

## ***Solutions to reduce stress in occupational maintenance***

### **1. Organisations involved**

Accident prevention and insurance association for the metal working industry (“Berufsgenossenschaft Metall Nord Süd”) (Karl-Thomas Wenchel and Prof. Dr.-Ing. Peter Hartung)

### **2. Description of the case**

#### **2.1. Introduction**

According to the standards DIN 31051 and DIN EN 13306 the following activities are considered to be maintenance:

*Maintenance includes all technical, administrative and managerial actions during the life cycle of an item – a workplace (building), work equipment, or means of transport – intended to keep it in, or restore it to a state in which it can perform the required function, protecting it from failure or decline. Maintenance activities can include:*

*inspection*

*monitoring*

- testing
- overhaul
- measurement
- replacement
- adjustment
- repair
- modification
- rebuilding
- fault detection
- servicing

These maintenance activities are associated with diverse hazards that may adversely affect workers’ health. Particularly during corrective maintenance, workers are exposed to psychosocial hazards such as high job demands and time pressure that may have negative consequences on health and safety. The exposure to such stress-generating factors may lead to an increase in occupational accidents and may also in the long term trigger occupational diseases among maintenance workers.

Statistics for fatal accidents reflect the high level of risks associated with maintenance activities: about 21 % of fatal occupational accidents are related to maintenance tasks, exceeded only by the transport and traffic sector which accounts for 42 % of work-related fatalities (Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, 2006). The exposure of maintenance workers to high levels of risk is also confirmed by the accident prevention and insurance associations (“Berufsgenossenschaften”). According to their statistics, 20% of all fatal occupational accidents are related to maintenance or corrective maintenance activities.

In order to reduce the levels of risk related to maintenance work at a German automobile manufacturer, the accident prevention and insurance association responsible for the metal working industry (“Berufsgenossenschaft Metall Nord Süd”) was asked for help.

## **2.2. Aims**

A risk-reduction workshop was devised, directed at preventing or reducing the exposure of maintenance workers to risk factors with adverse effects on both short-term and long-term health. In order to achieve these aims, the awareness of both workers and their managers about the risks involved had to be increased and feasible solutions developed.

## **2.3. Scope of the project**

To achieve these aims, a two-day workshop was held for workers at a German automobile manufacturing company. The workshop was run three times and each time around 15 employees from lorry production department took part. Two moderators led the workshop, but the primary method of training was through group discussion and presentation.

The workshop content was carefully structured. At the beginning, three maintenance accidents were described by the moderators. Maintenance workers were then asked to think about their work, focusing on critical and safety-relevant situations that might give rise to occupational risks of various kinds during maintenance activities.

Their observations were summarized and presented on specific boards and they were asked to propose solutions and discuss various approaches to the prevention or reduction of the risks they had identified. No managers took part in this phase of the workshop to ensure that the workers' view were not influenced or inhibited by their presence.

Instead the managers concerned were invited to participate in the final session of the workshop during which the results of the workers' discussions were presented to them by the two moderators. Then, through a joint critical appraisal involving both workers and managers, the proposed approaches to reduce or prevent risk were discussed.

## **2.4. Results and evaluation**

The workshop raised workers' awareness of the occupational risks they are exposed to and gave them an opportunity to discuss and develop strategies to prevent or reduce those risks.

Workers agreed that maintenance work is often unpredictable, involving quick responses to technical emergencies with an inevitable time pressure. This is often aggravated by difficult working conditions such as poor access to maintenance areas, heat, noise and working in confined spaces.

While discussing risk factors with managers responsible for maintenance, it became clear that risky behaviour by workers performing maintenance tasks could often be seen as compensatory behaviour intended to ease time pressures. Maintenance workers reported that time pressures were a typical, everyday part of their daily working lives, particularly where malfunctioning machines or systems were seriously disrupting production or in case of a breakdown.

Maintenance workers were also exposed to risks caused by a lack of organisational and technical preparation. They reported that they often had to work under difficult conditions, such as testing machines that were still running or working while protective devices were switched off. Other risks identified included unintentionally activating control devices and working alongside dangerous substances.

When machinery or systems failed, maintenance staff was often forced to improvise when the proper spare parts were not available, under pressure to restore normal production as quickly as possible. As a result, reported the workers, further failures and breakdowns were inevitable.

Finally, they reported, insufficient instruction and inadequate operation charts caused accidents and put them at risk of accidental injury and long term ill health.

If they are to do their jobs well, maintenance workers should not be exposed to further job strains in addition to those that are inherent in their work and cannot be avoided, such as machine failures and time pressure.

# CASE STUDIES

Yet additional sources of stress were frequently reported by the maintenance workers. One of the sources arose from the fact that the number of employees responsible for maintenance in recent years had been reduced. As a result breakdowns could not always be dealt with immediately and in some cases workers had voluntarily come into work on Sundays, in order to clear the backlog of maintenance tasks before the start of a new working week.

They also reported that preventive maintenance programmes had been steadily abandoned over the previous decade which, although cutting costs in the short term, was the root cause of more frequent machinery and system failures which were likely to incur higher costs in the long term.

Maintenance workers also believed that designers paid too little attention to how easy or difficult it might be in the future to maintain or repair machinery. Difficulties accessing areas that needed attention frequently became apparent when worn parts had to be replaced.

Another concern voiced by the maintenance workers was that maintenance tasks were often assigned to external service providers who seldom had the adequate know-how. Inadequate maintenance carried out by these workers could lead to additional maintenance costs in the long term.

Finally, workers felt that communication and the exchange of information between them and their managers should be improved. Poor communication was demonstrated when the managers joined the workshop for its final session and it became apparent that managers were not aware of many of the risks identified by the workers. It is of the utmost importance that both workers and managers are aware of all potential risks.

Time pressures associated with machine and system failures certainly cannot be eliminated but they can be reduced by the establishment of what is known as a 'mitigation plan'. In the first instance, the manager describes the task to be done in a meeting attended by all workers who will be involved in the process. Specific tasks are discussed and final decisions made by the managers to cover every situation which might arise during the maintenance work. The creation of this mitigation plan gives workers the confidence to be able to handle the situation.

## **2.5. Further information**

Instandhaltung (Solutions to reduce stress in maintenance activities at work).

Prof. Dr.-Ing. Peter Hartung, Medizinische Belastungen und Gefährdungen bei der Instandhaltung, (Occupational safety and health risks in maintenance activities)

Medizinisches Lexikon der beruflichen Belastungen und Gefährdungen. K. Landau und G. Pressel (eds.). Darmstadt, in press.

Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (BAuA). Tödliche Arbeitsunfälle – nach der zum Unfall führenden Tätigkeit. Zeitraum 1997 – 2006. Datenbank „Tödliche Unfälle“. [http://www.baua.de/n\\_11644/de/Informationen-fuer-die-Praxis/Statistiken/Unfaelle/toedliche-Arbeitsunfaelle/pdf/Toedliche-Arbeitsunfaelle-06.pdf](http://www.baua.de/n_11644/de/Informationen-fuer-die-Praxis/Statistiken/Unfaelle/toedliche-Arbeitsunfaelle/pdf/Toedliche-Arbeitsunfaelle-06.pdf)

## **2.6. Contact details**

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## **2.7. Transferability**

The methodology used is easily transferable to any company, sector or member state where maintenance activities are carried out.