

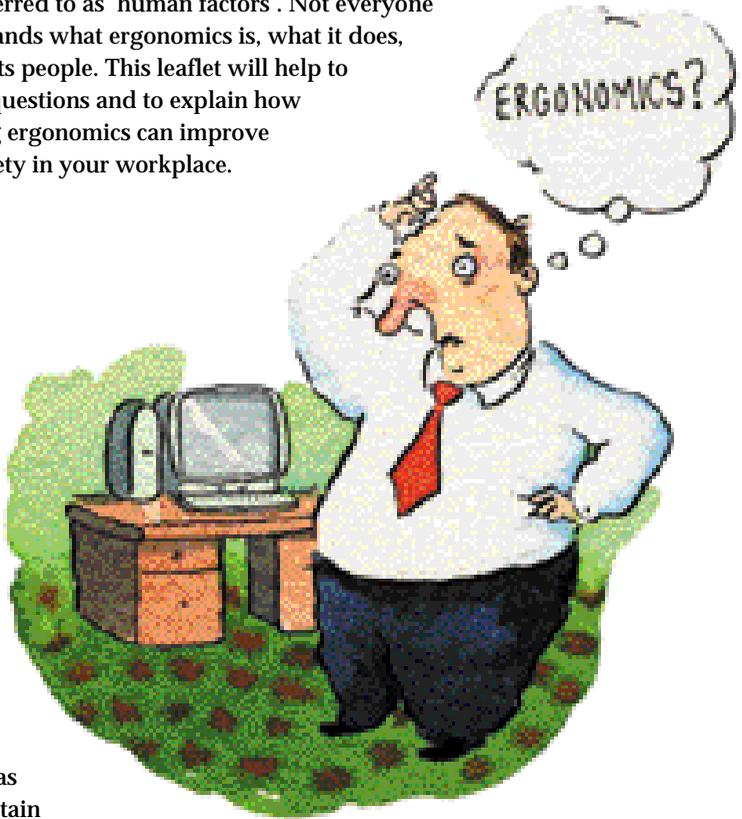


# Understanding ergonomics at work

*Reduce accidents and ill health and increase productivity by  
fitting the task to the worker*

## UNDERSTANDING ERGONOMICS AT WORK

You may have heard of the term 'ergonomics'. This is sometimes referred to as 'human factors'. Not everyone really understands what ergonomics is, what it does, or how it affects people. This leaflet will help to answer these questions and to explain how understanding ergonomics can improve health and safety in your workplace.



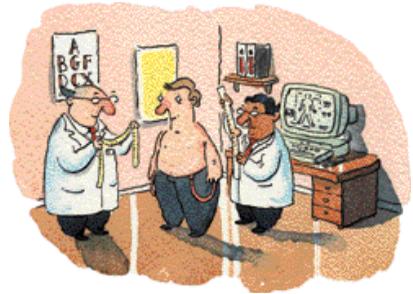
It is aimed at anyone who has a duty to maintain and improve health and safety and who wants to gain insight into ergonomics. It gives some examples of ergonomics problems and simple, effective advice on what can be done to solve them.

## What is ergonomics?

Ergonomics is a science concerned with the 'fit' between people and their work. It puts people first, taking account of their capabilities and limitations. Ergonomics aims to make sure that tasks, equipment, information and the environment suit each worker.

To assess the fit between a person and their work, ergonomists have to consider many aspects. These include:

- the job being done and the demands on the worker;
- the equipment used (its size, shape, and how appropriate it is for the task);
- the information used (how it is presented, accessed, and changed);
- the physical environment (temperature, humidity, lighting, noise, vibration); and
- the social environment (such as teamwork and supportive management).



Ergonomists consider all the physical aspects of a person, such as:

- body size and shape;
- fitness and strength;
- posture;
- the senses, especially vision, hearing and touch; and
- the stresses and strains on muscles, joints, nerves.

Ergonomists also consider the psychological aspects of a person, such as:

- mental abilities;
- personality;
- knowledge; and
- experience.

By assessing these aspects of people, their jobs, equipment, and working environment and the interaction between them, ergonomists are able to design safe, effective and productive work systems.

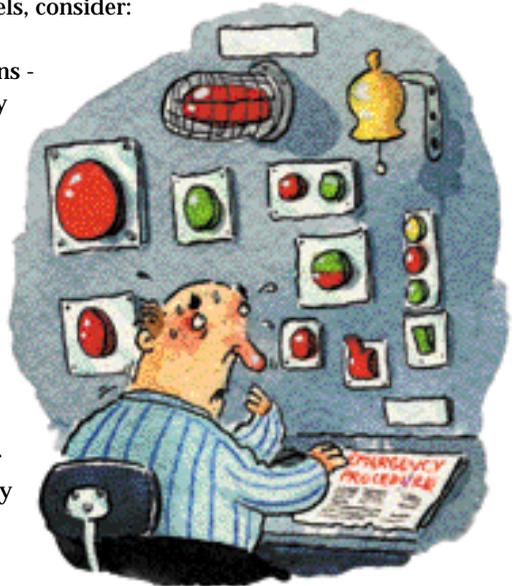
## How can ergonomics improve health and safety?

Applying ergonomics to the workplace:

- reduces the potential for accidents;
- reduces the potential for injury and ill health; and
- improves performance and productivity.

Ergonomics can reduce the likelihood of an accident. For example, in the design of control panels, consider:

- the location of switches and buttons - switches that could be accidentally knocked on or off might start the wrong sequence of events that could lead to an accident;
- expectations of signals and controls - most people interpret green to indicate a safe condition. If a green light is used to indicate a 'warning or dangerous state' it may be ignored or overlooked;
- information overload - if a worker is given too much information they may become confused, make mistakes, or panic. In hazardous industries, incorrect decisions or mistaken actions have had catastrophic results.



Ergonomics can also reduce the potential for ill health at work, such as aches and pains of the wrists, shoulders and back. Consider the layout of controls and equipment; these should be positioned in relation to how they are used. Those used most often should be placed where they are easy to reach without the need for stooping, stretching or hunching.

Failure to observe ergonomic principles may have serious repercussions, not only for individuals, but whole organisations. Many well-known accidents might have been prevented if ergonomics had been considered in designing the jobs people did and the systems within which they worked.

## What kind of workplace problems can ergonomics solve?

Ergonomics is typically known for solving physical problems. For example, ensuring that work surfaces are high enough to allow adequate clearance for a worker's legs. However, ergonomics also deals with psychological and social aspects of the person and their work. For example, a workload that is too high or too low, unclear tasks, time pressures, inadequate training, and poor social support can all have negative effects on the person and the work they do.

The following examples highlight some 'typical' ergonomic problems found in the workplace:

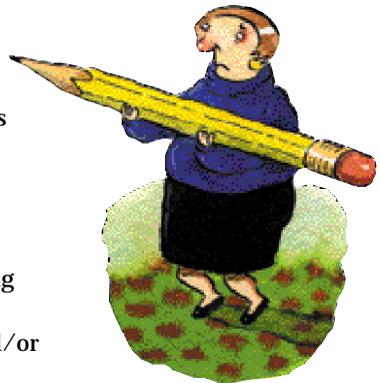
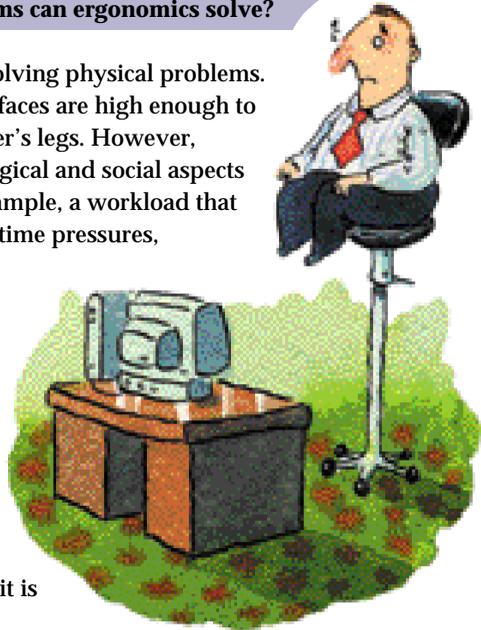
### **Display screen equipment**

- The screen is poorly positioned - it is too high/low/close/far from the worker, or is offset to one side.
- The mouse is placed too far away and requires stretching to use.
- Chairs are not properly adjusted to fit the person, forcing awkward and uncomfortable postures.
- There is glare on the screen from overhead lights or windows, increasing the risk of eyestrain.
- Hardware and/or software are not suitable for the task or the person using it, causing frustration and distress.
- Not enough breaks or changes of activity.

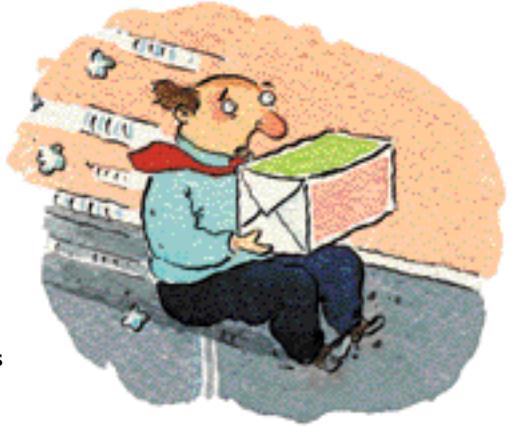
These problems may result in mistakes and poor productivity, stress, eye strain, headaches and other aches or pains.

### **Manual handling**

- The load is too heavy and/or bulky, placing unreasonable demands on the person.
- The load has to be lifted from the floor and/or above the shoulders.



- The task involves frequent repetitive lifting.
- The task requires awkward postures, such as bending or twisting.
- The load cannot be gripped properly.
- The task is performed on uneven, wet, or sloping floor surfaces.
- The task is performed under time pressures and incorporates too few rest breaks.



These problems may result in physical injuries such as low back pain or injury to the arms, hands, or fingers. The problems may also contribute to the risk of slips, trips, and falls.

### ***Work-related stress***

- Work demands are too high or too low.
- The employee has little say in how they organise their work.
- Poor support from management and/or colleagues;
- Conflicting demands, eg high productivity and quality.

Poor control of the risks causing work-related stress could lead to ill health and reduced performance and productivity.

### ***Managing the working day***

- Insufficient recovery time between shifts.
- Poor scheduling of shifts.
- Juggling shifts with domestic responsibilities.
- Employees working excessive overtime.



These problems may lead to tiredness or exhaustion, which can increase the likelihood of accidents and ill health.

## How do I identify ergonomic problems?

There are many ways in which ergonomic problems can be identified. These can range from general observations and checklists to quantitative risk assessment tools.

Ideally, several approaches should be used:

- talking to employees and seeking their views. Employees have important knowledge of the work they do, any problems they have, and their impact on health, safety, and performance;
- assessing the work system by asking questions such as:
  - Is the person in a comfortable position?
  - Does the person experience discomfort, including aches, pain, fatigue, or stress?
  - Is the equipment appropriate, easy to use and well maintained?
  - Is the person satisfied with their working arrangements?
  - Are there frequent errors?
  - Are there signs of poor or inadequate equipment design, such as plasters on workers' fingers or 'home-made' protective pads made of tissue or foam?
- examining the circumstances surrounding frequent errors and incidents where mistakes have occurred and people have been injured. Use accident reports to identify details of incidents and their possible causes;
- recording and looking at sickness absence and staff turnover levels. High numbers may result from the problems listed earlier and/or dissatisfaction at work.



## What can I do if I think I have identified an ergonomic problem?

- Look for likely causes and consider possible solutions. A minor alteration may be all that is necessary to make a task easier and safer to perform. For example:
  - provide height-adjustable chairs so individual operators can work at their preferred work height;
  - remove obstacles from under desks to create sufficient leg room;
  - arrange items stored on shelving so those used most frequently and those that are the heaviest are between waist and shoulder height;
  - raise platforms to help operators reach badly located controls;
  - change shift work patterns; and
  - introduce job rotation between different tasks to reduce physical and mental fatigue.
- Talk to employees and get them to suggest ideas and discuss possible solutions. Involve employees from the start of the process - this will help all parties to accept any proposed changes.
- Always make sure that any alterations are properly evaluated by the people who do the job. Be careful that a change introduced to solve one problem does not create difficulties elsewhere.
- You don't always need to consult ergonomics professionals, and the expense of making changes can often be kept low. However, you may need to ask a qualified ergonomist if you are unable to find a straightforward solution or if a problem is complex.
- HSE has published a range of guidance material, some of which is free. Aimed at employers and employees, this guidance provides help on how to achieve safe and healthy work environments. It includes practical evaluation checklists and advice.
- Good ergonomics sense makes good economic sense. Ergonomics input does not necessarily involve high costs, and can save money in the long term by reducing injuries and absence from work.



An understanding of ergonomics in your workplace can improve your daily work routine. It is possible to eliminate aches, pains, and stresses at work and improve job satisfaction. Ergonomic solutions can be simple and straightforward to make - even small changes such as altering the height of a chair can make a considerable difference.

### Case study 1

Eddie works on an engine assembly line. In his job he has to use a handheld impact wrench to fit a temporary adapter to an engine. The assembly line makes up to 2400 engines a day and it takes approximately 3 seconds to tighten each adapter.

As well as the risk from using a vibrating tool, Eddie often had to adopt poor postures to reach some parts of the engine. He had to repeatedly stretch out his arm and constrain his posture while tightening the adapter. After some time on the job, Eddie found he was leaving work with shoulder and neck pain. One tea break, Eddie's line manager saw him rubbing his neck and shoulder and recognised the pain could be due to the type of work Eddie was doing. The line manager told the company health and safety representative about what she had seen.

The company responded by making the following modifications:

- They replaced the impact wrench with a smoother running device and suspended it to support the weight. As a result, very little vibration would be passed to the operator.
- They modified the workplace layout and allowed workers better access to all sides of the engine, so they didn't need to adopt poor working postures.
- They implemented a job rotation scheme whereby the five workers on the line were moved around a number of different tasks. Some of these tasks still required the use of vibrating tools, but the overall exposure was halved.

As a result of the modifications there was:

- a reduction in vibration exposure;
- no need to adopt poor and constrained postures;
- reduced boredom and fatigue for Eddie's team; and
- improved productivity.

## Case study 2

Dominique is a receptionist in a large financial company. Much of her work involves using a telephone to take messages and redirect calls to appropriate departments. Dominique regularly uses a computer (display screen equipment or DSE) to make appointments, record messages and respond to e-mails.

After working at the front desk for eight months, Dominique found she was leaving work with an aching shoulder and neck, and with sore eyes and a headache. Dominique asked her manager for a risk assessment to identify possible problems with her working arrangements and to determine where improvements could be made.

The risk assessment identified the following areas for improvement:

- Dominique would often hold the telephone between her shoulder and ear while talking on the phone and typing a message on the computer. She regularly adopted this awkward, static, strained posture during her working day.
- During the summer Dominique's computer screen was difficult to read because of glare and reflections from light through the window. This meant she struggled to avoid making mistakes and would repeatedly adjust her posture to view the screen.

The assessment led to the introduction of simple, cost-effective measures to reduce the risks:

- A hands-free telephone headset was provided, which helped to eliminate Dominique's neck and shoulder problems.
- An eye test to establish if Dominique had any problems with her vision.
- With the help of her manager, Dominique rearranged her workstation so her screen was no longer facing the window, to remove the glare caused by daylight.
- Dominique's manager arranged for periodical DSE training sessions for all staff, so they were aware of the health problems associated with computer use and how to prevent them by adjusting their chairs, arranging their workstation appropriately, and taking regular breaks from keyboard work.

Dominique was much happier in her work, her health problems diminished, and productivity was increased.

## Where can I get more information?

### For names of ergonomics practitioners:

The Ergonomics Society, Devonshire House, Devonshire Square, Loughborough, Leicestershire, LE11 3DW Tel: 01509 234904 Website: [www.ergonomics.org.uk](http://www.ergonomics.org.uk)  
E-mail: [ergsoc@ergonomics.org.uk](mailto:ergsoc@ergonomics.org.uk)

### For advice on ergonomics information in the published literature:

The Ergonomics Information Analysis Centre, School of Electronic, Electrical and Computer Engineering, The University of Birmingham, Edgbaston, Birmingham B15 2TT Tel: 0121 414 4239 E-mail: [ERGO-ABS@bham.ac.uk](mailto:ERGO-ABS@bham.ac.uk)

### Books on ergonomics

Dul J and Weerdmeester B *Ergonomics for beginners* (Second Edition) Taylor and Francis 2001 ISBN 0 7484 0825 8

Kroemer K H E and Grandjean E *Fitting the task to the human: A textbook of occupational ergonomics* (Fifth edition) Taylor and Francis 1997 ISBN 0 7484 0665 4

Pheasant S *Ergonomics, work and health* Macmillan 1991 ISBN 0 33 348998 5

Wilson JR and Corlett EN *Evaluation of human work: A practical ergonomics methodology* (Second edition) 1995 Taylor and Francis ISBN 0 7484 0084 2

### Relevant HSE publications (available from HSE Books)

#### Priced

*A pain in your workplace? Ergonomic problems and solutions* HSG121 HSE Books 1994 ISBN 0 7176 0668 6

*Work with display screen equipment. Health and Safety (Display Screen Equipment) Regulations 1992. Guidance on Regulations* (Second edition) L26 HSE Books 2003 ISBN 0 7176 2582 6

*Lighting at work* HSG38 (Second edition) HSE Books 1997 ISBN 0 7176 1232 5

*Manual handling. Manual Handling Operations Regulations 1992. Guidance on Regulations* L23 (Second edition) HSE Books 1998 ISBN 0 7176 2415 3

*Manual handling: Solutions you can handle* HSG115 HSE Books 1994 ISBN 0 7176 0693 7

*Reducing error and influencing behaviour* HSG48 (Second edition) HSE Books 1999 ISBN 0 7176 2452 8

*Seating at work* HSG57 (Second edition) HSE Books 1997 ISBN 0 7176 1231 7

*Tackling work-related stress: A managers' guide to improving and maintaining employee health and well-being* HSG218 HSE Books 2001 ISBN 0 7176 2050 6

*Work related upper limb disorders HSG60 (Second edition) HSE Books 2002*  
ISBN 0 7176 1978 8

**Free**

*Five steps to risk assessment Leaflet INDG163(rev1) HSE Books 1998 (single copy free or priced packs of 10 ISBN 0 7176 1565 0)*

*Getting to grips with manual handling: A short guide for employers Leaflet INDG143(rev1) HSE Books 2000 (single copy free or priced packs of 15 ISBN 0 7176 1754 8)*

*Aching arms (or RSI) in small businesses - Is ill health and sickness absence due to upper limb disorders a problem in your workplace? Leaflet INDG171(rev1) HSE Books 2003 (single copy free or priced packs of 15 ISBN 0 7176 2600 8)*

*Working with VDUs Leaflet INDG36(rev1) HSE Books 1998 (single copy free or priced packs of 10 ISBN 0 7176 1504 9)*

### Further information

HSE priced and free publications are available by mail order from  
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Fax: 02920 859260 e-mail: [hseinformationservices@natbrit.com](mailto:hseinformationservices@natbrit.com) or write to  
HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

This leaflet is available in priced packs of 15 from HSE Books,  
ISBN 0 7176 2599 0. Single free copies are also available from HSE Books.

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