CASE STUDIES

OVERALL SAFETY MANAGEMENT OF MAINTENANCE WORK

1. Case metadata

- ***Country/ies of origin:***

Finland

- ***Year of publication by agency:***

N/A

- ***Sector:***

C23.5.1 - Manufacture of cement

- ***Keywords:***

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2. Organisations involved

Finnsementti Oy (owned by CRH group)

Industrial Health & Safety

3. Description of the case

3.1. Introduction

According to the CRH Group and public statistics, maintenance work is much more prone to risk than other production work. Maintenance work is especially hazardous when carried out by an external contractor, as is often the case at Finnsementti. According to the statistics provided by the CRH Group, contractors have accidents up to five times more often than a company's own personnel.

The example of Finnsementti demonstrates a modern practice for the prevention and promotion of activities with maintenance work. With this overall safety management procedure, the enterprise is concentrating on prevention and learning of near-miss incidents, as well. This means better risk management and development of the safety culture at maintenance work sites.

Safety has been seen as intrinsic value; therefore costs/benefits haven't been calculated exactly. About EUR 800 thousand has been spent on safety improvements (mechanical improvement, education, training etc.) during the last three years. As a benefit, the number of accidents has decreased clearly and serious accidents have been avoided.

3.2. Aims

The enterprise has not tried to enhance the safety of maintenance work by relying on isolated steps or campaigns. Instead, the main focus has been on improving all maintenance work-related steps, starting from invitation to tender and contract negotiations.

The aim is to change many conventional practices at work, but also to train and teach external contractors in the maintenance practice. This is also one part of quality assurance of maintenance work. Communication and interaction with all partners is bidirectional and immediate.

3.3. What was done, and how?

1. Advanced information for subcontractors

When an external company is used for maintenance and repair work, the level of safety operations of the company is examined in advance by sending a Contractor Safety Checklist questionnaire to the contractor. A representative of the contractor fills in the questionnaire, together with the contact person at Finnsementti, if required. The purpose of the checklist is to determine the level of industrial health and safety operations, attitude toward industrial safety and previous safety history of the contractor. The checklist also provides a way to ensure that the contractor's person in charge is aware of the safety requirements at Finnsementti.

Furthermore, the document "Observing safety matters when working at the factories of Finnsementti Oy" is sent to a potential contractor together with an invitation to tender. The document presents the most important safety requirements that have to be met when working at Finnsementti sites, as follow:

- Definition
- Responsibility for safety for all stakeholders
- Supervision and control
- Guidance and competence
- Risk assessment
- Collaboration, information
- Safety regulations (concerning following issues: Personal protective equipment, Isolating the work area from operating power, Working at height, Personnel lifts, Scaffolding, Forklifts, trucks and other working machines, Lifts, Fire safety, Order and cleaning, Safety checklist for the contractor)

By informing contractors as early as possible about the requirements, the enterprise wants to ensure that any safety-induced costs (e.g. use of protective equipment, fall protection) can be taken into account when calculating a tender.

Both of these documents serve to proactively avoid situations where a contractor might say something in the line of "we didn't know that everybody is supposed to use a helmet and goggles at the factory". Or "it is possible to carry out the work in accordance with safety regulations, but it will be more expensive".

Both documents are available in Finnish and in English.

By the end of 2010, safety management audits of main maintenance suppliers were started, and carried on through 2011. One result of the maintenance supplier audit was contact and cooperation with UPM Kymmene, a paper-manufacturing group.

2. Orientation and other safety training

As stated in both above documents, everyone carrying out maintenance or other work must participate in industrial health and safety orientation arranged by Finnsementti before starting work. Visitors to the factory accompanied by a representative of Finnsementti do not need to participate, but everyone working at the factory or moving around there unaccompanied must participate in the orientation. The contents of the orientation are mainly as follows:

- Contents and purpose of safety orientation
- Safety regulations for quarrying
- Safety principles; safety observations and reporting of near misses
- Local rules: traffic, isolating the work area from power supply, personal protective equipment, moving machines, work at height and personnel lifts, work permit system and hot works
- Special hazards: working in the cyclone tower, clinker basement, cement and clinker dust, working at cranes, working in hot environment, use of mobile cranes, railway-related work
- Cleanliness and waste treatment
- Fire alarm and waste treatment
- Contact information
- Social premises and canteen

The orientation includes a written multiple-choice test, which ensures that the basics are remembered. Including the test, the orientation takes 1.5 to 2 hours, depending on the size and tasks of the group.

Those who pass the test receive a Finnsementti Safety helmet sticker shown in Figure 1. The sticker makes it easier to control what happens at the factory and sites. Supervisors can easily check if all those working at the site have passed the orientation test.

During the test, it is ascertained that the person has a valid occupational safety card. It is also checked if the person has a Hot Work Licence and a permit issued by the employer to operate a forklift.

The names and employers of those who pass the test are filed in an electronic register. Those commissioning work can check the register in advance to see if employees of the contractor have passed the orientation sufficiently recently or if orientation is needed before starting work. The register also includes information on the occupational safety card, Hot Work Licence and forklift permit.

Safety orientation can be given by the industrial health and safety manager and by management-level people of the factory having received training on how to conduct safety orientation. At the moment, safety orientation sessions are held by the production manager, operating engineers and some supervisors.

Since 2008, it has been the company's goal to hold at least 12 hours of safety training per person for the company's own personnel. In 2009, the follow-up of safety training hours for maintenance and operation staff was further specified to refer to each employee individually instead of relying on an average. One maintenance mechanic had received less than 12 hours of training (10.5 h), and the average safety training hours for the personnel amounted to 22.4 hours during the year. The employees of the most important maintenance co-operation partners who regularly work at the factory are also invited to internal safety training sessions.

Topics of training vary yearly. Typical training topics include lifting accessories, personnel lifts and forklifts. Also, refresher and update training on instructions related to isolation from power supply (see 4.3) is held every year. Every month, Safety Alerts, i.e. 2-page descriptions on accidents circulated all over the Group are examined together with maintenance workers.

In 2011, the enterprise started to organize briefing and de-briefing meetings with the management of the maintenance suppliers before and after main haulages. The experience has been positive.

Employee involvement groups have been organized in the enterprise for a number of years. The purpose of those groups is to increase the amount of people participating in safety work, learning to make safety observations and improve working environment.

3. Making work safer

In order to identify and prevent hazards in maintenance work, safety observations and risk assessments are used. During maintenance work itself, it is a goal to manage risks, to make work safer, to facilitate control relying on the work permit system and to systematise isolation of work areas from power supplies.

3.1. Safety observations and near misses

Driven by the desire to make the reporting of near misses more active, the term “safety observation” was introduced at the factory towards the end of 2006. It was hoped that a safety observation would lower the reporting threshold, which was fairly high in the case of near misses. The change in reporting included not only a new name and an easier form, but also quicker and more efficient handling of near miss reports and safety observations, as well as public follow-up of observations and steps taken because of them. Furthermore, employees of contractors were encouraged to make safety observations, and report forms were circulated to them. As a large part of maintenance work is done by external workers, many maintenance work-related observations would be missed without their contribution.

Maintenance work-related risks are assessed during monthly inspections, in the same way as other risks at the factory. The topics for the inspections are chosen each year at the industrial health and safety commission. Risk assessments are made by the industrial safety delegate, the person in charge of the area in question, the company nurse and/or company doctor, as well as the industrial health and safety manager. To help in the identification of hazards and site inspections, a checklist called “Step” and employee interviews are used. Risks identified are assessed using a three-step spreadsheet template developed by Finnsementti. Risk management measures and names of the persons in charge can also be entered in the spreadsheet.

As a quick risk assessment tool for daily work, a leaflet called “Identifying risks of exceptional work items” is used (please see the Figure 3). The form is specifically intended for non-routine maintenance work, for which no separate risk assessment has been performed.

3.2. Work permit

The work permit system applies to all closed and confined spaces with potential risk of asphyxiation or being buried, and to large assemblies of equipment or processes, where isolation from power supply makes it necessary to follow separate instructions.

Work permits can be issued by managers at Finnsementti.

When a work permit is written out, the steps required in order to conduct work safely are assessed. The work permit is written out in two copies, one of which is given to the person conducting the work. The copy held by the person issuing the permit is put in view in the control room of the factory during the work, so that the control room is aware of all maintenance work activities being performed.

3.3. Isolating work area from power supply

One of the most common reasons for serious accidents in maintenance work is accidental start. Because of this, special attention has been paid to isolation. Isolation is divided into two parts: individual pieces of equipment and devices, and processes and equipment assemblies, for which separate isolation instructions have been prepared. Both cases are examined during industrial safety orientation.

3.3.1 Isolation of individual pieces of equipment and devices from power supply

To isolate individual pieces of equipment and devices, personal security locks are used. For electric devices and equipment, the safety switch is turned to position 0 and locked. If there is no safety switch, an electrician must remove the fuses from the device.

For pneumatic devices, air supply must be shut off and pressure must be released, if needed.

Hydraulic devices have to be made unpressurised.

If needed, material transfer to the work area has to be cut off. In addition, risks and measures needed also have to be assessed in writing in places potentially having stored mechanical energy (such as a stuck elevator).

The supervisor must always make sure that those performing the work know how to implement isolation. If two or more devices have to be isolated, i.e. if more than one lock is needed, written instructions must be supplied, using e.g. the “Identifying risks of exceptional work items” form.

3.3.2. Processes and assemblies of equipment with separate isolation instructions

Separate isolation instructions have been prepared for the main equipment at the factory, such as: cement kiln, cyclone tower, grate cooler, mills and their circuits (cement, coal and raw mills) and filters.

The production manager and the operating engineer in charge of the part of process in question are responsible for preparing and updating these isolation instructions and for training people to use them. As an example, please see the Figure 3.

The isolation of the above mentioned process parts is carried out in accordance with the relevant isolation instructions using the lock set for the equipment assembly in question, and the person who has carried out the isolation signs for the isolation measures in the

instructions. After this, the person having conducted the isolation takes the key from the lock set to the cabinet situated at the isolation point puts the key in the cabinet and attaches the signed for isolation instructions beside the cabinet, in the place reserved for them.

After this, everyone going to work in the area of the process part in question attaches his lock to the locking loop (or a separate attachment) of the cabinet. When going away from the area, the person removes his lock from the locking loop. The cabinet cannot be opened and the key cannot be removed from the cabinet until the last lock attached to it has been removed, i.e. when the last person has left the risk area.

3.4. What was achieved?

The safety of maintenance work is followed up together with industrial health and safety in general. Health and safety metrics used are accident frequency and severity. These are, however, calculated per 100,000 work hours, which is not common practice in Finland. Proactive metrics used are the numbers of safety observations and near-accident reports, as well as the implementation of the related corrective measures. The implementation of goals is followed up on company level at safety meetings presided by the country manager five times a year, and monthly in the management group of Finnsementti. At factory-level, trends are followed up monthly in the management group of the factory and at department meetings. Employees of contractors also take part in the calculation of accident frequency and severity.

The reporting of safety observations and near-accidents has evolved (please see the Table 1).

The trends in accident frequency and severity are followed up on a company level. In 2007, the rolling accident frequency was approximately 2 accidents/100,000 working hours. It quickly went

down to less than one, and during 2010 to less than 0.5 accidents/100,000 hours (circa 4/1,000,000 hours).

The main local metric used from 2007 onwards is the number of days with no accidents. In 2007 and 2008, there were 466 non-accident days at the Lappeenranta factory. The non-accident chain of 716 days started in 2008 ended in July 2010, when an electric fitter of a contractor sustained a wound in his ankle and had to take a three-day sick leave.

3.5. Success factors

The main success factor is the contribution of the whole organization. Workers contribution is needed to recognize the hazards, and they are finally doing the real work. Supervisors and managers are needed to develop and implement new managerial procedures and mechanical improvements. Senior management and owner support is needed to provide resources. Both organizational resources and fund resources are needed. Also, senior management support is needed to carry on this kind of long-term work. The results are achieved over a period of years; in terms of short term campaigns, it is difficult to achieve permanent changes.

3.6. Transferability

This good practice can be successfully applied in other sectors and other countries. This project is an example of strong collaboration between management, employees and contractors, which can also be implemented in other types of enterprises.

3.7. Further information

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4. References, resources:

- http://www.finnsementti.fi/inenglish_f.html

Figure 1. Orientation sticker

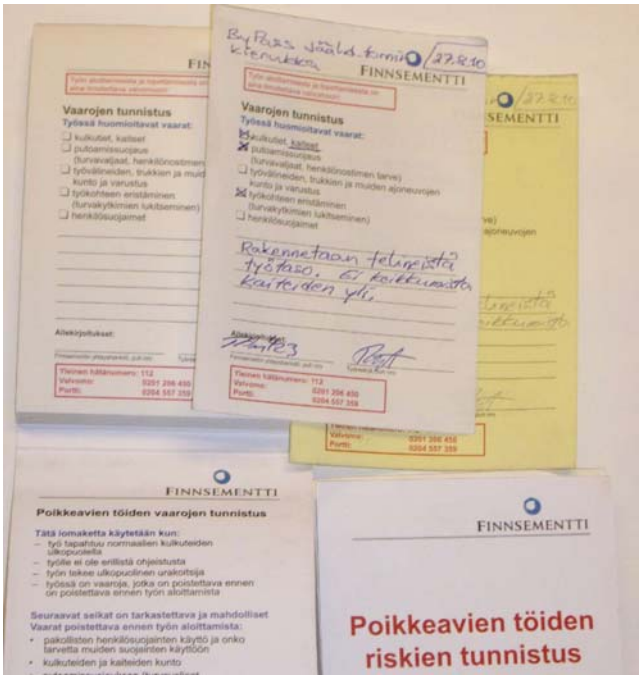

Figure 2. Example of using the leaflet “Identifying risks of exceptional work items”

FINNSEMENTTI **APPENDIX 4**

Tuotanto/JRi ISOLATION PROCEDURE 3.11.2009 1

CEMENT MILL 5- ISOLATION (uncontrolled translation)

This procedure is valid when there is a need to work inside the mill.

Machines and assemblies to be isolated

8501M1 clinker conveyor
8502M1 gypsum conveyor
8503M1 lime stone conveyor
8504M1 slag conveyor
8582M1 clinker dust conveyor
8520M1 SM5 main drive
8520M4 SM5 auxiliary drive

Isolation

Nr	Needed precautions (responsible person)	Precaution / operation	Operation executed (Initials and time)	Deletion of isolation (Initials and time)
1		Before stopping the mill must be driven to empty without feeding. Stop CM 5. Filter (8565) and fan must keep in operation to secure appropriate air intake.		
2		Order electrian to open the main drive (8520M1) switch.		
3		Isolate the feeding conveyors (8501M1 – 8504M1 ja 8582M1) by opening the safety switches and locking them out.		
4		Isolate the auxiliary drive (8520M4) by opening the safety switch and locking it out.		
5		Isolate the crane of mill house.		
6		Isolate the back feed by opening the safety switch of the fan of air slide and by shutting the damoers of the classifier.		

Figure 3. The isolation instructions for a cement mill

Vuosi	lkm
2006	26
2007	66
2008	122
2009	101
2010	92

Table 1. The number of safety observations and near-accident reports at the Lappeenranta factory of Finnsementti in 2006–2010. The number for 2010 includes observations and reports covering the period from 1 Jan. to 20 Aug. 2010.