HSE Human Factors Briefing Note No. 1

Introducing Human Factors

Case study

In January 2001, an accident at a lower tier COMAH site led to several tonnes of phenol being released into a bund. The operators setting up the process made an error and later in the operation, a tank outlet inadvertently closed. The phenol then overflowed from the tank.

No one was injured, but the cost in loss of materials, lost production and recovery of the phenol was £39,800.

Investigations found that the system for controlling pumps and valves was badly designed and prone to human error. Phenol is a poison that is absorbed through the skin. It was only luck that no one was injured in the incident because no one was near the leaking tank.

Source: HSE website www.hse.gov.uk/comah/index.htmT

This incident shows that, whenever people use control systems – whether by turning valves, using pushbuttons or a keyboard - if those systems are poorly designed then the operator could make an error. Poor design in this way is one example of a 'Human Factors' problem.

We want to make sure that companies do as much as they can to prevent everyday accidents and injuries - for example slips, trips and falls. But, we are particularly concerned that they prevent major hazard accidents: those that could injure a large number of people, on and off the site.

Since human failures are responsible for up to 80% of all types of accident and figure in almost every major accident it is important to reduce those failures as much as possible. We strongly believe that applying human factors methods helps to reduce accidents.

From recent site inspections and assessment of safety reports at COMAH sites, we believe that a large number of companies need to look more closely at human factors issues.

We know that there is potential for significant human factors problems at most COMAH sites, and we want to encourage all companies to find out more about this important topic area, and to apply that knowledge in a structured and rigorous way to their key safety critical activities.

As part of our strategy, we are providing information and guidance and will want to ensure that managers are applying that information.

This 'Briefing Note' is the introduction to a series of 12 and it:

- Explains what Human Factors are;
- Gives examples of human factors problems in companies like yours; and
- Describes what can be done to help solve those problems.

More information, help and guidance

The other briefing notes (2-12) are on Human Factors subjects that HSE believe need particular attention on major hazard sites:

2. Competence
3. Humans and Risk (integration of human factors into risk assessments and accident investigation)
4. Written procedures
5. Emergency Response
6. Maintenance
7. Safety culture
8. Safety-critical communications
9. Alarm handling and control room design
10. Fatigue
11. Organisational change and transition management
12. Human Factors and the Major Accident Prevention Policy (MAPP)

Human factors checklist

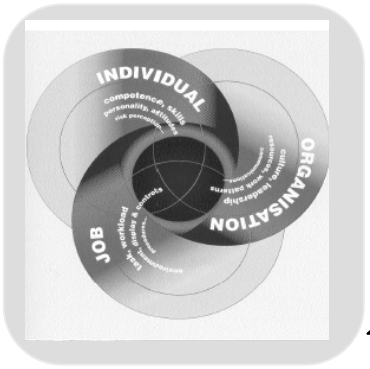
This list doesn't cover every aspect of human factors but will give you an idea of what is involved. It includes safety management factors. If you can tick most of the boxes, then your company is probably dealing with human factors and safety culture issues quite well.…but every company can improve.

For all the jobs done on this site, this company usually:

➢ Chooses the most skilled people to do the work, either our own people or contractors *(B'Note 2)*	☐
➢ Gives people interesting and varied work without overloading them	☐
➢ Arranges for work to be done in teams if that's the best approach *(2 and 3)*	☐
➢ Takes care that the working environment is not too hot or cold or uncomfortable *(3 and 10)*	☐
➢ Keeps noise levels down to help communications and concentration *(9)*	☐
➢ Provides good lighting *(9)*	☐
➢ Arranges reasonable working hours, meal and rest breaks *(10)*	☐
➢ Makes sure that there's enough room to work in, that is, not too cramped or confined *(12)*	☐
➢ Issues written instructions and other essential paperwork that work very well *(4)*	☐
➢ Avoids overloading people with information and doesn't give contradictory information *(8)*	☐
➢Provides the proper tools and equipment to do the work *(6)*	☐
➢ Doesn't apply unreasonable time pressure *(3 and 8)*	☐
➢ Minimises interruptions to jobs and doesn't change priorities all the time *(3)*	☐
➢ Makes sure that, if a job is handed over to another shift, key information is handed over with it *(8)*	☐
➢ Provides good supervision of important tasks or of less experienced teams *(2)*	☐
➢ Has practiced and realistic emergency plans in place in case there's a problem *(5)*	☐
➢ Encourages a good working culture and good relationships between people *(7)*	☐
➢ Doesn't keep changing the organisation, individual responsibilities or lines of management *(11)*	☐

Learning more about human factors

HSE's core guidance[1] on human factors defines it as the interaction between the 3 main factors affecting human performance at work - the job, the individual and the organisation. This means that, in a well-managed organisation:



Management within the **Organisation** take responsibility for all aspects of work and work design: they devise and maintain a good safety management system, and encourage a good safety culture by showing genuine commitment and consulting the workforce on key decisions. A learning organisation will take into account the latest thinking on best practice in safety and will learn from accidents and near misses.

The **Job** is well-designed to match known strengths and limitations of the person or team doing it. This is called fitting the job to the human. This design includes: work areas, the environment, tools, materials, machinery, control and display devices, management and communications systems and all written materials for guidance and job control.

The company will also select **Individuals** matched to the needs of the job. (Fitting the human to the job). They will have: the most suitable physique (size, build and strength), personality and intelligence fitted to the job. They will be fully competent by having the right skills, understanding, experience and training.

We need companies to put more emphasis on good job and task design and to assess and organise safety critical tasks so that they are safe.

However, in our inspections and investigations and in reading safety reports, we find that companies spend more time describing the reliability of the ***hardware***. This is important, but so is the reliability of the ***person*** operating the hardware and an equally rigorous and structured approach is needed.

Companies are not always realistic about how people actually behave at work, for example:

Companies state that employees will…	**The reality is….**	**Management should…**
Follow procedures	Procedures are often: missing, out of date or poorly written. People make up their own work methods	Find out why procedures are not being used. See if the way employees actually do the job is more efficient and safer
Be fully competent in everything they do	Everyone has gaps in their knowledge. Some companies have lost highly experienced people	For novices: provide supervision and good procedures For those whose knowledge is 'rusty': reassess them and provide refresher training For those who are leaving: plan for others to take over by learning from the experience of old hands before they leave
Be highly motivated in their work	Even the person in their ideal job has some 'off days'; many routine tasks are simply boring	Design jobs to stimulate interest; even if it means giving someone work that could be done by a machine. 'Rotate' people in and out of the most boring but necessary jobs
Are always where they should be	People wander off or are asked to do favours for others that takes them out of their normal workplace	Accept that people won't always be where they should be. Provide radios and pagers. Arrange for back up cover when someone really does need to go elsewhere

Companies state that employees will…	The reality is….	Management should…
In an emergency, 'save the day'	Real emergencies are often highly complex and stressful. People don't react as in the emergency plan	Practise emergencies so that everyone is familiar with the required routines and maintains skills in these infrequent events. Provide clear information during emergencies. Have a clear structure with fall back plans and ensure everyone knows their role
Work highly reliably: be very unlikely to make an error	All tasks are prone to errors – some more than others. Human errors are a major cause of accidents and can occur in all jobs – including operations, maintenance, modification and management	Consider human error when they assess risks. Make systems as 'forgiving' as possible (resistant to error; allow time for correcting the error). For safety critical tasks, make sure that eg key steps are independently checked, and that procedures and other job aids are clear. Avoid a 'blame culture'

Other key problems we have found from inspection and assessment are:

- Too much emphasis being placed on reducing personal accidents (slips, trips, falls etc) without an equal focus on preventing **major** accidents
- Failing to realise that that safety culture is about everyone in the company, including managers, not just the 'front line'
- Not being clear how the safety management system will prevent or reduce human errors which may lead to major accidents

Reference

1. Reducing error and influencing behaviour (HSG48), HSE Books 1999, ISBN 0 7176 2452 8