

International Journal of Occupational Safety and Ergonomics – rok 2009, ročník 15

Číslo 3



PROTECTION OF HUMAN IN THE WORKING ENVIRONMENT

Adam Pościk, Barbara Wandelt. *Application of a Photochromic Dye in an Automatic Welding Filter. S. 243-254.*

The main purposes of this study were to select a photochromic dye and to develop an active welding filter with a photochromic layer. A series of functionalized spirobenzopyranoindolins were synthesized and their photophysical and photochemical properties were investigated in a solution using absorption and emission spectroscopy. Time-resolved fluorescence spectroscopy measurements were used to characterize the decays and rate constants of fluorescence emission. One dye was selected as a suitable photoactive compound in automatic welding filters. A model of an active welding filter with a photochromic layer based on 1',3',3'-trimethyl-6-nitrospiro[2H-1-benzopyran-2,2'-indole] (6-nitroBIPS) was developed. The paper presents the results of tests of the filter conducted according to EN standards.

Ashish D. Nimbarte, Fereydoun Aghazadeh, Sai Chaitanya R. Bogolu, Sudhakar L. Rajulu. *Understanding the Effect of Speed of Exertion on Isokinetic Strength Using a Multiaxial Dynamometer. S. 255-263.*

In this study a multiaxial isokinetic dynamometer was used to measure strength during various upper-body isokinetic exertions. Ten male participants performed 7 different upper-body isokinetic exertions. In addition, to evaluate the effect of speed on strength, each participant performed sitting pull exertions at the speed of 0.026, 0.130, and 0.260 m/s. Average isokinetic strength increased from 236.6 ± 39.1 to 291.8 ± 65.8 N with the initial increase in speed from 0.026 to 0.130 m/s. The average isokinetic strength decreased to 276.7 ± 87.2 N with a further increase in speed to 0.260 m/s. The curve between isokinetic strength and speed followed a bell-shaped curve (fitted with the Gaussian function, $R^2 = .9$). The results of this study could be useful in deciding on the work pace of various manual material handling tasks requiring maximal and/or near maximal exertions.

Krzysztof Baszczyński, Marcin Jachowicz. *Corrosion of Retractable Type Fall Arresters. S. 265-275.*

Retractable type fall arresters constitute a most effective group of components used in personal protection systems protecting against falls from a height. They are designed primarily for outdoor use, which results in exposure to atmospheric factors associated with risk of corrosion of metal elements. This paper presents the results of a study, in which retractable type fall arresters were exposed to a simulated corrosive environment, a neutral salt spray. It discusses the development of corrosion processes depending on the duration of exposure to corrosive conditions. Tests demonstrated that corrosion of elements decreased their strength and impaired the functioning of mobile parts. The article presents methods of testing the correct functioning of devices, necessary for assessing their resistance to corrosion, which have been developed for this purpose. It also analyzes the correlation between corrosion-related damage of retractable type fall arresters and potential hazards for their users.

Iqbal Ahmed Khan, Zulquernain Mallick, Zahid A. Khan, Mohammed Muzammil. *A Study on the Combined Effect of Noise and Vibration on the Performance of a Readability Task in a Mobile Driving Environment by Operators of Different Ages.* S. 277-286.

This study investigated the combined effect of noise and vibration on the performance of a readability task in a mobile driving environment by operators of different ages. Subjects performed a readability task on a laptop computer in a sitting posture without their backs supported under varying levels of noise and vibration. Data in terms of a mean number of characters read per minute were collected and statistically analyzed. Results showed that the individual effects of noise, vibration, and operators' age as well as the interaction between operators' age and vibration were statistically significant. However, the combined effect of noise and vibration was not found to be statistically significant. Results also indicated that the operators' age was statistically significant at all levels of vibration and vibration was statistically significant at all levels of operators' age.

Rafał Młyński, Emil Kozłowski, Jan Żera. *Attenuation of Noise by Motorcycle Safety Helmets.* S. 287-293.

For workers such as police motorcyclists or couriers, traffic and engine noise reaching the ears is an important factor contributing to the overall condition of their work. This noise can be reduced with motorcycle helmets. In this study, insertion loss of motorcycle helmets was measured with the microphone-in-real-ear technique and sound attenuation with the real-ear-at-threshold method. Results for 3 Nolan helmets show essentially no protection against external noise in the frequency range <250 Hz. In the frequency range >500 Hz, attenuation increases linearly at a rate of 8–9 dB per octave, to ~30 dB at 8 kHz. Lack of attenuation in the low-frequency range may cause annoying effects. In addition, high attenuation in the high-frequency range may decrease intelligibility of speech signals for a rider in a helmet. Attenuation measured in this study does not take into account noise generated by turbulent wind around the helmet. Thus, the measured values of attenuation represent a motorcycle rider's best conditions of hearing.

PROTECTION OF HUMAN AT THE WORKSTATION

Cyril J. Donnelly, Jack P. Callaghan, Jennifer L. Durkin. *The Effect of an Active Lumbar System on the Seating Comfort of Officers in Police Fleet Vehicles.* S. 295-307.

The purposes of this study were to determine which seat features/occupational demands contributed to police officer discomfort and whether an automobile seat fitted with an active lumbar system (ALS) could reduce driving discomfort. Fifty-eight officers were given questionnaires to assess driving discomfort. High discomfort levels were associated with computer use, duty belt, sidearm/radio, body armour and lumbar support interface.

Discomfort was highest in the lumbar, sacrum, upper pelvis and mid-back regions. Twelve officers spent one shift each in a police vehicle seat and an ALS seat. Discomfort was assessed every 2 h during 8-h shifts. Reduced discomfort was reported with the ALS seat. Three lumbar support features, the duty belt, and the lumbar and right upper pelvis regions, showed reduced discomfort. Overall seat discomfort decreased by 47% after 8 h of exposure to the ALS. Modifying the automobile seat helps to reduce officer discomfort during prolonged vehicle usage.

Ming Yu, Linyan Sun, Jianhua Du, Fengge Wu. *Ergonomics Hazards Analysis of Linemen's Power Line Fixing Work in China*. S. 309-317.

This study used qualitative and quantitative methods, such as OWAS (Ovako working posture analysis system) and behavior observation, to analyze musculoskeletal disorder (MSD) risk factors of power line fixing work in China. Video-based sampling was used to record and analyze the frequency and posture of on-pole activities. Those key subtasks showed ergonomics characteristics of on-pole fixing tasks. Insulator-fixing was the longest subtask (33% of total working time). Bar-installing was the second longest (26% of total working time). It was evident that bar-installing and insulator-fixing were full of hazardous risks. The action categories of the 2 subtasks were higher than of the other ones. The 2 subtasks were also time-consuming, difficult and induced MSDs. Assistant linemen faced more hazardous factors than chief linemen.

Maria Silvia Monteiro, Neusa Maria Costa Alexandre, Juhani Ilmarinen, Cíntia Mendes Rodrigues. *Work Ability and Musculoskeletal Disorders Among Workers From a Public Health Institution*. S. 319-324.

Objective. The study investigated the associations between diagnosed musculoskeletal disorders (MSD), work ability and demographics, work and lifestyle characteristics in a public health institution with a variety of occupations. Methods. A cross-sectional study was carried out in a public health institution in Brazil. The subjects (n = 168) aged 20–69 answered a questionnaire on demographics, work, lifestyle characteristics and the work ability index. Results. A univariate regression analysis was carried out with the presence of MSD as a dependent variable. Association was found in relation to the age group, type of work demand, tenure at the institution, body mass index, work in the nutrition and laundry sectors, being a maid in the previous job, auxiliary service and auxiliary maintenance occupations, work ability in relation to physical and mental demands, estimated work impairment due to diseases, sick leave in the past year, own prognosis of work ability in 2 years' time and mental resources: enjoying daily activities, being active and alert, being full of hope for the future. Conclusion. The presence of MSD affected several aspects of work ability.

Faramarz Helali. *Using Ergonomics Checkpoints to Support a Participatory Ergonomics Intervention in an Industrially Developing Country (IDC) : a Case Study*. S. 325-337.

To achieve ergonomics awareness in 3 subsidiary companies, an intervention team was formed. The aims of this study were to implement basic ergonomics through a participatory ergonomics intervention process that can support a continuous learning process and lead to an improvement in health and safety as well as in the work systems in the organization. The findings of this study (i.e., method, continuous learning and integration) were key to making the participatory ergonomics intervention successful. Furthermore, 4 issues of the ergonomics checkpoints (i.e., work schedules, work tasks, healthy work organization and learning) for assessing the work system were found suitable for both changing work schedules and for improving the work system. This paper describes the result of this project and also the experiences gained and the conclusions

reached from using the International Labour Office's ergonomics checkpoints in the industries of industrially developing countries.

NOTES

Akio Yoshihara, Kimihiro Yamanaka, Mitsuyuki Kawakami. *Effects of Polyphenol on Visual Fatigue Caused by VDT Work*. S. 339-343.

Visual fatigue of VDT (visual display terminal) operators poses a serious problem for corporations where VDT work is a major part of operations. In this study, an investigation in a corporation was carried out to examine the effect of polyphenol on recovery from visual fatigue of the visual function caused by working at a VDT. Three kinds of parameters were used for evaluating the effect of polyphenol. As a subjective evaluation, the first was a questionnaire to ascertain subjective feelings of fatigue. As aspects of a physiological evaluation, the second and third parameters were the accommodative function and the flicker value.