

Focus on IFA's work

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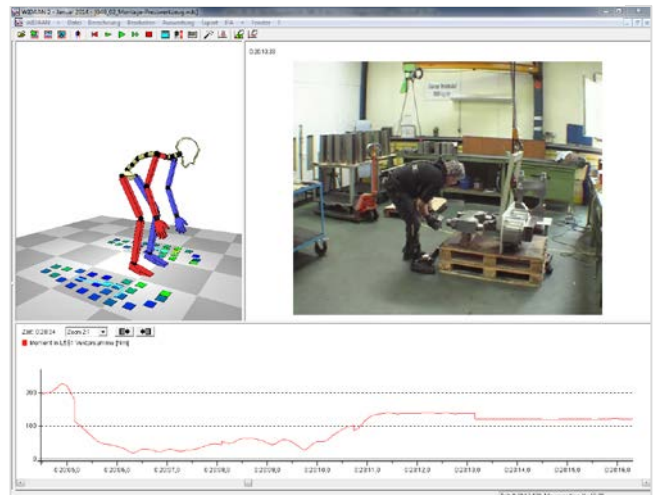
Exposure of machinists to back stresses/ further development of the G 46 Principle

Problem

Machinists are exposed to a range of physical stresses, for example as a result of manipulating loads manually and working in unfavourable trunk postures. These stresses are considered risk factors for occupational spinal complaints. Occupational spinal stresses and subjectively perceived complaints of the lumbar and cervical spine within this occupational group were therefore to be quantified, and based upon the results, selection criteria formulated for occupational medical check-ups and preventive measures at workplaces. The IFA study formed a part of Project FF-FP0293 (Further development of the G 46 occupational medical examination for the musculoskeletal system) supported by the DGUV and conducted under the auspices of the Institute and Out-patient Clinic of Occupational Medicine of RWTH Aachen University.

Activities

410 workers in machining (373 male, 37 female) in 11 companies and 8 different task areas served as test persons in the study. The Standardized Nordic Questionnaire was used to record the subjective disorders of the lumbar and cervical spine. A subgroup of 78 persons (73 male, 5 female) from all task areas was selected on which measurements of the spinal stresses were performed over a shift. Body postures and load manipulations were recorded by the CUELA personal measurement system. Cumulative dose values were computed on all test persons in the sub-collective for the angle of forward trunk inclination, manipulated load



Analysis by measurement of musculoskeletal stresses among machinists, CUELA¹ software user interface: animated computer character (top left), video of the work situation (top right), characteristic of the measured stress values (bottom)

weights, lumbar moments and intervertebral disk compression forces on the lowest intervertebral disk at L5/S1.

RWTH Aachen University also conducted intensive physical and mental risk assessments on all workstations, together with functional diagnostic examinations in accordance with the "Fokus" method on all test subjects. The exposure data obtained as a result were correlated with the results of the surveys of disorders and of the identified for improving occupational medical

¹ CUELA: computer-based measurement and long-term analysis of stresses upon the musculoskeletal system

functional diagnoses in order for strategies to be prophylaxis in accordance with the G 46 Principle. Correlations and odds ratios (ORs) in particular were calculated, in order to determine the relationship between the subjectively perceived disorders of the lumbar and cervical spine and the cumulative work stresses.

Results and Application

The stress dose values varied strongly between the different task groups. Mean cumulative angles of trunk inclination of $160,000 \pm 90,000$ °s, load manipulations of $28,000 \pm 22,000$ kg, lumbar moments of 200 ± 80 Nmh and lumbar compression forces of 3.9 ± 2 kNh per day were measured across all tasks. A significant correlation with an OR of 2.07 (CI: 1.08-3.98) was observed for the highest versus the lowest exposure quintile for the relationship between the cumulative angles of trunk inclination and the subjectively perceived lumbar and cervical spine disorders. This result permits formulation of a defined guideline value for risk assessment of work performed in constrained trunk postures; in turn, the guideline can serve as a selection criterion for occupational medical check-ups in accordance with DGUV Principle G 46. Stress/disorder characteristics for other forms of stress frequently followed a U-shaped progression.

Area of Application

Metalworking industry

Additional Information

- Winkler, R.; Schikowsky, C.; Lang, J.; Ochsmann, E.; Kraus, T.; Bechmann, J.; Böser, C.; Ellegast, R.P.: Praktikabilität, Wirksamkeit und Weiterentwicklung des DGUV Grundsatzes „G 46“ unter besonderer Berücksichtigung des Aspektes „Rückenschmerzen“ (IFA Report 3/2015). Published by: German Social Accident Insurance (DGUV), Berlin 2015

Expert Assistance

IFA, Institute management

Literature Requests

IFA, Central Division