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Ergonomics methods —

Part 2:
A methodology for work analysis to support design

Ergonomie —

Partie 2: Méthodologie d'analyse du travail à l'appui de la conception

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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This document was prepared by the European Committee for Standardization (CEN) (as EN 16710-2:2016) and was adopted without modification other than those given below. It was assigned to Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 1, *General ergonomics principles*, and adopted under the "fast-track procedure".

— Source documents for 3.2, 3.4, 3.6 have been updated to ISO 6385:2016.

A list of all parts in the ISO 16710 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The ergonomic design approach involves considering human capabilities, skills, limitations and needs. It is developed on the basis of a decision process, which calls upon not only scientific and technical knowledge data provided by existing standards but also expression of the “know-how” capitalised by the intended user population. Know-how and other knowledge data provided by standards can only become meaningful when based on preliminary analysis of real-work.

Ergonomics design focuses on the actual activity of operators. The methodology described in this document therefore increases the effectiveness and efficiency of the machinery or system being designed; improves human working conditions; and reduces adverse effects on health, safety and performance.

This methodology can lead to one or more suitable solutions embracing situations to be confronted by future users. Applying this will raise productivity, improve work quality, reduce technical support, maintenance and training needs, and will enhance user/operator satisfaction.

Application of this methodology will be most effective when management is closely involved (adoption, communication, etc.).

Extensive ergonomics knowledge exists in relation to organizing and establishing an efficient design process. Applying this knowledge, this present document structures a user-based approach and proposes corresponding requirements for project managers. This approach complements existing design methods and requires reference to ergonomists.

This process concerns both established, as described by ISO 12100, and emergent risks and their association with the independent evolution of any system, user variability and conditions of equipment usage.

In this respect, the methodology for work analysis presented in this document is based on the resultant design being at least partly determined by anticipated future developments, especially those indicated by the client.

This is a shared procedure, in which the client provides specifications detailing the knowledge helpful to a design suited to the needs and expectations of users. Examples of the contribution of an ergonomics design approach to preparing specifications are included in informative Annex A.

Design based on an ergonomics process is necessary to meet any “performance obligation” (i.e. obligation of result).

This document complements knowledge generated by work activity analysis to enhance the quality of references and other solutions validated within a participative framework. This is indeed the case when a compromise solution cannot be found in relation to a specific point because the underlying knowledge cannot be validated. This document facilitates orientation towards a shared final decision.

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Ergonomics methods —

Part 2:
A methodology for work analysis to support design

1 Scope

This document describes a procedure for analysing human activity in relation to specifying and refining the human component in the design or redesign of machinery and work systems.

NOTE 1 The ergonomics methodology described in this document could also be applied to the design or redesign of products and non-work systems.

This document is intended to assist project leaders in implementing human and physical resources, methods and schedules as well as in preparing the documents necessary to meeting related requirements.

The ergonomics methodology described can be applied to all different stages in design projects from the earliest concept to the final “prototype” or “mock-up”, whatever the industrial field or sector.

The objective of this standard is to achieve a solution that takes into account as many situations as possible which all users - including operators, maintenance staff and installers, may encounter. This will ultimately allow improved usability of the machinery and more robust technical solutions, combined with significantly greater system resilience, user autonomy and accessibility.

NOTE 2 Examples of the application of the methodology described in this document are provided in Annex A.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
ergonomics
scientific discipline concerned with the understanding of interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance

[SOURCE: ISO 26800:2011, 2.2, modified — Admitted term "human factors" deleted and NOTE deleted.]

3.2
worker
operator
person performing one or more activities to achieve a goal within a work system

[SOURCE: ISO 6385:2016, 2.4, modified — synonym “operator” added]

3.3
work activity
manner in which a prescribed task is, in reality, performed

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3.4
work system
system comprising one or more workers and work equipment acting together to perform the system function, in the workspace, in the work environment, under the conditions imposed by the work tasks

[SOURCE: ISO 6385:2016, 2.2]

3.5
accessibility
extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use

[SOURCE: ISO 26800:2011, 2.1 modified — NOTE 1 and NOTE 2 deleted.]

3.6
work equipment
tools, including hardware and software, machines, vehicles, devices, furniture, installations and other components used in the work system

[SOURCE: ISO 6385:2016, 2.6]

3.7
assumption
proposal relating to the explanation or interpretation of phenomena, observable facts and solution principles, assumed temporarily before being subjected to checking

Note 1 to entry: In observing workers the observer should verify any hypotheses concerning knowledge acquired regarding the work and its translation into solution principles with the workers concerned.

3.8
prescribed task
formal description of how a task is expected to be performed

EXAMPLE prescribed and prohibited tools, conditions of use, procedures, order of operations etc.

4 General requirements in specifying the human components

4.1 User experience and resultant activity

Ergonomics design involves considering all work situations that may be encountered by intended users. Users of machinery and of other systems performing the same or similar functions, possess a variety of levels of skills (including procedures for anticipating and avoiding risks) and knowledge of various constraints concerning individual and collective performance (described by the term “know-how”). Systematically collecting this know-how is fundamental to decision making in developing the design of a new machine and or work system. The know-how of an individual has a strong influence on their activity. It is essential to understand the motivations induced by the work system and the experiences of the user, which determines their observed activity.

To maximize accessibility, the design shall take account of the full range of users depending on the objectives of design including, where applicable, older people and those with disabilities. This requires the designer to consider characteristics which are associated with increasing age. It might also include identifying specific subgroups that should be included, for example people with impaired hearing, those with cognitive impairment, and people who are already using assistive technologies or who might require individualized solutions or alternative means of access. For this purpose, the approach described by this document firstly requires identification of reference situations, in which work analysis will be performed. Reference situations are situations close enough to the design situation to enable the extraction of the knowledge data required, to enrich the specifications for the system (machinery, work system, product, etc.) to be designed.

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