



Renault, analysis of risk situations

1. Organisations involved

CRAM Normandy

2. Description of the case

Key points

- The main difficulty in risk analysis and assessment for corrective maintenance operations is the diversity and variability of these operations.
- It is possible to detect risks to which the operators may be exposed in the course of maintenance operations and look for preventive measures.
- Maintenance on live machinery involves high risk because workers need to perform operations on the machines without switching off the power supply.
- Solutions come from the floor: it is important to involve the workers, through discussions and communication, to achieve the best results.

2.1. Introduction

The main difficulty in risk analysis and assessment for corrective maintenance operations is the diversity and variability of these operations.

While direct observation of the work performed can be done easily for a fixed work station, observation of repair operations is difficult because of the diversity of the equipment and the differing types of malfunctions, diagnosis, repair operations and operating procedures.

However, in order to devise preventive measures, the risks have to be analysed. This analysis involves research on the work actually performed by various operators..

The method outlined here was proposed by a working group consisting of maintenance managers at companies in the Normandy region of France. It involved interviews with operators about the operating procedures they actually used. This information was then analysed to identify the risks to which they were exposed, and appropriate preventive measures were proposed.

Originally designed to improve safety in the fault-finding stage, it can also be used to design procedures for various stages of the repair process and is suitable for all maintenance operations, whether scheduled or not.

The Renault plant at Cléon (Seine-Maritime region) has used this method to improve the safety of its maintenance operations at machinery centres. They have been able to identify the most risky situations and make permanent improvements.

Management chose the machine centres because there are a large number - about a hundred - of them in this factory, spread throughout two different areas, the gearbox and the engine workshops. Machine centres use a recent technology that is "well known by workers". The technology is being introduced across all areas of operation.

Protecting the health and ensuring the safety of all workers is a priority in the Cléon plant. A health and safety policy lays down objectives for continual improvement of working conditions on the site. Its main features include compliance with occupational health and safety regulations, making management of safety and working conditions a major role of supervisors, provision of all necessary and appropriate resources and measures to support the policy, and inclusion of health and safety criteria in all decisions about products used, processes, layout and organisation.



2.2. Aims

The objective of the approach was to identify the risks to which operators may be exposed in the course of their maintenance operations, and to look for preventive measures.

The approach was carried out in 4 stages:

- Collect information on the current actual practice, personalised by operator, for each type of diagnosis on the work equipment in question;
- Group this information for analysis
- Submit proposals for preventive measures to operators;
- Implement the agreed measures.

A steering group was set up. Its members were chosen to include department managers from maintenance and manufacturing, engineers and technicians from the safety and working conditions departments and from the various workplaces involved in the machine centres.

2.3. Scope of the project

Corrective maintenance operations, often urgent and needing to be done immediately, can be a cause of accidents or near misses. The risks to which workers may be exposed during such operations include impact, crushing and electric shock.. In Renault's Cléon plant, around 1,000 employees – out of a total of 5000 – are involved in maintenance operations on the 10,000 machines on the site.

In 2003, the regional health insurance fund (CRAM) of Normandy suggested identifying and analysing the risks to which operators at the Cléon plant could be exposed during such operations. This would then make it possible to look for solutions.

The project was conducted in four stages: collection of information via interviews, analysis of the replies, proposals for preventive measures, and implementation of the identified measures.

It was important to remind managers and operators of the hierarchy of risk control principles and to stop them viewing personal protective equipment as the main protection measure. For this reason the SPO (Suppress or limit – Protect – Organise) accident prevention method, which promotes more comprehensive methods of controlling risks, was chosen by the CRAM and management of Renault's Cléon plant.

Stage 1: The interviews

Interviews with the operators took place over a period of about one month.

The process was conducted in the following phases:

- Choice of a machine centre
- Identification of personnel performing work on the selected machine centres
- Conducting interviews
- Compilation of results

The interviews were distributed among interviewers according to their own expertise. For example, maintenance technicians were questioned by an interviewer from the maintenance section who was familiar with the work they do day by day.

A guide was produced to assist the interviewers and give them a common set of questions:

- Why does a worker intervene? What operation (maintenance, adjustment, repair, etc.) are they required to do in the machine centre?

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- *With the help of the answers, fill in the interview sheet in (A).*
- For each operation, ask the worker what the operating conditions are: technical and organisational requirements, etc.
- *With the help of the answers, fill in the interview sheet in (B).*
- Analyse each operation entered in (A) — ask the worker whether he perceives any risks during the operation and, if so, what are they?
- *With the help of the answers, fill in the interview sheet in (C).*

There were no problems during this phase.

In all, 45 operations were identified. The interviews were able to pinpoint risky situations.

Stage 2: Analysis of operations

The analyses were carried out by the steering group.

The approach adopted can be summarised in 3 points:

- For each of the operations described by the interviews, ask the question: "why do the workers operate in this way?"
- Identify all the risks involved in each operation.
- Look for and propose preventive measures to counter the risks identified, using the SPO principle (Suppress, Protect, Organise).

For each task, a record sheet was created comprising three sections:

- Section 1- summarising the information from the interviews (see preceding example)
- Section 2- presenting the results of the risk analysis carried out by the working group.
- Section 3- proposing risk prevention solutions classified according to the SPO headings.

Table 1: Interview sheet

Interview (stage 1)		Analysis and search for preventive measures (stage 2)		
First section 1		Second section 2		Third section 3
How do you operate?	Perceived risks	Why is the operation performed in this way?	Identified risks	Preventive measures (SPO)

The problems highlighted by the interviews led the members of the working group to exchange information concerning the same equipment with other production plants, and it became apparent that some problems were identical in these plants.

Ideas for solving the problems were collected from the interviews and from the steering group during analysis of the results.

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Stage 3: Proposing and validating preventive measures

Following these analyses, the group proposed preventive measures which were either technical or organisational. They were described to the operating personnel and tested. Some measures that were adopted, such as handling systems, also saved a lot of time on maintenance operations and were therefore immediately profitable.

Validation of the measures proposed by the group gave rise to a formal agreement in which everyone involved was able to offer their opinion about the effectiveness of the implemented solutions and follow-up measures for the initiative in progress.

Stage 4: Incorporating newly identified preventive measures into work practices

Actions were taken to consolidate the preventive measures:

- Performance of an investment cost study in order to acquire suitable tools
- Writing a standard operational maintenance sheet for operations on machine centres
- Integration of the identified measures into the engineering specifications.

2.4. Results and evaluation

Tangible results appeared rapidly, such as use of scaffolding together with a hoist for raising heavy loads, and a trolley for the handling of electric spindles.

Solutions were also developed for operations on live machinery. While adjustments were being made, safety systems were often circumvented by using "hot sticks", to perform operations on the machines without switching off the power supply.

The interviews showed that the operators were not aware of the risks involved in the work they were doing. They mentioned matters of ergonomics, such as carrying heavy loads and slipping, but were not aware of the risks while working with live machinery.

The company became aware of the risks involved in this practice through the work done to identify the problems by the steering group in Stage 2. Out of 45 identified operations, fifteen had been performed on live equipment and 10 of them were performed with downgraded protection. Now, through the analysis of the tasks, it had been shown that only three of the 10 operations required downgrading of the protection. In such cases, alternative preventive measures had to be defined.

As a solution, the "ISEPA" concept - "Intervention Sous Energie Avec Protection Alternative" (operations on live equipment with alternative protection) has been introduced. In effect this means using protective measures that were not devised at the machine design stage.

In the gearbox machinery workshop, for instance, various improvements have been made such as the installation of hatches providing access to the pressure monitors without entering the machining bay, and a step to reduce the risk of slipping when entering the bay.

The introduction of various improvements and a strong management commitment to take into account the real conditions of maintenance operations has changed the constraints under which operators work.

Improving safety has brought gains in time, ergonomics, comfort, safety and mental well-being. For example, the replacement of a spindle, a part weighing 80 kg, now requires 1.5 hours less than before which brings obvious economic benefits, but also significantly improves working conditions. Before the introduction of a trolley on which they could be moved around, the spindles had to be carried at arm's length. The technicians were not aware of any particular risk in this practice.

This project has clearly shown that solutions can come from the workshop floor and that it is important to involve the workers, through discussions and communication, to get the best results.

It is also essential that there is a strong political will and management commitment to move things forward; this is the key to success.

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As a next step, the company's senior management has set the line management the task of deploying identical approaches throughout the plant.

Renault's Cléon plant has summarised the benefits of this approach as follows:

- An "integrated" approach to safety
- A Human Resources function providing support for the maintenance department (guiding thread)
- Better knowledge of maintenance
- Experience sharing (old & young)
- Additional gains (reliability, speed, etc.)
- Constructive relations with the OH&S Department of the CRAM fund

This experimental programme on machining centres has extended to the whole plant a programme to reduce maintenance operations on live equipment in 'degraded safety' mode.

While the implementation of this type of programme may seem a heavy investment in time, the results achieved are not confined to operator safety. The programme brings significant improvements in productivity and reduced machine downtime, and promotes improvements in new equipment purchase specifications. It also encourages the development of healthy communication culture between maintenance and production personnel.

2.5. Contact information

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2.6. Transferability

This method of action – a structured approach to maintenance risks - is transferable to other sectors of activity, and its success depends on the following factors:

- Involvement of the company's senior management is essential; support must also be obtained from the maintenance operators and the Committee For Health, Safety And Working Conditions (CHSCT)
- The application of the hierarchy of means of risk prevention in looking for solutions
- Checking that the proposed preventive measures do not cause other risks
- Interviewing all operators, since ways of doing things can differ from one person to another.
- Analysis of sheets and seeking solutions must be carried out in groups and the operators should play a major role in this.
- The interviews should be carried out by experienced people who know the machine and its risks.

Very often, after analysing the risks, simple and inexpensive solutions become apparent. The method improves the safety of maintenance operators as well as the working conditions in general.