PROTECTION OF HUMAN IN THE WORKING ENVIRONMENT

Manglesh Kumar Manglam, Vinod Kumar Sinha, Samir Kumar Praharaj, Dipanjan Bhattacharjee & Anindya Das. Personality Correlates of Accident-Proneness in Auto-Rickshaw Drivers in India. S. 159-165.

Objective. We examined the personality correlates of accident-proneness of auto-rickshaw drivers in the Indian city of Ranchi. Methods. This was a cross-sectional study in which 50 male drivers aged 18–50 years, selected randomly from a list of licensed auto-rickshaw drivers in Ranchi, were assessed with a Hindi version of Cattell’s 16 Personality Factors (16-PF) Questionnaire. Results. There was a significantly higher frequency of breaking rules, crossing speed limits, substance use and a trend towards a higher frequency of carrying extra persons (i.e., more than recommended) in accident-prone drivers. There was significant negative correlation of accident-proneness with 16-PF factors such as reasoning, rule consciousness, apprehension and emotional stability. Conclusion. Personality characteristics with lower scores of reasoning, rule consciousness, apprehension and emotional stability are common in commercial auto-rickshaw drivers with high accident-proneness.


Co-operation between different parties and effective safety management play an important role in ensuring safety in multiemployer worksites. This article reviews safety co-operation and factors complicating safety management in Finnish multiemployer manufacturing worksites. The paper focuses on the service providers’ opinions; however, a comparison of the customers’ views is also presented. The results show that safety-related co-operation between providers and customers is generally considered as successful but strongly dependent on the partner. Safety co-operation is provided through, e.g., training, orientation and risk analysis. Problems encountered include ensuring adequate communication, identifying hazards, co-ordinating work tasks and determining responsibilities. The providers and the customers encounter similar safety management problems. The results presented in this article can help companies to focus their efforts on the most problematic points of safety management and to avoid common pitfalls.
The aim of this study was to assess self-perceived quality of life of people with physical disabilities from the perspective of work. The following tools were used in the study: a personal questionnaire, an SF-36v2 questionnaire, an I-E Scale at Work and a Polish adaptation of the Ferrans and Powers Quality of Life Index. The study involved 426 disabled persons aged 18–65. It demonstrated that quality of life depends, to a large extent, on factors such as age and labour force participation. Duration of looking for work had a significant influence on the satisfaction from the psychological perspective and on the perception of general health. For the respondents who were unemployed and not looking for work, quality of life decreased with increased duration of professional inactivity.

Industrial noise in the working environment has adverse effects on human hearing; literature and private studies confirm that. It has been determined that significant changes in the hearing threshold level occur in the high frequency audiometry, i.e., in the 8–20 kHz frequency range. Therefore, it is important to determine the effect of ultrasonic noise (10–40 kHz) on the human body in the working environment. This review describes hearing and nonhearing effects (thermal effects, subjective symptoms and functional changes) of the exposure to noise emitted by ultrasound devices. Many countries have standard health exposure limits to prevent effects of the exposure to ultrasonic noise in the working environment.

Introduction. Studying human errors as a risk factor in the occurrence of accidents is necessary. Thus, the aim of this study was to identify, predict and control human errors in industrial control units. Method. This is a case study carried out using SHERPA in the first unit of Zagros Methanol of Asalooyeh, Iran, and its subunits. To collect the required data, various methods were used: observing, interviewing processing specialists and control unit operators, and studying technical documents and records. Results. In total, 222 human errors were identified in various occupational tasks. This study showed that 48.62% of them were action errors, 31.97% were checking errors, 6.75% were retrieval errors, 11.70% were communication errors and 0.90% were selection errors. Conclusion. It can be inferred that this method is appropriate for different industries, and it is useful for identifying human errors leading to hazardous accidents.

Aim. The aim of this study was to measure aerobic demands of fire fighting activities including exercise in the heat. Methods. Twenty-two experienced firefighters performed the Trondheim test simulating fire fighting tasks including work in the heat. Maximal oxygen uptake (VO2 max), heart rate (HR) and ventilation were recorded continuously. Data were compared with results obtained during a treadmill test during which the participants were dressed as smoke divers. Results. The participants completed physical parts of the Trondheim test in ~12 min (range: 7.5–17.4). Time to complete the test was closely related to the participant’s VO2 max. HR of ~170 beats/min and pulmonary
ventilation of ~100 L/min were higher than at lactate threshold (LT) during laboratory tests. VO2 averaged over the test’s physical part was 35 ± 7 ml/min/kg, which was at the same or below the level corresponding to the participants’ LT. Physically fit participants completed the test faster than less fit participants. Slower and physically less fit participants consumed more air and used more oxygen than faster and physically more fit participants. **Conclusion.** The Trondheim test is physically demanding; it distinguishes physically fit and less fit participants.


**Aim.** Firefighters must meet minimum physical demands. The Norwegian Labour Inspection Authority (NLIA) has approved a standardised treadmill walking test and 3 simple strength tests for smoke divers. The results of the Trondheim test were compared with those of the NLIA tests taking into account possible effects of age, experience level and gender. **Methods.** Four groups of participants took part in the tests: 19 young experienced firefighters, 24 senior male firefighters and inexperienced applicants, 12 male and 8 female. **Results.** Oxygen uptake (VO2) at exhaustion rose linearly by the duration of the treadmill test. Time spent on the Trondheim test was closely related to performance time and peak VO2 on the treadmill test. Senior experienced firefighters did not perform better than equally fit young applicants. However, female applicants performed poorer on the Trondheim test than on the treadmill test. Performance on the Trondheim test was not closely related to muscle strength beyond a minimum. **Conclusion.** Firefighters completing the Trondheim test in under 19 min fit the requirements of the NLIA treadmill test. The Trondheim test can be used as an alternative to the NLIA tests for testing aerobic fitness but not for muscular strength. Women’s result of the Trondheim test were poorer than the results of the NLIA treadmill test, probably because of their lower body mass.

**PROTECTION OF HUMAN AT THE WORKSTATION**

**Tzu-Hsien Lee & Chia-Shan Han.** *Analysis of Working Postures at a Construction Site Using the OWAS Method.* S. 245-250.

This study used OWAS to analyze the working postures of construction workers on building the foundations of a log cabin. Three construction workers, with an average work experience of 40 years, participated in this study. Eight elementary jobs of building the foundations of a log cabin were videotaped at a construction site and analyzed later in the laboratory. For an overall distribution of trunk postures, OWAS identified that a bent and twisted trunk posture (34%), which fell into action category 3, was the major poor posture for construction workers. This study also identified that tying beams with steel bars, assembling column templates, and cement grouting of the ground were the 3 principal jobs in which workers building the foundations exhibited poor working posture. This article suggests ways to reduce and evaluate poor posture in a dynamic construction site.

**Tzu-Hsien Lee & Tsung-Yu Liu.** *Postural and Muscular Responses While Viewing Different Heights of Screen.* S. 251-258.

This study aimed to examine the effects of visual display terminal (VDT) viewing angle on human postural angle and muscular activity. The participants’ neck, thoracic bending, and trunk inclination angles; and the activity of sternocleidomastoid, trapezius, splenius capitis, and erector spinae at 5 viewing angles (+40°, +20°, 0°, −20°, and −40°) of a VDT screen were collected for 1 min. This study showed that neck and thoracic bending
angles increased with viewing angle, while viewing angle did not significantly affect trunk inclination angle. In addition, the activity of trapezius and erector spinae increased when viewing a higher or lower VDT screen height compared with viewing a horizontal VDT screen height; however, the activity of splenius capitis decreased with viewing angle.


This paper discusses the design and development of worksheets for helping notebook computer (NBC) users to compute NBC and workstation adjustments so as to assume an appropriate seated posture. The worksheets (one for male users, the other for female ones) require the following information: body height, NBC screen size, work surface height, and seat height. The worksheets contain tables for estimating recommended NBC base angle, NBC screen angle, body–NBC distance, work surface height, and seat height. Additionally, they include flow charts to help NBC users to determine necessary adjustment accessories and their settings.


In Iran, furniture is mainly manufactured in small workshops, where most activities are performed manually. This study was conducted among workers of furniture workshops to determine prevalence of musculoskeletal symptoms and to assess ergonomic working conditions to identify major risk factors associated with musculoskeletal symptoms. In this study, 410 randomly selected furniture workers participated. The Nordic questionnaire and an ergonomics checklist consisting of 6 sections were used as data collection tools. An index was calculated for each section of the checklist. Action categories indicating the priority of corrective measures were also defined. The highest prevalence of symptoms was reported in the knees (39%), lower back (35.6%) and wrists/hands (29.5%). It was found that manual material handling, poor workstation design and awkward working postures were associated with the reported symptoms in these regions (OR 1.77–4.52). Poor general working conditions and work organization showed association as well. Any interventional measures should focus on these areas.


The basic aim of this research was to establish the efficiency of filtering materials widely used in respiratory protection devices with particular interest in their porosity, degree of electric and changeable process parameters, such as the flow rate of the test nanoaerosol and the size range of nanoparticles. Tests were carried out with an NaCl solid aerosol of 3.2 × 105 particles/cm3 for the range of particle size of 7–270 nm, at aerosol flow rate of 1800, 2700, 3600, 4500 and 5400 L/h. The tests showed that electrospun nonwovens were the most effective filtering materials for nanoparticles over 20 nm. Melt-blown electret nonwovens with lower porosity than electrospun nonwovens had higher values of penetration of 1%–4%. Those materials provided very efficient protection against nanoparticles of certain sizes only.

Kazimierz Jamroz & Leszek Smolarek. **Driver Fatigue and Road Safety on Poland’s National Roads.** S. 297-309.
This paper presents an overview of factors causing driver fatigue as described in the literature. Next, a traffic crash database for 2003–2007 is used to identify the causes, circumstances and consequences of accidents caused by driver fatigue on Poland’s national roads. The results of the study were used to build a model showing the relationship between the concentration of road accidents and casualties, and the time of day. Finally, the level of relative accident risk at night-time versus daytime is defined. A map shows the risk of death and severe injury on the network of Poland’s national roads. The paper suggests to road authorities steps to reduce fatigue-related road accidents in Poland.


**Background.** Changes in industries and work practices have coincided with work-related musculoskeletal disorders (MSDs). This study was conducted to determine the prevalence of MSDs and to assess postural loading in assembly workers of an Iranian telecommunication manufacturing company. **Methods.** Data were collected from 193 randomly selected workers in 4 units of the company. The Nordic musculoskeletal disorders questionnaire and the UBC ergonomic checklist were used as data collection tools. Loading on the upper body assessment (LUBA) was used to assess postural loading. **Results.** Lower back symptoms were the most prevalent problems among the workers (67.9%). LUBA showed that most assembly workers (94.3%) had experienced considerable and high postural loading (postural load index, PLI > 5). Regression analyses revealed that lighting, rotation, contact stress, repetition, gender and age were factors associated with symptoms. **Conclusion.** Work-related MSDs occurred at a high rate among workers. Postural loading requires consideration. Any ergonomic intervention should focus on eliminating ergonomic factors associated with symptoms.


The inversion method was used to test vibroacoustic processes in large-size machines used in opencast mines of rock material. When this method is used, the tested machine is replaced with a set of substitute sources, whose acoustic parameters are determined on the basis of sound pressure levels and phase shift angles of acoustic signals, measured with an array of 24 microphones. This article presents test results of a combine unit comprising a crusher and a vibrating sieve, for which an acoustic model of 7 substitute sources was developed with the inversion method.