Failure Information Survey Results

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1. INTRODUCTION

The results of a maintenance survey on failure information are presented in this report. The survey was conducted using a questionnaire, which was posted to maintenance personnel at 100 UK companies, posted at the Plant Maintenance Resource Centre Website, and used in a survey of maintenance managers attending a short course in Australia. The survey was conducted between July and August 2002 and, mainly addressed the following issues:

- Use of failure history records to assist maintenance;
- Current maintenance trends in managing failure histories;
- Relationship between machine users and vendors with regard to maintenance.

The report summarises the findings coming from seventy nine valid responses.

2. FINDINGS SUMMARY

- Overall, 84% of respondents record failure histories from their machine tools. The majority of these respondents classified the failure history records as very important to assist their maintenance function. The most common reasons why failure histories are being collected are as follows; to plan and schedule maintenance activities and, to analyse failure modes and effects;
- The respondents that do not collect failure history records claimed that one of the main reasons is because their maintenance management systems do not support the feature of recording failure histories;
- 70% of respondents who record failure histories use a system to classify failures. Almost half of the respondents who record failure histories keep records of all failures and have no criterion to select the failures that should be recorded;
- The majority of the respondents who record failure histories use a computer-based system to collect and store their failure histories. Commercial systems are more commonly used than own-designed systems. Only 9% of respondents use only paper-based systems;

- On average respondents classify their data storage system as poor for data export purposes;
- On average respondents that record failure histories reported that their maintainers rarely refer to written descriptions of failure histories to solve new problems;
- Overall, 72% of respondents do exchange failure information with their machine vendors. However, the majority of respondents classify their relationship with vendors, concerning assistance with machine maintenance, as neither good nor poor;
- Overall, on average respondents reported that a database of failure histories for machine failures that is populated by users but vendor managed would be useful for their organisation. In addition, a significant 85% of respondents said that would contribute their failure records to build such a database;
- An analysis of the responses showed that there is no relation between the non collection of failure records and, the industry type, the company size and the process type.

3. RESPONDENT DATA
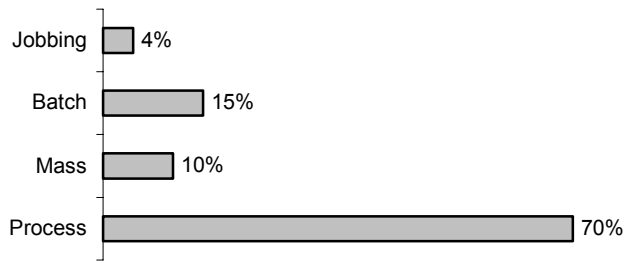The general questions about the respondent data were answered by 72 respondents (90%).

Respondent's origin and industry type
The majority of the respondents are from the United Kingdom and Australia, which represent 80% of sample. The responses came from a wide range of industries, which were classified into the groups showed in the following diagram. Automobile and mining were the most widely represented types of industry.
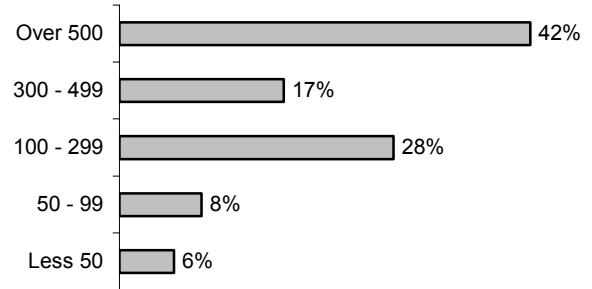

Respondent's origin

Industry type
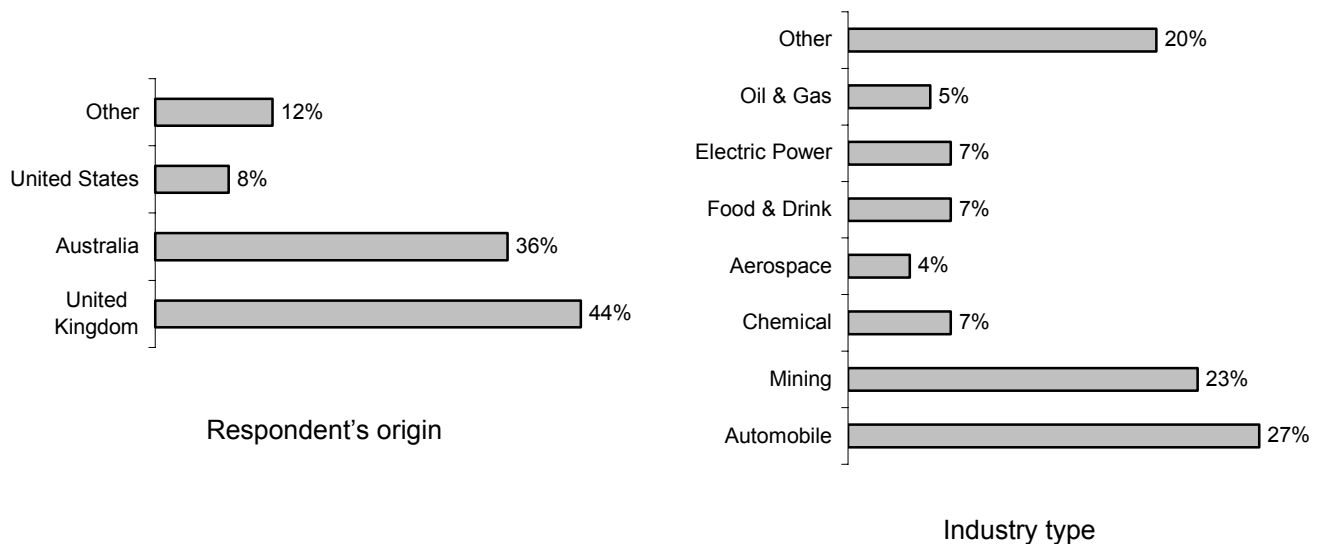
Respondent's manufacturing process type and employees number

Process manufacturing is used by 70% of respondents as their main production typology. Nearly half of respondents represent large companies, which have over 500 employees.
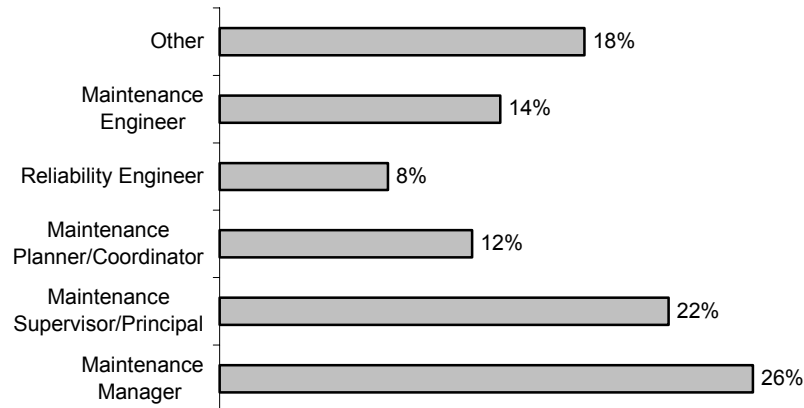

Manufacturing process type

- Jobbing 4%
- Batch 15%
- Mass 10%
- Process 70%

Employees number

- Over 500 42%
- 300 - 499 17%
- 100 - 299 28%
- 50 - 99 8%
- Less 50 6%

Respondent's job title

The most representative respondent's job positions were maintenance manager and maintenance supervisor/principal, which together represent nearly half of the sample.

- Other 18%
- Maintenance Engineer 14%
- Reliability Engineer 8%
- Maintenance Planner/Coordinator 12%
- Maintenance Supervisor/Principal 22%
- Maintenance Manager 26%
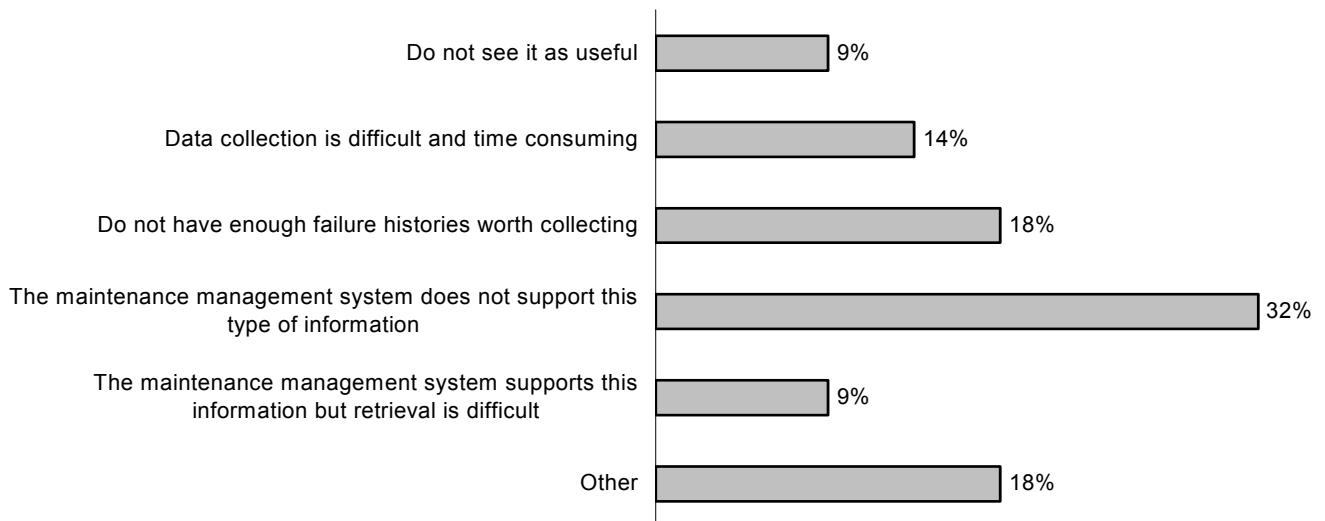
4. FAILURE HISTORIES RESULTS

Failure histories record and importance

84% of all respondents answered that they record failure histories from their machine tools. The majority of respondents (55%) who record failure histories rated them as very important to assist their maintenance function.

Record of failure histories

Importance of failure histories
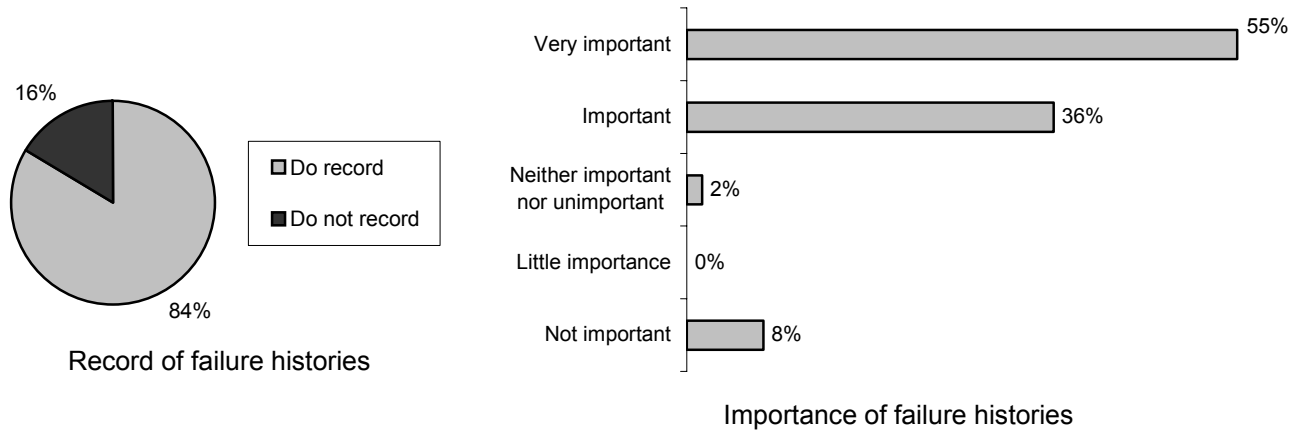
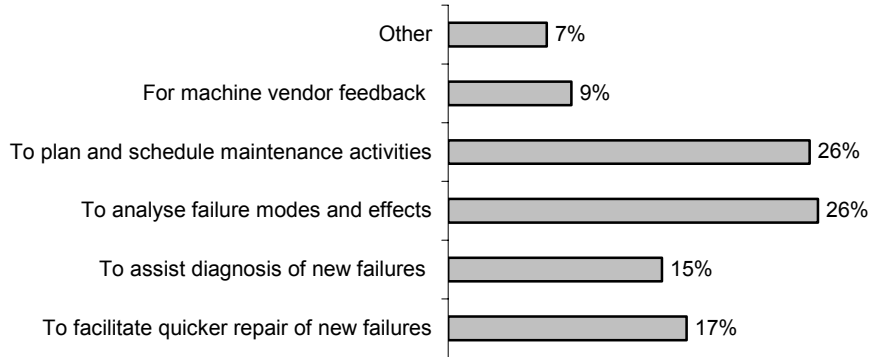### Reasons why some respondents do not record failure histories

Only twelve respondents (16%) reported that do not record failure histories. Among them, maintenance management systems that do not support the feature of recording failure histories were pointed out as one of the main causes for not recording failure histories.

Additional reasons for not recording failure histories were pointed out by some respondents as; (i) not having time to work on the shop floor and do paper/computer work and (ii) due to the complexity of their maintenance management system.
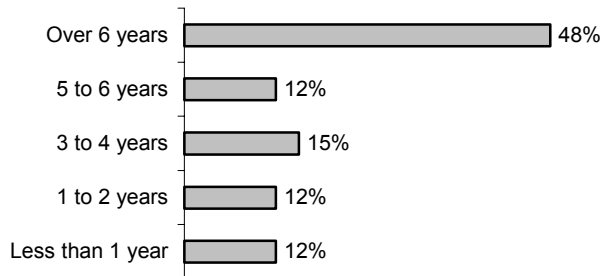
Reasons for failure histories record

Among the respondents who record failure histories, the two most common reasons why failure histories are being collected are to plan and schedule maintenance activities and to analyse failure modes and effects.
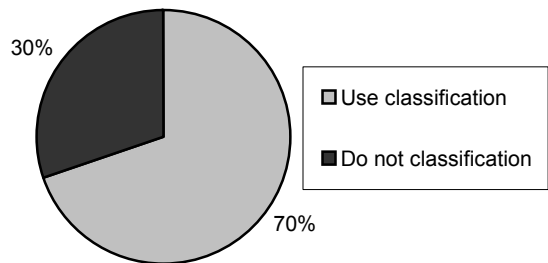
Category	Value
Other	7%
For machine vendor feedback	9%
To plan and schedule maintenance activities	26%
To analyse failure modes and effects	26%
To assist diagnosis of new failures	15%
To facilitate quicker repair of new failures	17%

Time recording failure histories and use of a failure classification system

Almost half of the respondents who record failure histories have collected data for more than 6 years and 70% use a classification system to record failure histories.
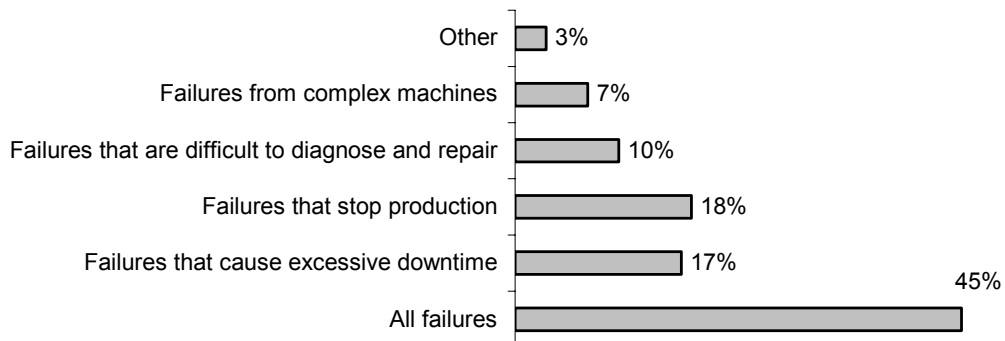
Category	Value
Over 6 years	48%
5 to 6 years	12%
3 to 4 years	15%
1 to 2 years	12%
Less than 1 year	12%

Time recording failure histories

Use of a failure classification system
- Use classification: 70%
- Do not classification: 30%

What type of failure histories are being recorded

Nearly half of the respondents who record failure histories have no criterion to select the failures that should be recorded and so they record all failures, whether minor or major.

Category	Value
Other	3%
Failures from complex machines	7%
Failures that are difficult to diagnose and repair	10%
Failures that stop production	18%
Failures that cause excessive downtime	17%
All failures	45%

Type of system used to collect and store failure histories

The majority of the respondents who record failure histories use only a computer-based system to collect and store their failure histories. A significant number of respondents (26%) use both paper and computer based systems. Commercial systems are more commonly used than the own-designed systems. A small number of respondents (9%) use only a paper-based system.
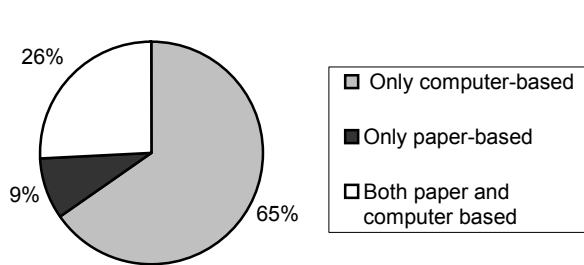

Computer-based system *vs* paper-based system
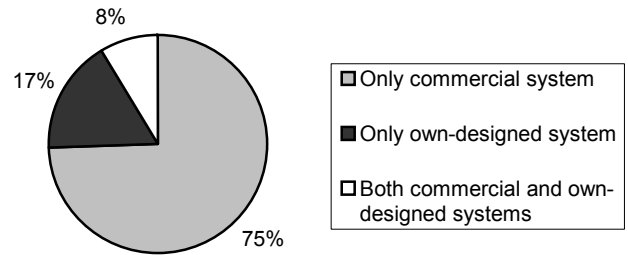
Commercial system *vs* own-designed system

Rate of the data storage system for data retrieval and data export

The respondents were asked to rate their failure data storage system for data retrieval and export. On average respondents who record failure histories classified their storage systems as neither good nor poor for data retrieval and, as poor for data export.
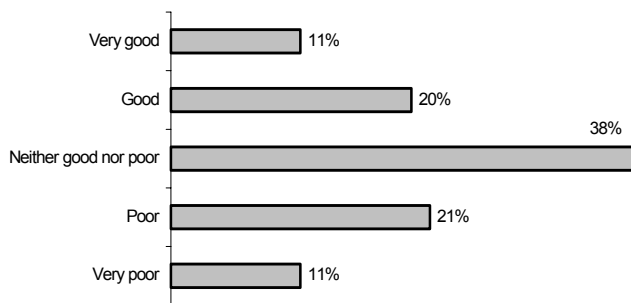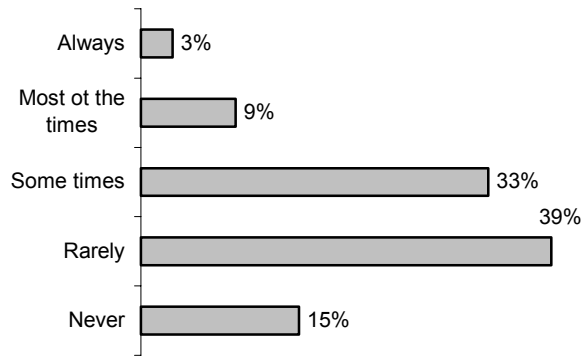

Data retrieval
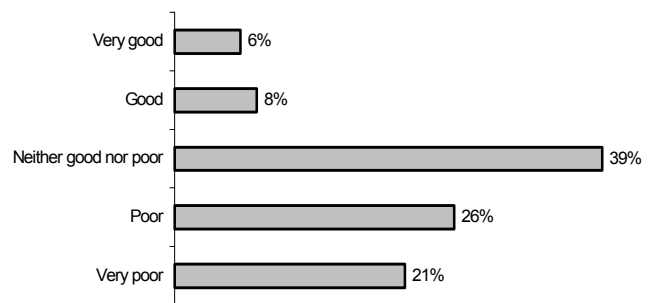
Data export

Frequency maintainers refer to written descriptions of failure histories to solve new problems

On average, respondents who record failure histories reported that their maintainers rarely refer to written descriptions of failure histories to solve new problems.

5. RELATIONSHIP BETWEEN MACHINE USERS AND VENDORS

The questions regarding the relationship between machine tool users and vendors were answered by all respondents. A significant 72% of respondents do exchange failure information with their machine tool vendors. The majority of respondents classify the relationship with the vendor, concerning assistance with machine maintenance, as neither good nor poor.
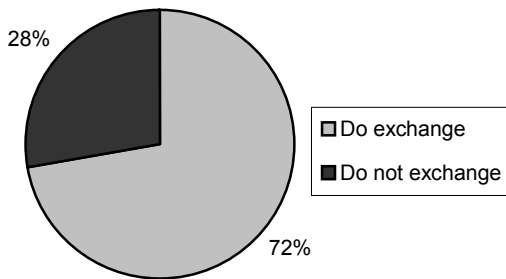

Exchange of failure information with vendor
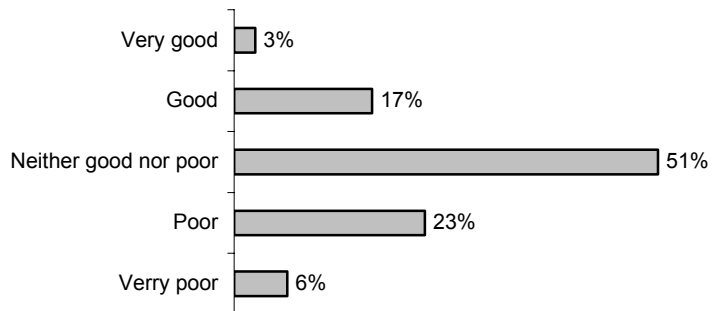
Respondent's relationship with their machine vendors

6. FAILURE DATABASE

Respondents were asked whether they feel that a database of failure histories for machine failures populated by users but vendor managed would be useful. They were also asked if they would contribute their failure histories to build such a database. All respondents answered these questions. On average respondents find the failure database useful and, 85% of respondents reported that they would contribute their data to such a database.

Failure database usefulness

Contribution to a failure database
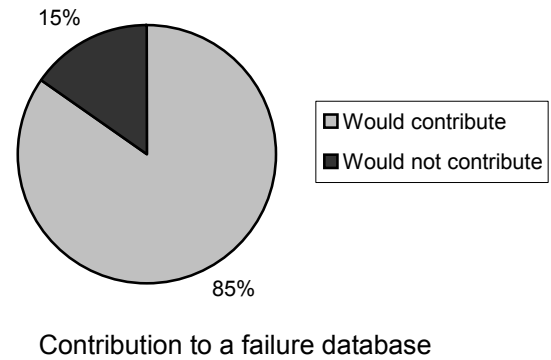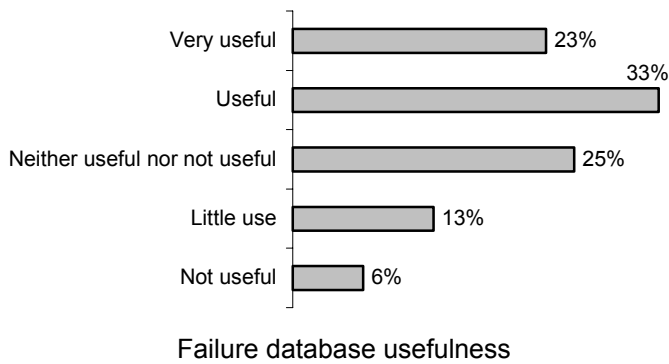
7. FUTURE ENHANCEMENT

We would like to thank all who contributed to this survey and welcome any comments on the results shown in this report. In the near future we will be running a second survey which aims to identify the most important attributes of machine failures, and to evaluate what is the most important information from failure troubleshooting to be recorded in the failure reports.

The results of both surveys will be used to generate a failure classification and coding system. This system will be the backbone for the development of a decision support system for maintenance, which may be used by maintenance to improve their approach to troubleshooting downtime failures.

The contribution of all maintenance experts will be essential to this research. Therefore, if this research addresses some of your concerns please participate. In return, besides the reports with the findings you will have the change to follow up the research, which we believe will be of great use to your organisation.

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