

Focus on IFA's work

Edition 2/2013

617.0-IFA:638.81

Awkward body posture strain resulting from work on overhead high-voltage power lines

Problem

During standard maintenance and service work on overhead high-voltage power lines at an electricity utility, the employees were observed assuming difficult and unusual postures in order to perform their work.

Taking this as a starting point, an analysis of the musculoskeletal strains experienced by these high-voltage line workers was initiated with the cooperation of the then Berufsgenossenschaft für Feinmechanik und Elektrotechnik [the institution for statutory accident insurance and prevention for the precision and electrical engineering industry] within the framework of a company occupational safety and health campaign.

The aim of the analysis was to record the workers' postures as precisely as technically possible, provide a differentiated analysis of the measurements, and devise preventative measures to better ensure the health of the workers.

Activities

IFA's own CUELA measurement system – a computer-aided system for long-term recording and analysis of body motions – was used to record and measure the physical movements, postures, and loads carried. Sensors in the workers' clothing continuously measured movements in the spinal column (inclination, bending, lateral bending, twisting), the hips (bending on both sides), and the knees (bending on both sides).



Typical conditions for workers on high-voltage power lines

The weight of the loads handled were determined by measuring the ground reaction forces using pressure-sensitive sensors on shoe sole inserts. The data gathered on different test subjects over several hours in this manner were then analysed in terms of musculoskeletal risk factors. The evaluation of the loads measured was conducted using a method related to the OWAS occupational science method developed in Finland.

Results and Application

The measurements indicated that particularly static postures and unfavourable positions and movements were the substantial factors involved in physical strain. Combinations of movements in the end sections of the spine (e.g.: deep bending in connection with heavy twisting) in particular could be identified as highly strenuous.

Static postures were also measured in the lower extremities. Carrying heavy loads was only found in but a few activities and only for a rather short duration.

The results of this risk analysis can be used for collective preventative measures (such as work materials, work organisation) as well as for individual preventative measures (back training, better use of break periods, etc.). The medical department at a member firm was able to use this analysis to devise a back muscle training programme suited to the real working conditions.

Area of Application

All branches of industry where the main occupational strains and hazards arise from rather unfavourable and uncomfortable body postures and motions.

Additional Information

- Glitsch, U.; Keller, S.; Kusserow, H.; Hermanns, I.; Ellegast, R.P.; Hüdepohl, J.: Physical and physiological workload profiles of overhead line service technicians (Physische und physiologische Arbeitsbelastungsprofile von Freileitungsmonteuren). IEA 2006. 16. World Congress on Ergonomics. 10-14 July 2006, Maastricht/The Netherlands – Lecture. CD-ROM. Ed.: Pikaar, R.N.; Koningsveld, E.A.P.; Settels, P.J.M. Elsevier Ltd. 2006

Expert Assistance

IFA, Division 4: Ergonomics – Physical environmental factors

German Social Accident Insurance Institution for the energy, textile, electrical and media products sectors (BG ETEM), Cologne

Literature Requests

IFA, Central Division