

Sample Maintenance Audit Report

NOTES:

- 1.0 This sample maintenance audit report and contents is indicative of the coverage and approach taken by Lifetime Reliability Solutions Consultants when performing a maintenance audit. Every company is unique and individually analysed and thus each audit report is written to reflect the company and the situation we investigate.**
- 2.0 This sample document is a construction and is not of a real company. It contains extracts from sections of a range of maintenance audit reports to provide evidence of our maintenance audit methodology and capability and is otherwise not to be used.**

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1.0 Introduction

This maintenance audit is a review of the maintenance management processes and practices at <Insert Company Name> <Insert Site Name> Operations was prepared by Lifetime Reliability Solutions following a request by <Insert Name>, Maintenance Manager of the operation.

1.1 Scope of Work

- 1) Review the current effectiveness of maintenance processes
- 2) Suggest improvements to the content and set up of the computerised maintenance management system (CMMS) at <Insert Site>;
- 3) Complete an objective maintenance review, using a spider audit question set; and
- 4) Provide a written report, complete with recommendations for improvement, detailing the results of the maintenance audit and review.

Copies of your maintenance system documents were requested and reviewed by the Author to familiarise themselves with your operation and to understand the completeness and capability of your maintenance processes.

A site visit to the <Insert Site> Processing Plant was undertaken to complete the audit and to review the general maintenance performance.

A PowerPoint presentation was prepared for delivery to the site senior management summarising the audit results and key improvement opportunities. (See Appendix B).

The comments in this report are based upon reviewing your maintenance processes, doing the site inspections, the Author's previous experience in maintenance, current best practice benchmarks in asset maintenance management, documentation provided by your personnel and discussions with the following personnel.

<Insert Name>	-	General Manager
<Insert Name>	-	Operations Manager
<Insert Name>	-	Maintenance Manager
<Insert Name>	-	Maintenance Shift Supervisors
<Insert Name>	-	Maintenance Planner
<Insert Name>	-	Senior Electrical Supervisor
<Insert Name>	-	Senior Mechanical Supervisor
<Insert Name>	-	Maintenance Clerk / CMMS Administrator
<Insert Name>	-	Stores Superintendent
<Insert Name>	-	OH&S Advisor
<Insert Name>	-	Production Manager
<Insert Name>	-	Production Supervisor
<Insert Name>	-	Production Shift Supervisors

2.0 Executive Summary

At the time of the audit we rate the maintenance performance at the operation as shown on the Plant and equipment Wellness Circle in Figure 1.

Journey to Operational Excellence

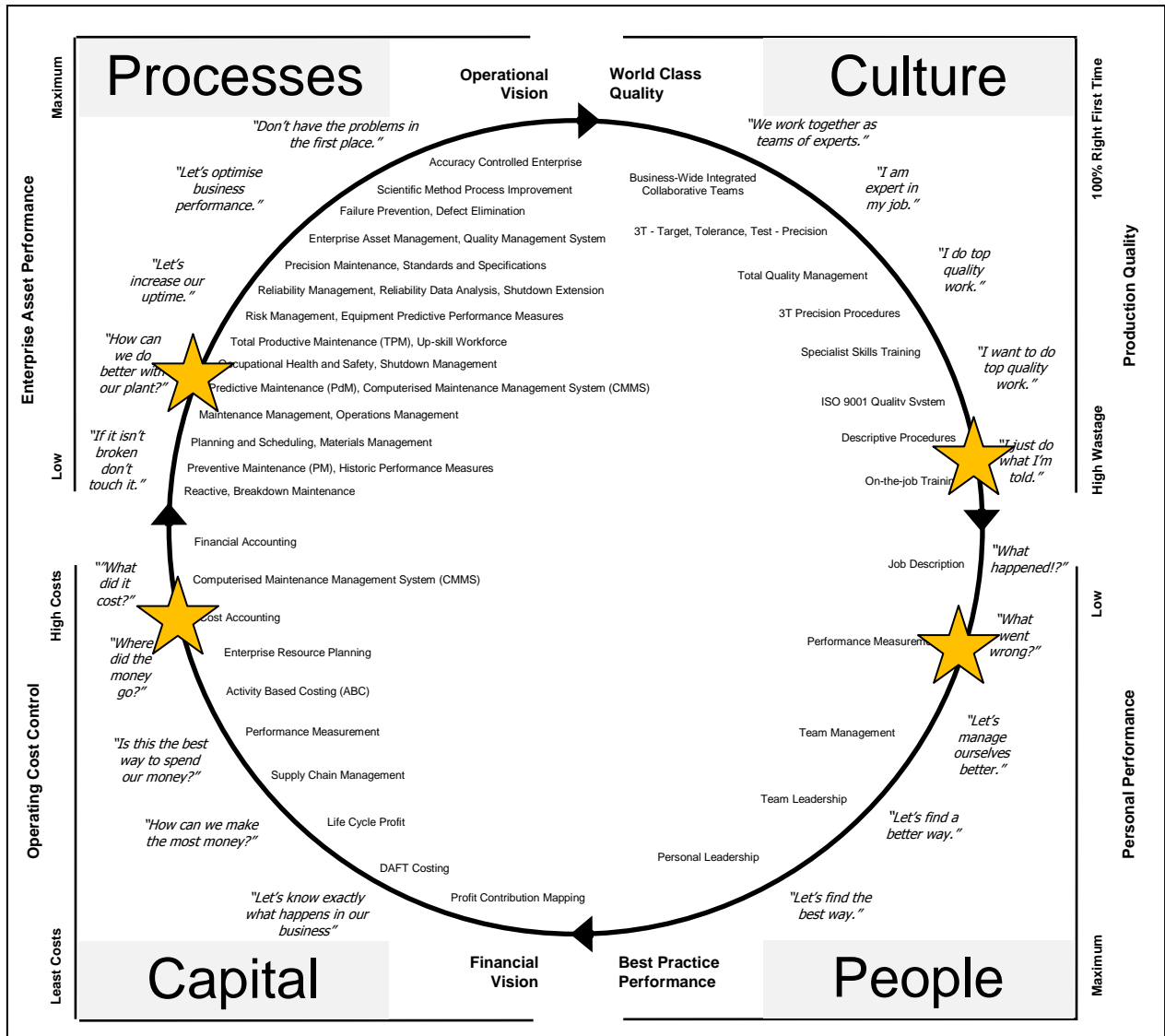


Figure 1 – Progress to Plant and Equipment Wellness

2.1 Overview of Maintenance Audit Results

An objective maintenance audit was completed by using a targeted questionnaire covering the key factors for world class maintenance that was developed specifically for the operation (*see Appendix A*). The questionnaire allowed us to compare the current effectiveness of maintenance performed in the operation with maintenance best practice at other organisations across the world.

The operation's total score was 49% out of 100% and individual key area scores were:

Organisation Culture and Empowerment	44%	Performance Measurement	41%
Work Management	64%	Asset Management	48%
Contractor Management	38%	Budgeting and Cost Control	45%
Materials Management	70%	Information Technology	43%

2.2 Current Maintenance Capability

Maintenance is being hampered by a lack of maintenance management process knowledge and/or training in the company's Computerised Maintenance Management System (CMMS) which results in not following formalised maintenance processes or procedures.

Another useful framework for considering the current status of maintenance in the operation is illustrated by the Maintenance Capability Plot on Table 1. Table 1 provides useful insights on where your business has weaknesses and hence the major opportunities available to you for rapid improvement.

	Leadership and Empowerment					Systems and Processes				
	Maintenance Vision and Strategy	Performance Measures	Organization Structure	Human Resources	Knowledge Base	Asset Maintenance Strategy	Materials Management	Planning and Scheduling	Contractor Management	Reliability Engineering
Mastery	Quality System managed Accuracy Controlled Enterprise where everyone in every department works to 3T error prevention procedures; Lean philosophies improve processes	Business strategy focus; Maximising Life Cycle Profit; Defect And Failure Total (DAFT) Cost database. Process Step Contribution monitoring across all processes	Integrated cross-functional teams incorporating financial, engineering, operations and maintenance	Empowered, flexible, cross-functional teams of experts working to scientific discipline	Continually learning, pushing-out the boundaries of human knowledge and understanding, Six Sigma discipline is normal	Precision Domain drives all engineering, installation, operations and maintenance work; Risk analysis and management normal	Materials problems designed-out, OEM monitors real-time information on critical parts' condition and carries necessary spares	Maintenance reducing as continual improvements extend time between outages; continually reducing time to repair with Lean philosophies	Small teams of experts servicing entire local industry delivering precision maintenance and design-out maintenance with profit sharing	'Design and Operations Cost Total Optimized Risk' (DOCTOR) is used to minimise all operating risks throughout the facility's life. Reliability growth pervades thinking
Excellence	Personnel action plans; appraisals are clearly tied to the maintenance strategy	On-going benchmarking of metrics and processes; Full cost database	Total Productive Maintenance where operators drive reliability, fault-find and maintain equipment; root cause failure analysis by operators and maintainers	Empowered, flexible, world-class workers; self-managed teams	Expert systems used; fully integrated CMMS common database	Preventive & Predictive plans continuously optimized; the 'right' maintenance tactic is applied based on analysis	Stores system integrated to CMMS and accounting system; bar coding or radio frequency tags of all stores items; World-class Stores Management	>90% all maintenance is planned and >95% first-time schedule compliance; rolling schedule fixed for the week ahead	Small numbers of contractors on long term sharing partnership agreements with high innovativeness	Risk and unplanned failure reduced to best in industry by analysis and modelling
Competence	Reliability focused Maintenance improvement action plan is linked to the maintenance Management Strategy	Statistical process control applied to maintenance process measures; Equipment specific maintenance costs available	Established teams for achieving key objectives in the Maintenance Management Strategy	Multi-skilled trades with process capability analysis and basic operating skills	Easy access to knowledge bases available to all employees at all times	Preventive & Predictive plans exist for all maintainable items; emphasis on PdM. All tactics understood	Single source supplier partnerships established and effective; Area stores with controls; Reliability of spares maintained. Suppliers provide technical expertise	Long term asset planning established; Critical path used for all rebuilds and shutdowns	Contractors are established based on principle of 'risk sharing'; Contractors provide technical expertise	Effective Root Cause Analysis (RCA) applied to equipment problems to extend life
Understanding	A clear Maintenance vision and strategy is documented and communicated to employees	Input – Output process measures reviewed and displayed; Down time by cause; Segregated maintenance costs reviewed	Decentralized with central support; Clearly written, mandates/roles for each maintenance function and group	Trades have problem identification and solving; team dynamics and training skills	Document control system established; CMMS installed and used to manage knowledge bases	Preventive & Predictive plans exist for all equipment; Compliance to scheduled maintenance more than 95%	Spares classified with separate strategies; Spares linked to BOMs/Equipment Drawings; Standardization polices exist; ABC spares management with 'A' spares protected	All but unexpected failures planned; All planned jobs specify safety, labour, materials, tools, technical details	All contractors repairing rotables are capable of Original Equipment Manufacturer's testing	Basic equipment conditions established; Good failure databases; All major failures investigated; PMs modified based on site experience
Awareness	No clearly documented role of maintenance; No Maintenance vision or strategy	Some downtime records; Maintenance costs regularly available, but not segregated into area/line	Centralized maintenance group with alignment to production; Technical approach to technical problems	Trades have OH&E and maintenance skills	Plant register established and useful data collected; central technical library; All drawings and equipment information identified	System to identify all maintainable items exists; Emphasis on time-based overhauls and inspections	Stores catalogue established; Inventory accuracy >95%; Goods receiving practices in place	Work Request/Work Order system established; Major rebuilds, shutdowns fully planned and programmed	Contractors peak loads and more maintenance work	Collect the failure data; Equipment history occasionally reviewed for failure analysis
Innocence	The main role is to fix it when it breaks/fails	Incomplete or no maintenance downtime records; Maintenance costs not readily available	Centralized maintenance group with no alignment to production; Command and Control' approach	Trades have their basic trade skills, however little or no technical knowledge or support and training given	Ad-hoc records kept for purchasing; No plant register or control of drawings	"If it isn't broke don't fix it"; Annual shutdown and inspections only	Ad-hoc stores; No costing or control of spares	No planning function; planning done on-the-run; Short term focus	All maintenance carried out by in-house team, which may include individual contractors	No failure records

Table 1 Maintenance Capability Plot

3.0 Maintenance Systems Audit Results

3.1 Maintenance Audit Methodology

The maintenance audit format was generally as described in ISO 19011 Guidelines for quality and environmental management systems audits. This guide provides a structured approach and framework to control the maintenance audit. Aspects and issues specifically relevant to asset maintenance management were addressed by use of the recognised asset management, maintenance management and reliability management best practice guides and standards listed in *Appendix J*.

3.2 Maintenance Audit Objective

The objective of the maintenance systems audit consisted of answering many questions grouped into the key areas of maintenance management as listed below.

- | | |
|---|---------------------------------|
| Organisation Culture and Employee Empowerment | Performance Measurement |
| Maintenance Tactical Delivery: Work and Contractor Management Processes | Maintenance Process Improvement |
| Asset Management Strategy | Budgeting and Cost Control |
| Reliability Improvement | Planning and Scheduling |
| Materials Management | Information Technology |

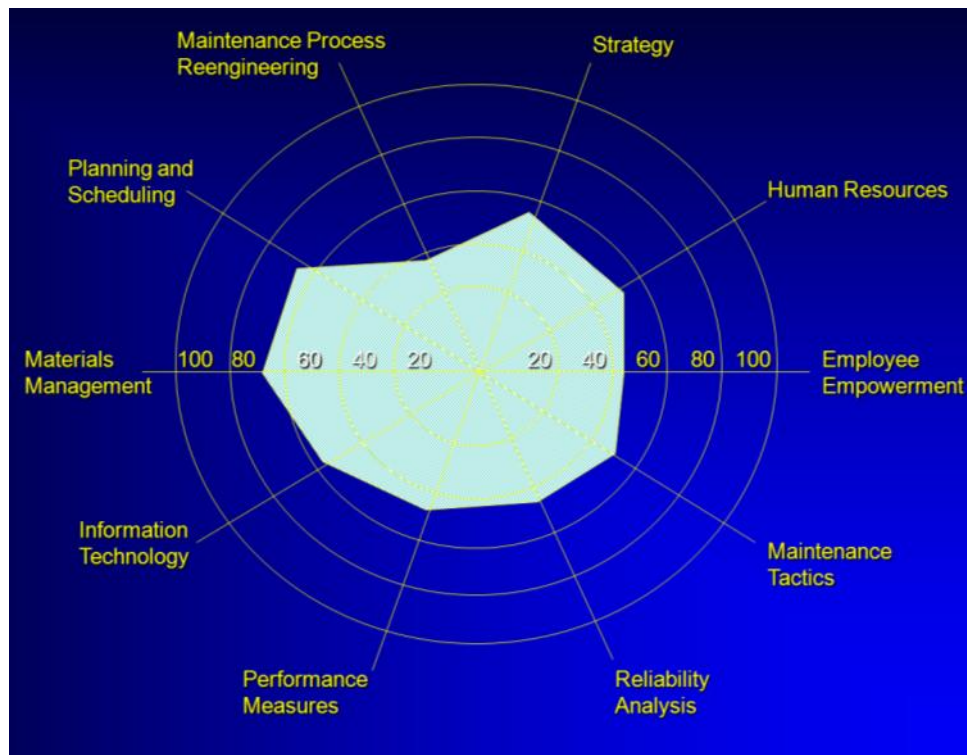


Figure 2 Spider Chart Overview of the Maintenance Management System

As can be seen from the chart, the overall maintenance performance for the operation ranges from 'Poor' to 'Competent'.

The areas with the highest scores were ‘Planning and Scheduling’ that provided good work management control, ‘Materials Management’, and ‘Information Technology’. This was mainly due to high levels of work planning, scheduling and execution, the use of outsourced contractors for specialist skills, high levels of safety and environmental compliance, formal communication and dedicated planner and supervisor roles.

The strengths and weaknesses of your maintenance management system and practices is illustrated by the chart of Figure 3.

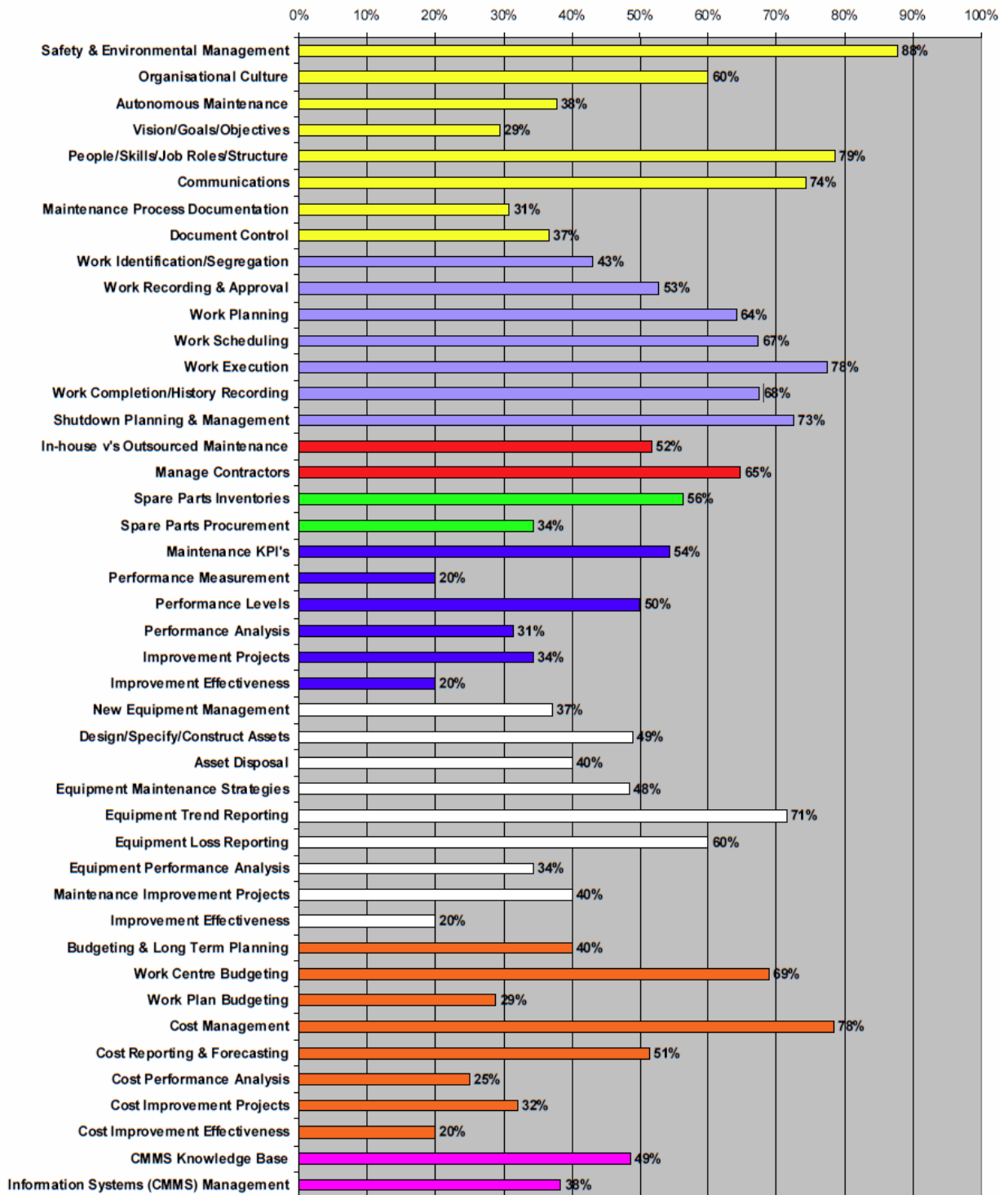


Figure 3 Scores for Maintenance Processes and Practices

The area with the lowest score were human resources related and these areas provide the biggest opportunity for improvement. Another significant opportunity for improvement is the ‘Reliability Analyse’ area, specifically the complete set-up and full utilisation of the CMMS for maintenance history analysis.

3.3 Maintenance Process Capability Performance and Stability

Figure 4 is a time series graph, or run chart, of your company’s total breakdown hours per week for the sixteen weeks prior the maintenance audit. If the graph is representative of your normal operation, the time series can be taken as a sample of the business’ typical performance. Important information about the company’s way of operation can be exposed by using basic statistical analysis to look at your maintenance process variation, stability and capability.

The average breakdown hours per week were 31 hours. Assuming a normal distribution, the standard deviation is 19 hours. The Upper Control Limit at three standard deviations, is 93 hours. The Lower Control Limit is zero. Since all data points are within the statistical boundaries, the analysis indicates that the breakdowns are common to the business processes and not caused by outside influences.

Your company has a statistically stable system for making their equipment breakdown that produces an average of 31 hours a week of breakdown work with a possible spread from 0 hours to 91 hours. Production breakdowns are another one of your business’ ‘products’.

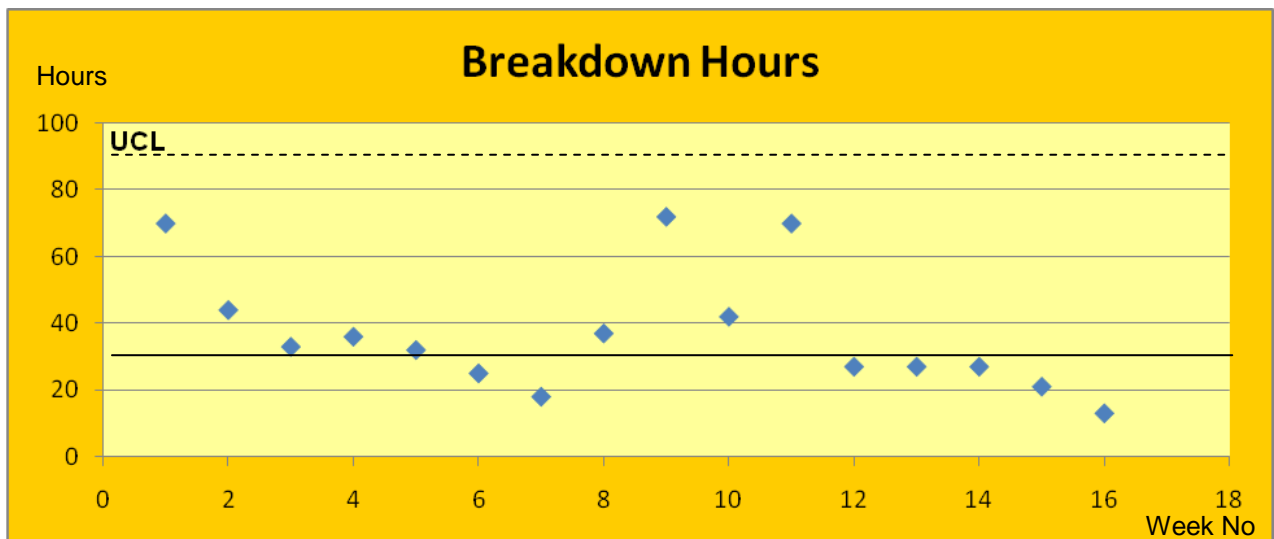


Figure 4 – Breakdown Hours per Week

Because the breakdown creation process is stable, the future generation of breakdowns is predictable and certain. Your business has built breakdowns into the way it operates because the process of breakdown manufacture is part of the way the company works.

The only way to stop the number of breakdowns occurring is to change to those operational, engineering and maintenance processes that prevent breakdowns. From our statistical analysis of operational and maintenance history data we identified a number of factors that, if addressed, will reduce breakdowns and improve your maintenance results. These opportunities are explained and discussed in *Appendix C*, where we have provided a number of recommendations regarding the most appropriate changes to focus on for the operation to gain rapid improvement.

3.4 Prediction of Future Maintenance Performance

The operation is currently in a reactive maintenance death spiral quickly falling toward major production problems and perhaps even disaster. This was identified when a count was made of the work orders raised to address the following vital improvement opportunities, which must always be ongoing work in continuous improvement for every industrial operation.

- Maintenance work orders spent on improving equipment
- Maintenance time spent removing breakdown causes
- Maintenance time spent improving maintenance procedures
- Maintenance time spent improving maintainer skills/knowledge
- Maintenance effort spent reducing operating problems
- Time spent removing waste effort from maintenance processes
- Efforts spent improving stores management and layout
- Maintenance work orders spent improving safety

It was evident that predictive KPIs such as those listed above which indicate if you are focusing time and efforts on improving the operation were not even developed. Your company has skilled people available who can improve the performance of the operation and you are in a position to schedule the work that they do. You can direct a small portion of resources and effort into making improvements that will make your plant and equipment more reliable.

Our recommendation is that you urgently develop improvement strategies and plans to arrest the decline of the operational equipment reliability, rebuild the capabilities you need for reliability improvement and focus a minimum of 20 percent of your manning resources to rapidly improving the operations performance.

4.0 Discussion and Recommendations

The following recommendations, if implemented in the operation will contribute to an improvement in the maintenance performance, improve your plant reliability and availability and reduce maintenance costs.

4.1 Organisation Culture and Empowerment

Apart from Vision/Goals/Objectives, Maintenance Process Documentation, Document Control and Autonomous Maintenance, all other sub-areas within this key area were in the “Competent” range.

The strengths within this area were Safety & Environmental Management, People/Skills/Job Roles & Structure, Communications and Organisational Culture.

A serious opportunity for improvement in this area are the establishment of clearly defined maintenance visions, goals and objectives, formal maintenance process documentation (*policy and procedures*), clarification of maintenance job roles and responsibilities, and following all the maintenance procedures.

Another major opportunity to harness the maximum potential of the workforce is to change from the existing silo structure to an autonomous team based organisation where each team is responsible for delivery of outcomes.

4.1.1 It is recommended that autonomous production teams be introduced manned with persons with the skills and capabilities to deliver the necessary business results.

The safety culture evident on site was very good. Maintenance safety meetings are held weekly, with meeting minutes and follow up actions recorded into the site safe register. There is a separate dedicated maintenance safety noticeboard located in the crib room. There is a daily pre-start meeting which includes a safety topic.

A safety improvement opportunity was identified where the trades’ personnel were supposed to review or complete a JSA at the start of every job; however in reality this did not always happen.

4.1.2 It is recommended that the risk assessment step use of JSA’s or standard work instructions for all jobs be included into every job plan as a standard task that all trades personnel must complete on every job.

4.2 Work Management

Work Management is the foundation of effective maintenance and several key distinct steps or processes are used. These steps commence with work identification, recording and approval of the work, followed by planning and scheduling of the work, completing the work and recording any history. Shutdown planning and management is another key area of work management fundamentals.

The strengths in the Work Management in the operation was quite clearly work execution and shutdown planning and management.

The area with the greatest opportunity for improvement is Work Identification, primarily because the formal work request system in CMMS was not being used. This is due to a lack of training and password expiry issues. Most work requests for maintenance are verbal and this ensures that some will be missed and some will be poorly interpreted.

4.2.1 It is recommended that the appropriate training be provided so the CMMS is used for raising all maintenance work requests. (Do not be tempted with the alternative of using a carbon copy work request book, as the site must urgently become fully computer literate.)

At the time of the audit there were no formal maintenance systems or documented work management procedures in place for managing maintenance jobs through all the stages of the work management process. Although there once used to be a standard suite of maintenance procedures and processes used they are no longer representative of what happens on site.

Another opportunity for improvement is the re-implementation of these formalised maintenance business processes and procedures updated for <Insert Company> and CMMS.

There is no documented work escalation procedure and there are no definitions of Emergency or Urgent Work, although there used to be.

4.2.2 It is recommended that the full suite of maintenance work management procedures be updated and incorporated into the CMMS, after which they be re-implemented, including use of the work escalation procedure.

The call out procedure and work escalation is generally well followed on the back shifts; however on day shift, Production will usually go directly to the Maintenance Supervisor or Planner for any emergency or urgent work.

4.2.3 Move the Maintenance Planner away from becoming involved in the daily activities so they can concentrate on making the future successful by fully planning and preparing the schedulable maintenance work.

The call-out trades personnel carry mobile phones for emergency or urgent work on the back shifts. Most maintenance personnel carry 2-way radios.

4.2.4 On day shift one person from each trade i.e. Mech and Elec be nominated on-call fitter or electrician to be first point of contact for all emergency or urgent work. They carry a radio so that they can be easily contacted by Production.

The Operation does not have any formal systems or processes for contract variations or before additional work is undertaken. There are no contract management plans evident for any contractor and no formal process for managing contractor engagement or performance e.g. regular meetings before and during a project.

There are some quoted jobs e.g. Water tank repair, Fines Conveyor 7 upgrade and tank bases concrete repairs, however the majority of contractor payments is for labour hire on an hourly rate. Contractor timesheets are approved by the Maintenance Planners or Supervisors. Contractor invoices can only be approved by the Maintenance Superintendent or the Processing Manager.

Further observations in this area are documented in the objective audit spreadsheet in Appendix A.

4.3 Materials Management

There is a separate supply department on site which is responsible for all purchasing and inventory management on site.

All inventory and non inventory items correctly have unique stock numbers to industry recognised standards. Most key maintenance personnel (*Maintenance Planners and Supervisors*) had a copy of an excellent up to date hard copy print out of the stores catalogue, sorted by description and stock code.

There are no formal tools or analysis for managing stock levels, although stock levels are managed informally based upon known equipment criticality, local weather conditions and lead time.

Maintenance does have the bad practice of using squirrel stores, which are managed by maintenance. Replacement of items in the squirrel stores is by direct purchase.

The store is a 'closed' store, on the back shifts and semi-closed on day shift.

The strengths within the materials management area is the purchasing, management and control of the inventory within the store using computerised supply management systems and having formalised supply processes such as regular stock-takes, ANSI's (*Add New Stock Items*), direct purchase and stores requisitions.

Other strengths in the materials management area is that all maintenance materials are booked to maintenance work orders, having a separate lockable section for attractive items in the store and also having a closed store on the back shifts.

There is no formal process for identifying obsolete stock, apart from the slow moving stock report, which hasn't been issued recently.

4.3.1 It is recommended that formal stores procedures and stock analysis tools be implemented to formalise the inventory management process.

To gain access to the store on the back shifts requires two keys, the Shift Supervisors key and the on-call tradesperson's key. There is a stores person on day shift for issuing stock, although if a tradesperson knows the location of the parts they will self-pick the items. A stores requisition book must be appropriately completed in order to get stock.

Maintenance and Supply personnel interact on daily basis. All maintenance materials are booked to a work order and self picked by the trades person. Supply personnel enter the goods taken into CMMS and also expedite maintenance orders.

At the time of the audit there was no cyclic stock-takes being undertaken, although ad-hoc stock-takes are done every time stock is issued. The stores requisition sheet has provision for quantity required, quantity issued and quantity left, which is used. There was a stock-take completed at the end of the financial year.

All direct purchases for maintenance and stores requisitions are through paper based purchase and stores requisitions. Electronic requisitions and picking slips are not used.

4.3.2 It is recommended that electronic purchase and stores requisitions be implemented to streamline the maintenance /supply interface.

All direct purchase items have the Originators Name, Purchase Order No and Requisition No written on them and are put on a rack in the store for pick up. Originators are occasionally notified by e-mail that their direct purchase goods have arrived.

4.3.3 It is recommended that electronic notification of direct purchase items to the originator when the goods are receipted be instigated in CMMS. Alternatively e-mail all buyers when the goods have arrived.

General consumables, such as nuts and bolts, welding rods etc are readily available from the maintenance workshop. There is no consignment stock held onsite, however there are preferred suppliers. Easily stolen stores items (*eg drill bits, safety clothing, safety equipment etc*) are locked in a separate cupboard in the Store.

Because there is seven day coverage in the Store, very little (*if anything*) is purchased without a purchase order. An ad-hoc emergency procurement process whereby the planners will commit to a purchase and follow up with an order number later, although very little is purchased without an official purchase order.

Very few supply agreements are in place; however key suppliers for similar stock e.g. fasteners – Sweetman’s, Toyota parts – Spares Toyota, etc, do exist. Generally Supply purchase items from wherever they can get them, which is not good practice due to the impossibility to control the outcomes from such a wide range of suppliers.

4.3.4 It is recommended alliances and preferred supplier partnerships be established with as few suppliers as possible to minimise the work performed to buy and secure parts and maintenance materials .

Further observations in this area are documented in the objective audit spreadsheet in Appendix A.

4.4 Key Performance Measurement and Performance Monitoring

There are no control charts or graphs used for monitoring availability, reliability, plant capability or quality losses.

There were very few measurement of the maintenance business processes and equipment performance and it is an area with significant opportunity for improvement.

Backlog size is not formally monitored and the backlog definition is not consistent between maintenance personnel.

The only equipment performance KPI’s being measured was availability and reliability; however the equations are incorrect for the measures trying to be monitored and they also were not graphed for visual display. Reliability is being reported as the number of unscheduled jobs for the whole plant. Availability and reliability are both reported in the Operations Weekly report.

4.4.1 It is recommended that equipment availability and plant reliability be properly calculated for all key processes and graphed for all to see.

Other maintenance KPI's measured and reported on in the period report include "planned & scheduled" v's "breakdown" maintenance, schedule completion and maintenance costs against budget.

None of the maintenance business process KPI's are graphed and the figure for scheduled completion being reported is consistently over 100%, which indicates a lack of understanding of the KPI's. Service or PM completion is well done with greater than 95% completion.

Downtime history was available from year to year, but has not been used for any formal analysis or to construct any Pareto graphs.

There is no formal process for equipment performance analysis, root cause analysis or when a root cause analysis should be completed. Equipment performance may be discussed on an ad-hoc basis at the Daily Production Meeting and/or the weekly maintenance toolbox meeting.

4.4.2 It is recommended that formal equipment performance analysis be undertaken and regular Pareto graphs produced for review.

There used to be a formal major stoppage (*root cause analysis*) procedure used but has not been updated nor been used many years. The use of failure investigation and root cause analysis doesn't happen automatically and this will now need to be driven by senior site management.

4.4.3 It is recommended the formal root cause analysis procedure (see sample failure removal process in Appendix H) be re-implemented for any unplanned downtime in excess of two hours and be driven by the Processing Manager.

There were some equipment performance related improvement projects in progress; however there is no formal process for managing and keeping records of the projects.

4.4.4 It is recommended that all improvement projects be prioritised and formally managed with realistic target completion dates set and monitored on bar charts.

Further observations in this area are documented in the objective audit spreadsheet in Appendix A.

4.5 Budgeting & Cost Control

The current maintenance budget is effectively a work centre budget. Labour is allocated via the work order system to separate maintenance cost centres in the processing budget. There is a separate cost centre for maintenance overheads.

There are strengths and many opportunities for improvement in the Budgeting and Cost Control area. The strengths were in Cost Management and Work Centre Budgeting.

Improvement opportunities were Budgeting and Long Term Planning, Work Plan Budgeting, Cost Performance Analysis, Cost Improvement Projects and Cost Improvement Effectiveness.

Apart from regular plant shutdowns, there is no plan or schedule of major maintenance activities. Though there is a separate maintenance budget, prepared by the Maintenance Superintendent, the Maintenance Budget is rolled up into the Production Budget and is not made common knowledge or shared with other maintenance personnel. Most maintenance personnel interviewed were aware there is a maintenance budget, but have no knowledge of the details.

The budget was prepared by process area and maintenance expense elements and there is no separate budget for mechanical, electrical or ancillary services work centres. Budget preparation is mainly from last year's budget as a base and adjusted accordingly. There is no input from the Maintenance Supervisors and consequently no ownership or knowledge of the budget at supervisor level.

4.5.1 The recommendation is that the Maintenance Budget be provided down to Supervisor and Planner level so these personnel actually understand and can commit to the expenditure within their limits.

Apart from maintenance overheads, labour and materials are recharged to processing cost centres via work orders.

There is only one maintenance work centre for all maintenance activities, however separate work centres within maintenance for mechanical, electrical, services and light vehicles could be easily set up.

Because there is only one work centre within maintenance there are potentially several personnel that could spend money within that work centre, however all maintenance expenditure must be approved by the Maintenance Superintendent who is ultimately responsible for all expenditure within Maintenance.

4.5.2 It is recommended that work centres for mechanical, electrical, services and light vehicles be established with the respective supervisors actively assisting in developing budgets for their areas of responsibility.

There is no separate plan maintenance work order budget for maintenance jobs. A work plan budget is based upon the known preventive and routine maintenance jobs and major maintenance on an equipment-by-equipment basis.

4.5.3 It is recommended that all CMMS PM work plans be budget based on the known and major maintenance on an equipment-by-equipment basis for the site.

Further observations in this area are documented in the objective audit spreadsheet in Appendix A.

4.6 Information Technology

One of the key strengths in the Information Technology area is the use of CMMS, which is fully integrated with Purchasing and Accounts. CMMS is a very intuitive user friendly maintenance package that is capable of being used by production and trades personnel and supports the fundamental requirements of the maintenance business process.

CMMS has an electronic work request system which is not being used, primarily due to lack of training. Unfortunately CMMS has not been well implemented in many and many users are struggling with CMMS.

CMMS does have an on-line help facility and electronic manuals; however the only person with access to all the manuals is the CMMS administrator. Only one person on site had a hard copy manual.

CMMS has been set up with some maintenance codes such as work types, priority, work order status and resources, however some of these codes are ambiguous in their definitions and do not reflect recognised industry standard codes. None of these codes are documented outside of CMMS. The set up of CMMS with meaningful maintenance codes is essential for implementing, managing and analysing the maintenance work management process.

At the time of the audit, there were five priority codes and 13 work type codes which are considered to be too many; however they do cover the key maintenance job types.

4.6.1 It is recommended that CMMS users be appropriate trained and taught how to set up their screens for speedy, user friendly application.

Unfortunately CMMS has not been set up with Bills of Materials (*BOM's*) or structured fault codes and linked documents have been poorly set up. Also kit lists for PM Tasks are not used. There is no documented procedure for use of fault codes when closing work orders.

4.6.2 It is recommended that Bills of Material and structured codes as per the samples in Appendix F be set up in CMMS to improve its effectiveness, utilisation and user friendliness.

5.0 Key Improvement Opportunities

Using the framework from Table 1 it is suggested that strategies and line-of-site plans be developed to take the operation us to the 'Excellence Level' throughout the site.

5.1 Maintenance Capability

In order to escape the reactive practices and progress into a more proactive maintenance environment it is necessary to set a direction towards becoming a high performance maintenance organisation.

5.1.1 Develop a Maintenance Business Plan (Strategy)

It is recommended that improvement initiatives in the four areas still at the Awareness Level first be undertaken. These are outlined as follows:

5.1.1.1 Reliability Improvement

Maintenance personnel at all levels require a clear view of how to improve reliability in order to:

- Motivate them to action
- Ensure that short term decisions are consistent with the longer term plan
- Enable reliability benchmarks to be set, against which performance can be measured

It is therefore recommended, that a longer term strategy to improve the capacity of each person to improve the equipment reliability in the operation be completed. The strategy should:

- Be developed with the involvement of maintenance personnel at all levels, including the trades personnel;
- Include development of new precision skills
- Payment for higher capabilities as people prove themselves willing and able to deliver reliability growth.

6.0 Conclusion

In conclusion, there are many opportunities to improve the maintenance performance at <Insert Site>. The challenge is to ensure focus on making the most significant improvements first, and in being selective about the areas for improvement to focus on. Trying to make too many improvements simultaneously frequently means that little is achieved at all.

Nevertheless, this improvement journey should be guided by a longer-term vision and plan and it is strongly recommended this plan be developed as the first step and your people be involved in the plan's development and that its progress be regularly communicated to all personnel.

Some high priority opportunities for maintenance to improve their performance have been outlined and all the recommendations in this report have been prioritised as shown in Appendix C.

If the recommendations of this report are adopted, then your Operations should see significant benefits.

If there are any queries on any aspect of this report, please direct them to the Author via our head office.