

Generic Health and Safety - EC Directives and Technical Policy Implications

B. S. Neale

Technology and Health Sciences Division, Health and Safety Executive,
Magdalen House, Bootle, L20 3QZ, United Kingdom

Abstract

This paper describes the need for automation and robotics developments to take effective cogniscence of relevant occupational health and safety requirements and guidance. The latter includes existing and developing standards, together with recent and proposed legislation. It looks at how automation and robotics techniques should be developed to help those responsible for them to comply with new and proposed legislation. This short paper, which is to introduce the issues, examines some aspects of generic health and safety management, including the requirement for assessment of risks, with respect to directives^{1,2} emanating from Europe.

1. INTRODUCTION

For a number of reasons this is a good time to focus on workplace, or occupational, health and safety issues for automation and robotics in industry. To maximise potential, any such development needs to ensure conformity with legislation and standards. Early awareness of such requirements can have the benefits of both stimulating possible developments as well as ensuring that developments are acceptable for use, without the need for modification. Occupational health and safety includes those who are at work as well as the effects on others as a result of work activities.

There is also a need to be aware of health and safety requirements whilst progressing such developments, such as in the laboratory, during trials and even earlier during any information gathering process. The construction sector of industry still produces more accidents³ than any other sector. Developments to help reduce the accident rates must be encouraged. The costs of accidents^{4,5} needs also to be taken into consideration. The results of introducing new technologies to the construction industry may remove some risk areas, for example, by considerations at the design stage of the building or structure, and for instance by reducing the need for people to work at heights. An assessment will need to be made, however, to identify any new potential hazards that may be introduced so that the potential associated risks are realised and adequately managed⁶. It is essential that any developments involving automation and robotics are properly assessed for holistic health and safety effects.

2. DEVELOPING STANDARDS

This is a particularly good time to examine technologies, techniques and systems employed in the industry. Alternative systems and philosophies need to be examined. Automation and

robotic techniques are advancing in construction worldwide and advantage can be taken to enhance health and safety on sites. As they advance, the health and safety implications need to be considered in the development process as an integral part of the design philosophy for the end use.

Currently, much is happening in the development of number of technical standards and EC Directives for health and safety on site, including the technical methods and controls for structural, building, and civil engineering designs where these can influence construction (building and assembly activities) and also future maintenance and future repair⁷. This will include the creation, maintenance and modification of those designs.

3. DIRECTIVES

Alongside technical developments in automation and robotics, the European Union as the EC is now known, is promulgating Directives on a number of topics in Europe, some of which will influence the way some of the ideas under scrutiny will be used and developed.

A number of EC Directives on occupational health and safety were required to be implemented into national legislation^{8,9,10,11,12,13} by the EC (as it then was) member states by 1st January 1993. Other requirements will be introduced into national legislation⁷ in 1994/5. A central theme of one of those directives, which is known as the "Framework" directive⁸ is the need to assess risks. Proposed legislation⁷ derived from a directive which applies specifically to the construction industry introduces legal responsibilities of those involved, such as clients and designers, as well as contractors.

In some cases the legislation will merely reflect the better practices already followed in sectors of the industry. The effect of the legislation should be to introduce these good practices throughout. Automation and robotic techniques can play a leading part in a number of ways.

The basis of the new requirements is still a safe and healthy place of work and also a safe and healthy environment for the public as a result of those work activities. In generic terms, these are similar to existing legislation in, for instance the UK, the basis of which is the Health and Safety at Work etc Act 1974¹⁴.

4. RISK ASSESSMENT

The application of risk assessments for work activities will need to be made and will form a central part of health and safety planning¹⁵. Identifying hazards and any consequential risks will enable them to be effectively managed. The results of assessments can then be implemented by designing safety into the job, by taking into account factors such as structural stability, safe systems of work and safe places of work. One way to manage the risks is to remove people from the hazardous areas. Techniques to achieve this can include use of machines. Control methods for, and "intelligence" of, any machines could vary. Methods of work will be decided and these will be incorporated into a safety plan based upon those risk assessments. Automation can be used positively to improve health and safety, also, in such areas as design and management, including CAD systems. The use of expert systems could be of use, also¹⁶. In the construction sector of industry there is scope for integrated development.

There will be a duty of care to test for hazards and risks that may be introduced in place of those removed. New hazards may include: mechanical ones from the machine, gravity because of the location of the machine, integrity of the programmable machinery, and computer

(control) software reliability and safety. Controls, including adequate training and supervision are required.

Initially, a "qualitative" approach to risk assessment is appropriate, looking critically at all activities in sequential order and examining the possible consequences of those activities in terms of hazard. The risks can be examined on a comparative basis with alternative methods looked at. More sophisticated techniques include "quantitative" methods. However, well presented cases based on comparative risk assessments, which may include some "quantitative" considerations¹⁷ may be appropriate.

For the purpose of this paper it is relevant to set out initial concepts to start the discussions on a more formal risk assessment process for the industry. A summary of the basic hierarchy of dealing with risks is to identify, avoid, combat at source, provide collective protection, provide individual protection.

What is needed is for the processes of identification of hazards and minimisation or elimination of risks to be considered in a structured, logical way. If the risks are only minimised and not eliminated then the residual risks will have to be controlled. Considerations will need to commence at concept and design stages.

Human reliability¹⁸ also needs to be considered. An assessment should include identification of all points in a sequence of operations where incorrect human action, or a failure to act, may lead to adverse consequences. These may result in immediate risk, or may lead to an environment which may create a risk which need not have occurred. Such assessments could indicate the steps that need to be taken to reduce likelihood of error at identified operations by introducing organisational, procedural, ergonomic or other changes such as designing out the need for particular operations.

The results of these assessments can form a basis for the preparation of integrated method statements for use as working documents. These will need to be reviewed and updated, through auditing and monitoring, as the job proceeds¹⁵. Within this context there is significant scope for further development and introduction of initiatives of automation and robotics.

5. CONCLUSIONS

The basic message is that the research and development community interested in this topic need to be aware of these legislative developments at an early stage to enhance the benefits of their developments to potential end users. This could well mean a take-up of the ideas by industry at an earlier date if they are readily within the scope of health and safety requirements, either existing, or in the process of development, as well as because of economic considerations.

Within the scope of health and safety in this environment is the dependability or reliability of operation. Fundamental to this is the reliability of the computer software used in the processes.

Risk assessments and subsequent method statements and safety plans will need to be developed. Clients and professional advisers will be involved. This is a practice that currently occurs in some sectors of the industry. Any implementation of automation and robotics will come within this requirement.

In future whole construction, maintenance, repair, decommissioning, demolition, and partial demolition processes should receive greater consideration by more people such as clients, managers, planners, structural engineers and specific safety professionals at more levels. Safety plans will need to be prepared before work commences. The overall objective is fewer personal injury incidents.

6. HSE PUBLIC ENQUIRY POINT

For those wishing further information from the HSE, this is available at the:

HSE Information Centre, Broad Lane, Sheffield, S3 7HQ

TEL: 0742-892345 FAX: 0742-892333

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