

PRACTICAL IMPLEMENTATION OF A COMPREHENSIVE OSH MANAGEMENT SYSTEM FOR WINDMILLS IN A REPAIR AND MAINTENANCE COMPANY IN PORTUGAL

1. Organisations involved

VESTAS

2. Description of the case

2.1. Introduction

VESTAS is a large international wind turbine producer with branches all over the world. The risks tackled by its OSH management system concern the repair and maintenance operations (not production operations). Wind turbines are complex machines requiring continuous maintenance to keep them running 100% of the time.

The OSH management system covers two situations: regular service and 'repair on demand', sometimes in emergency situations. In the case of regular servicing, operations, including OSH aspects, can be planned thoroughly in advance. In 'repair on demand' cases a single worker or a group of workers is sent to the wind turbine to perform the tasks necessary to achieve normal operation. In such situations the manager and the workers cannot normally foresee the type and extent of the damage and the risks involved.

VESTAS has developed a comprehensive system to reduce such risks to the minimum possible. The system was designed for worldwide use, but has national and regional deviations where appropriate.

International studies have shown that working in repair and maintenance involves a higher risk of accidents than daily routine work in standard situations. Factors which contribute to this phenomenon are: high work pressure, unfamiliar working environment for workers from external services, poor cooperation between groups of workers and different departments, and dangers from the damaged or malfunctioning equipment itself.

Wind turbine maintenance and repair is in many aspects comparable with standard service tasks in the engineering industry. In some respects, however, the risks are much higher than average:

- working at height
- work with or in rotating parts
- work under electrical current.

These high risks require special safety precautions.

2.2. Aims

The objective of this management system is to keep the accident rate as low as possible. The target incidence of industrial injuries per million working hours for 2008 was 15 (VESTAS group annual report, 2006). Achieving this target required standard information and communication routines to be clearly defined, as well as working standards for all major or dangerous working situations.

2.3. What was done, and how?

The implementation of an OSH management system is seen by VESTAS as an important tool to help it work in a more systematic way to improve OSH aspects. Some of the most important

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features of the OSH management system implemented in VESTAS Portugal are described below.

Risk Assessment

VESTAS Portugal applies a risk assessment tool that is based on the probability and severity of risks. It covers both environmental and safety incidents and accidents. The identification of the risks takes into account:

- normal operation
- abnormal operation
- emergency situations.

Risk identification is performed by the responsible Quality, Safety and Environment (QSE) personnel of the Service Business Unit with the collaboration of all interested parties. Tools that can be used for the identification of risks are available at the Group QSE's homepage.

Based on the risk assessment, preventive measures have to be taken. After implementation of the preventive measures the risk level is assessed once again.

The Mediterranean Occupational Risk Prevention Plan

Based on the company's prior experience and the risk assessment, VESTAS Portugal has developed a comprehensive system that covers all relevant aspects (the plan is accompanied by detailed 'Business Process' (BP) and Instructions (INST)). These aspects are listed below.

- Roles and responsibility of the management and the workers.
- OHS Programme Management (keeping the system up-to-date and implementing it effectively by safety meetings and work planning).
- Emergencies (rules for situations such as fire, accident to a worker or runaway situations).
- Incident Reporting (rules for reporting of accident near-misses and unsafe conditions).
- General Safety (good housekeeping and special regulations for visitors).
- Fire Prevention (instructions for welding, handling of flammable liquids and smoking).
- Personal Safety (instructions for working alone and work under different weather conditions, e.g. protection of the skin in sunny periods, protection during strong wind and thunderstorms).
- Personal Protective Equipment (comprehensive instruction on many aspects of personal protection. Special attention is paid to work at height, especially on fall arrest equipment (approved harness, lanyard with energy absorber, positioning rope, fall arrester for wire or rail)).
- Work at heights (this chapter sets out rules for this type of work).
- Rules for electrical work (workers often deal with high voltage over 1000v AC. This requires a strict regime to avoid fatal accidents).
- Safe working with Hydraulics (hydraulic parts and equipment can lead to serious injuries. The instructions cover some of the most risky situations).
- Work on rotating parts (this is one of the high-risk areas which require special rules).
- Working with hazardous materials (to function properly, windmills need considerable amounts of oil, lubricants and cooling fluids).
- Tools and other Equipment (this chapter deals with typical sources of accidents such as scaffolds or ladders).

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- Vehicles Heavy Transport and Lifting Equipment (cranes and other heavy lifting equipment is required to repair or maintain the upper and higher areas of the windmill. They often have to be used on unsuitable natural surfaces, which poses considerable accident risk).
- Subcontractor OHS Requirements.

Responsibilities of the management – information and communication

The OSH management system has a chapter entitled OSH Programme Management that clarifies the role and responsibilities of the management. The management is first and foremost responsible for ensuring that work is carried out in compliance with health and safety guidelines. The tasks of the management are defined as follows (shortened version):

- Encourage employee and subcontractor involvement in the safety process.
- Provide appropriate supervision at work sites.
- Ensure that both legal and internal requirements are complied with.
- Ensure that workers are informed about job hazards and are prepared to handle any site-specific hazards on the work site.
- Ensure that personal protective equipment (PPE) is readily available at the work site, correctly used, correctly stored, correctly maintained and replaced when necessary.
- Ensure that workers and suppliers are appropriately qualified to carry out the work required.
- Develop and maintain a certifiable environment and work environment management system in accordance with ISO 14001 and OHSAS 18001.
- Communicate the management system to all personnel and subcontractors affected by the system.
- Implement and document regular audits of all VESTAS workplaces to show that procedures and rules are being complied with and to identify areas of improvement.
- Maintain all safety and environmental records in accordance with applicable legal regulations.
- Ensure that industrial accidents and near-misses are reported and processed with a view to corrective and preventive action.

General safety meetings are one of the major tools used to implement these targets. The responsible manager must conduct regular safety meetings with the department's employee safety representative. Beyond that he/she must also conduct safety meetings with employee safety representatives and representatives from relevant subcontractors and other partners at the site.

A template of topics to be addressed at such meetings is provided in the OSH management system.

VESTAS conducts a number of training courses to help staff implement the principles successfully. The safety training consists of four main elements:

- Basic Safety training – Training provided according to the OSHA Safety Manual.
- The duration of this training is 2 1/2 days.
- First Aid – 8 hours training (theoretical and practical).
- Fire fighting – 8 hours training (theoretical and practical).
- Rescue and evacuation from a Wind Turbine – 8 hour training (practical).

This adds up to 44 hours of training in total. No worker is allowed to work without this training. Once it has been completed, then technical training commences.

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Responsibilities of the management – planning of work

The responsible manager is also obliged to plan the work. She/he must be informed of any task that is to be carried out on the site, and he/she must give permission before the task can be carried out. VESTAS requires a 'Permit-to-Work process' on special and non-routine work activities to ensure hazards and risks associated with these activities are identified and safeguarded.

Responsibilities of the workers

The main responsibility of the workers is, on one hand, to follow the health and safety instructions and to apply the appropriate procedures. This concerns the use of PPE, good housekeeping and operation of all equipment. On the other hand the OSH system gives the worker an active and preventive role. This active role is expressed in instructions as:

- Report any hazardous or unsafe conditions to their immediate manager.
- Observe activities of fellow employees and subcontractors to ensure their safety and the safety of those around them, and to correct unsafe acts in a proactive, positive manner to prevent an incident or near-miss from occurring.
- Respectfully refuse to perform work when unsafe conditions exist or when unable to perform the task competently.
- Report all industrial accidents, near-misses, injuries and illnesses to their immediate manager.

VESTAS also has a network of safety representatives, who are appointed from among the employees according to local regulations.

The person in charge of the task must discuss the tasks of the day in detail with all those involved to ensure coordination of all the parties involved. In the case of a serious accident, all involved parties must be informed and involved in future efforts to prevent similar incidents.

Supervision

All equipment and operations that can have an impact on the environment or on the OSH of the employees are subject to operational control. For each device (tool, machine, installation, safety equipment, measuring equipment) with an actual or potential impact on the environment or OSH of personnel, a procedure for maintenance or operational control is established in order to ensure that it is in an acceptable condition to perform the required work.

Applicable legal requirements are considered when procedures are established.

Education or training requirements related to the established procedures for operational control and maintenance are identified and the necessary training and education is planned and performed.

Audits

Part of the supervision involves regular audits to determine whether the QSE management system conforms to the requirements or not, whether it has been properly implemented and maintained, and whether it is effective in meeting the VESTAS QSE policies and objectives. Previous audits are reviewed, and the results are reported to the management.

2.4. What was achieved?

Published figures are only available for the VESTAS group as a whole. These figures show a decline in accident incidence and injuries parallel to the increasing introduction of management systems.

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Table 1. VESTAS Group – Introduction of management systems and OSH development

Products							
Occupational health and safety							
Objective							
To give highest priority to safety.							
To include consideration for employees and environment in the planning and implementation of activities.							
Measuring point/method	2002	2003	2004	2005	2006 ¹⁾	2006	Target 2008
Incidence of industrial injuries per million working hours	48.5	39.3	42.5	46.7	38.8	36.5	15
Absence due to illness among blue-collar employees (%) ³⁾	4.5	4.4	3.5	4.1	3.8	3.2	2.5
Absence due to illness among white-collar employees (%) ³⁾	1.7	1.4	1.6	1.5	1.6	1.5	-
Management system							
Objective							
Systematic introduction of certified management system according to the ISO 14001 and OHSAS 18001 standard.							
Measuring point/method	2002	2003	2004	2005	2006 ¹⁾	2006	Target 2008
Percentage of VESTAS certified according to the ISO 14001 standard (%) ⁴⁾	N/E ²⁾	71	57	75	N/E ²⁾	76	100
Percentage of VESTAS certified according to the OHSAS 18001 standard (%) ⁴⁾	N/E ²⁾	64	51	63	N/E ²⁾	77	100
1) Sites included in the reporting for 2005.							
2) Not estimated for the year.							
3) Absence due to illness has been designated as a benchmark for employee welfare.							
4) VESTAS is working systematically with the improvement of environmental and OSH aspects, and the introduction of environmental and OSH management is seen as an important tool in this connection.							
Source: Environmental and OSH indicators for the Group, VESTAS Annual Report 2006							

Each service unit has to report monthly about the safety status of the equipment, the training measures, accidents and injuries.

Problems faced

There are some situations where instructions do not exist. For these situations VESTAS Portugal has developed a special Business Process (BP). This BP determines the steps to follow when specific work has to be carried out in a wind turbine and no relevant instructions exist.

2.5. Success factors

The high commitment of the management at the head office and at the regional offices is one of the main success factors. Certification of enterprise units according to OHSAS 18002 and ISO 9001 has added to this. VESTAS Portugal is certified according to ISO 9001, and is undergoing certification by OSHA 18001 and ISO 14001.

2.6. Further information

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2.7. Transferability

The system can be transferred easily to other wind turbine service companies in Europe and worldwide. In some countries specialised SMEs are contracted by the wind turbine producers or the owners of the wind parks to perform regular servicing and repair operations. These SMEs can profit from the VESTAS OSH management system.

In addition, the general regulations and the methodology could be transferred to other types of maintenance and repair work.

3. References, resources:

- http://osha.europa.eu/en/publications/reports/mainstreaming_osh_business