How to create a Maintenance Plan

Innovation is guiding the maintenance reality. Maintenance must stick with this trend. From the boiler machine to the PLC's (Programmable Logic Controller) and robots, the requirements to the maintenance changed continually.

It is not only this first point that motivates an upgrade of the maintenance but also questions linked to the environment, certifications, legal restrictions and economics. In that way, maintenance and its planning should try to respond to all those external points fulfilling effective and efficiently its purpose: keeping the equipment/asset in good condition and doing the require function well, during all the life cycle.

The EN 13306 defines Maintenance Plan (MP) as a *structured and documented set of tasks that include the activities, procedures, resources and the time scale required to carry out maintenance*. It is possible to conclude that a MP should answer to four key points:

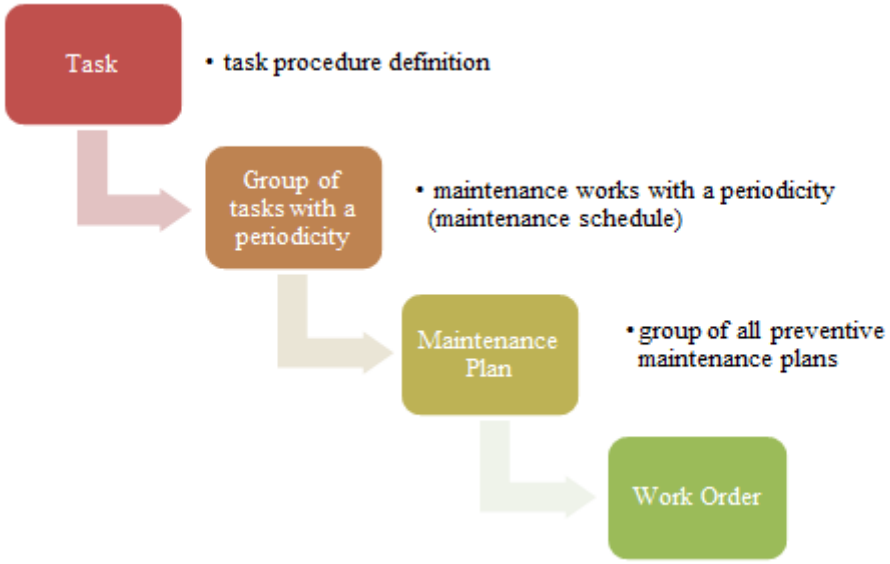
- What? - *structured and documented set of tasks;*
- How to do it? - *activities, procedures;*
- Planned men-hours, materials, services – *resources;*
- Maintenance time – *time scale.*

A MP, to guarantee is success, must specify these four points. The lack of information or unnecessary information may increase the probability of failure, increase the usage of resources, waste time and may cause accidents.

It is necessary to mention the difference between planning and programing. Although being vital tasks, they occur in different moments and they have different specificities. Bad programming could ruin a good planning, and good planning cannot save bad programming. Planning must occur always before programming and can be done at the office. To be efficient, programming needs a good coordination with the calendar and with all necessary resources to make the plan.

Following this line of reasoning, it is easy to understand the necessity of giving to the maintenance technician a well-designed group of documents to help him carry out all the maintenance tasks.

In order to achieve a level of excellence on maintenance management it is necessary to stay updated with all maintenance works. The monitoring of maintenance should not be a simple check of tasks carried out but it should also give inputs to the system as a way to update the plan to the reality. There are four big actions that influence the maintenance planning: plan, programming, perform, monitoring.



Write a Maintenance Plan

A maintenance plan should refer to the assets of any company. When we talk about planning maintenance we are thinking on preventive maintenance.

There is no template or rule that says how a maintenance plan must be. There are some ideas and good practices that guide the maintenance manager on his job.

A start point for the selection of the assets could be based on:

- Supplier advice;
- Operation based actions;
- Legal concerns;
- Risk, costs, times analysis for the decision on the type of maintenance.

These points have a huge effect on all the maintenance system, with special relevance to costs. Before starting to explain some ideas it is important to locate a maintenance plan on all the process.

As mentioned before maintenance plan has all the tasks and procedures for a well done maintenance work. So it is neither a work order (that puts a date in the maintenance plan) nor is it a simple task. It is a document that must estimate all the preventive works on an asset during its life cycle. A Maintenance Plan should not be a fixed document, it requires updates.

The tasks and procedures that make up a preventive maintenance plan have a periodicity that creates frequency of work on an asset. This periodicity can be calculated based on calendar time or records of a measure (normally operation records). There are two types of operation records: fixed daily running records, when equipment runs day the same amount of time; or it is based on real records (kms, hours, miles…) when the equipment as a counter that rules the maintenance.

The source of information is a critical point on creating a maintenance plan. With all the different ideas and standards, I would like to highlight some points to be included on maintenance plans.

- Understand the supplier manual and as far as possible adapt the maintenance plan according to:
    - Running conditions;
    - Equipment history (if it exists);
    - User manual;
- Identify all safety measures by type of work and equipment:
    - Specification of all tasks to carry out before the work, safety measures, precaution measures, and refer to all applicable documents;
- Define clearly and objectively the work type, periodicity and duration of the work;
- Describe all the tasks and its sequence:
    - description of the work;
    - Identify all the reading parameters and specify the acceptable values:
        - Specify the measure criteria;
        - Subjective analysis must be avoided;
- Provide a list of components which will be intervened, and maps to record values;
- Specify all necessary tools;
- Forecast all the necessary man-hours;
    - The forecast should be done by function (mechanic, electrician, other)

    - Thinking about the man-hours forecast helps the maintenance manager understand the necessary work force and to planning the distribution of his men;
- Forecast all the materials:
    - The availability of the material is a key aspect of a maintenance system;
    - A huge amount of stored materials represent a cost, so a well done forecast of materials can help save money;
- Forecast all the cost with third-party services;
    - A work could sometimes have an outside service, and the cost must be controlled.
- Identify the performers and the manager in charge of the work;
- Test the operability of the equipment – this is an action that should be in the end of any maintenance plan.

Other inputs may also come from:

- Existing technical literature;
- Information based on failure history;
- Experience of the maintenance department;
- Empirical knowledge.

The contribution of all employees is a plus.

For a fast and easy reading of a maintenance plan it is important to use: direct and simple statements; action orders (attention, measure, tighten, install…); use details to detect errors. An interesting tip: use checkboxes to be checked during the maintenance work, so the techinician can check (OK) or not check (NOK). The usage of images could be helpful to show the technician how something should be done.

A step ahead

A maintenance plan should not be a static paper and action. For example the supplier maintenance requirements may be adapted depending on the usage condition. It is in that moment that maintenance monitoring is essential, in order to check the needs for additional maintenance. For example a lubrication analysis may show better the real need for maintenance. So the manager starts adjusting the plan to real situations.

Another good practice is to start looking to a maintenance work as an opportunity not only to do the actual work in case but also to check other things: collect information about levels, parameters; do a general inspection or make some improvements in the machine.

Maintenance is a risk management activity. The pressure to control and even reduce costs and resources is higher and higher. The optimal point is reached when the maintenance plan is able to manage the probability of failures, with the scope of reaching the available level of failure's consequences.