

# Focus on BGIA's work

Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung

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## Ergonomic analysis of grinding tasks in structural steel engineering

### Problem

In structural steel engineering and specifically in the shipbuilding industry, large metal parts are welded together. In order for reliable welds to be produced, the weld region must be ground. A manually guided angle grinder is generally used for this purpose. Employees report that this task involves a high degree of stress upon the locomotor apparatus. In a member company of the Metall-Berufsgenossenschaft (institution for statutory accident insurance and prevention in the metal-working industry), an ergonomic belt grinding machine (see bottom figure) was developed. This machine enabled grinding work to be performed by the operator walking upright, similar to operation of a lawnmower, and unfavourable postures therefore to be avoided.

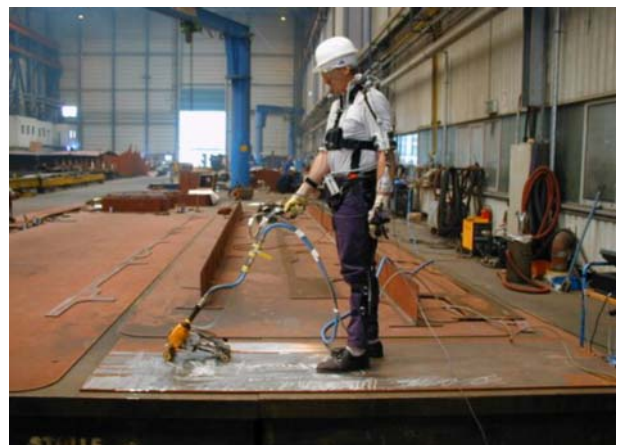
The objective of this study was the comparative analysis of postures during work performed in the conventional manner and that performed with the modified ergonomic equipment design.

### Activities

During performance of the two procedures in the plant, the postures were recorded at the usual workplace by means of the BGIA's CUELA system for computer-aided measurement and long-term analysis. The test subject was an experienced member of the plant's staff. The working situation was simulated, but corresponded to the usual stress situation.

### Results and Application

Work performed with the conventional angle grinder was found to place a high degree of stress upon the locomotor apparatus. In particular, strong



Arrangement for ergonomic analysis during use of the conventional (top) and ergonomic (bottom) angle grinder

static bending of the spine occurred in conjunction with twisting of the trunk and a kneeling posture. By contrast, the use of the new tool substantially alleviated the stress; it enabled work to be performed for the most part in an upright posture. Significant components of bending and twisting of the trunk were not recorded.

Work with the new equipment can therefore be regarded as being ergonomically more favourable than that with a conventional angle grinder.

### **Area of Application**

Structural steel engineering/shipbuilding

### **Expert Assistance:**

BGIA, Division 4: Ergonomics – Physical environmental factors  
BG for the metalworking industry in Northern Germany, Hanover (now the BG for the metals industry in North and South Germany)

### **“Focus on BGIA's Work”**

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Deutschen Gesetzlichen Unfallversicherung  
Alte Heerstr. 111  
53757 Sankt Augustin  
Germany  
Edited by: Dr R. P. Ellegast  
Phone: +49 2241 231-02/Fax: +49 2241 231-2234  
e-mail: [bgia@dguv.de](mailto:bgia@dguv.de)  
Internet: [www.dguv.de/bgia](http://www.dguv.de/bgia)