

Maximizes Asset Use, Profit

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(Maintenance Management – Outsourcing)

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1. ABSTRACT

Maintenance Outsourcing Services aim to accelerate return on investment by reducing costs and increasing asset effectiveness. Management contracts with specialized companies achieved these results and more.

The goals of Maintenance Service are optimize the plant, minimizing equipment failures, maximizing availability, and establishing the type of cultural changes that sustain those achievements far into the future. The contract begins by measuring areas of the plant that were underperforming and that offer opportunities for cost reduction. Equipment and procedures are then engineered to improve this situation. Cultural change consolidates and sustains those improvements.

Maintenance Outsourcing Services helps customers to generate savings through asset consolidation and higher asset productivity. The plant is audited to find areas where automation, equipment modifications, and reliability centered maintenance will make a significant difference.

This approach, which is the basis for all Maintenance Outsourcing Services, ensures profits for the customer.

- ✓ **Benefits**
- ✓ **Outsourced maintenance excellence**
- ✓ **Performance based KPI's measured**
- ✓ **Lowering maintenance costs and increasing profits**
- ✓ **Improved operational results, including lower energy costs**
- ✓ **Increased equipment availability and usage**
- ✓ **Process optimization**
- ✓ **Implementation of quality standards**

Throughout this case of Maintenance Outsourcing Services, we will try to show the implementation of Maintenance Methodology Master Plan, in order to establish the tasks to Maximizes Asset Use and reduce the maintenance cost of de plants.

2. INTRODUCTION

The globalization of the world economy, resulting in increased competition and price erosion has led manufacturers to focus more on their core business and to sub-contract support functions. Customers are therefore concentrating especially on restructuring and improving the efficiency and effectiveness of their operations. Doing this, professional up-to-date maintenance has emerged as the new way to improve asset performance, to increase product quality and to lower costs. Hence, customers started to think of new ways and means of handling their maintenance, e.g. by looking for long term maintenance partnership agreements with shared interest in results.

General contracts with large Maintenance Services Companies. They are required financial capacity, legal support, trade union management, capital for maintenance of high-cost and regularly off-service equipment, administrative and accountancy infrastructure as well as financial and banking infrastructure, etc.

The Service answer to this new market demand is Full Service. Optimize the customer's maintenance function, and maximize production availability and effectiveness means **“better performance at lower cost”**.

3. PRESENTATION & ANALISYS

3.1 *Implementation of the Outsourcing Maintenance*

Mobilization includes the following organizational aspects and activities:

- Mobilization of an HR team in order to establish the personnel evaluation and selection process, in conjunction with the Project Leader of the contract.
- Definition and location of the offices and support areas' layout.
- Adaptation of the new facilities including the maintenance Laboratory/Workshop and offices.
- Provision of patterns, vehicles, tools, instruments, etc.
- Interface of Operation and Maintenance with internal customers.

3.2 *Engineering and Equipment Improvement Studies*

It establishes guidelines to develop engineering studies that will allow for improvements in the performance of the industrial facilities where Maintenance Outsourcing carries out works, and it also increases the general productivity of internal processes, which have a direct impact on competitiveness.

Obtaining better productivity results derives, among other factors, from an increase in the performance of operational units through the optimization and reduction of the different losses in production processes.

The necessary improvements in the equipment and systems may involve different aspects, such as the revision of the basic project, evaluation of process conditions, analysis of failures and discussion on operational and maintenance procedures.

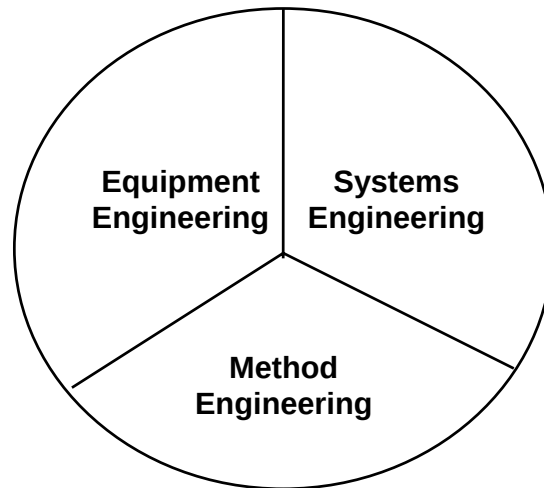
Thus, the reduction of losses and introduction of improvements in production processes depend on the integrated work of **“Maintenance Engineering”** with **“Process Engineering”** and **“Project Engineering”**.

- a- **Process Engineering's** function is developed through actions in the Basic Engineering and Process Follow-up segments, and it is usually carried out by the Customer.
- b- **Project Engineering's** function involves the detailed description of the Basic Project and includes the following aspects:
 - Equipment/instrument layout and specification;
 - Piping project;

- Electric and control systems project;
- Structure and equipment calculation;
- Preparation of designs, data sheets and as-built.

In addition, Project Engineering is usually carried out by the Customer's team.

- c- **Maintenance Engineering's** function is developed through actions in three basic segments: Equipment Engineering, Method Engineering and System Engineering.



- **Equipment Engineering**

Development of analyses and technical solutions that intend to increase the reliability and operational availability of a component, equipment or production system, involving aspects such as:

- Analysis of repeated failures;
- Revision of the project;
- Integrity evaluation;
- Performance evaluation;
- Specification of new materials.

- **Method Engineering**

Development and improvement of the means to execute maintenance activities, in order to increase productivity and labor quality, which involves aspects such as:

- Operational procedures;
- Tools/devices;
- Technological updates.
-

- **Systems Engineering**

Development and improvement of maintenance management techniques, which adjust to the individual characteristics of each case, such as:

- Management models;
- Managerial tools;
- Standardization;
- Audits.

3.3 *Stages in the Improvement Study Work*

3.3.1 Identification of Problems

Maintenance engineering studies are developed from the identification of their need, through:

- Preliminary survey of chronic and/or critical problems, in conjunction with the Customer;
- Development of the maintenance strategy, through policy characterization;
- Systematic evaluation of historical records.

The survey should typically include aspects involving:

- Equipment defects or failures that may affect availability, reliability, performance and product quality;
- Safety;
- Operation (facilities, rationalizations, etc.);
- Easily accessible and executable maintenance;
- Costs;
- Rationalization of maintenance work.

All aspects inherent to methods, equipment and systems involved in the process are eventual study issues.

3.3.2 Preliminary Analysis

Once problems have been identified, a preliminary analysis is carried out which allows for the following definitions:

- Scope of the studies;
- Benefits;
- Responsible individuals;
- Schedule/terms;
- Budget;
- Priority.

3.3.3 Preparation of the Study

The development of a real engineering study consists of gathering and dealing with the surveyed data through analysis in order to identify and understand phenomena, correlations, trend studies, calculations, etc. These analyses should lead to identify the causes of the problems and proposals to solve them, which will be submitted in a report format.

All engineering studies should generate reports. Studies involving the customer's industrial assets should have reports sent to the customer, with the following issues in mind:

- Level information;
- Discuss and consolidate information with the customer;
- Obtain the customer's approval and commitment to handle and implement the recommendations made.

3.3.4 Implementation of Recommendations and Improvements

The implementation of approved solutions, recommendations and improvements is the coordinators' responsibility, in conjunction with the contract's MAINTENANCE ENGINEERING'S advice.

In the case of studies prepared by Maintenance Engineering, or where so requested by the contract, the implementation of solutions may also involve its advisory assistance.

3.3.5 Documentation Updates

The updates of technical maintenance documents concerning the study carried out will be handled by the contract's Engineering Group.

The updates of the project's technical documentation is the customer's responsibility and will be carried out by MAINTENANCE ENGINEERING.

3.3.6 Comparison of Results

Once the recommended solutions have been implemented, their results are measured and the actual benefits compared with the expected ones.

This follow-up should be conducted by the contract's MAINTENANCE ENGINEERING and the comparative analysis attached to the original report.

3.3.7 Integration among Result Centers

Maintenance Engineering of the Maintenance Management Contracts should, whenever possible, find technical solutions, mainly in geographically close contracts.

3.3.8 Definition of Temporary Equipment's criticality

The definition of the equipment's criticality will be reevaluated together with **Customer** depending on **Customer** needs based on the following international criteria:

“CATEGORY A” EQUIPMENT

When facing failure or defect condition:

- It interrupts the production process immediately or in a period of time involving a corrective action with an interval longer than that predetermined.
- It affects the product’s final quality. Their maintenance schedule should be strictly complied with.

“CATEGORY B” EQUIPMENT

When facing failure or defect condition:

- It reduces the production volume,
- It can be stopped for corrective actions because they have backup
- If there is a redundant equipment in the process (stand-by), its maintenance schedule should be carried out during a scheduled outage.

“CATEGORY C” EQUIPMENT

Equipment not directly involved in the production process and the outage of which does not affect the production flow. Its maintenance schedule should be executed only under favorable cost conditions.

3.4 *Communication Chain*

In conjunction with **Customer** it shall be established the maintenance control entries to be included in the administrative report to deliver to **Customer** on a monthly basis.

The evaluation of the maintenance system is based on the following premises:

- a) The efficient management of the maintenance system requires the systematic treatment of information in such a way that it will indicate the evolution and the trend of each process involved and evaluate how effectively it is handled.
- b) Control points are surveyed based on information issued by the computerized maintenance management system, and by other mechanisms such as: audits, self-evaluations and evaluation of customer satisfaction.
- c) The results and the evolution of the control points should be submitted in the contract’s monthly performance report.

The evaluation of the maintenance system is carried out through the following instruments:

3.4.1 Performance Report

The performance report prepared by the Maintenance Management contracts basically include information on:

3.4.1.1 Routine Management

Routine Management is carried out based on the control items identified as representative of the processes that make up the maintenance system.

Maintenance control items are generated from the data obtained during a predefined period of time in order to make them comparable. Information goes through a standardized mathematical treatment and is presented for analysis in a format that makes such information easy to read, understand and interpret.

The Coordinator will define together with the customer the control items that will make up the web of indicators for the evaluation of the contract.

3.4.1.2 Strategic Action Management

It involves the management of the necessary actions to implement the maintenance management model and other actions defined for the Contract, such as ISO, TPM, etc.

3.4.1.3 Customer Satisfaction Evaluation

The Customer Satisfaction Evaluation is carried out periodically in agreement with prior adequate decisions. A monthly frequency is usually adopted for the first year of the contract and longer periods (bimonthly or quarterly) as of the second year, if the execution is carried out within the normal deadlines and results.

3.4.1.4 Evaluation Meeting

The evaluation meeting in the Maintenance Management Contracts is held at the beginning with the same frequency of the Customer satisfaction evaluation, also in agreement with prior adequate decisions.

The evaluation meeting is held with the following purposes:

- To clarify and reinforce the issues dealt with in the monthly performance report,
- To inform of corrective actions in connection with any weak point detected in the previous evaluation;
- To receive clarifications regarding the Customer satisfaction evaluation;
- To level information on issues of common interest.

The Coordinator, the Project Manager, Operation Managers and, whenever possible the Production Director, should be present at the evaluation meetings for Maintenance Management Contracts.

3.4.1.5 Self-evaluation of Models Application

The Coordinator shall carry out the self-evaluation of his/her contract and shall direct the results to the Engineering Office and to the Orientator on a semiannual basis.

The Engineering Office shall carry out audits in order to evaluate the understanding of the self-evaluation procedure. The frequency and sampling shall depend on the evaluator's degree of maturity regarding the self-evaluation process.

3.4.1.6 Audits

An internal audit schedule shall be prepared in order to standardize systems and actions, to identify disagreements, train and execute specific developments.

3.5 Key Performance Indicators

In line with the proposed methodology, the contract shall be executed through KPI's performance indicators to assure a shared approach with the customer. It is implied that the Outsourcing Service shall only be awarded by a greater delivery of plant indicators.

KPI#1

A safety KPI shall be fixed as from the first month of the contract. It is made up of occurrence of accidents and its severity with loss of worked hours.

KPI-PM

In connection with KPI's directly related to Operation/Maintenance, our proposes a three-stage development:

- **Identification**
- **Measurement and Evaluation**
- **Application**

The first 4 months of full production, shall be devoted to identifying and defining how to measure.

From the fourth to the eighth month, shall measure and evaluate the behavior of such indicators and as from the eighth month onwards, it shall apply the so- called KPI-PM indicators.

Upon compliance of the conditions established by KPI-PM, shall be awarded or penalized.

3.6 Safety

Safety is one of the most important issues for Outsourcing Service.

In order to ensure the extremely high standards of safety demanded, our company has developed a full and exhaustive methodology covering all aspects of Safety, Health and Environment.

The most important aspects of the Safety Plan Guidelines and Implementation Guide are given below:

- ✓ Responsibility

Concrete responsibilities are assigned, given a clear chain of responsibility extending to the Regional level.

- ✓ Safety Plan

The general Safety Plan is adapted and extended to meet the specifics of each contract, including local legislation and customer requirements

- ✓ Job Safety Analysis and Permit - JSAP

All works to be carried out are regulated by a specific JSAP for the particular task, giving consideration to the exact risks and requirements of the task, as well as to its inter-dependence on other tasks and procedures also taking place.

- ✓ Daily Dialogue on Safety

In order to ensure that safety is always a priority for the operatives' and does not become neglected, every day starts with a five to ten minute meeting that covers the safety risks and requirements for that day's tasks

- ✓ Accident and Incident Control

In the event of an accident or incident, already defined procedures for control and minimalisation of the event are swiftly put into action, ensuring minimal loss or damage and accurate logging of the event for later analysis.

- ✓ Reporting

A number of Safety Indicators are recorded, and then subsequently analyzed on a monthly basis together with the customer.

- ✓ Training

In safety, as in all other areas, ABB Service considers training to be one of the most important factors for success. Each operative has a training program, which naturally includes safety training.

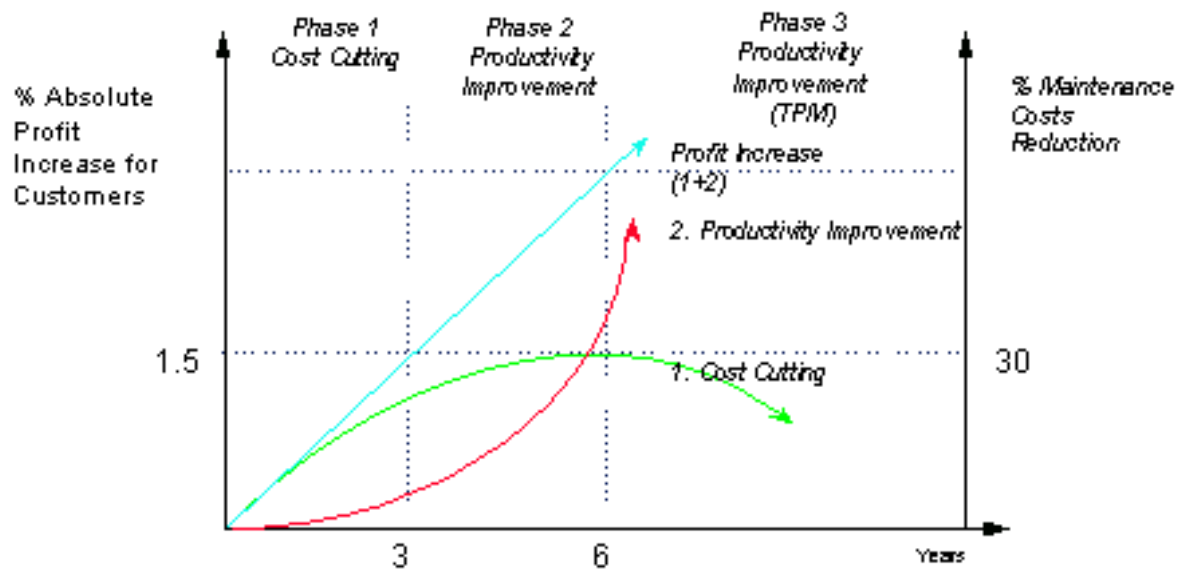
3.7 *Quality Policy*

Quality is one of tools to meet the objectives set for the business. Our concept of quality includes all the aspects and characteristics of our products and services to meet our customers' demands and expectations.

4. **CONCLUSIONS**

According to the information above, the key of Long Term Maintenance Outsourcing is PROFIT INCREASE that can be achieved through a balance between cost reduction and productivity improvement.

The strategy of productivity improvement is shown graphically below.



The three colors of the chart define responsibilities within a typical Service organization.

The green curve (or “Cost Control Curve”) shows results as soon as Maintenance Service becomes responsible for a site. This involves the implementation of cost control strategies that initially have high impact, like rationalizing subcontractors, reviewing on inventory levels, rationalizing suppliers, etc. The effect of these initiatives is seen within the first twelve months. After this period, effects of these strategies diminish as shown. The maintenance teams through positive innovation maintenance deliver these cost control measures.

The red curve (or “Productivity Improvement Curve”) shows a slower rise in impact on the results of a site. The red curve charts the impact of maintenance innovation, for which the MMC is primarily responsible. The red curve is slow to begin but almost has an exponential profile as innovation and continuous improvement impact the “client’s bottom line” over the 2-5 Year timeframe.

The blue line (or “Profit Increase Curve”) is the summation of both the blue and red curves and is the responsibility of the management team on site. Their scope of work is to deliver the combined result for the client. Therefore the green team goals are aligned with the 1, 2 and 3-year goals of the client’s management team.

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- ✓ Michel Porter, Competitive Strategy. London: The Free Press, 1980.