

# **International Journal of Occupational Safety and Ergonomics – rok 2012, ročník 18**

## **Číslo 3**



### **PROTECTION OF HUMAN IN THE WORKING ENVIRONMENT**

**Kimmo Vänni, Pekka Virtanen, Tiina Luukkaala & Clas-Hakan Nygard.**  
***Relationship Between Perceived Work Ability and Productivity Loss. S. 299-309.***

This paper presents an approach to assessing presenteeism (on-the-job productivity loss) that is related to perceived work ability. The aim of this explorative research was to find out if perceived work ability could be a robust indicator, interchangeable with presenteeism, in Finnish food industry organizations. The developed approach was based on existing presenteeism research as well as on register and survey data. The approach demonstrates that one step downward on the 10-point perceived work ability scale theoretically reduces employees' on-the-job productivity by ~5 percentage points. At the company level, on-the-job productivity loss was 3.7% (mdn 0), while sickness absence was 5.0% (mdn 2.2). The probability of productivity loss among factory workers was fourfold compared to women in office work. The developed approach makes it possible to assess perceived productivity loss at the level of an individual and an organization. Perceived work ability may, in fact, be a robust indicator for assessing perceived productivity loss.

**Dorota Żołnierczyk-Zreda, Sylwia Bedyńska & Magdalena Warszawska-Makuch.**  
***Work Time Control and Mental Health of Workers Working Long Hours: The Role of Gender and Age. S. 311-320.***

The aim of this study was to examine the relationship between work time control and mental health in workers working long hours. The study also attempted to show how that relationship depended on age and gender. Three hundred and six white-collar workers doing clerical work for over 8 h daily were diagnosed on work time control and mental health with the 28-item General Health Questionnaire. The results of an analysis of variance (ANOVA) showed that participants working long hours but having high control over their work time had a significantly higher level of their mental health with regard to somatic complaints and anxiety and marginally higher with regard to social dysfunction than workers with low control over their work time. Male and female workers reported different problems with their mental health depending on what age (stage of life) they were at. It is hypothesized that the work-family conflict, inability to fulfil social commitments and poor working conditions can influence those effects.

**Ljiljana Blagojević, Branislav Petrović & Jelena Blagojević. *Risk Factors for Health Disorders in Computer Operators in Telecom Serbia. S. 321-327.***

Computer operators are at risk to develop health disorders related to prolonged computer use. We assessed the occupational risk factors for computer-related health disorders and evaluated health conditions of 939 Serbian computer operators. Musculoskeletal (55.8%), ocular (27.3%) and mental disorders (7.1%) were reported most frequently. Risk factors for health disorders, in both male and female populations, were age; overtime work; negative working atmosphere; awkward posture at work; the presence of vibrations, noise, dust and chemical pollution in the workplace. Negative working atmosphere, body mass index > 30, total job tenure and duration of exposed employment were risk factors for developing health disorders only in males, while smoking was a risk factor only in the female population. Our study showed high prevalence of musculoskeletal and ocular disorders in Serbian computer operators. More effective preventive measures are necessary to improve computer operators' health.

**Anna Bogdan, Iwona Sudoł-Szopińska, Anna Łuczak, Maria Konarska & Piotr Pietrowski. *Methods of Estimating the Effect of Integral Motorcycle Helmets on Physiological and Psychological Performance. S. 329-342.***

This article proposes a method for a comprehensive assessment of the effect of integral motorcycle helmets on physiological and cognitive responses of motorcyclists. To verify the reliability of commonly used tests, we conducted experiments with 5 motorcyclists. We recorded changes in physiological parameters (heart rate, local skin temperature, core temperature, air temperature, relative humidity in the space between the helmet and the surface of the head, and the concentration of O<sub>2</sub> and CO<sub>2</sub> under the helmet) and in psychological parameters (motorcyclists' reflexes, fatigue, perceptiveness and mood). We also studied changes in the motorcyclists' subjective sensation of thermal comfort. The results made it possible to identify reliable parameters for assessing the effect of integral helmets on performance, i.e., physiological factors (head skin temperature, internal temperature and concentration of O<sub>2</sub> and CO<sub>2</sub> under the helmet) and on psychomotor factors (reaction time, attention and vigilance, work performance, concentration and a subjective feeling of mood and fatigue).

**Thanwadee Chinda. *A Safety Assessment Approach Using Safety Enablers and Results. S. 343-361.***

Industrial safety is an important issue in Thailand, and attempts have been made to improve safety performance and accident records. This paper examines key criteria influencing safety improvement. Exploratory factor analysis confirms 9 safety criteria, including 5 "enablers" and 4 "results", with a total of 47 associated attributes. A safety assessment approach is developed, using those 9 key criteria, to measure an organization's current safety maturity level. Organizations can use the assessment approach to plan its safety improvement, and progress through to higher maturity levels by focusing on the weakest criteria shown in the assessment results with the lowest scores.

**Jonathan Bohm & Don Hartus. *Hazard Awareness of Construction Site Dumper Driver. S. 363-373.***

In UK's construction industry, site dumpers cause more serious accidents than in any other type of construction plant. Previous research has indicated that driver behaviour plays a pivotal role in the vast majority of these accidents. Using a mental models-based approach, 20 dumper drivers were interviewed with regard to the process by which

several typical types of accident occurred. It was found that drivers were generally well-informed about the hazards of driving dumpers on a construction site. However, the findings also exposed some critical knowledge gaps, which could increase a driver's chances of an accident. Educational material relating to these knowledge deficiencies could easily be prepared and incorporated into revised construction information leaflets or driver training courses.

**Katarzyna Majchrzycka, Beata Gutarowska, Agnieszka Brochocka & Bogumił Brycki. *New Filtering Antimicrobial Nonwovens With Various Carriers for Biocides as Respiratory Protective Materials Against Bioaerosol*. S. 375-385.**

This study evaluated the bioactivity of polypropylene melt-blown filtering nonwovens used in respiratory protective devices (RPD) with a biocidal agent (alkylammonium microbiocides) on 2 mineral carriers. Two types of carriers were tested: a bentonite, with an aluminosilicate base, and a perlite, volcanic glass. High biostatic and biocidal effects of modified nonwovens with biocides were tested against *Escherichia coli* (*E. coli*) and *Staphylococcus aureus* (*S. aureus*) bacteria. Nonwovens modified with a biocide on a bentonite carrier showed an opposite reaction to a biocide on a perlite. The research also showed that 10% concentration of a biocidal agent on a perlite carrier was sufficient to inhibit the growth of bacteria (100% reduction) placed in the structure of a filtering material during normal use of RPD. A comparison of the biological activity of 2 filtering materials, each containing 10% of a perlite and produced in a laboratory and industrial conditions, showed no statistically significant differences.

**PROTECTION OF HUMAN AT THE WORKSTATION**

**Tzu-Hsien Lee. *Effects of Range and Mode on Lifting Capability and Lifting Time*. S. 387-391.**

This study examined the effects of 3 lifting ranges and 3 lifting modes on maximum lifting capability and total lifting time. The results demonstrated that the maximum lifting capability for FK (from floor to knuckle height) was greater than that for KS (from knuckle height to shoulder height) or FS (from floor to shoulder height). Additionally, asymmetric lifting with initial trunk rotation decreased maximum lifting capability compared with symmetric lifting or asymmetric lifting with final trunk rotation. The difference in total lifting time between KS and FS was not significant, while FK increased total lifting time by ~20% compared with FS even though the travel distance was 50% shorter.

**Tzu-Hsien Lee & Te-Shiang Cheby. *Effects of Hand Posture, Breathing Type, Arm Posture and Body Posture on Hand Errors*. S. 393-398.**

This study consisted of 2 experiments. Experiment 1 examined the effects of hand posture, arm posture and body posture on hand error, while experiment 2 examined the effects of hand posture, breathing type and body posture on hand error. This study showed that more hand errors occurred in the nondominant hand, extended arm, normal breathing and standing compared with errors in the dominant hand, flexed arm, inspire-hold and sitting, respectively. This study advised people to use their dominant hand, flex their arm, inspire and hold the breath and support their body while performing fine manipulation tasks. Finally, hand error varied dramatically across the participants, indicating the need to screen individuals for fine manual manipulation tasks.

**Andrzej Dąbrowski. *Reducing Kickback of Portable Combustion Chain Saws and Related Injury Risks: Laboratory Tests and Deductions*. S. 399-417.**

Portable chain saws are still very dangerous machines. Reduced prices of these machines mean they are widely available to people who like DIY (do it yourself) and professionals. Kickback of chain saws is extremely dangerous for the operator. This paper discusses the results of laboratory investigations of combustion chain saws. The tests were conducted on a standardized kickback test stand and covered the course of kickback, its energy, angle and duration. The results showed that during the contact of a saw chain with wood, the first to appear was the process of wood cutting, which absorbed 90–95% of the reduced energy of the cutting system. The greater the absorbed energy, the smaller the kickback angle. Wood cutting work is particularly influenced by proper chain tension, the use of chains with anti-kickback links, guide bars with sliding endings and a quickly activated chain brake.

**Alireza Choobineh, Ahmad Soltanzadeh, Hamidreza Tabatabaee, Mehdi Jahangiri & Solayman Khavaji. *Health Effects Associated With Shift Work in 12-Hour Shift Schedule Among Iranian Petrochemical Employees.* S. 419-427.**

**Introduction.** The main purposes of this study were to investigate shift-work-related health problems in 12-h shift schedule and to identify major factors associated with these problems. **Materials and methods.** This cross-sectional study was conducted at 8 petrochemical plants. The study population consisted of 1203 workers (549 shift and 654 day workers). Data on personal details, the shift schedule and adverse health outcomes were collected with a self-administered questionnaire. **Results.** The results showed that health problems in shift workers were more prevalent than in day workers; however, the differences were significant only in gastrointestinal and musculoskeletal disorders. Logistic regression analysis revealed that in addition to shift work, other variables such as extended work time, type of employment, second job and job unit were associated with health problems. **Conclusions.** Working shifts is one important variable influencing the health of petrochemical workers. To improve workers' health, interventional program should focus on the shift schedule as well as other significant aspects of working conditions.

**Bo-Keun Cho, Fereydoun Aghazadeh & Saif Al-Qaisi. *Effect of Video-Game Experience and Position of Flight Stick Controller on Simulated-Flight Performance.* S. 429-441.**

The purpose of this study was to determine the effects of video-game experience and flight-stick position on flying performance. The study divided participants into 2 groups; center- and side-stick groups, which were further divided into high and low level of video-game experience subgroups. The experiment consisted of 7 sessions of simulated flying, and in the last session, the flight stick controller was switched to the other position. Flight performance was measured in terms of the deviation of heading, altitude, and airspeed from their respective requirements. Participants with high experience in video games performed significantly better ( $p < .001$ ) than the low-experienced group. Also, participants performed significantly better ( $p < .001$ ) with the center-stick than the side-stick. When the side-stick controller was switched to the center-stick position, performance scores continued to increase (0.78 %). However, after switching from a center- to a side-stick controller, performance scores decreased (4.8%).

**Marzena Malińska, Joanna Bugajska, Joanna Kamińska & Anna Jędryka-Góral. *Analysis of Conditions and Organization of Work of Notebook Computer Users.* S. 443-449.**

**Aim.** The aim of this study was to evaluate working conditions with a notebook computer (notebook) as a potential cause of musculoskeletal disorders. **Material and methods.** The study had 2 stages. The first one was a questionnaire survey among 300 notebook

users. The next stage was an expert analysis of 53 randomly selected workstations. The questionnaire survey included questions about the participants, their working conditions, work organization and also duration of work with a notebook. **Results and conclusions.** The results of the research showed that most examined operators used a notebook as a basic working tool. The most important irregularities included an unadjustable working surface, unadjustable height of the seat pan and backrest, unadjustable height and distance between the armrests and no additional ergonomic devices (external keyboard, docking station, notebook stand or footstool).