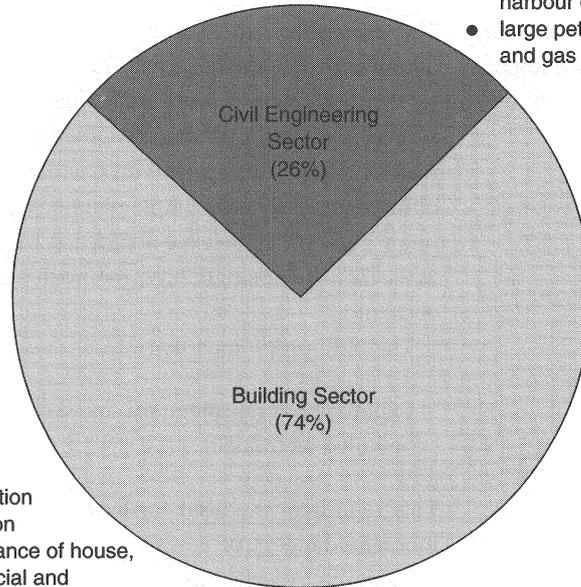
Table 2.2 presents the distribution of the 561 fatalities to employees among occupations within the construction. Labourers and civil engineering operatives comprise the largest group, accounting for 34 per cent of all fatal accidents. Trade operatives that typically work at heights, roofing workers, painters, scaffolders and steel erectors were involved in 68, 40, 22 and 20 fatal accidents respectively. Combined these account for 27 per cent of all incidents. A further occupational group that suffered substantial fatalities was that of other construction and non-construction workers. These are occupations that typically service and support the construction processes on site. Some 37, or 7 per cent, of total fatal accidents occurred in this group.

Almost three-quarters (74 per cent) of all accidents occurred within the building sector. Incidents involved construction and demolition works and occurred during maintenance operations to houses, commercial and industrial processes. The remaining 26 per cent of total accidents involved works to the construction and maintenance of roads, sewer pipelines, sea and harbour defences and large petrochemical, oil and gas installations within the civil engineering sector. These statistics are shown in Figure 2.1.

Figure 2.2 presents the main categories of fatal accidents within the construction sector as a whole for the five-year period. Clearly, falls represent the principal reason for accidents, accounting for 52 per cent of the total number occurring. Accidents involving falling materials or objects and transport and mobile plant account for 19 per cent and 18 per cent respectively. Electrical hazards, asphyxiation (which includes drowning), fire and explosions and

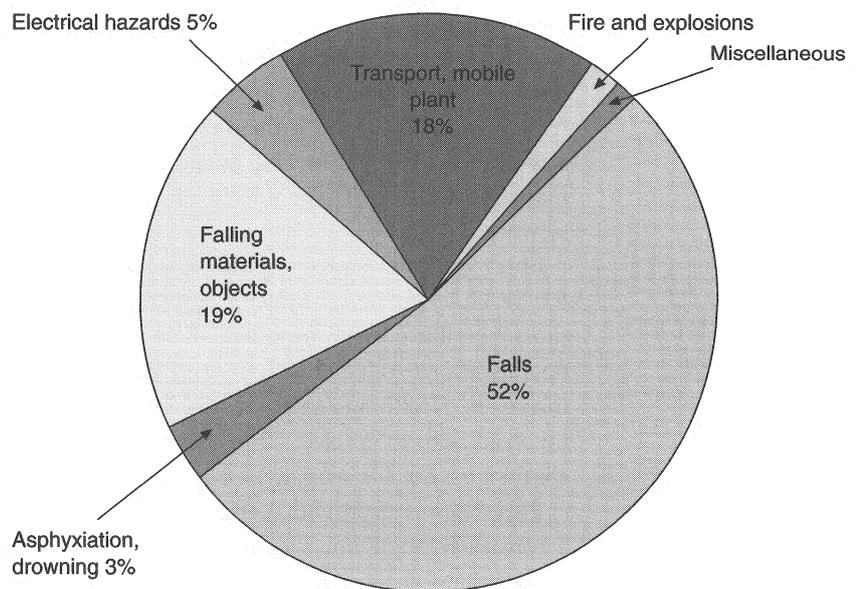
**Blackspot Construction**

- construction and maintenance of roads
- sewer pipelines and harbour defences
- large petrochemical, oil and gas installations



**Fig. 2.1** Distribution of fatalities by construction sector  
*Source:* data from HSE (1988)

- construction
- demolition
- maintenance of house, commercial and industrial premises



**Fig. 2.2** Major categories of fatal accidents in construction  
*Source:* HSE (1988)

## Construction health and safety management

miscellaneous reasons account for the remaining 11 per cent of the total fatal accidents within the construction processes.

### **What do these principal accident statistics show?**

The principal accident statistics demonstrate that incidents are not exclusive to any occupational group nor to specific activities. Accidents occur across the total construction process and to any participants, even those who are time-served and well experienced. Often, fatal accidents occur during simple and routine works during activities which might normally be considered to be quite innocuous, for example painting operations. Whereas a high level of risk might reasonably be expected, for example in demolition, maintenance work presents a surprisingly high risk with a substantial number of fatal accidents occurring.

The HSE propounds that:

Experience is no safeguard and experienced workers were just as likely to be killed as trainees.

This reinforces the need for training, in particular for operatives new to the inherent dangers of construction. Equally, education and training remains essential to experienced workers as the HSE points out:

People are often at risk because recognized custom and practice in the industry is not necessarily safe practice.

Construction operatives succumb to quite unnecessary accidents. Falling from ladders, working platforms and structures, falling through roofs, the collapse of excavations, the impact from falling materials and dangers from plant movement are the most prominent. Accidents can occur in any situation, whether a construction project be small or large, confined or extensive, complex or simple. Accidents can be just as likely to occur from a major and transparent danger, such as the inappropriate deployment of a mobile crane, as they can from poor housekeeping around the site, for example not tidying up debris on a working platform. The HSE suggests that such instances were inexcusably marred by a lack of planning, inadequate supervision and unsafe systems of work.

Effective health and safety management starts with pre-site planning and the development of safe systems of working for any construction project. This must be followed with proactive attention to health and safety awareness by operatives and staff and with positive leadership and attentive supervision by managers. Health and safety management requires liaison between all those involved with the project – the client, consultants, principal contractor, sub-contractors, professional advisers, project staff and workforce, and the public.

Everyone involved with a construction project and working on or visiting a construction site must learn to identify danger and take positive steps to protect themselves and others.

### The analysis of fatal accidents within construction

This section presents an analysis and evaluation of the fatal accidents examined by HSE and reported in *Blackspot Construction* (HSE, 1988).

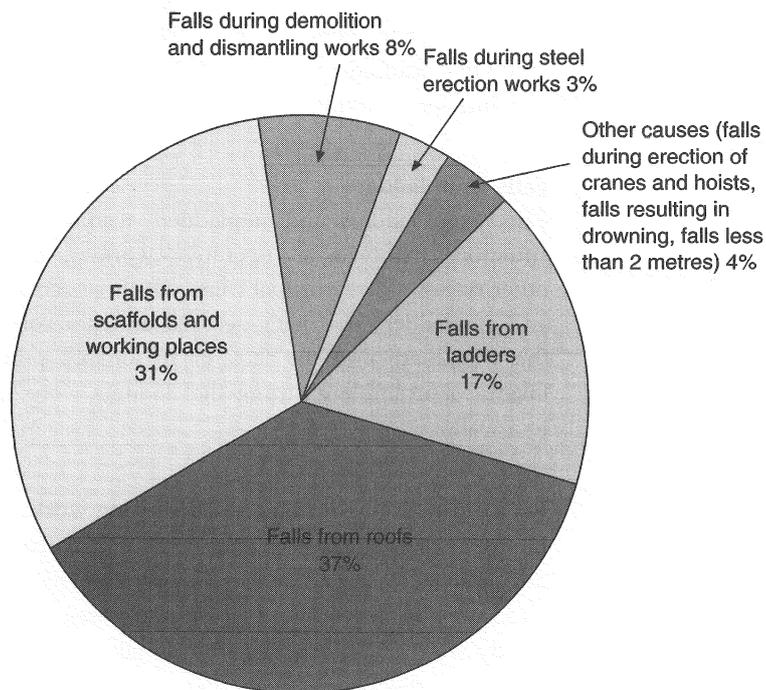
**Falls** Over half, 52 per cent (383 out of 739), of all fatal accidents recorded in the HSE study resulted from falls. This is the largest single cause of death among construction workers.

Figure 2.3 presents an analysis of the category of falls broken down into groups, of which there are six.

- Falls from roofs – 37 per cent (142).
- Falls from scaffolds and working places – 31 per cent (121).
- Falls from ladders – 17 per cent (66).
- Falls during demolition and dismantling works – 8 per cent (29).
- Falls during steel erection works – 3 per cent (11).
- Falls due to other causes, for example during erection of cranes, and hoists, and falls resulting in drowning – 4 per cent (14).

#### Falls from roofs

Three main situations accounted for the 142 fatal accidents resulting from falls from roofs. These were: (1) roof edge falls; (2) falls through fragile materials; and (3) falls from the internal structure of roofs.



**Fig. 2.3** Breakdown of fatal accidents resulting from falls  
 Source: adapted from HSE (1988)