

# MAINTENANCE PLANNING

## Maintenance System

Crea provides technical assistance in developing a fully customized **Maintenance System**, which allows the identification of the tasks to be carried out and in what conditions these have to be executed.

Good maintenance planning is required to ensure that the correct

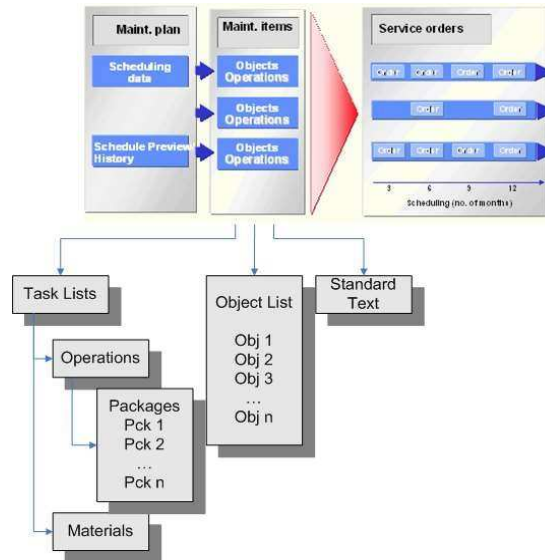
balance is achieved between investment and results.

Our approach in developing a Maintenance System can follow the Corporate Procedure and it can be seen as a hierarchical process, which leads to a system composed by many objects.

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## Steps to the creation of a Maintenance System

- ✦ **Defining the Maintenance plan** through scheduling information which will be used to calculate the due dates for the maintenance operations to be performed on the assigned technical objects.
- ✦ **Identifying Maintenance item(s)** that allows to describe which preventive maintenance tasks should take place regularly on a technical object or on a group of technical objects.
- ✦ **Defining a Task Lists** which describes the list of activities which has to be executed, the materials needed and working time estimations.
- ✦ **Defining the Technical Object Lists** whose output is the list of equipment or positions managed by the Maintenance Item to be applied.



## Our Approach

Our approach’s main goals are ensuring that assets continue to perform their intended functions with expected efficiency, achieving improvements in terms of defining safe minimum levels of maintenance, changes to operating procedures and strategies and maintenance regimes and plans.

A successful implementation of these goals passes through the **Reliability Centered Maintenance (RCM)** approach, which leads to increases in cost effectiveness, machine uptime and a greater understanding of the Assets level of risk. In fact, RCM is a systematic approach to define a routine

maintenance program composed of cost-effective tasks that preserve important functions.

Our *customized* approach to RCM starts from the analysis of *Basis of Design*, performing a preliminary screening to decide if some *Reliability, Availability, Maintenance, Integrity & Safety (RAMIS)* data is advisable.

Then, using **Risk Based Inspection** analysis (RBI) it is possible to focus on prevention of structural failures (mainly vessel and tube failures) and on prevention of the functional failures.

## Our Services

Our services cover a wide range of analysis, depending from goals to be reached.

- ✦ **Structural failures** are managed via a classical **RBI analysis**, which studies and defines the inspection policies based on a Risk Analysis. RBI is usually performed in steps:
  - **Qualitative RBI Analysis**, which aims to find out the low criticality zones, using a *Qualitative Criticality Matrix* obtained from Likelihood vs. Consequence as per *API-581* and production consequence from *RAMIS*.
  - **Quantitative RBI Analysis**, which is performed for all those items not belonging to the low criticality area of the *Qualitative Criticality Matrix*.
- ✦ **Functional failures** are managed with a **Failure Mode Effects and Criticality Analysis (FMECA)** study; FMECA is an inductive failure modes analysis within a system with the goal to classify failures by severity and likelihood. A successful FMEA helps to identify potential failure modes based on past experience FMEA also serves as a form of design review to erase weakness out of the design or process.
- ✦ **Criticality analysis**: to focus only on relevant topics which will be judged using a Criticality Matrix. Criticality Matrix has been defined in many published standards but it can be adapted to any specific usage.
- ✦ **Failure Cause Analysis** to identify possible impacts on design to be addressed to engineering department.

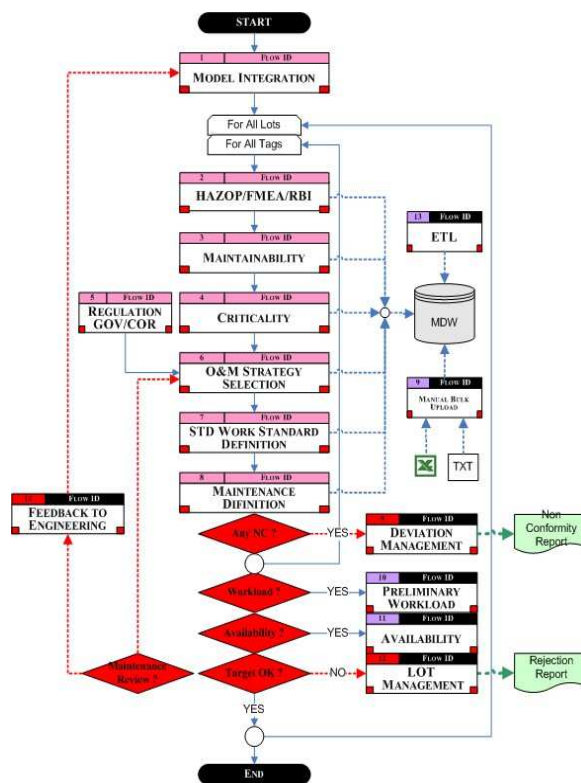
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The final output is the building up of an **Overall Maintenance and Inspection Plan** and the assessment of the related **Maintenance Workload**.

This process directly addresses maintenance **Preventable failures** and when the risk of such failures is very high, RCM encourages to consider changing something, which will reduce the risk to a tolerable level.

The result is a **Maintenance Plan** that focuses economic resources on those items that would cause the most disruption if they were to fail.

RCM emphasizes the use of **Predictive Maintenance (PdM)** techniques in addition to traditional preventive measures.



## Benefits

RCM & RBI methodologies ensure that every task is generated in response to a problem (a failure) and that the solution developed actually does improve or maintain reliability/availability and is worth doing. Every task must be determined if it is **Applicable** and **Effective**:

- \* **Applicable task:** really does prevent, discover or reduce the impact of a particular failure;
- \* **Effective tasks:** once a task has been determined as applicable, it needs to be determined if it is worth the expenditure of resources, based on the consequences of the happening failure.

By applying the described methodologies, it is ensured that careful thought has been given to every maintenance goal and to tasks to achieve them. Every generated task is guaranteed to address a problem of concern, with a proper solution and that the expenditure of resources to accomplish that task is more beneficial than simply allowing the failure to occur.

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## Contacts

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