

Maintenance and OSH — A statistical picture

According to the European Standard 13306,¹ maintenance concerns the 'combination of all technical, administrative and managerial actions during the life cycle of an item – workplace (building), work equipment, or means of transport – intended to retain it in, or restore it to, a state in which it can perform the required function'. Maintenance influences the safety and health of workers in two ways. First, regular maintenance, correctly planned and carried out, is essential to keep machines and the work environment safe and reliable. Second, maintenance itself has to be performed in a safe way, with appropriate protection of maintenance workers and other people present in the workplace.

Different types of maintenance can be distinguished:

- **corrective maintenance**, when actions are intended to restore a system from a failed state to a working state (e.g. repair or replacement of broken components). This type of maintenance is also known as 'reactive maintenance' because the action is initiated when the unscheduled event of an equipment failure occurs.
- **preventive maintenance**, when actions are carried out at predetermined intervals or according to prescribed criteria intended to reduce the probability of failure or the degradation of the functioning of an item. In this case, actions are scheduled, proactive and intended to control the deterioration process leading to failure of a system (e.g. replacement, lubrication, cleaning or inspection).

Maintenance covers several occupations and it concerns all sectors of activity. For these reasons, it is difficult to identify the exact number of workers involved in maintenance activities. Data from France and Spain indicate that **about 6% of the working population** is involved in maintenance tasks. The majority of maintenance workers are men (around 90% in France and 65% in Spain), and within this category of workers the largest age group is 30-49 years.

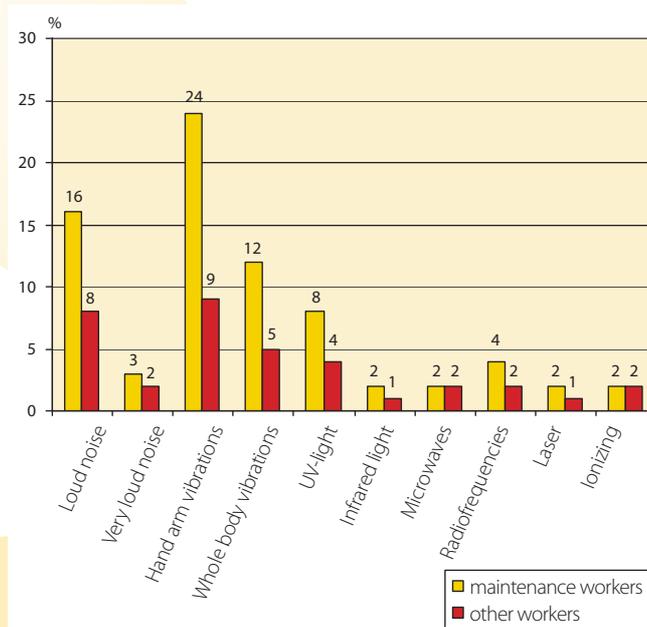
According to a survey conducted in 2005 in France, maintenance is **the most subcontracted function in industry**. In Spain, maintenance workers are most often found in the services sector (70% in 2004), followed by industry (19%), and construction (10%).

Because they carry out a wide range of different activities, maintenance workers are exposed to many and varied hazards at work. There are physical hazards (noise, vibrations, excessive heat and cold, radiation, high physical workload), chemical hazards (work with asbestos, welding, exposure to

dangerous substances when working in confined spaces), biological hazards (legionella, leptospira), and psychosocial hazards (poor work organisation). Maintenance workers are also at risk of all types of accidents.

Data from the Spanish working conditions survey indicate a higher exposure of maintenance workers to noise, vibrations and different kinds of radiation when compared to the rest of the working population (see Figure 1). Maintenance workers are also more exposed to heat in summer (44% compared to 19% among other occupations), cold in winter (44% compared to 17%) and a humid atmosphere (25% compared to 13%). They are also more exposed to dangerous substances, vapours and fumes.

Figure 1. Exposure to hazards among maintenance workers (Spain, 2007).



Analyses of EUROSTAT data based on the ESAW methodology (*European statistics on accidents at work*) can help identify accidents related to maintenance operations in several European countries. Within the variable 'working process', used for the classification of causes and circumstances of accidents, there are four subcategories that are related to **maintenance operations**:

- setting up, preparation, installation, mounting, disassembling, dismantling
- maintenance, repair, tuning, adjustment
- mechanised or manual cleaning of working areas and machines

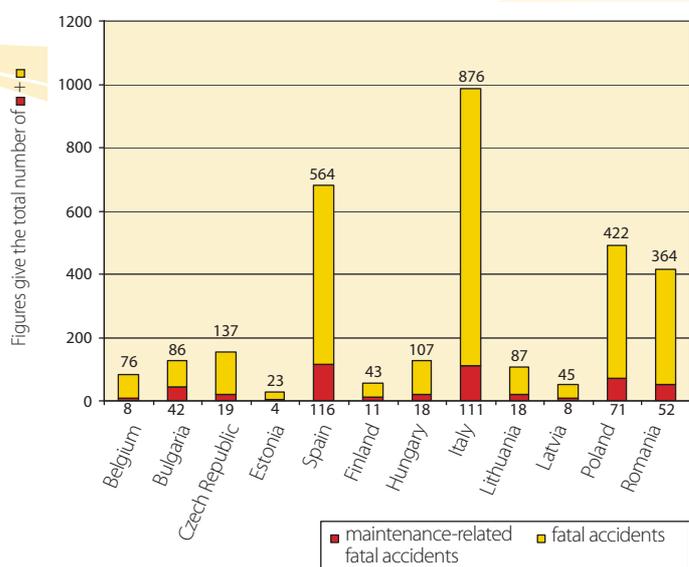
(¹) CEN EN 13306 Maintenance Terminology, <http://www.cen.eu/>

- monitoring, inspection of manufacturing procedures, working areas, means of transport, equipment – with or without monitoring equipment.

The number of accidents related to these subcategories was compared to the total number of accidents related to any other subcategory within the variable 'working process'.

The data show that around **20%** of all accidents in Belgium (in 2005-2006) were related to maintenance operations, as well as around **18-19%** in Finland, **14-17%** in Spain, and **10-14%** in Italy (in 2003-2006). Additionally, the figures from several European countries indicate that in 2006 around **10-15% of all fatal accidents were related to maintenance operations** (see Figure 2). Scientific studies indicate that occupational diseases and work-related health problems (such as asbestosis, cancer, hearing problems, and musculoskeletal disorders) are also more prevalent among workers involved in maintenance activities.

Figure 2. Number of fatal accidents related to maintenance operations (EUROSTAT, 2006).



EUROSTAT data from five EU countries indicate that the majority of maintenance-related accidents occur in manufacturing, construction, real estate, renting and business activities,² and in Austria also in hotels and restaurants. Additionally, in the **electricity, gas and water supply** sector in 2006 **50%** of accidents in Finland and Belgium, **34%** in Spain, and **23%** in Italy were related to maintenance operations. In the **real estate, renting and business activities** sector **40%** of accidents were related to maintenance in Finland, **34%** in Spain, and **26%** in Belgium. In Belgium also in the **education** sector **41%** of accidents were maintenance-related. In other sectors, depending on the country, **15-20%** of accidents were related to maintenance operations.

(²) Real estate, renting and business activity consists of subcategories such as 'maintenance and repair of office, accounting and computing machinery' as well as 'industrial cleaning'.



The scientific literature indicates that most of the accidents occurred during **corrective maintenance** activities. Moreover, an analysis of a French work accidents database shows that in 2002 maintenance employees were the second most frequent victims of accidents related to subcontracting, just behind construction workers.³

Lack of maintenance or inadequate maintenance can also lead to dangerous situations, accidents and health problems. This may be related to lack of or poor maintenance of vehicles, industrial or agricultural machines, electrical facilities, fire extinguishers, buildings or water facilities. Maintenance failures may contribute to large-scale disasters with extremely damaging consequences for humans and the environment.

The process of maintenance should start at the design and planning stage – before maintenance workers even enter the workplace. It is essential to implement appropriate **risk assessment** procedures for maintenance operations, as well as employing **adequate preventive measures** to ensure the safety and health of workers involved in maintenance activities. After maintenance operations are completed, special checks (inspections and tests) should be carried out to ensure that maintenance has been properly carried out and that new risks have not been created. During the whole process **good maintenance management** should ensure that maintenance is coordinated, scheduled and performed correctly as planned, and that the equipment or workplace is left in a safe condition for continued operation.

Further information

The full report, *Maintenance and OSH — A statistical picture*, is available at:

http://osha.europa.eu/en/publications/literature_reviews

This factsheet has been produced to support the European 2010-11 campaign on safe maintenance. Other factsheets in the series and further information on this topic are available at <http://osha.europa.eu/en/topics/maintenance>. This resource is being continually developed and updated.

(³) Grusenmeyer C. 'Sous-traitance et accidents. Exploitation de la base de données EPICEA'. Les Notes Scientifiques et Techniques de l'INRS, 266, 2007.

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