

Focus on IFA's work

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Hand-arm vibration from working with sanding machines

Problem

In the steel and shipbuilding industries, processing welding seams is associated with much manual labor. The traditional method of doing this work has so far been to use **hand-held** angle sanders, which causes a high degree of vibration stress and strain on the hand-arm region. One user developed a **hand-guided** belt sander to improve quality and performance. By changing the technical method of functioning, the intent was also to reduce the amount of vibration. Both work procedures were measured and recorded and compared in order to analyse the hazards and to verify the improvements.

Activities

The measurements were conducted under typical working conditions. The degree of strain described as "acceleration value of the frequency-weighted hand transmitted vibration" was analysed separately for three measurement axes at the respective periods of exposure. Additional measurements were made on the support handle of the angle sander.

Results and Application

In processing welding seams, the hand-held angle sander produced values for the "acceleration value of the frequency-weighted hand transmitted vibration" on the support handle of $a_{hw} = 11.5\text{m/s}^2$ which diverged considerably from the claims of the



Processing welding seams with a hand-held angle sander (left) and the hand-guided belt sander (right)

manufacturer, given at $a_{hw} = 7.0\text{m/s}^2$, by more than 60%. The hand-guided belt sander reduced the vibrations substantially, with an acceleration of vibration of $a_{hw} = 0.77\text{m/s}^2$ in comparable work situations.

The hazards of hand-arm vibrations from the hand-held angle sander is already exceeded with a daily exposure of more than 24 minutes. In contrast, the hand-guided belt sander produces values below the suggested prevention threshold values even at a daily exposure of eight hours.

Area of Application

The metal-working, steel, and shipbuilding industries.

Additional Information

- DIN EN ISO 28927-1: Hand-held portable power tools – Test methods for evaluation of vibration emission – Part 1: Angle and vertical grinders (05.10). Beuth, Berlin 2010
- DIN V 45695: Hand-arm vibration – Guidelines for vibration hazards reduction – Engineering and management measures (04.96). Beuth, Berlin 1996
- Schwingungs-Belastungs-Rechner für Hand-Arm-Vibration www.dguv.de/webcode/d3245
- Lärm- und Vibrations-Arbeitsschutzverordnung (LärmVibrationsArbSchV) vom 6. März 2007. BGBl. I (2007), S. 261-277

Expert Assistance

IFA, Division 4: Ergonomics – Physical environmental factors

Literature Requests

IFA, Central Division