

## USE OF ERGOMEDICAL DATA FOR CONSTRUCTION

**M. Milfelner and F. Cus**

Laboratory for Researches in Cutting  
Faculty of Mechanical Engineering  
University of Maribor, SI-2000 Maribor, Slovenia

*Abstract: The present paper describes the technological system used to rationalize the production. An important feature in introducing this system into production is the correct arrangement and ergonomics of work station and components. The technological system for analyzing and introducing the ergonomic environment and products contains the ergonomic programme package ANTHROPOS and the digitalizing system GP12. As an example the analysis of the introduction of the work station in the working environment is presented.*

*Keywords: work station, ergonomics, programme package, technological system*

### 1 INTRODUCTION

The work station ergonomically incorrectly formed reduces the readiness for work and productivity of workers. This results in the increase of the number of errors in production and in the discontent, reduction of the working capability and the number of illnesses of workers. Also the work accidents and professional illnesses are a consequence of the deficiencies of the non - ergonomic environment. The resulting damage can be high for all those concerned and in some cases the quality of life of some individuals is reduced or even the existence of the company is endangered.

It is advantageous that modern industry takes into account not only the economic and humanitarian criteria but also assures the quality, competitiveness, industrial designing by including also the ergonomics. This process can be accelerated if in restructuring the industry takes into account the ergonomic and medical findings included in the most developed programme packages.

This does not only concern the design regarding actual working conditions, but also the ergonomic design of technical equipment as a whole. The ergonomic principle is important not only in the working areas but also in the home environment, in the leisure environment and in wider environment. It is a fact that during handling of technical devices errors or in case of workers , injuries can occur. This can be avoided by using all the available information and thus changing the structure of objects in different living environments.

Also in Slovenia we have made a step forward by modifying the law on safety and health at work, following the example of the other European countries. According to this law the employers and the employees will be responsible for safety and health at work. At the beginning of August 1998 the Ministry for work, family and social affairs proposed to the government the proposal of the law on safety and health at work and the government proposed it to the parliament for second discussion. The wording was proposed after discussion at the session of the government boards and it was discussed by the economic - social council and the government council for social security. The law is very important for all those employed since it defines the rights and duties of the employers and employees concerning the safe and healthy work and the action necessary for that purpose. According to that law the employers will be responsible to assure safety and health of the workers while they are working. He will have to take into consideration some basic principles such as avoiding risks and their assessment, suitable forming of the work station and working environment, suitable selection of equipment and production methods, the necessary action for preserving and improving the health and adapting to technical development.

### 2 TECHNOLOGICAL SYSTEM FOR ANALYZING AND INTRODUCING THE ERGONOMIC ENVIRONMENT AND PRODUCTS INTO INDUSTRY

With the aid of the **technological system for analyzing and introducing the ergonomic environment and products** a considerable improvement of the product planing can be reached. The programme, measuring and testing equipment in the frame of the technological system offers a multitude of scientific findings which can be used in practice. Thus the hitherto methods of fast changing of parameters, quality analyses, measurements and test results are improved owing to this system.

The technological system for analyzing and introducing the ergonomic environment and products covers the area which is more and more necessary in the development and at the work stations in almost all fields of industry. The well established foreign manufacturers have been paying great attention to this topics. This is particularly true in the aircraft industry, automobile industry, industry of machines and equipment. Recently, the advances are strong also in the furniture industry, particularly in the development of the computer work stations. (As an example the inclusion of this activity in the branches of industry is shown in the Figure 1).

The technological system for analyzing and introducing the ergonomic environment and products is divided into the area of **analyzing, designing and measuring** and the area of **testing of equipment in use**. Basically, both areas are independent except that the second area is the superstructure of the first area.

The area of analyzing, designing and measuring includes the **system GP12** for fast digitalization and transfer of the existing environment into the 3D graphic package and the highly capable **programme package ANTHROPOS**, for ergonomics analyzing and forming of the working environment.

Testing of equipment are the activities by which it is verified whether the user uses the equipment as it was planned. The verification should be unintrusive so that it would be not restrict the user in the execution of his working tasks. The foreseen devices are: **3D measuring system, system for measuring the position of the equipment and the system for measuring the angular location of the kinematic chain**. In the questionnaires also the user's opinion concerning adequacy of the work station will be included. The systems anticipated for testing of equipment, do not interfere into the area of medicinal researches.

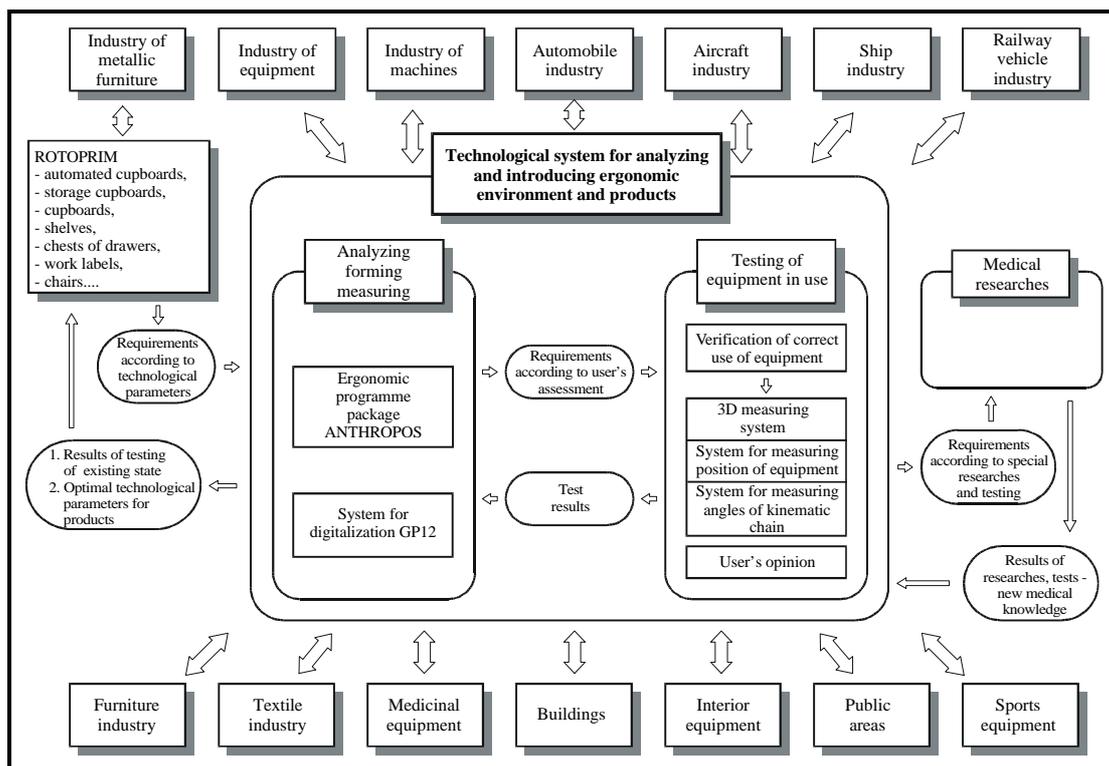


Figure 1. Technological system for analyzing and introducing ergonomic environment and products

### 3 PRACTICAL EXAMPLE OF INTRODUCING ERGONOMIC WORK STATION INTO THE WORKING ENVIRONMENT

The practical example shows some possibilities of the analysis out of the wide spectrum offered by the programme package ANTHROPOS. The presented example is only an initial approach to the analysis, whereas the complete analysis requires several attempts and, consequently, the optimal solution of the problem posed.

The model (person tested), selected has the following parameters: nationality: - German, gender - male, age 20-24 years, bodysize 50 percentile, proportionality - NA, somato type Char=0 in Corp=0 and acceleration 2000.

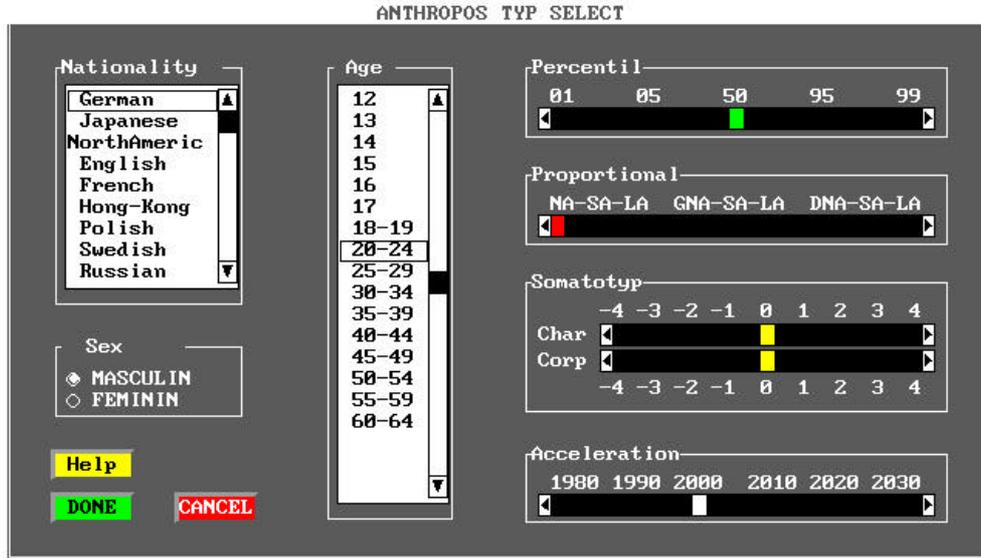


Figure 2. Selection of type of person in programme window Typ Select

### 3.1 Work station - presetting of tools

The example shows the sitting position of the model measuring the tool geometry.

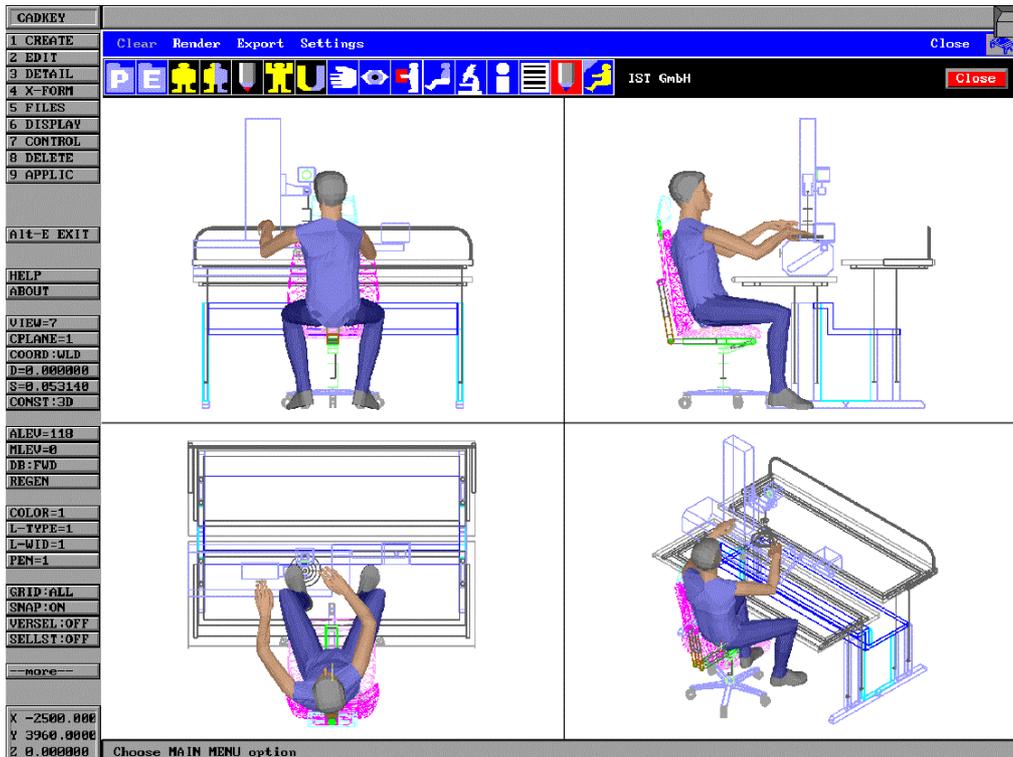


Figure 3. Example of the work station in the production

### 3.2 Reachability

When analyzing the reachability we select the points (positions, elements) which the man should reach during the work.

In both cases the reachability of the left and right hand is indicated by coloured circles of different diameters. The circle of smaller diameter of blue colour indicates reachability of the left hand and the circle of yellow colour indicates reachability of the right hand. Large circles indicates the degree of reachability: red colour - not reachable, yellow colour - only just reachable and green colour - optimal.

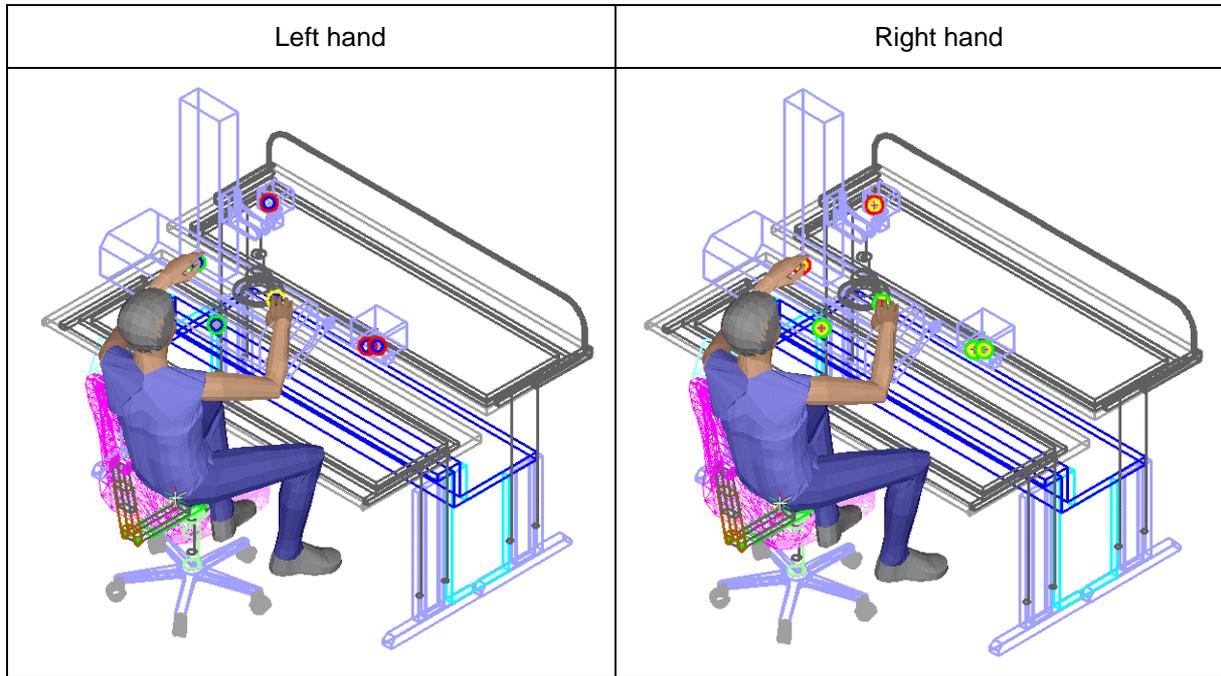


Figure 4. Representation of analysis of reachability

### 3.3 Sight

Also the sight analysis, separately for the left and right eye, in plane projection and in polar projection.

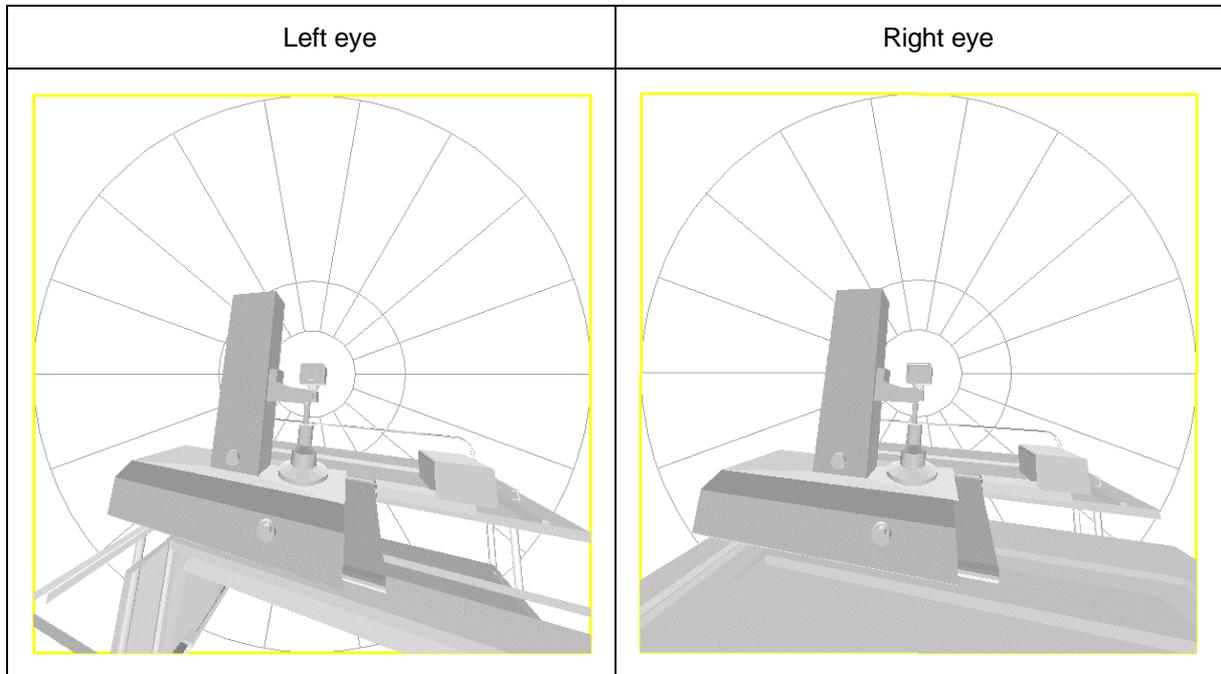


Figure 5. Plane projection

## 4 CONCLUSION

The working environment in which the employees work, is changing so fastly that studying of these problems lays behind or not enough attention is paid to it.

The present paper indicates the direction for optimization and introduction of work stations by means of the programme package ANTHROPOS assuring humanness of work stations and, consequently, cost - efficiency, quality and competitiveness of production.

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**AUTHOR(S):** Matjaž Milfelner, B. Sc. Mech. Eng., Prof. Dr. Franci Āuš, B. Sc. Mech. Eng., B. Sc. Econ., Laboratory for Researches in Cutting, Faculty of Mechanical Engineering, University of Maribor, Smetanova 17, SI-2000 Maribor, Slovenia, Phone: +386 62 22 07 623 Fax: +386 62 22 07 990 E-mail: matjaz.milfelner@uni-mb.si, franc.cus@uni-mb.si