

# A basic ergonomic standard

## How to provide optimal working conditions for personnel

By Mrs. Wietske Eveleens, convener of ISO/TC159, Ergonomics, SC1, Ergonomic guiding principles, Working group WG 1, Principles for the design of work systems, Utrecht, The Netherlands



*Each day, many workers are continuously exposed to work-related risks related to repetitive motion and strain with injury, illness, and lost work time as a consequence. Industries are challenged with designing strategies to mitigate these risk factors so that injuries and illnesses are reduced within a cost-managed framework.*

*ISO/FDIS 6385, Ergonomic principles in the design of work systems, is expected to increase user satisfaction and productivity, decrease support and training costs and improve user health and well being.*

*Guidelines to improve, (re)design, and modify working situations to make the workplace safer, more comfortable, and more productive are contained in this newly revised International Standard ISO 6385, the core ergonomic standard which serves as a reference for many other ergonomic standards.*

### Why this revision is important

Since the publication of the first version of ISO 6385, *Ergonomic principles in the design of work systems* in 1981, working situations have become more technical and complex and they change more quickly. The benefits of Information and Communication Technology (ICT) have helped organizations and factories to increase their productivity and flexibility. The jobs and tasks of people in production processes,

their equipment and workplaces have changed considerably ever since; e.g. it is now possible to work where and when you want as a “teleworker”. Office organizations can use their office space in a more flexible way. Despite the fact that much work has been automated, e.g. in the printing industry, highly automated production systems are controlled by man. The human factor has become ever more important and critical in the design of work systems.

This new standard gives guidance to the integrated design of human-centred solutions with the help of ergonomic principles and specifications for the design of tasks, jobs, the work environment, work organization, equipment and workplaces.

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This worldwide basic ergonomic standard is meant for professionals, including engineers, consultants and health professionals, managers and workers.

The technical designer – the equipment designer, software designer or architect – faces challenges when applying the latest knowledge and ergonomic standards. Designers want freedom to be innovative on one hand, but equally like to have specific information on the other. Specific standards, e.g. on the use of Video Display Units (VDUs) or on the size of office tables, are those that are best applied. Their application is sometimes promoted in national legislation on working conditions. But specific standards do not always represent the latest



knowledge. The design of VDUs changed in a short time: cathode ray tubes can now be replaced by flat screens, allowing smaller office tables than those presented in the original standard. Designers who are only interested in the application of specific ergonomic standards might feel restricted when looking for the optimal tailor-made solution. The new ISO 6385 helps the technical designer not only with specifications on the design of equipment and workplaces, but also gives guidance in the design. This helps

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the designer to apply the latest knowledge in a human-centred way, and to develop the most innovative solutions.

Managers often have to change working situations. But investments in machines, software and workplaces do not always result in the higher productivity and flexibility desired. Workers may reject innovations, because their specific “know how” is not considered in an appropriate way.

Fortunately there is a growing awareness that workers should be consulted during the design process. This can result not only in a better design, with the use of practical knowledge of the production process during the process, but also in a more effective implementation of innovations. Nowadays workers are better educated than in 1981. The new standard supports and gives guidance to the participation of workers in the design of work systems.

## Users of the standard

Ergonomists and professionals in the field of working conditions are and will probably be the most important users of this standard.

ISO 6385 was the first ergonomic standard developed by ISO. Since 1981, more than 50 ergonomic ISO International Standards have been developed by ISO/TC 159. But there are also ergonomic CEN (European Committee for Standardization) standards, coming from CEN/TC 122, as well as national ergonomic standards. The ergonomic working field has become an area with a great variety of subjects. There are specific standards on human characteristics (anthropometrics, metabolism and postures), but also on the design of specific types of working situations, such as office workplaces, control rooms or mobile machinery. There are specifications and guidelines for physical and for mental workload (see page 6). The enormous growth in the number of standards and the general validity of ergonomic standards has led to some overlap and inconsistencies in ergonomic standards. In order to solve these problems and to make ergonomic standards more accessible for the users, it is important to go back to the fundamental ergonomic standard, ISO 6385.

In the “new” revised ISO 6385, all the basic ergonomic terms and principles can be found. This has strengthened the basis of the ergonomic working field. This process of reordering has not been finished yet, and will continue during the next revision!

This new standard promotes the use of ergonomic knowledge and experience in an early stage of the design process, e.g. also in the preparation of decisions on investments in buildings, machines and automation. Professional ergonomists have the experience and knowledge to support managers, other professionals and workers in the translation of ergonomic standards to practical tailor-made solutions.

## About the author



Mrs. Wietske Eveleens Eur.Erg., M.Sc. is an independent specialist in workstyle ([www.workstyle.nl](http://www.workstyle.nl)). She combines her background in industrial design engineering, ergonomics and management consultancy by supporting organizations in the development of a tailor-made, effective and healthy way of working.

## Who will want to implement the new revised standard?

The new standard provides guidance on the design of work systems, which can be used to diagnose problems and facilitate the design of working situations in order to maximize the usability of equipment and workplaces for workers. It is intended to provide optimal working conditions by removing barriers to quality, productivity and safe human performance.

The revised ISO 6385 is applicable to a variety of working situations, regardless of industry or profession. It is relevant to all sectors, not only heavy industry, but also the growing service industries (office organizations) and the health care sector. This standard is going to help professionals in the creation of durable solutions when facing the challenge of human-centred technical innovation in a quickly changing world.

This second edition has been updated to take into account the definition of ergonomics as well as the principles and processes involved in the design of work systems. It also gives an account of all the components which together

form the designed work system, including the work organization, tasks, jobs, environment, and work equipment, both hardware and software, as well as the workspace and workstation.

It will help project managers to consider user capabilities, skills, limitations and needs as well as their acceptance, commitment and compatibility to the working situation. For example, adverse thermal conditions can result in unsafe behaviour and good lighting can enhance the performance of inspection tasks.

It is applicable throughout the design process of the work system in order to prevent negative effects such as delays

in projects; extra costs for adaptation; a low design quality; and bad usability.

For professionals, managers and employees, this standard is helpful both as an introduction and a basis in the ergonomic working field. For professionals, such as quality managers, facility managers or people managers, ISO 6385 can help in the clarification of their role, tasks and responsibilities in the field of working conditions. Non-ergonomic professionals may want to use this standard to investigate where ergonomic expertise is necessary or useful by checking their working situation. □



# Optimizing mental workloads

## Standards to help improve the design of work systems and equipment

By Friedhelm Nachreiner, Professor of Industrial and Organizational Psychology at Carl von Ossietzky University, Oldenburg, Germany, as well as the convener of ISO/TC 159/SC 1/WG 2 and DIN subcommittee, *Mental workload*, and Wolfgang Schultetus, Director of the Institut für angewandte Arbeitswissenschaften e.V. (Institute for Applied Ergonomics), Cologne, Chair of TC 159 and ISO/TC 159/SC 1, as well as chair of the DIN committee, *Ergonomics*.

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some of the principles related to mental workload.

This is why ISO/TC 159, *Ergonomics*, in 1981, after completing its basic standard (ISO 6385, *Ergonomic principles in the design of work systems – Terminology and general guiding principles*, see p. 3) decided that a standard on ergonomic principles related to mental workload was required. The aim was to make designers of work systems or work equipment aware of relevant concepts

and principles of mental workload, to motivate and help them to apply such principles in the design process, and to give advice to managers in the manufacturing and services sector for the design and management of work tasks and/or jobs in order to optimize human and system performance.

*Standardization in the field of mental workload looks somewhat peculiar on the agenda of a technical standardization body like ISO: does that mean that people and even their mental operations are now being standardized? Or what is this all about?*

*It no longer looks so curious, however, when standardization in this field is related to its domain – ergonomics – where the aim is to provide for guidance and specifications for the design*

*of work systems and work equipment in order to improve the effectiveness, efficiency, safety, health and well-being of people at work while at the same time contributing to overall system effectiveness, efficiency and reliability.*

Since work has more and more become a matter of mental rather than physical workload, guidance on how to design work systems or work equipment with regard to mental workload has become more and more important. This can easily be seen when using everyday products, e.g. ticket machines, mobile phones, or computer software, which are sometimes not really as easy and efficient to use as they could have been if the designer had observed

**“...Ticket machines, mobile phones, or computer software, ... are sometimes not really as easy and efficient to use as they could have been if the designer had observed some of the principles related to mental workload.”**