

Human Factors Practitioner Course

Overview

The discipline of Human Factors (HF) is otherwise known as ergonomics, human performance engineering, user-centred design, usability engineering or people-related requirements. This course takes to a higher level some of the themes developed in the basic Human Factors – an introduction course, and introduces new concepts in the challenging areas of cognition, task analysis and biomechanics.

On completion of this course, delegates can be expected to be conversant with the core areas of the subject and the improvements good HF practice can make to safety, efficiency and productivity.

Target Audience

The course is designed for delegates with a deep interest in the subject or with a need to know more than just the fundamentals. It is valuable to personnel from most industrial sectors, including defence and manufacturing, such as:

- Engineers and designers who make decisions affecting the operability of a new or modified 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 lifecycle.
- Production managers wishing to enhance productivity and reduce staffing costs without prejudicing safety.
- Leaders (or HF contacts) of Integrated Project Teams in the MoD, who need a fuller understanding of the requirements and benefits of the subject.

Objectives and Utility

On completion of this course, delegates will have a working understanding of Human Factors. They can be expected to be aware of the importance and value of a person-centred approach and possess some familiarity with the practice of the subject.

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

The Training Process

There are ten complementary modules each lasting around an hour, spread over the two days. The course presentation is largely audiovisual, but practical exercises encourage delegate participation and reinforce the key principles. The course adopts an analytic and incisive approach to the subject area, with minimal technical jargon and an accessible style. A brief assessment at the end of the course allows delegates to demonstrate their new knowledge and to discuss the solutions to simple problems in HF.

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

Human Factors Practitioner Course

Course Programme

Day 01 - AM

418-S What is Human Factors?

This brief introductory module defines Human Factors and its history. The module provides delegates with an overview of the Human Factors approach. The core areas are listed and the typical benefits of HF are explained.

The module ends with 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. Case studies include the Piper Alpha oil rig fire, the Zeebrugge ferry sinking, the Texas City refinery explosion, the Ladbroke Grove train disaster, the Kegworth air crash and the Three Mile Island nuclear melt down. In each case, the sequence of events is described and the HF failings are identified with the participation of the delegates.

424-S Physical Ergonomics

Over a third of all over-three-day lost-time injuries occur during manual handling operations in the UK. The Manual Handling Operations Regulations are introduced, and the responsibilities they place on employers and employees to reduce the risk of injury are discussed. The basic anatomy of the spine is demonstrated and the possible injuries arising from lifting operations are described. Techniques for assessing musculoskeletal risk from lifting, pushing and pulling are introduced, including the HSE filter, the NIOSH equation, the HSE's Manual Handling Assessment Charts and various software tools. Methods of preventing risk focus in turn on the task design, the individual and the load being lifted. Good lifting techniques are presented and practised, and a selection of lifting aids is presented.

The cardiovascular system is presented in the context of the physical workload that can be sustained by the heart, blood and lungs. The module concludes with a discussion of other types of injuries that can be sustained at work, including Carpal Tunnel Syndrome and de Quervain's Tenosynovitis.

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.

Day 01 - PM

055-P HFI Management Activities and Documents

This module summarises the origins and principles of integrating Human Factors into the defence procurement. The seven HFI domains are introduced, as defined in Defence Standard 00-25. For every defence project there is series of management activities for HFI. The CADMID cycle is presented and the content and timings of HF management activities are described. The HFI Strategy, Early Human Factors Analysis, Human Factors Risk Register, Human Factors Working Group and HFI Plan are all explained. Key documents are described with reference to the new defence Human Factors standard 00-250.

425-S Human Factors Integration: Technical Activities

This module explains the technical activities in the HFI process, which are conducted under the management activities described in the previous module. We discuss the content and timing of Early Human Factors Analysis, allocation of function and target audience description.

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 HAZOPS, 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.

Day 02 - AM

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.

407-T Human-computer Interaction (HCI)

Effective human-computer interaction (HCI) is critical in high-reliability industries. This module presents effective HCI designs and how to achieve them. It begins by explaining the importance of mental models and the need for the interface design to support and develop the mental model of the process held by the user. Principles of good 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 some of the common mistakes made by designers of computer interfaces. Standards and regulations relevant to interface design are referenced and summarised, in particular the Regulations governing the design of Display Screen Equipment workstations. Future HCI technologies are discussed, including automatic speech recognition, gesture recognition and haptic interfaces.

Day 02 - PM

405-T Task Analysis

Task analysis is central to the Human Factors approach. In order to improve the design of task, equipment of process, the analyst must have a clear understanding of what the operator is doing, what he is using, where he is located and how long he is taking. This module presents the main methods of task analysis available to the analyst, detailing the advantages and disadvantages of each. The principal methodology, Hierarchical Task Analysis (HTA), is discussed in detail. Delegates have an opportunity to apply HTA to a simple task. Link analysis, timeline analysis, verbal protocols, activity sampling and sequential sampling are presented and evaluated. The concept of the 'repertory grid' is introduced and its value is discussed. The various computer tools for task analysis are compared.

420-S Industrial Psychology

This advanced module begins with basic discussion of the psychological concepts relevant to an industrial or military setting. It moves on to describe the 'psychological contract' made between staff and employer (or between soldier and officer), illustrating how this underpins teamwork and trust. The concept and utility of 'knowledge lifecycle management' are discussed. An understanding of cognition is increasingly important as the focus of attention in our society moves steadily from physical to mental work. The module discusses the working of the human memory (short and long term) and the concepts underlying mental workload measurement (SWAT scales) and prediction (VACP analysis). Finally the Wickens model of Multiple Resource Theory is introduced. The background of the theory and its successes and failures are discussed.

426-S Human Factors Conclusions

The course material is summarised and the delegates' understanding of it is appraised through their answers to a few typical Human Factors problems. There is a final opportunity for questions, answers and discussions.