

Asset Management Performance Review

84 Point Questionnaire

(Confidential)

Your Company: _____

Your Name: _____

Date Completed: _____

Questionnaire Scope and Confidentiality

The following questionnaire is a self-administered audit of your company's opportunities to improve physical asset management, maintenance management, and plant/equipment reliability.

This questionnaire is a tested method and a proven analytical tool to help you advance your operational, maintenance and business performance. The information you complete is for confidential use between your company and us. Its contents will not be discussed, shared or viewed by others.

The questionnaire is written in a life-cycle format starting with the Feasibility phase and sequencing through Financial Approval, Detailed Design, Procurement and Fabrication, Construction, Installation and Commissioning, Operations and Maintenance, De-commissioning.

Please complete the questionnaire as best you can with as complete details as possible. If a question is not relevant, just mark in N/A (Not Applicable). If the practice suggested in a question is not done in your company write 'Not done at present'. If you do not have answers to a question, or you do not understand the question, do not concern yourself. We will discuss them with you later if it is necessary.

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Please respect these rights and protections by using this document solely for your company and the purpose intended.

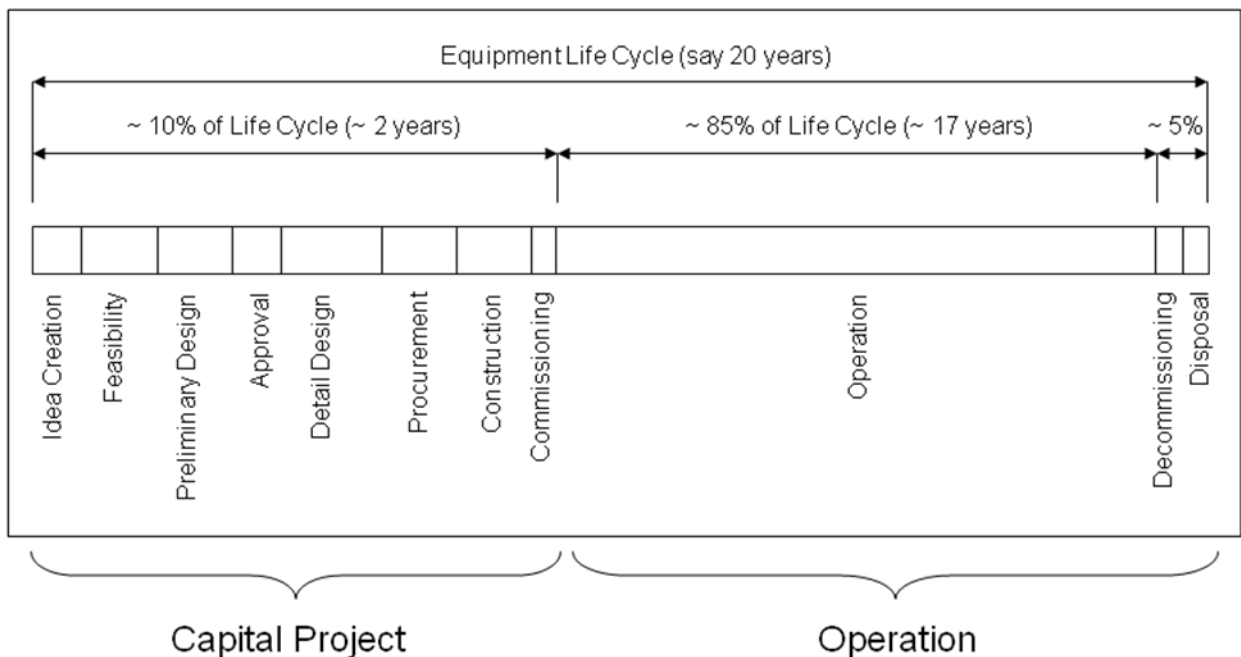
Upon Completion

If you wish you can forward a copy of the completed questionnaire to us for our opinion by scanning it and attaching it to an email sent to info@lifetime-reliability.com. Whether we chose to reply and make comments is entirely at our discretion. As we do not know your circumstances any suggestions that we make which you adopt are wholly at your risk.

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Plant and Equipment Life Cycle



1 Feasibility Stage Opportunities

Feasibility Phase – the initial engineering investigations and preliminary design work to establish project costs associated with operational requirements, environmental requirements, safety case requirements, and submission of total capital requirements for financial approval

1.1 Describe the process of how new plant and equipment is specified and selected.

1.2 What method does your organisation use to identify future cost of equipment ownership?

1.3 What method is used to identify likely 1) equipment installation risks and 2) equipment operating risks associated with the use of a proposed process or item of plant?

1.4 What is the extent of risk analyse conducted for new projects and equipment prior to placing an order?

1.5 What consideration is given to standardisation of equipment and technologies when considering new projects and equipment?

1.6 Describe the extent and detail of engineering design conducted for projects and new equipment installations as part of their feasibility prior to financial approval?

1.7 Describe the extent of input from the Operations and Maintenance groups during the feasibility phase.

1.8 Is Equipment Criticality of all plant items identified during feasibility? If so describe the process used to determine Equipment Criticality.

1.9 How is process uptime and plant availability requirements specified for the feasibility investigation?

1.10 What reliability modelling is done to confirm the required process uptime and plant availability?

1.11 What level of equipment failure analysis is conducted during feasibility? What methodology is used?

1.12 What accuracy of capital estimate is required for submission to get financial approval? Describe the steps taken to arrive at that level of accuracy.

1.13 Explain what financial modelling is done for a project during feasibility. How are the operating and maintenance costs determined in the model?

1.14 What level of analysis is conducted to identify start-up and early-life plant and equipment problems?

1.15 What levels of parts sparing is identified during the feasibility?

2 Project Approval Stage Opportunities

Project Approval – review of the financial justification, and analysis of business risk prior approval, or not, of capital expenditure

2.1 Describe the process of how your organisation decides to approve, or not approve, the financing of a capital proposal.

2.2 What sensitivity analysis is performed on a project proposal? Describe what factors are used or considered during the sensitivity analysis.

2.3 What level of production process design is prepared for costing a project?

< 20%	30%-40%	50%-60%	70%-80%	90%-100%
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2.4 What level of detailed engineering design is done for costing a project?

< 20%	20%-30%	30%-40%	40%-50%	50%-60%
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2.5 List all the documents prepared during the feasibility phase to develop the capital costing.

3 Detailed Design Phase Opportunities

Detailed Design – the development of all engineering calculations, engineering specifications, production plant drawings, fabrication drawings, electrical/mechanical/civil/structural drawings, equipment selection specifications, maintenance strategy, maintenance documentation, construction specifications, and contractual documentation needed to build, commission and operate the project and its equipment

3.1 Describe how the detailed design process is controlled to ensure it meets business requirements and list the documents generated to provide the control.

3.2 Describe the level of involvement provided by the Operations and Maintenance groups during the detailed design?

3.3 What engineering standards does the organisation use during detailed design?

3.4 Describe what efforts are made to standardise equipment across the company when new projects are being designed?

3.5 What involvement do the Operations and Maintenance groups have with approving the selection of operating plant and equipment?

3.6 What methodology is adopted during detailed design to identify the maintenance requirements of the production plant and equipment? Who does the analysis?

3.7 What operating procedures are developed during the detailed design phase?

3.8 What maintenance procedures are developed during the detailed design phase?

3.9 When is the equipment maintenance database populated to contain required materials purchasing information and maintenance information? Who performs this activity?

3.10 What engineering is done and what specifications are written to provide equipment foundations suitable for machine vibration control?

3.11 What engineering is done and what specifications are written to provide stiff equipment base plates/frames that prevent vibration?

3.12 What engineering is performed and what specifications are written to ensure equipment is installed so they are distortion-free at operating conditions?

3.13 Describe how each of the following are specified and confirmed for rotating equipment:

Balancing: _____

Shaft Alignment: _____

Lubrication Standard: _____

Bolt Tension: _____

Bearing Vibration: _____

Bearing Selection: _____

3.14 Describe the documentation provided and the process used to control the quality of equipment and materials supplied to a project.

3.15 Explain how operating hazards, risks and operating costs are identified and addressed during the detailed design.

3.16 Describe what analysis is performed and documents developed during detailed design to improve maintainability?

3.17 Describe the analysis performed and the documents provided during detailed design to address supportability¹?

3.18 List the project and design documents and records passed to the operations and maintenance groups from the detailed design.

¹ Supportability – a measure of the ability of an item to deliver its intended service for the least cost of ownership

4 Procurement and Fabrication Phase Opportunities

Procurement – the detailed specification and purchase of equipment and materials to construct and start-up the operation

4.1 Describe the purchasing process and documentation provided to buy project equipment.

4.2 Describe how Original Equipment Suppliers proposals are confirmed to be suitable for the required duty and service life in the plant, and list the documents developed from that process.

4.3 What documents are Equipment Suppliers requested to supply with 1) their proposals and 2) with the equipment they provide? Who are involved with reviewing these documents before equipment is purchased?

4.4 How is the equipment items delivered to-site confirmed to be what was originally ordered?

4.5 What documented evidence do Suppliers provide to 1) confirm the equipment is suitable for the required service and 2) to confirm the quality of manufacture?

4.6 What is done to ensure equipment is safely delivered to-site without damage? Describe a recent example.

4.7 Does the operation use second-hand equipment? If so, describe the second-hand equipment types brought and used and the extent of refurbishment provided before going into service.

5 Construction, Installation and Commissioning Phase Opportunities

***Construction** – site works, earthworks, services, materials and labour to build the Operations’ physical infrastructure and buildings for its people and equipment to make production*

***Installation** – the placing and mounting of plant and equipment into position on their foundations and the provision of services and process interconnections to operate them at design specification to make quality product at the required plant availability and production rate*

***Commissioning** – testing and proving the plant and equipment can be operated safely and will meet all design specifications prior to acceptance and handover*

5.1 Describe how plant and equipment installation is controlled to ensure it meets the equipment manufacturer’s requirements.

5.2 What 1) installation standards are used for plant and equipment installation and 2) what documented evidence is required that they have been met?

5.3 Explain the commissioning process and the documents developed to control it.

5.4 What individual equipment commissioning records are kept as proof that the equipment meets its duty requirements?

6 Operations and Maintenance Phase Opportunities

Operations – safely and sustainably running plant and equipment to produce in-specification product at the design rate and cost for distribution

Maintenance – the care and sustenance of operating plant and equipment to ensure it safely delivers its design duty for least operating costs

6.1 Explain how the equipment maintenance strategy is arrived at.

6.2 What level of training are plant and equipment operators provided and by whom? Describe how operators are trained and tested.

6.3 Explain how the quality of maintenance work done on equipment is 1) specified and 2) confirmed as being achieved.

6.4 Describe the process and documentation provided for purchasing replacement equipment.

6.5 Describe how equipment parts are purchased, issued and replenished.

6.6 What proportion of maintenance materials used annually are kept and provided direct from suppliers instead of keeping them in your own store?

<20% 20%-30% 30%-40% 40%-50% 50%-60% 60%-70% >70%

6.7 Describe the range of emergency spares carried in your store.

6.8 How often in a year are stocked materials, or parts delivered to-site for a job, not available or not found when required? Describe a recent example.

6.9 Explain in detail the change management process used in your operation.

6.10 Describe the amount of preparation, planning and risk analysis conducted before plant and equipment is removed from service for maintenance.

6.11 Describe how maintenance work is planned and prepared. Who does the planning? Who does the purchasing?

6.12 Describe how maintenance work is scheduled with Production to be done.

6.13 What proportion of maintenance work is planned and prepared ready to be done before it is allocated to a worker to do? Describe what information and documentation is given to the maintainer to do a maintenance job.

6.14 What is the average weekly ratio of scheduled maintenance work orders to all maintenance work orders done for the last eight (8) weeks?

6.15 How many weeks maintenance backlog (uncompleted work orders) is there at present?

6.16 What information is exchanged between the Operations and Maintenance groups on a 1) daily basis, 2) weekly basis, 3) monthly basis, 4) long-term basis? What processes and documents are used to facilitate the exchange of each sort of information?

6.17 Describe the various methods employed in the operation to identify equipment problems and resolve them.

6.18 When was the last time that a process was value-stream mapped for efficiency improvements?

6.19 Where are 5S practices used in the operation?

6.20 Is a quality management system is used in conducting production/operations? If so what standard does it meet?

6.21 Which quality management system is used in doing maintenance work?

6.22 What maintenance activities are performed by the plant and equipment operators?

6.23 What condition monitoring technologies are used on-site? What equipment types is each one used on?

6.24 How many training days a year on average are given to a maintenance person? What training is provided to maintainers?

6.25 How many training days a year on average are given to an operator? What training is provided to operators?

6.26 List the key performance indicators used to monitor 1) equipment performance, 2) maintenance performance, 3) production performance

6.27 Is there a maintenance vision for the operation? Describe it if there is one.

6.28 Who is involved in 1) determining the maintenance strategy and 2) reviewing its effectiveness?

6.29 What is the ratio of reliability specialist to maintenance employees? Describe the qualifications required for a reliability specialist in your operation.

6.30 Are long-term hired contractors and/or permanent maintenance employees used to do maintenance in the operation? What are typical manning levels for the two types? List the

disciplines covered by contractors and by permanent employees and describe the type of maintenance activities done by each.

7 Plant Decommissioning Opportunities

Decommissioning – the safe removal from service of plant and equipment for sale, storage or scrapping.

7.1 What is done with the documentation and operating/maintenance history of equipment removed from service?

7.2 What is done to the spares holding of equipment removed from service?

7.3 Are documented procedures developed for decommissioning plant? If so what is the content of such procedures?

7.4 Describe the risk review process used when decommissioning plant and removing it from service?

7.5 List the standards, laws and regulations that apply to your operation with regards scrapping, storing or on-selling decommissioned plant and equipment.
