

## Human Factors - An Introduction

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### Overview

This one-day course is designed to impart a basic understanding of Human Factors (HF). By the end of the course, delegates can be expected to understand the core areas of the subject and the improvements good HF practice can make to safety, efficiency and productivity.

The first module defines the discipline, outlines its development and explains the levels at which it can be applied: the operator, the task, the equipment, the environment and the organisation. The second module takes a case study approach to high-profile catastrophes and highlights how, if HF had been addressed, they may have been avoided. Having set the scene, the course proceeds to consider the detailed areas of HF: human-computer interaction, task analysis, workstation design, environmental ergonomics and human reliability.

### Target Audience

The course is designed for those requiring a working understanding of Human Factors. It will be relevant to delegates in most industrial sectors, including defence and manufacturing, such as:

- Engineers and designers who make decisions which could affect the usability [and hence the operational capability] of a new or modified system or item of equipment.
- Project Managers, Support Managers and Operations Managers requiring an understanding of HF for effective decision-making at all points in the project cycle.
- Operators of machinery in process industries who wish to avoid musculoskeletal disorders, reduce fatigue and optimise their working conditions.
- Production Managers wishing to enhance productivity and reduce staff costs without prejudicing safety.

### Objectives and Utility

On completion of this course, delegates will have a basic grounding in Human Factors on which they can build. They can be expected to be aware of the importance and value of a person-centred approach.

The knowledge they gain from the course will benefit professionally and benefit their sponsoring organisation through improved product design, safety and productivity.

### The Training Process

The course consists of eight complementary modules. The course presentation is largely audiovisual - interspersed with short practical exercises in order to encourage delegate participation and reinforce the key principles.

The course adopts an analytical and incisive approach to the subject area, with minimal technical jargon and an accessible style.

The course includes a description of health and safety legislation, where this is relevant. National and international standards being discussed.

All delegates are issued with a comprehensive course booklet and certificate of attendance.

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## Course Programme

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### Day 01 - AM

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#### 401-T **What is Human Factors?**

This first module provides delegates with an overview of the Human Factors approach. HF is defined and its history is described. The core areas are listed and the typical benefits of HF are explained. The module discusses typical applications of HF and its relationship to other disciplines

#### 402-T **HF and the Prevention of Major Military and Industrial Catastrophes**

This module presents a series of high-profile catastrophes selected from a range of industrial sectors, in order to stimulate thought and discussion on the role of HF in preventing major accidents. There are seven case studies: Piper Alpha, Zeebrugge, Space Shuttle Challenger, Tenerife Air Disaster, Ladbroke Grove, Kegworth and Three Mile Island. In each case, the sequence of events is described and the HF failings are identified with the participation of the delegates

#### 403-T **Workstation Design**

This is the first of the modules dealing with the detail of achieving high levels of operability. A suitable workstation design must take account of the users' anthropometry, biomechanics (including posture) and vision. This module explains the common fallacies of workstation design and replaces them with an ergonomic approach. The sources and the method of use of anthropometric data are described. Basic workstation design principles are described which support good working posture of the operator. The main assessment methodologies for posture are described and appraised. The optimal positioning of controls and displays is described.

Finally, the module discusses relevant legislation in the area of workstation design, with particular reference to the Display Screen Equipment regulations and the ISO9241 standard.

#### 404-T **Environmental Ergonomics**

This module explains the fundamental technical and regulatory issues pertinent to maintaining a work environment that is optimal for safety, comfort and efficiency. It discusses thermal comfort, lighting, vibration, radiation and hazardous chemicals. In each case, the units of measurement are discussed, relevant legislation is described and the methods of mitigating adverse health and performance effects are presented.

### Day 01 - PM

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#### 405-T **Task Analysis**

Task analysis is central to the Human Factors approach. In order to improve task or equipment design, the analyst must have a clear understanding of what the operator is doing and how the operator is processing information. This module presents the main methods of task analysis available to the analyst, detailing the advantages and disadvantages of each.

#### 406-T **Human Reliability Assessment**

An understanding of human reliability issues is essential for managers of socio-technical systems and for operators working within these systems. This module begins by exploring the causes, types and contexts of human error, then examines the techniques available for identifying and quantifying error in new or extant systems. The following techniques are covered: Human HAZOP, THERP, HEART, SHERPA and SLIM. The modifying role of performance shaping factors on error likelihood is explained. The module concludes by examining a range of approaches for eliminating and mitigating human error.

#### 407-T **Human-computer Interaction (HCI)**

Effective human-computer interaction (HCI) is critical in high-reliability industries. This module presents the fundamentals of designing equipment for effective HCI. It begins by explaining the importance of mental models and the need to design the interface around the mental model of the user. Principles of best design practice are presented, under the general themes of layout, labelling, consistency, selection of control and display types, text size and feedback. The module then outlines the common mistakes made by designers of computer interfaces. Standards and regulations relevant to interface design are referenced and summarised. Future HCI technologies are discussed, including automatic speech recognition and haptic interfaces

#### 408-T **Manual Handling**

Figures released by the Health and Safety Executive (HSE) indicate that typically over a third of all over-three-day lost-time injuries occur during manual handling operations (e.g. 38% in the UK in 2001/2002). This final module explains the basic anatomy of the spine and the possible injuries arising from lifting operations. The majority of the module is spent discussing the Manual Handling Operations Regulations and the responsibilities they place on employers and employees to reduce the risk of injury. Methods of assessing risk are discussed, including the HSE filter, the HSE's Manual Handling Assessment Charts and software tools for manual handling assessment. Methods of preventing risk focus in turn on the task design, the individual and the load being lifted. Correct lifting techniques are presented.

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**500-R Recapitulation**

The course is summarised. This is also a final opportunity for questions and answers.