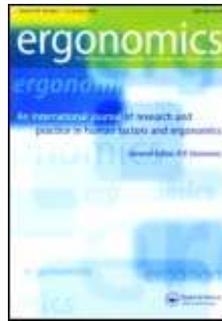


Ergonomics– rok 2007, ročník 50

Číslo 4



Chih-Long Lin; Mao-Jiun J. Wang; Colin G. Drury. Biomechanical, physiological and psychophysical evaluations of clean room bolte. S. 481–496.

The purpose of this study was to evaluate the significance of boot sole properties on reducing fatigue, to evaluate the effects of load carrying and walking (over a 1 h period) on biomechanical, physiological and psychophysical responses, and to investigate the correlations between the measurements. The results indicated that elasticity and shock absorption of the boot had significant effects on outcome variables. Significant load effects were seen in most measurements. All of the significant time period effects gave strong regressions, with no R^2 value less than 0.983. The findings of this study provide useful information for the selection and design of clean room boots as well as for job design for load carrying tasks in the clean room environment.

- **Keywords:** Clean room boots; Physiological measures; Shock-absorbing soles

Deepti Sood; Maury A. Nussbaum; Kris Hager. Fatigue during prolonged intermittent overhead work: reliability of measures and effects of working height. S. 497 – 513.

Shoulder pain is prevalent among industrial workers and existing evidence supports that overhead work is an important specific risk factor. Existing guidelines are limited, with overhead work typically recommended to be avoided, and research on overhead work has been mixed in terms of the effects of increasing arm reach. A laboratory-based simulation of overhead work was conducted, at three working heights, in order to facilitate improved guidelines and to identify potential non-linear effects of overhead work height. Several indicators of shoulder fatigue served as outcome measures and a preliminary study was performed to assess the reliability of several of these measures. Fatigue measures based on electromyography (EMG) generally had low reliability, whereas excellent reliability was exhibited for ratings of perceived discomfort (RPD). Consistent with this, no effects of overhead work height were found on EMG-based measures, yet clear non-linear effects were found on RPD and task performance. The source of the effects of work height appeared to be related to a combination of muscle activation levels and demands on precision/control at the highest location. These results support the utility of subjective measures for relatively low-level intermittent exertions and demonstrate increasingly detrimental fatigue and performance effects at extremes in reach during overhead work.

- **Keywords:** Fatigue; Overhead work; Intermittent work; Shoulder; Reliability; Electromyography; Perceived discomfort

Jan M. Noyes; Daniel P. J. Brunetu. A self-analysis of the NASA-TLX workload measure. S. 514–519.

Computer use and, more specifically, the administration of tests and materials online continue to proliferate. A number of subjective, self-report workload measures exist, but the National Aeronautics and Space Administration-Task Load Index (NASA-TLX) is probably the most well known and used. The aim of this paper is to consider the workload costs associated with the computer-based and paper versions of the NASA-TLX measure. It was found that there is a significant difference between the workload scores for the two media, with the computer version of the NASA-TLX incurring more workload. This has implications for the practical use of the NASA-TLX as well as for other computer-based workload measures.

- **Keywords:** Subjective workload; NASA-TLX workload measure; Computer vs. paper administration; Absolute vs. relative workload measures

Dan Odell; Alan Barr; Robert Goldberg; Jeffrey Chung; David Rempel. Evaluation of a dynamic arm support for seated and standing tasks: a laboratory study of electromyography and subjective feedback. S. 520–535.

The goal of this study was to determine whether a new dynamic arm support system reduced shoulder and arm muscle load for seated and standing hand/arm tasks. The new system provides support for both horizontal and vertical arm motion. A total of 11 participants performed ten tasks (five seated and five standing) both with and without the arm support. Outcomes were assessed with electromyography and subjective feedback. Muscle activity was measured over the dominant side supraspinatus, triceps and forearm extensor muscles. Significant ($p < 0.01$) reductions in static muscle activity were observed in one of ten tasks performed with the support device for the supraspinatus muscle, in five tasks for the triceps and in one task for forearm extensor muscles. Likewise, a significant improvement in subjective measures was reported with the support device for 'ease of task' for two of ten tasks, for 'forearm comfort' for three of ten tasks and for 'shoulder effort' for six of ten tasks. The results suggest that a dynamic forearm support may improve subjective comfort and reduce static muscle loads in the upper extremity for tasks that involve horizontal movement of the arms. For rapid motions, the value of the support is limited due to internal inertia and friction.

- **Keywords:** Forearm; Support; Electromyography; Shoulder; Muscle load

Niels C. C. M. Moes. Variation in sitting pressure distribution and location of the points of maximum pressure with rotation of the pelvis, gender and body characteristics. S. 536–561.

The pressure distribution and the locations of the points of maximum pressure, usually below the ischial tuberosities, were measured for subjects sitting on a flat, hard and horizontal support, and at various angles of the rotation of the pelvis. The pressure data were analysed for force- and pressure-related quantities. Multiple regression was applied to explore relationships between these quantities and (i) a set of body characteristics and (ii) the pelvis rotation. The maximum pressure and the pressure gradient were mainly found to be explained by the ectomorphic index and the distance between the maximum pressure points by gender and the angle of rotation of the pelvis.

- **Keywords:** Ergonomics; Biomechanics; Pelvis; Pelvis rotation; Pressure distribution; Sitting; Anthropometry; Ischial tuberosity

Charlie D. Frowd; Vicki Bruce; Hayley Ness; Leslie Bowie; Jenny Paterson; Claire Thomson-Bogner; Alexander McIntyre; Peter J. B. Hancock. Parallel approaches to composite production: interfaces that behave contrary to expectation. S. 562–585.

This paper examines two facial composite systems that present multiple faces during construction to more closely resemble natural face processing. A 'parallel' version of PRO-fit was evaluated, which presents facial features in sets of six or twelve, and EvoFIT, a system in development, which contains a holistic face model and an evolutionary interface. The PRO-fit parallel interface turned out not to be quite as good as the 'serial' version as it appeared to interfere with holistic face processing. Composites from EvoFIT were named almost three times better than PRO-fit, but a benefit emerged under feature encoding, suggesting that recall has a greater role for EvoFIT than was previously thought. In general, an advantage was found for feature encoding, replicating a previous finding in this area, and also for a novel 'holistic' interview.

- **Keywords:** Facial composite; Parallel presentation; Memory; Holistic; Witness

Yu F. Zhang; David P. Wyon; Lei Fang; Arsen K. Melikov. The influence of heated or cooled seats on the acceptable ambient temperature range. S. 586–600.

In 11 climate chamber experiments at air temperatures ranging from 15 to 45°C, a total of 24 subjects, dressed in appropriate clothing for entering a vehicle at these temperatures, were each exposed to four different seat temperatures, ranging from cool to warm. In one simulated summer series, subjects were preconditioned to be too hot, while in other series they were preconditioned to be thermally neutral. They reported their thermal sensations, overall thermal acceptability and comfort on visual analogue scales at regular intervals. Instantaneous heat flow to the seat was measured continuously. At each ambient room temperature, the percentage dissatisfied was found to be a second-order polynomial function of local heat flow. Zero heat flow was preferred at an air temperature of 22°C and the heat flow that minimized the percentage dissatisfied was found to be a single linear function of air temperature in all conditions. The analysis indicates that providing optimal seat temperature would extend the conventional 80% acceptable range of air temperature for drivers and passengers in vehicle cabins by 9.3°C downwards and by 6.4°C upwards.

- **Keywords:** Heated seat; Cooled seat; Thermal comfort; Thermal acceptability; Control algorithm

Heiko Hecht; Julia Bauer. Convex rear view mirrors compromise distance and time-to-contact judgements. S. 601–614.

Convex rear view mirrors increasingly replace planar mirrors in automobiles. While increasing the field of view, convex mirrors are also taken to increase distance estimates and thereby reduce safety margins. However, this study failed to replicate systematic distance estimation errors in a real world setting. Whereas distance estimates were accurate on average, convex mirrors lead to significantly more variance in distance and spacing estimations. A second experiment explored the effect of mirrors on time-to-contact estimations, which had not been previously researched. Potential effects of display size were separated from effects caused by distortion in convex mirrors. Time-to-contact estimations without a mirror were most accurate. However, not distortion, but visual angle seemed to cause estimation biases. Evaluating advantages and disadvantages of convex mirrors is far more complex than expected so far.

- **Keywords:** Rear-view mirror; Convex mirrors; Time-to-contact; Distance estimation

H. T. Juslén; M. C. H. M. Wouters; A. D. Tender. Lighting level and productivity: a field study in the electronics industry. S. 615–624.

The effect of illuminance on the speed and the quality (percentage of errors) with which workers assemble electronic devices was studied in an electronics factory in The Netherlands. For the study, the horizontal illuminance was alternated per work shift between 800 and 1200 lux. The first test was done during the summer and a second test during the winter. A significant effect of illuminance has been found. With 1200 lux at the working plane, the speed of production in the summer was 2.9% higher than with 800 lux. In the winter it was 3.1% higher with the increased illuminance. There was no significant effect of the illuminance on the percentage of errors.

- **Keywords:** Lighting; Productivity; Speed; Industrial environment