

Focus on IFA's work

Edition 10/2014

617.0-IFA:638.222

Whole-body vibration exposure during fork-lift truck travel over ramps

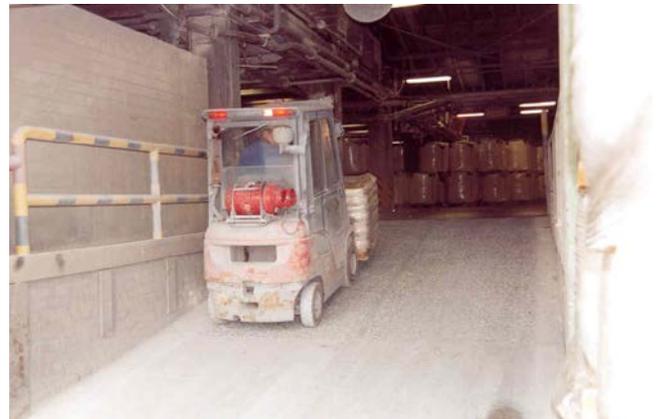
Problem

Fork-lift truck drivers complained of pain in the region of the lumbar and thoracic spine during repeated travel over ramps (ramp angle: 15.5°). Exposure to vibration containing a shock element was regarded as the cause.

Activities

The existing vibration exposure situation on the truck seats was first recorded in the two horizontal axes of vibration x (back-chest axis of the driver) and y (shoulder-shoulder axis), and in the vertical axis of vibration z (spinal axis). The source of the shocks giving rise to the complaints was suspected to be insufficient spring travel in the vertical axis of the suspension seats fitted. The manufacturer's preferred seat supplier was therefore requested to supply improved suspension seats with greater spring travel.

The vibration generated in the existing seats was compared in the IFA's seat test laboratory with that of the improved seats. The seats deemed suitable on the basis of this comparison were fitted to the fork-lift trucks in the plant, and the new vibration exposure measured in practical use.



Fork-lift truck negotiating a ramp

Results and Application

Two seats with a greater spring travel than that of the original seats, and with two different damper characteristics were initially selected on the basis of the laboratory results. The selection was confirmed by use in the plant: the seat with the harder damper characteristics proved to be suitable. It improved vibration attenuation in the vertical axis on the seat compared to excitation at the seat mounting point from 55% to 65%, without the spring reaching the end of its travel. The reason for the previously unsatisfactory seat function was an unusually high vibration excitation for the load capacity class of the truck, caused by the transitions to the ramp.

Area of Application

Goods handling and transport by fork-lift truck

Additional Information

- EN 13490: Mechanical vibration – Industrial trucks – Laboratory evaluation and specification of operator seat vibration (03.09). Beuth, Berlin 2009 (former DIN EN 13490:2002, EN 13490/A1:2008)

Expert Assistance

IFA, Division 4: Ergonomics – Physical environmental factors