

Working postures and physical demands on a utility vehicle assembly line

Laura K. Thompson^{1,2}, Thorsten Franz¹, & Heinzpeter Rühmann²

¹MAN Nutzfahrzeuge AG, Munich, Germany

²Lehrstuhl für Ergonomie, Technische Universität München,
Munich, Germany

Abstract

The working postures, physiological workload and manual materials handling demands of male workers on a utility vehicle assembly line were measured using methods that could be implemented in industry. For an analysis of working posture, ten working postures and workplace-specific tasks were defined. During observation, the elapsed time per working posture and task was recorded. The observed activities included the mounting and fastening of the drive shaft and steering rod, and the fastening of the front and rear axles. Generally the working postures were found not to be harmful, except for the severely bent posture during the mounting and fastening of the connecting drive shaft. The physiological workload was measured in terms of the energy expenditure required to complete the assembly work and was acceptable for the male workers. The manual materials handling demands were assessed using both the NIOSH equation and the VDI method. Both methods indicated that the lifting of the steering rod was too demanding. Both the NIOSH equation and the VDI method could be easily implemented in industry, but the working posture analysis was too time-consuming to be used as a general analysis method.

Introduction

Musculoskeletal disorders in the German manufacturing industry accounted for most (29%) of the lost days due to illnesses and injuries in 2002, with an average of 15.5 days per worker. This corresponds to a production shortfall of approximately 4.16 billion Euro (BAuA, 2002). Corrective measures are needed to reduce these costs and injury rates. At the MAN Nutzfahrzeug plant in Munich, a goal is to reduce the relatively high number of workers on sick leave. One of the possible measures is to improve the ergonomic conditions on the assembly line. Therefore this study was undertaken as a pilot project to analyse the ergonomic conditions on the assembly line at MAN and determine corrective measures. Three sample workplaces were chosen. The observed activities included the mounting and fastening of the drive shaft and steering rod, and the fastening of the front and rear axles on different utility vehicle models.