ERGONOMICS GLOSSARY

Ergonomic risk factors

Risk factors are job attributes or exposures that increase the probability of musculoskeletal disorders. The major workplace ergonomic risk factors to consider are: high task repetition, forceful exertions, sustained awkward postures.

Ergonomic hazard

A source with a potential to cause MSD (musculoskeletal disorder). Ergonomic hazards include themes such as repetitive movement, manual handling of heavy loads, workplace/jobtask design, inadequate workstation height and poor body positioning.

Ergonomics hazard prevention

Proactive system which prevent the introduction of new ergonomics hazards into operation. Well-designed workplace (compliance with ergonomic rules) make it possible the prevention/reduction of ergonomic hazards.

MSD

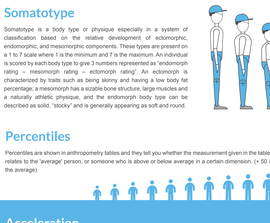
Musculoskeletal Disorders are the most common health issues in case of workers which usually affect the back, neck, shoulders, upper limbs and lower limbs.

Risk assessment (WERA)

Workplace Ergonomic Risk Assessment is the foundation of the ergonomic verification of the workplace. The expert evaluates the possible MSD factors.

Hierarchy of control

Controlling exposures to occupational hazards is the fundamental method of protecting workers. Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective control solutions. The hierarchy is arranged beginning with the most effective controls and proceeds to the least effective. Although eliminating the hazard is the ultimate goal, it can be difficult and is not always possible. (NIOSH)



Screening

The inspection of the workplaces to identify the risk category of the different workstations, workload, health hazards and the possibility of injuries and illnesses.

Motion capture measurement

Motion capture systems are designed to measure and record the movements of the whole body which can be analyzed later in order to identify possible health and security risks and help to create optimal workstations.

Anthropometry

Anthropometry or anthropometrics is the science of obtaining systematic measurements of the human body (body proportions, movement limits, body forces etc.). Anthropometrics are useful for a wide array of applications, providing a kind of baseline for human measurement.

Somatotype

Somatotype is a body type or physique especially in a system of classification based on the relative development of ectomorphic, endomorphic, and mesomorphic components. These types are present on a 1 to 7 scale where 1 is the minimum and 7 is the maximum. An individual is scored by each body type to give 3 numbers represented as 'endomorph rating – mesomorph rating – ectomorph rating'. An ectomorph is characterized by traits such as being skinny and having a low body fat percentage; a mesomorph has a sizable bone structure, large muscles and a naturally athletic physique, and the endomorph body type can be described as solid, "stocky" and is generally appearing as soft and round.

Percentiles

Percentiles are shown in anthropometry tables and they tell you whether the measurement given in the tables relates to the 'average' person, or someone who is above or below average in a certain dimension. (+ 50 is the average)

Acceleration

Acceleration in ergonomics means that in our world people have better and better living conditions because of the advancements in healthcare and public service, therefore the general body size and proportions increase over the course of time.

Corrective workflow

Evaluation and optimization of existing workplaces based on the worker's real movements. Its main elements are screening, motion capture measurement, simulation, analysis, action plan and implementation.

Conceptive workflow

Ergonomic virtual verification and quality control of new workplaces in planning phase, without prototype production. Based on the CAD model of the planned workstation and the work instruction, possible deficit points of the planned workstation/component can be revealed and corrected before the implementation.

Transposed workflow

This workflow is intended to create a compliance analysis of distant people and machines by using different ergonomic methods.

Virtual verification

This method can help design, evaluate and optimize workstations in the planning phase without prototype production.

Optimization action plan

After a detailed analysis, ergonomic experts specify the possible organizational, technical and individual actions which can help to optimize the work environment.

Collaboration

Working together with someone to reach a certain goal. This can be easier achieved with such systems which give the opportunity to work together from spatially distant places in real time.

Design for all

The term Design for All (DfA) is used to describe a design philosophy targeting the use of products, services, and systems by as many people as possible without the need for adaptation.

CAAA

COMPUTER AIDED ANTHROPOMETRIC ASSESSMENT

Computer Aided Anthropometric Assessment (CAAA) is a state-of-the-art computerized product evaluation method in which the relevant model of a potential or real user can be placed in the digital model of the product and its environment. Functional body positions can be used to evaluate location-, access- and vision compliance or -deficit.

Industry 4.0

Industry 4.0 is a name for the current trend of automation and data exchange in manufacturing technologies. Industry 4.0 describes a new, emerging structure in which manufacturing and logistics systems use the globally available information and communications network for an extensively automated exchange of information and in which production and business processes are matched.

ANALYZES

Ergonomic analyzes are used for identifying risk factors. In the following, this glossary will explain the most commonly used seven methods.

1 RULA

Rapid Upper Limb Assessment (RULA) is a survey method developed for use in ergonomic investigations of workplaces where work related upper limb disorders are reported. RULA is a screening tool that assesses biomechanical and postural loading on the whole body with particular attention to the neck, trunk and upper limbs. Reliability studies have been conducted using RULA on groups of VDU users and sewing machine operators. A RULA assessment requires little time to complete and the scoring generates an action list which indicated the level of intervention required to reduce the risks of injury due to physical loading on the operator. RULA is intended to be used as part of a broader ergonomic study.

2 ISO 11226:2000

The international standard for 'Evaluation of static working postures' establishes ergonomic recommendations for different work tasks. This standard provides information to those involved in design, or redesign, of work, jobs and products who are familiar with the basic concepts of ergonomics in general, and working postures in particular.

It specifies recommended limits for static working postures without any or only with minimal external force exertion, while taking into account body angles and time aspects. It is designed to provide guidance on the assessment of several task variables, allowing the health risks for the working population to be evaluated. It applies to the adult working population. The recommendations will give reasonable protection for nearly all healthy adults. The recommendations concerning health risks and protection are mainly based on experimental studies regarding the musculoskeletal load, discomfortpain, and endurance/fatigue related to static working postures.

3 EN 1005-4:2005

This European Standard presents guidance when designing machinery or its component parts in assessing and affecting health risks due only to machine-related postures and movements, i.e. during assembly, installation, operation, adjustment, maintenance, cleaning, repair, transport, and dismantlement. **This European Standard specifies requirements for postures and movements without any or with only minimal external force exertion. EN 1005-4 defines the frequency of the repetitive movements and specifies whether this frequency is acceptable for the movement of a particular body part.** The requirements are intended to reduce the health risks for nearly all healthy adults. This European Standard is not applicable to the machinery, which is manufactured before the date of publication of this European Standard by CEN.

4 OWAS

OWAS identifies the most common work postures for the back (4 postures), arms (3 postures) and legs (7 postures), and the weight of the load handled (3 categories). Whole body posture is described by these body parts with a four digit-code. These 252 postures have been classified to four action categories indicating needs for ergonomic changes. The observations are made as "snapshots" and sampling has usually been with constant time intervals.

OWAS was developed in Finland in a steel industry company, Ovako Oy, in 1973 to describe the workload in the overhauling of cran smelting ovens. (Karhu 1977). A portable computer system for coding and analysis of OWAS has been developed (Kivi 1991).

5 NASA-OBI

The NASA-OBI method examines static physical forces affecting the skeleton and muscle system. It depicts health-damaging loads with a diagram. It is also possible to provide support for the arms or legs, which reduces the load in the given body parts of the examined subject. Each moment of the examined workflow is evaluated on a scale of 1 to 4. Score 1 if no change is required, and score 4 whenever an immediate change is required.

6 Spaghetti diagram

The analysis allows you to measure the length of a journey by a worker, within a given time interval, whose route can be displayed in the model layout. The route enables the process team to identify redundancies in the work flow and opportunities to expedite process flow.

7 Reachability analysis

Reachability test enables to define the comfort zone of hands. The Reachability analysis helps determine the right place of devices, machines and equipments on the workstation. The location of objects will be evaluated based on the displayed access range.