

Chapter 35

MAINTENANCE AUDITS

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35.1 INTRODUCTION

It is well known that the asset maintenance manager who is allowed to get on and implement his maintenance strategy and develop his operation without let or hindrance is an endangered species - external influences can cause even the best laid plans to go astray! Occasionally it is essential for the maintenance manager to take a step back and look at the overall progress being made; in short to carry out a maintenance audit. An audit is a more questioning activity than monitoring performance indicators. It can include a review of one or more of the following four areas:

- Equipment condition and effectiveness.
- The maintenance processes, and the procedures and systems in place.
- The ISO quality system, if appropriate.
- An improvement project in isolation from all other activities.

Progress on any combination of these may be judged against a range of landmarks covering the key maintenance issues and the quality of their delivery.

The aim of a maintenance audit, which is the main consideration of this policy sector, is to determine whether the way forward is correctly defined and is being followed. The audit should measure the effectiveness of the normal practices and reveal whether improvements are required. From this, action plans may evolve which will sharpen up not only the maintenance strategy, but also the way in which the maintenance operations and technologies are applied. Any changes should not be made just for the sake of change, and they should be translated into economic benefit and added value.

Some of the changes required may be external to the maintenance function and outside the direct control of the manager of maintenance. The outcome of audits are enhanced by positive communication and the involvement of all voices of opinion during the audit. The scope of an audit should include maintenance clients and maintenance suppliers. The resultant open climate allows organizations to change positively and improve motivation as a team.

Some people may feel that the methods used of annual budget review, frequent communication and structured meetings, and perhaps quality circles etc, already cater for the adequate review and development of the maintenance approach. Auditing is perhaps the only method available of assessing proactively if any review or quality system is appropriate designed, is understood and followed by all involved, and achieves the desired results. It is usually the only set piece situation when all the maintenance issues and their inter-relationships are addressed together.

Ideally, the audit should be carried out internally by a non-partisan, brave and knowledgeable person. If no such person is available then external assistance should be sought. Some of the best run maintenance operations retain their position because they are ready to accept and respond to comment in this way.

The aim of the audit should include:-

- Increasing awareness of the maintenance contribution.
- Pin-pointing areas where there are short-falls in the service.
- Measuring the completeness and integration of the policies.

35.2 PREPARING FOR AN AUDIT ASSESSMENT

- Highlighting the practices to be introduced or requiring change.
- Gaining involvement in setting and monitoring maintenance targets.
- Developing an environment for continuous improvement in quality of the maintenance service.

35.2 PREPARING FOR AN AUDIT ASSESSMENT

The reason for carrying out an audit is to identify problems, and then find solutions to those problems. Of particular importance is the need to identify system defects and organizational weaknesses, and to confirm whether previous problems in the service have been rectified. Clearly, a key success factor of an audit is the working relationship between the maintenance function and the audit assessor. There is a need to confirm the following:

- That a proactive approach and manner will be adopted by the audit assessor.
- That comments on the methods of auditing used will be separated from the findings of the audit itself.
- That the assessor's appraisal of one area will not outweigh the judgment of competence in other areas.
- That where deficiencies are highlighted, recommendations for progress follow.

A prerequisite to a successful assessment is to ensure that a formal internal audit procedure is in use which will submit each element of the maintenance function to a rigorous appraisal, starting from the objectives, the strategy and the targets. It should not only evaluate the processes and the internal performance, but also question the effectiveness of the criteria established for measuring the targets; and review the practicality of the auditing system itself.

An audit methodology can be prepared which combines the scope of the maintenance issues to be addressed with the quality issues outlined in Chapter 25 (Quality Systems). In this way, the key issues are identified and audited within the structure provided by ISO 9001. However, each site is likely to be different.

35.3 GATHERING THE INFORMATION

A number of approaches can be employed individually or together for gathering the information needed to complete the audit. Separation of the 'wheat from the chaff' is required for economy, because there is much to discuss, and there is little point in continuing discussion down 'blind alleys'. Information which contains a message is looked for, and which will contribute to the evaluation of improvements. Different organizations have their own ways of doing this, some of which are as follows:

- As described in Chapter 4 (Benchmarking Analysis), issuing a questionnaire up to three weeks before the audit requesting data on performance, organizational, systems and technological etc aspects of maintenance management. This data is used to derive key ratios. A self-assessment exercise is then facilitated with a group of 8 - 12 staff which may include third parties, who address the best practice enablers for eight key areas of maintenance management.
- Observing in an informal way how people organize their work can often be used as a means of assessing how well the processes are being followed and, in fact, the quality of the processes themselves. The issuing of work and organizing the stores are simple examples of areas which can be viewed with ease and the methods assessed against best practice.

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- Discussing with individual people how they fit into the organizational structure and the roles and the activities they carry out raises any difficult situations they have experienced and what actions they have taken to resolve them. Informal discussion sessions of this nature can encourage people to consider ways of improving the manner in which the operations around them are conducted, and how the team is structured and knits together. This approach needs to be handled carefully.
- Examining the way asset strategies are developed, technology is used, data is recorded and systems are followed, and how documentation and drawings are referenced and stored. This approach can reveal much about the documentation procedures and systems of the maintenance function, the quality of feedback of information and the planning.

A common method used for helping the process of gathering information is reference to a prepared list of set questions which are designed to reveal how people think they are doing against performance criteria, and whether they are complying with operational needs. A check list of this nature requires careful thought to ensure that the most important features of the maintenance function are included. This chapter puts forward, as a guide, a number of check lists designed specifically for conducting a maintenance audit. (See Appendices 35.1 and 35.2.)

A major ingredient for gathering information in any audit is the participation of people in discussions of the way in which the policies are developed, and the maintenance service is given and how it is received. These discussions can take many forms. They can be one-to-one interviews of representative people from various job functions or they can be group discussions. Group discussions can be extremely fruitful if controlled but should be limited in size since it is only possible for one person to be heard at once. There is a danger that with both an increase in the size of the group, and the period of discussion, the outcome would be less constructive and less positive than required. The outcome of the audit may be a mirror image of what was discussed. However, the way forward may demand further discussion and be very different to the original expectations.

Who should be included in any discussion depends on the scope of the audit, and everybody who can contribute should be invited to do so. Reason must prevail on the number of people taking part, but the temptation to limit numbers can be offset by the will to air all the issues. All levels of personnel should be invited to contribute to the audit if a full scope review is required. Usually, it is recommended that all relevant functions both within and outside the maintenance function are represented. It is important that the people participating are willing to be a part of the audit team.

Once the information has been gathered it is important that agreement on its authenticity is gained with the supervisor, manager or director of the area being audited. This ensures that the information is correct and establishes the best working relationships for identifying how improvements may be made.

35.4 THE SCOPE OF THE AUDIT

The audit scope should be wide ranging and include the questioning of the whole approach to maintenance. The audit methodology described below is an actual example used in a number of industrial situations. The scope includes strategic issues, operational issues and maintenance technology.

35.4.1 Strategic issues

The audit should include the need to understand how the strategy was set to meet the objectives for asset management / maintenance and how the maintenance practices have evolved, as depicted below:

35.4 THE SCOPE OF THE AUDIT

OBJECTIVES	PRACTICES	STRATEGY
What are the aims and targets?	What developments are others making? What is it possible to achieve?	What changes are required? How should they be implemented?

When considering what the scope of a maintenance audit should be, it is as well to reflect on the numerous options there in meeting the maintenance objectives. Many different maintenance practices can be operated in different ways depending on previous shop-floor agreements and emphasis on different skill and trade requirements in the company.

There may be issues of a corporate nature which are beyond the scope of the maintenance audit, but which impinge strongly on the ability of the maintenance operation to be effective. These issues can include materials and spare parts supply (if outside maintenance operations control), company and governmental policies on safety, policies with regard to training, the use of contractors and local working agreements.

35.4.2 Operational issues:

The audit will establish whether the range of the maintenance operations, and the abilities and achievements of the maintenance function, have been discussed and demonstrated clearly, logically and in management terms on a yearly basis to the manufacturing director and chief executive. For example, do the costs of maintenance clearly reflect the full range and scope of the activities carried out, and have the benefits arising from the efforts made to provide a good quality maintenance service been quantified and displayed? On the other hand, has the board given the maintenance manager adequate information on the future operational expectations in terms of throughput, availability needs etc, of the equipment for an adequate strategy and set of plans to be established?

The audit can determine what the prevailing forces are from a corporate, manufacturing or maintenance point of view that are shaping the way in which the maintenance operation can perform. It can tell us what the current requirements for maintenance depend upon. It can formally establish what the results of the endeavours are, and the degree of sophistication and conformance of the maintenance procedures and systems. It can review how well the machines are maintained, and how maintenance is viewed in the company.

35.4.3 Technological issues:

Any comment on the operational and strategic approach of a maintenance function is meaningless unless it is based on the knowledge of the condition and ability of the equipment to meet its manufacturing performance requirements. The audit should, ideally, include an appreciation of the equipment being maintained. It should include time to understand the condition of the equipment, the types of faults which re-occur on them and are of consequence to them, and the maintenance work carried out on them. In short the audit can reveal whether an asset strategy is developed and to what degree the asset strategy reflects the latest technology. It can show whether a planned maintenance procedure is in place which achieves considerably more than just stop the machines. Hopefully, it will confirm the existence of an excellent system based on predictive maintenance being progressed with the full support of the production department.

For repair organizations, whose business is maintenance, then the range of issues will be even wider.

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35.5 AUDIT ORGANIZATION

Before commencing an audit, the manner in which it will be organized should be understood and agreed. The range of considerations involved includes the following:

- The scope of the maintenance issues to be addressed and the depth of the assessment.
- Who will carry out the maintenance audit, and the program of work to be completed.
- How the audit will be carried out and what the deliverables will be. For example, the desired outcome may be a complete feasibility assessment of improvement projects, fully resourced and costed. On the other hand, the audit may be limited to providing pointers to where problems or non-conformance exist.
- The need to inform and, in particular, to prepare all the participants by communicating the aims of the audit, how it will be run, and how the deliverables will be handled.

Most audits are carried out by a team of assessors of two or more people, one of whom will be the team leader. Particularly well versed individuals can complete an audit on their own. The auditor should prepare for the site being reviewed and should have the skills to control the program, be able to involve and inform people, and have the ability to make recommendations to management, including presentation at boardroom level. The report should not contain any surprises and should be presented with a positive and constructive manner, and should not refer to the performance of any individual. The outcome of the report should be viewed as the basis of a management review of the whole maintenance function.

The project may take one to three days or two to three weeks to complete, depending on the scope of the audit and the size and complexity of the organization. There is no single approach which satisfies all situations. An audit which is appropriate for a 20 person operation may not be suitable for one employing 200 people, certainly in the timescales required for completion, and an audit exercise does not benefit from general or generic conclusions drawn in haste. A little more time taken on drawing the right conclusions from the outset could save significant additional expenditure which might be incurred by implementing the wrong changes.

35.5.1 Audit methodology

An audit can be given a 'kick-start' if background documentation, referring to the current operating details of the maintenance function, is made available. This typically should include the following:-

- The layout of the organizational structure illustrating the relationships and responsibilities of the people and their roles.
- A strategy document or policy statement. This provides an understanding of the current direction and driving forces which are in place.
- Financial information and performance results which can provide a measure of progress against key ratios, and an indication of the level and accuracy of the information to hand.

Any documentation to be used by the auditor should also be to hand. The style of documentation will depend on the auditors knowledge and experience. If the business already operates to ISO 9001 quality systems,

35.5 AUDIT ORGANIZATION

then the operational audit needs to reflect this. This may well indicate that someone with the capability to audit may well be available within the company, although it should be noted that the right external advisor will always bring experience and knowledge of other maintenance cultures, performance ratios, abilities and methods.

Where a documented maintenance quality system exists the auditors should audit the maintenance processes in line with it. An internal complaints procedure may also be practised which provides the maintenance customers with a mechanism for flagging shortfalls in service or recommending areas for improvement; this channel of information should be assessed. Additional deficiencies or performance shortfalls identified by the audit should be addressed in order to improve the quality of service to the customers.

The program used for carrying out the audit can be many and varied. One approach is to split the exercise into four discreet stages, as follows:-

- Appreciation of the assets, their condition and needs.
- Understanding the function, the operation and the targets.
- Evaluation of the changes and improvements needed.
- Preparation of the report for management review.

Appreciation of the asset condition, the needs and the change culture

Some audits are completed without an appreciation being gained of the age of the equipment and the environment in which it is operated. This appreciation is fundamental to the way forward. It is difficult to understand the height of the mountain the maintenance function has to climb unless this is known. Focus can be concentrated on the manufacturing facilities, but all the assets including the buildings and site services should be reviewed. Inspections can be made on a random basis to critical machines to identify the condition, cleanliness and the standard of maintenance being carried out. If little time is available, then the views of the customers and the engineers, tradesmen and operators should be obtained.

This stage is aimed at gaining a feel for the way the operation is carried out and for the atmosphere, relationships and culture for change. It is a time for checking the standard of maintenance being performed by the operators and the tradesmen, and is an opportunity for identifying and understanding the processes, operations and machines. Data which has not already provided should be gathered, and this may be gained in a combination of ways:

- From shift logs.
- From component failure records, if available.
- From machine and process output and downtime.
- From top ten costs, fault analyzes or other computer based information.

The outputs from this stage are shown, in general terms, below - Figure 35.1.

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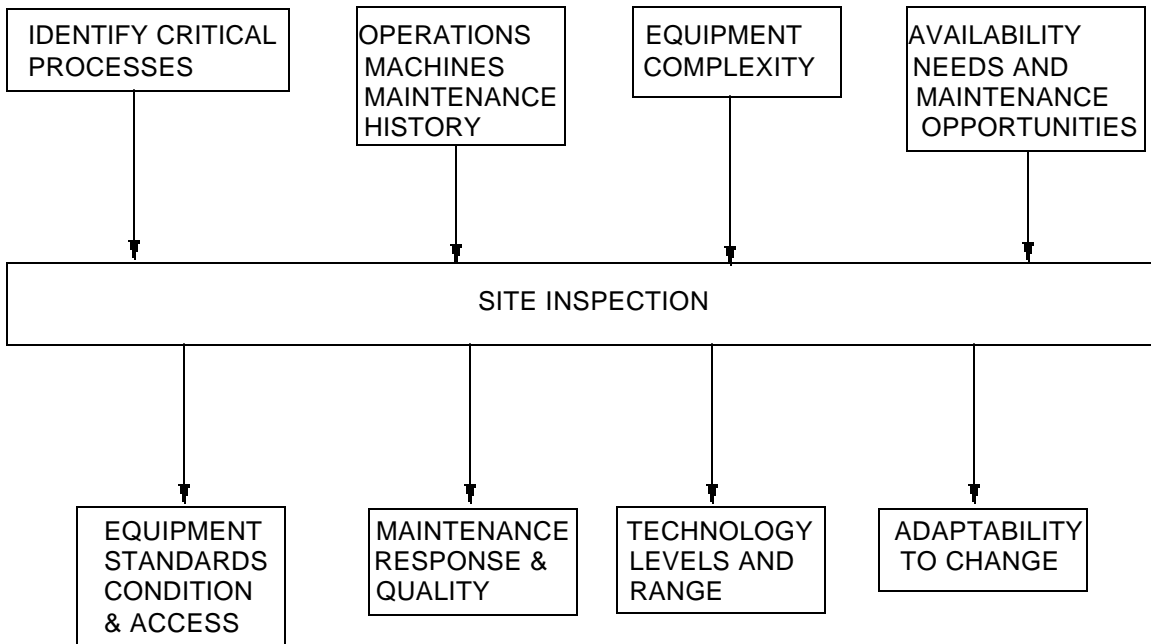


Figure 35.1 - Site inspection inputs and outputs

In this first stage, the equipment complexity and the range of the maintenance tasks can be assessed. A measure of whether the emphasis is on failure prevention, predictive diagnosis or reactive repair can be seen at first hand. Whether the maintenance techniques used are specific to the particular plant and process of the industry concerned will be evident. The inspection should, where possible, highlight areas where the consequences of breakdowns or malfunctions are particularly critical, and identify any monitoring techniques and on-line control mechanisms used.

The levels of equipment availability required by production will be evident. The ease, or otherwise, of access to the likely problem areas can be seen at first hand. The opportunities for carrying out maintenance can be discussed, and the relationships and ease of communications between maintenance and other operations can be appreciated.

This first stage of the audit can differ widely from one site situation to the next. Where it differs significantly from the 'short and snappy' style of some audits carried out is in the analysis of the current state conditions and needs of the equipment. An understanding of the machinery needs and problems, and the adaptability of the operation to change, is often critical to appreciating the current approach of the maintenance function. Only with this knowledge can the importance of the equipment and the position of maintenance in the company be identified. From this, judgment can be made more easily on the scope for change and the rate of change needed and possible.

Understanding the maintenance operations and targets

This second stage includes gaining an understanding of the current work and human organization, and how maintenance addresses the present and future needs of the business. Discussions can be held typically with the people shown below. The deliverables required from this step can be split into five headings shown in Figure 35.2.

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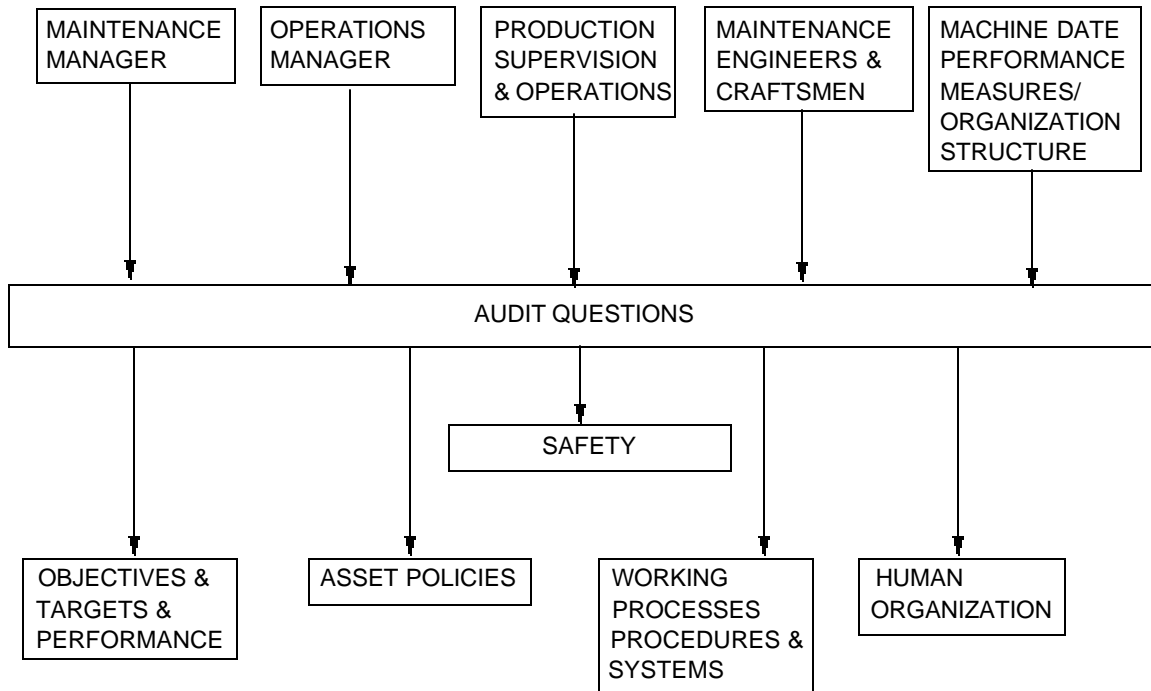


Figure 35.2 - Audit questions

It is important that the discussions are held in a logical manner and a predetermined set of general topics for questioning can be useful in achieving this. If appropriate, an auditor may prepare in more detail, and set out a list of questions within each of the topics. Furthermore, for each question the answers may be rated against a benchmark, and the marks can then be added together to give an overall performance rating. However, in some situations, a generalized set of questions is inappropriate and the auditor may allow a discussion to proceed in a way which will highlight the strengths and knowledge of the individuals and the maintenance function concerned. This concentrates the discussion towards the issues of major relevance to the experience and role of the individual or group.

Discussion can commence on the main business objectives identified in the companies overall strategy, including:-

- Corporate plans.
- Financial statements.
- Manufacturing plans and quality requirements.
- Machine purchasing policy.
- Maintenance objectives and performance ratings.

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The asset and planning policies may include information on the following:-

- The use of asset criticality assessments and RCM.
- Any specific techniques needed for maintaining the machines.
- Tasks developments and resource needs.
- Workflow plans and methods.
- Budget plans, replacement policies and insurance spares policies.
- Documentation used.

The human organization should include information on the following:-

- The organizational structure and the use of in-house and contractor resource.
- Roles and responsibilities and how these have changed over the years.
- Communication with the client.
- TPM and multi-skilling.
- Training.
- Special services including reliability engineering, health and safety, quality control etc.

The working practices will include information on the following:-

- Work planning, control and costs analysis.
- Materials management and inventory control and management.
- Computer systems and the flow of data.
- Links between departments and activities, and quality systems.
- Asset management tools.

Evaluation of the changes and developments

A main objective of the evaluation and development stage is to align and consolidate the present state of the maintenance function with the future needs, and to construct alternative options of how the maintenance function can be improved - Figure 35.3.

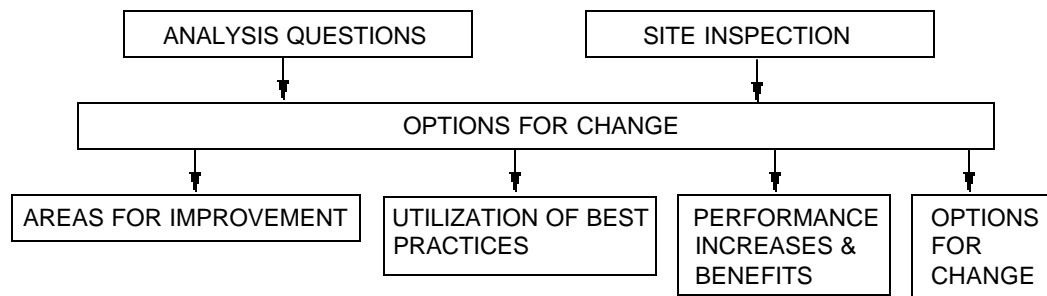


Figure 35.3 - Options for change

35.5 AUDIT ORGANIZATION

Although not essential to the operational maintenance manager, a benchmarking technique can assist in evaluating where the maintenance operation is currently placed when judged against a list of criteria considered to be good practice. The policies development scheme shown in Chapter 24 is an approach to assessing the progress of the practices included in the eight policy sectors of the Guide.

On the other hand, if a more specific assessment is appropriate then documentation can be prepared for this, and examples are shown in Appendices 35.1 and 35.2, consisting of:

- Appendix 35. 1.1 Human organization.
- Appendix 35.1.2 Materials management.
- Appendix 35.2.1 Preventive maintenance activities.
- Appendix 35.2.2 Planning and control systems.

The advantage of the comparative aspects of the techniques such as these are clear, particularly if the scheme can be used again and can include other sites and companies (see Chapter 4). This approach can demonstrate actual improvements and help focus the mind. Whether giving marks actually motivates a maintenance may be debatable, however, but they are a means to an end. Comparison between the ratings for some of the questions does depend on the specific condition and operational requirements of the equipment on the one site only. They are useful in conducting a snapshot evaluation of how well the maintenance fundamentals are implemented and used, from which improvements will arise.

This evaluation and development stage can highlight the areas for improvement and the changes needed to the working practices, etc, which will provide increases in performance. The opportunities for relatively speedy changes can be assessed where it is clear that improvements may be obtained in the short-term, and the overall plan would not be compromised. The options for change to a range of issues can be prepared and costs for the necessary investment compared with the estimated benefits. During this development stage the options should be discussed with management who, for their part and for the success of any proposed changes, should feel comfortable to associate themselves as individuals with the need to change and the options evaluated on the way to proceed. This will provide the maintenance team with a range of issues for further detail and presentation.

Preparation for management review

The final stage of the maintenance audit should be designed to consolidate all the previous work in the form of a report. The report can be of varying content. One suggestion is to split the report into four parts as shown in Figure 35.4.

The first deliverable of the report is to review the present state of the maintenance function within the business and to indicate the areas for improvement. The outline approach to the changes needed which can be developed in the future into a new strategy should be produced. This may have regard for the overall business strategy and the realistic options for change chosen from the eight policy sectors. It will highlight the major maintenance objectives and generalized recommendations on how to achieve them, together with an outline assessment of resource costs, likely problem areas and the estimated cost benefits.

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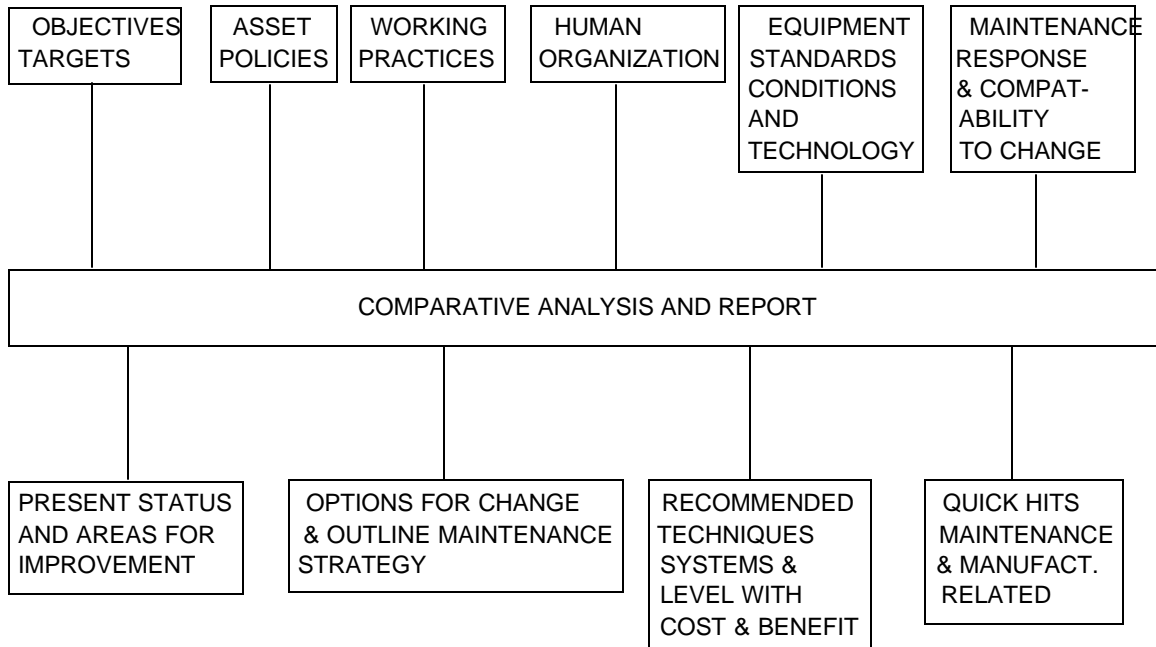


Figure 35.4 - Comparative analysis and report

A section of the report can be dedicated to relatively 'quick hits' which will result in benefits in the short-term. The recommendations will be aimed at giving financial savings to the business. This report should then form the basis of the need to convene a management review of the way forward for the maintenance function.

35.6 ACTION AFTER THE AUDIT

A closing meeting is often held between the appropriate manager(s) and the auditor. During the meeting the audit findings will be presented and discussed. The aim of the meeting is to agree the outcome and determine what action is proposed to correct any discrepancies. It is important to remember that the auditors brief may not include the determination of future actions (unless he or she is a consultant who has been asked to advise on recommended action). The implications of any development or improvement projects should be evaluated at this stage and the scope, benefits, resource needs and costs for making the changes should be thought through and evaluated. Everyone involved should then be properly informed of the outcome.

Having established the auditing procedure; the recommendations made should be followed-up; the adherence to the new methods should be noted; and their success in removing the non-compliance and improving performance should be re-audited. These follow-up audits are only intended to check on those areas where non-compliance or developments needed to be addressed. Some companies carry out as many as three full audits each year.

APPENDIX 35.1

Appendix 35.1.1 - Human organization



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Appendix 35.1.2 - Materials management



APPENDIX 35.2

Appendix 35.2.1 - Preventive maintenance activities

SYSTEM/SUB SYSTEM	IS THE SYSTEM IN PLACE? (MARK CORRECT ANSWER: NO, YES, NOT SURE, PLANS IN PROGRESS)	SYSTEM RESULTS	SYSTEM RANKING VS. RESULTS 0 = POOR 10 = EXCELLENT COMMENTS
E. PREVENTIVE MAINTENANCE			
E-1 LUBRICATION SYSTEM IS COMPLETE i.e. EQUIP. ID. TASK ID. FREQUENCY OF TASK, TYPE/AMOUNT OF LUBE	N, Y, NS, PIP	NO FAILURES OCCUR DUE TO LUBRICATION PROBLEMS	0.....5.....10
E-2 A VIBRATION ANALYSIS PROGRAM IS IN PLACE	N, Y, NS, PIP	NO UNPLANNED DOWNTIME OCCURS OCCURS DUE TO BEARING FAILURES	0.....5.....10
E-3 A CONDITION MONITORING AND COMPONENT CHANGE OUT PROGRAM IS IN PLACE	N, Y, NS, PIP	NO UNPLANNED DOWNTIME OCCURS DUE TO EQUIPMENT FAILURES	0.....5.....10
E-4 A SYSTEM EXISTS TO TEST AND MONITOR ALARMS AND INTERLOCKS	N, Y, NS, PIP	NO UNPLANNED DOWNTIME OCCURS DUE TO EQUIPMENT FAILURES	0.....5.....10
E-5 A DOCUMENTED SYSTEM EXISTS FOR PERIODIC INSPECTION BY OPERATIONS, FOR MECHANICAL, ELECTRICAL & INSTRUMENTATION EQUIP	N, Y, NS, PIP	NO UNPLANNED DOWNTIME OCCURS DUE TO EQUIPMENT FAILURES	0.....5.....10
E-6 A DOCUMENTED SYSTEM EXISTS FOR PERIODIC INSPECTION BY MAINTENANCE FOR MECH., ELECTRICAL & INSTRUMENTATION EQUIP	N, Y, NS, PIP	NO UNPLANNED DOWNTIME OCCURS DUE TO EQUIPMENT FAILURES	0.....5.....10
E-7 AN ONGOING SYSTEM EXISTS TO PERFORM THERMAL SCANS OF ELECTRICAL EQUIPMENT	N, Y, NS, PIP	NO DOWNTIME OCCURS DUE TO OVERHEATED CONTACTS OR POWER DISTRIBUTION WIRING INSULATION FAILURES	0.....5.....10
E-8 A COMPLETE DC DRIVE P.M. SYSTEM EXISTS	N, Y, NS, PIP	NO DC DRIVE FAILURES OCCUR DUE TO BRUCH PROBLEMS, CONNECTIONS, LOOSE WIRES, OR NOISY TACH SIGNALS. NOCARD REPLACEMENT FAILURES OCCUR DUE TO LACK OF TEST BENCH BURN IN OR PRE-INSTALLATION TESTING	0.....5.....10
E-9 A PNEUMATIC CONTROLS P.M. PROGRAM EXISTS	N, Y, NS, PIP	NO PNEUMATIC FAILURES OCCUR DUE TO DIRTY INSTRUMENT AIR, WORN DIAPHRAGMS, DIRTY RELAYS, INCORRECT PRESSURES, ETC	0.....5.....10
E-10 A COMPLETE POWER DISTRIBUTION PREVENTIVE MAINTENANCE PROGRAM IS IN PLACE	N, Y, NS, PIP	NO UNPLANNED DOWNTIME OCCURS ASSOCIATED WITH POWER DISTRIBUTION EQUIPMENT FAILURES INCLUDING INCOMING FEEDERS AND TO AC MOTORS	0.....5.....10
E-11 THERE IS A SYSTEM TO ENSURE ROTATING EQUIPMENT IS PROPERLY BALANCED AND ALIGNED.	N, Y, NS, PIP	NO BEARING, SEAL OR COUPLING FAILURES OCCUR DUE TO LACK OF PROPER BALANCING OR ALIGNMENT	0.....5.....10

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Appendix 35.1.4 - Planning and control systems

SYSTEM/SUB SYSTEM	IS THE SYSTEM IN PLACE? (MARK CORRECT ANSWER: NO, YES, NOT SURE, PLANS IN PROGRESS)	SYSTEM RESULTS	SYSTEM RANKING VS. RESULTS 0 = POOR 10 = EXCELLENT COMMENTS
D. PLANNING/SCHEDULING/WORK ORDER SYSTEMS			
D-1 A SYSTEM EXISTS TO IDENTIFY, DOCUMENT, PRIORITIZE, PLAN, SCHEDULE, AND TRACK MAINTENANCE WORK	N, Y, NS, PIP	WORK IS ONLY DONE AGAINST AN APPROVED WORK ORDER THROUGH A PLANNING SYSTEM	0.....5.....10
D-2 A SYSTEM EXISTS TO PROVIDE TIMELY INFORMATION TO PEOPLE ABOUT WORK THEY ORIGINATED AND OTHER OUTSTANDING WORK OF EQUIPMENT IN THEIR AREA	N, Y, NS, PIP	PEOPLE ARE MOTIVATED TO DOCUMENT WORK NEEDED THROUGH THE WORK ORDER SYSTEM AND NO DUPLICATE WORK ORDERS ARE CREATED. PEOPLE FEEL COMFORTABLE THAT WORK THEY IDENTIFY WILL BE DONE AND ASSIGN REALISTIC PRIORITIES	0.....5.....10
D-3 A SYSTEM EXISTS TO COLLECT AND RETRIEVE EQUIPMENT HISTORY	N, Y, NS, PIP	NO DOWNTIME OCCURS DUE TO LACK OF THE ABILITY TO ANALYZE FAILURES	0.....5.....10
D-4 A SYSTEM EXISTS TO PLAN AND SCHEDULE WORK AT LEAST ONE DAY BEFORE THE WORK IS DONE	N, Y, NS, PIP	NO DOWNTIME OCCURS DUE TO POOR QUALITY REPAIRS, LACK OF PARTS, TOOLS OR INFORMATION	0.....5.....10
D-5 A SYSTEM EXISTS TO DEVELOP AND MAINTAIN EQUIPMENT REPAIR PROCEDURES. PROCEDURES ARE RETRIEVED EASILY AND ALWAYS UP TO DATE	N, Y, NS, PIP	EQUIPMENT IS REPAIRED CORRECTLY THE FIRST TIME AND NO ADDITIONAL DOWNTIME IS EXPERIENCED DUE TO LACK OF PROPER REPAIR	0.....5.....10
D-6 A NUMBERING AND LABELLING SYSTEM EXISTS CLEARLY IDENTIFYING ALL EQUIPMENT	N, Y, NS, PIP	MISCOMMUNICATION OVER EQUIPMENT NEVER OCCURS	0.....5.....10
D-7 A SYSTEM IS IN PLACE TO INCORPORATE SAFETY INTO WORK PLANNING	N, Y, NS, PIP	NO SAFETY VIOLATIONS OR ACCIDENTS OCCUR DUE TO LACK OF PLANNING	0.....5.....10
D-8 A SYSTEM EXISTS TO ENSURE GOOD HOUSEKEEPING AND MILL APPEARANCE AGAINST STANDARDS	N, Y, NS, PIP	THERE IS A CLEAN, ORDERLY WORK ENVIRONMENT	0.....5.....10