



Strategies for Excellence in Maintenance Management

INTRODUCTION



INTRODUCTION 1/6

- ❖ In most companies, business suffers because we don't pay enough attention to maintenance.
- ❖ What do we gain by maintaining our physical assets with the same care as our human and financial resources?
 - ❖ First and foremost, we gain Uptime– the capacity to produce and provide goods and services.
 - ❖ Also, we expand our process capability, or the ability to produce goods and services to the customer's satisfaction, consistently.
 - ❖ Finally, more than ever, we can predictably provide a safe and controlled work or service environment, with a minimum of risk.
- ❖ Many senior executives and managers are surprised at the total cost of maintenance. Fig.1



INTRODUCTION 2/6

Sector	Percentage
Mining	20 to 50
Primary metal	15 to 25
Manufacturing	5 to 15
Processing	3 to 15
Fabrication & assembly	3 to 5

Figure 1. Ratio of Direct maintenance Cost to Total Value-Added Costs



INTRODUCTION 3/6

- ❖ Several key concerns impact the cost of asset maintenance. Some of them are difficult, indeed, to quantify:
 - How do we attract and keep capable people to maintain sophisticated equipment systems?
 - What is the optimum level of inventory of maintenance parts, materials, and consumables?
 - Do we need specialist maintenance engineering support?
 - What organization arrangements are appropriate?
 - How much and what should we contract out?



INTRODUCTION 4/6

- ❖ **Business is under enormous pressure to be financially productive.**
- ❖ **Everywhere, the dictum is the same – maximize output of goods and services and minimize input of resources – financial, human, and physical. Provide the best value to both the customer and the shareholder, but at the same time be environmentally conscious.**
- ❖ **Providing value clearly has to do with giving the best quality, at the least price. To satisfy customers, an enterprise must respond quickly to service goods throughout their life cycle. It follows, then:**



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$$\text{Value to the customer} = \frac{\text{Quality x Service}}{\text{Cost x Time x Risk}}$$



INTRODUCTION 6/6

- ❖ World class enterprises are responding to this value equation.
- ❖ Maintenance management is important to all business sectors – and critical to those that are capital intensive.
- ❖ *Uptime* is a discussion of some of the latest thinking and practices for maintenance management.
- ❖ *Uptime* is structured in four parts: beginning with effective leadership, then gaining control of the maintenance functions advancing to continuous improvement activities, which set the stage for quantum leaps in asset productivity. Fig.2

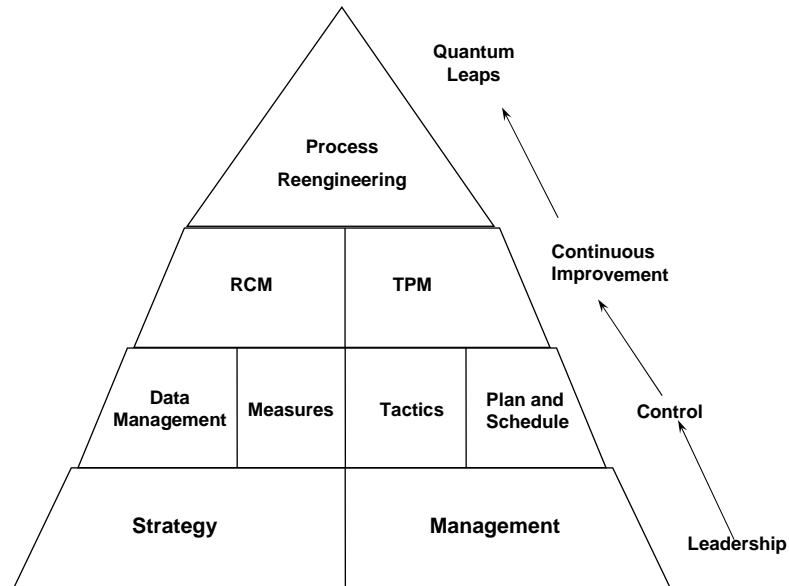


Figure 2. World Class Maintenance



Building a Maintenance Strategy

Section 1



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INTRODUCTION 1/2

- ❖ In larger enterprises, such as manufacturing and processing plants, most employees and specialist managers do not know their customers or understand their real needs.
- ❖ This crucial information is lifted to the sales staff or marketing department.
- ❖ They, in turn, pass along what they learn to the corporate development department.
- ❖ Keep in mind that what works for maintenance is not much different than for the business generally.
- ❖ You have to know where you are, how well you are doing, and where you are going.



INTRODUCTION 2/2

- ❖ A typical business strategy has the following elements:
 - ❖ A description of the current products and services, and of the key customers and their degree of satisfaction.
 - ❖ An analysis of the financial performance
 - ❖ A review of the competitive environment and state of the market place.
 - ❖ The strengths, weaknesses, and key competitive dimensions of the business
 - ❖ A description of the business vision in, say, five years
 - ❖ A statement of the mission, guiding principles, and major objectives to be accomplished and the business plan to achieve them.
- ❖ Once they company defines and communicate its business strategy, the same approach can be applied to maintenance.



MAINTENANCE MANAGEMENT IN CONTEXT 1/3

- ❖ Simply stated, maintenance keeps an asset performing to the standard that is required.
- ❖ Maintenance management deals with the planning, organizing, and controlling it takes to accomplish that.
- ❖ But many questions remain unanswered.
 - ❖ Can we design for better maintainability?
 - ❖ Can operating procedures affect asset performance?
 - ❖ How does maintenance impact asset life-cycle costs?
- ❖ Clearly, maintenance is only part of the asset life cycle.
- ❖ Maintenance is one step in a nine-step asset management process, described in Fig. 1.1.



MAINTENANCE MANAGEMENT IN CONTEXT 2/3

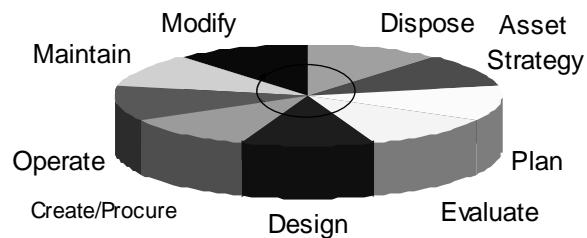


Figure 1-1. Optimizing Life-Cycle Investment Value



MAINTENANCE MANAGEMENT IN CONTEXT3/3

- ❖ We are also programmed to think and act in functional silos “I design, you operate, and someone else fixes” – that we often miss the overall business process.
- ❖ Asset management begins by asking why the asset is required and how it relates to the business plan.
- ❖ After that a closer look sets the purposes, function, and standards or performance.
- ❖ Reaping the cost-benefits of an assets rests on all nine steps.
- ❖ Ideally, maintenance, operations, engineering, materials, accounting, and any other relevant department will be involved each step of the way.



FRAMEWORK FOR THE STRATEGY 1/4

- ❖ Building a maintenance strategy follows the model described in Fig.1.2.
- ❖ Foremost in any business plan are the needs and wants of the customers, shareholders, and other stakeholders.
- ❖ The key objectives for each function and element in the business strategy are drafted with them in mind.
- ❖ Maintenance is likely to have the following targets:
 - ❖ Maximize the production rate of a particular product.
 - ❖ Phase out the operation of a plant or product line.
 - ❖ Add productive capability (assets) for another plant.
 - ❖ Eliminate store inventories through vendor partnering.



FRAMEWORK FOR THE STRATEGY 2/4

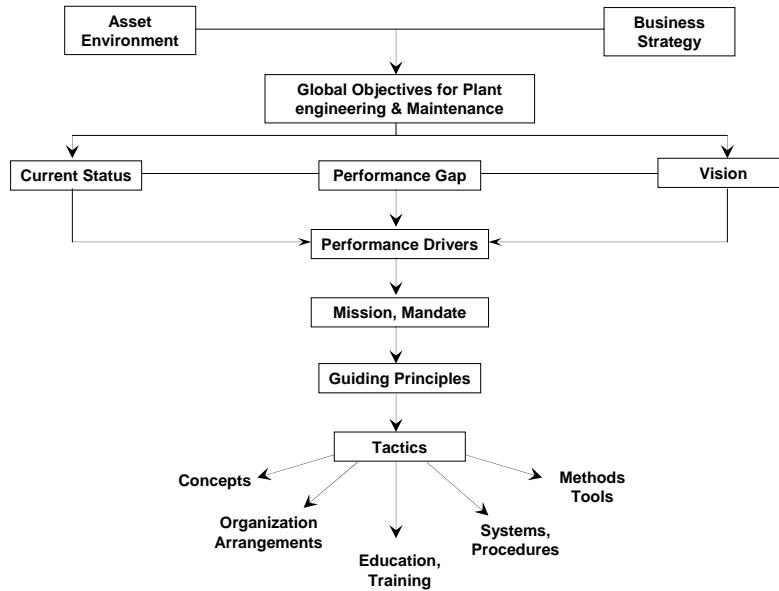


Figure 1-2. Maintenance Strategy Model



FRAMEWORK FOR THE STRATEGY 3/4

- ❖ A maintenance strategy is like any other tool of business - it is not meant to hammer away in only one direction.
- ❖ If the company's situation changes, so must the maintenance model.
- ❖ One organization restructured so radically that every job was altered. Former employees could apply for the fewer positions that resulted.



FRAMEWORK FOR THE STRATEGY 4/4

- ❖ The new maintenance engineering manager set key three-year objectives.
 1. To re-engineer the entire maintenance management process, with particular emphasis on preventive and planned corrective work.
 2. To set the terms for, select, and implement a computerized maintenance and inventory management system.
 3. To introduce a multi-skilling pilot project in conjunction with the union local.
 4. To augment the short – medium -, and long-range maintenance planning capabilities.
- ❖ These four objectives were the foundation of the maintenance vision.
- ❖ To implement them, there is a need to evaluate the current status.



THE MAINTENANCE DIAGNOSTIC 1/8

- ❖ Maintenance improvement fails when there's little understanding of the situation at hand.
- ❖ Before embarking on an improvement program, assess thoroughly the strengths and weaknesses of the present system and which areas should head the list for enhancements.
- ❖ It should be comprehensive and cover strategic, procedural, technical, administrative, and cultural issues



THE MAINTENANCE DIAGNOSTIC 2/8

- ❖ **Appendix A is the table of contents of a maintenance management diagnostic review. Major areas of this review are:**
 - ❖ **Business characteristics**
 - ❖ **Maintenance environment and strategy**
 - ❖ **Organization arrangements and human resource management**
 - ❖ **Maintenance administration**
 - ❖ **Planning, scheduling, and work order management**
 - ❖ **Preventive and predictive maintenance (tactics)**
 - ❖ **Equipment records and histories**
 - ❖ **Purchasing, storage, and parts inventory control**
 - ❖ **Performance measurement and customer satisfaction.**
 - ❖ **Automation and information technology**

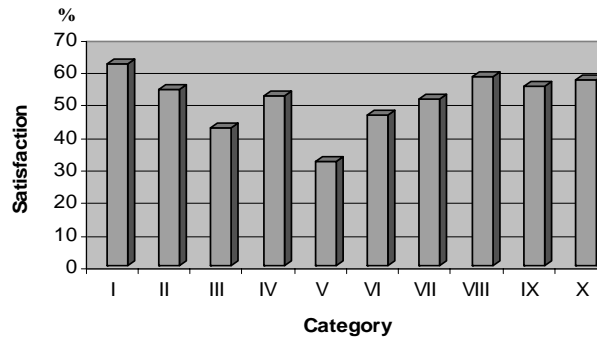


THE MAINTENANCE DIAGNOSTIC 3/8

- ❖ **Another way to perform assessment is to distribute a self-administered questionnaire. Participants are asked to rate various aspects of plant engineering and maintenance.**
- ❖ **Each response is scored and plotted either on a histogram (Figure 1.3) or on a Bell-Mason type spider diagram (Figure 1.4).**
- ❖ **In Figure 1.3, this example has ten categories. The areas requiring the greatest attention are performance monitoring and reporting, and the work order system.**



THE MAINTENANCE DIAGNOSTIC 4/8



- I. Maintenance
- II. Organization & Administration
- III. Work Order System
- IV. PM & Failure Analysis
- V. Performance Monitoring and Reporting
- VI. Stores and Purchasing
- VII. Cost control
- VIII. Safety and Housekeeping
- IX. Maintenance Engineering
- X. Training

Figure 1-3. Self-Evaluation of Maintenance Management Summary Results



THE MAINTENANCE DIAGNOSTIC 5/8

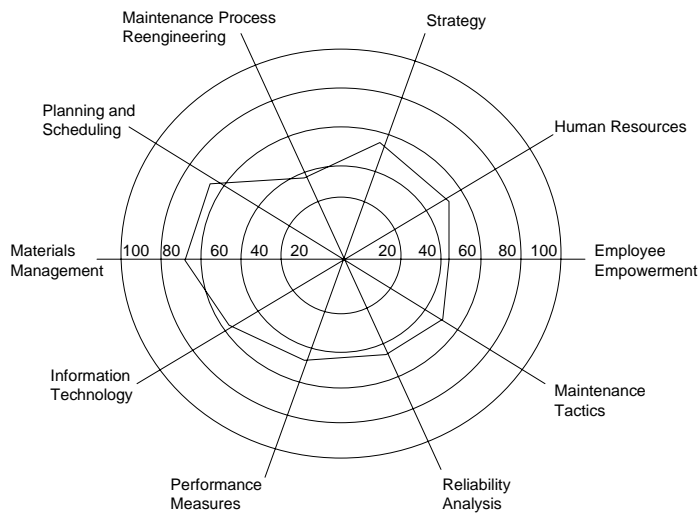


Figure 1-4. Maintenance Self-Assessment Results



THE MAINTENANCE DIAGNOSTIC 6/8

- ❖ Finally, maintenance management is perceived differently throughout an organization.
 - ❖ Production, engineering, senior management, an area or trades grouping – all have their own needs. A simple grid, measuring nine broad areas against the current status, can give a qualitative score, from Innocence to Excellence. Figure 1.5 provides an example.



THE MAINTENANCE DIAGNOSTIC 7/8

MAINTENANCE EXCELLENCE GRID

	Strategy	Human resources Management	Planning & Scheduling	Maintenance Tactics
EXCELLENCE	Set corporate maintenance strategy/asset strategy	Multi-skilled independent trades	Long-term and major project planning & engineering	All tactics employee-based on analysis
COMPETENCE	Long-term Improvement plan	Some multi-skilled	Good job planning scheduling, engineering support	Some CBM; some PM; few surprises
UNDERSTANDING	Annual improvement plan	Decentralized mixed trades groups	Planning group established, ad hoc engineering	Time and use based inspections; some NDT
AWARENESS	PM improvement plan	Partly centralized for some trades	Trouble shooting support; inspection scheduling	Time-based inspections
INNOCENCE	Mostly reactive to breakdowns	Highly centralized	No planning; little scheduling; no engineering	Annual shutdown inspections only



THE MAINTENANCE DIAGNOSTIC 8/8

MAINTENANCE EXCELLENCE GRID (CONTINUED)

	Performance measures	Information Technology	Employee Involvement	Reliability Analysis	Process Analysis
EXCELLENCE	Equipment effectiveness; benchmarking; full cost database	Fully integrated; common database	Autonomous work teams	Full value-risk program	Regular review of process cost, time, quality
COMPETENCE	MTBF/MTTR availability; separate maintenance costs	Fully functional; linked to financials/materials	Continuous improvement teams	Some FMECA applied	Some review of administration, engineering & trades process
UNDERSTANDING	Downtime by cause; maintenance cost available	Fully functional; no link to other systems	Formal workplace improvement committees	Good failure database; sell used	Some reviews of trades processes, tactics
AWARENESS	Some downtime records, maintenance costs not segregated	Basic maintenance scheduling; some parts records	Some improvement, safety meetings	Collect the data; little used	A one-time review of maintenance process
INNOCENCE	No systematic approach; maintenance costs not available	Manual or ad hoc specialty systems	Only union-staff mandated meetings	No failure records	Never reviewed



DEVELOPING THE VISION 1/3

- ❖ **Once you understand where maintenance management stands, a shared vision must be developed.**
- ❖ ***The difference between the current reality and the vision is, in essence, your maintenance improvement plan.***
- ❖ **Goals must be based on the overall business plan, and the major differences between “best practice” and current reality must be understood. Two steps remain:**
 - ❖ **Ensuring “best practice” is a realistic vision for your industry sector and your particular operation.**
 - ❖ **Setting priorities for the various factors assessed.**



DEVELOPING THE VISION 2/3

- ❖ **Benchmarking is an excellent way to start. This technique involves looking at how the leaders in the field achieve your own performance targets.**
- ❖ **A published review of maintenance engineering may be the best option. Technology and management periodicals and newsletters often publish features on innovation and best practice.**
- ❖ **Understand your own strengths and weakness before studying how others manage maintenance.**
- ❖ **There is a significant difference between stating a vision and having all concerned accept.**
- ❖ **Those who will be responsible for achieving the vision should be involved in the maintenance plan.**



DEVELOPING THE VISION 3/3

- ❖ **Giving them the chance to help create the plan will encourage the participants to pull together. They'll feel responsible for making it work.**
- ❖ **Someone to facilitate this group session should have no direct stake in the outcome.**
- ❖ **That way, you'll get objective leadership and more individual involvement.**



CLOSING THE GAP-PLANNING IMPLEMENTATION 1/3

- ❖ **With the maintenance review and vision determined, you must devise a plan for achieving the vision. Consider**
 - * **The task and its key activities. For example, Planning and Scheduling includes identification, prioritization, materials, labor/skills, work steps, safety considerations, justification, etc.**
 - * **The priority of the initiative.**
 - * **Estimated resources and level of effort required.**
 - * **The “Champion,” or person responsible for ensuring successful completion, and the “sponsor” to provide the resources.**



CLOSING THE GAP-PLANNING IMPLEMENTATION 2/3

- * **The start date, completion date, and milestones along the way.**
 - * **The goal to be achieved on successful completion, and what you’re going to measure to determine if you’re on the right track.**
- Example: One business with a solid history of reliability and profitability developed an overall physical asset management strategy, which dealt with most of the asset management process described in Figure 1-2.**



CLOSING THE GAP-PLANNING IMPLEMENTATION 3/3

- ❖ **The mission** – “To maintain asset to meet customers’ needs cost effectively; to continuously improve skills and process to optimize asset life, using best-fit methods and technologies; to work safely and be environmentally responsible.
- ❖ **Objectives** – Five long-term objectives were selected to fill the gaps between the reality and vision. The focus was on having higher equipment effectiveness than the industry average at a lower maintenance cost based on the replacement value of assets employed.
- ❖ **Action** – Each objective was “owned” by a champion, who committed resources, developed a timetable, and structured a detailed implementation plan.



CONTRACT MAINTENANCE

- ❖ **Contracting maintenance activities is strategically important.** Most business contract out some form of maintenance.
- ❖ **In North America, about 15 percent of maintenance is subcontracted to a third party; in Japan and Europe, it is about double that.**
- ❖ **Something that allows you to compete and win in the marketplace.**
- ❖ **Ensure that performance standards are set and monitored closely.** There should be clear lines drawn between in-house and contract involvement.
- ❖ **Despite a clear strategy, the best-laid plans can go astray.**
- ❖ **You have to know your customers, then dedicate yourself to satisfying their needs.**



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