### Project title:
Ergonomic design of the worker-furniture-environment system

### Project number:
117-0680720-3051

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### Project duration:
01.01.2007.-1.1.2012

### Project abstract:
Sitting furniture should enable the worker to take an optimal bodily sitting posture, ensuring active and dynamic sitting. A long-lasting and non-ergonomic bodily posture in this position causes uncomfortable sitting. Defining optimal working postures and strains makes a contribution to the reduction of necessary energy and facilitates working and circulation functions. The total work space should be designed in compliance with all criteria of the working posture and technical requirements. It is necessary to know the worker well, his working capabilities, work place and work methods to ensure an optimal working environment. Furniture dimensions and workplace, surrounding the furniture, regarding its optimal utilization, should be harmonized with the worker's anthropometric sizes. Research methods are experimental, theoretical and numerical. Functional dependences of the worker-furniture-environment system will be investigated, based on ergonomic postulates in order to find optimal conditions between work humanization and productivity. Investigations are determined by measuring and recording typical working postures as well as conditions of excessive workload. Using digitally scanned 3D anthropometric characteristics of the human body, a digital 3D biomechanical model is obtained, taking account of the appropriate kinematic-dynamic motion rules and the construction of the inner skeleton. 3D program applications with advanced automated defined anthropometric and ergonomic features of biomechanical models and digital figures will be recorded. A 3D visualization of the workplace by using a computer-based 3D model of furniture and computer-based character animations of workers will be performed. By using computer 3D program solutions, the prototype is substituted by 3D models on which all necessary designs and changes in real time have been carried out interactively. Computer visualization will be used to perform a biomechanical analysis of movements based on the real correlation within the space of the interaction of workers and belonging working environment on the obtained 3D models of workers and workspace. It is necessary to analyze the workspace and time studies of motion accurately. The 3D virtual model will enable a detailed biomechanical analysis of motion, speed and acceleration and more designer's solutions of furniture with biomechanical and ergonomic parameters. Detrimental impact of too a high noise on workers as well as efficient procedures of noise reduction will be investigated. Special attention will be focused on detrimental action of microclimatic conditions regarding technological requirements of the industry. The optimization of work energy during the performance of the work by the worker will be performed to lessen fatigue and to remove excessive workload and to reduce sick-leaves. The performance of these investigations will result in ergonomic technical-economic design of the interactive work-furniture-environment system which is of great importance for the development of the Republic of Croatia and elsewhere in the world.