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Chapter

Introductory Chapter: An Overview to Maintenance Management

Fausto Pedro García Márquez and Mayorkinos Papaelias

1. An overview to maintenance management

The industry requires maintenance to ensure the correct operations of the engines, components, structures, etc. [1] Any failure, that is, termination of the ability of an item to perform a required function, generates downtimes, costs, risks for the human labors, etc. The high competitiveness in the current industry does not lead these failures to the firms [2].

The advances in information and communication systems, together with the technologies, lead to the industry to incorporate new sensors, condition monitoring systems, etc. [3] They also require advance analytics in order to format, save, and analyze these signals and information, from qualitatively and quantitative point of views [4].

In order to reduce the failures occurrence probability, a correct maintenance task is required. British Standard, BS EN-13306:2017 [5] defines maintenance as "managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function. Technical maintenance actions include observation and analyses of the item state (e.g., inspection, monitoring, testing, diagnosis, prognosis, etc.) and active maintenance actions (e.g., repair, refurbishment)." The correct maintenance support to a maintenance organization to carry out the correct tasks is called maintenance supportability.

There are a large number of maintenance types, where the principal could be:

- **Corrective maintenance**, is the most common type, is done when the failure appears. In case, if it is delayed, it is defined as deferred corrective maintenance; in other case, it is called as immediate corrective maintenance.

- **Preventive maintenance**, done in certain times or according to criteria to reduce the failure probability [6]. Predetermined maintenance is set according to intervals of times or use of the item. Scheduled maintenance is done as predetermined maintenance or in a time schedule established previously. Condition-based maintenance is carried out regarding to the item status that is set generally by sensors, testing, and analytics [7].

- **Predictive maintenance**, the maintenance tasks are done according to the item condition predicted in order to avoid a failure [8].

Figure 1 shows the main maintenance types.

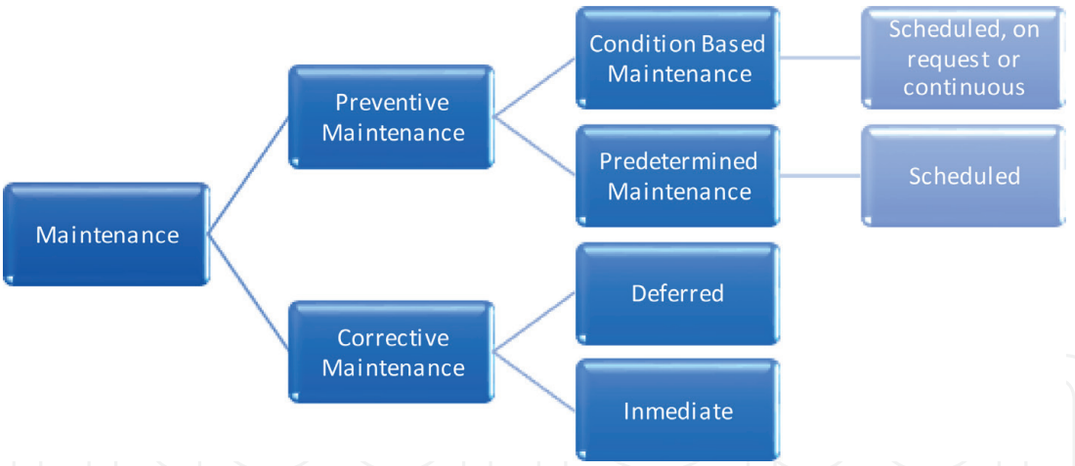

Figure 1.
Overall view of maintenance types [5].

According to EN 13306:2010 [9], maintenance management is defined as "all activities of the that determine the maintenance objectives, strategies and responsibilities, and implementation of them by such means as maintenance planning, maintenance control, and the improvement of maintenance activities and economics." The maintenance strategy is set to get the objectives, fixed by the costs, availability, safety, reliability, etc. The maintenance strategy should be set by maintenance management by the responsibility point of view, considering the availability, safety of the human, the environment, and any other mandatory requirements associated with the item, etc., item durability and the final product quality taking into account the cost, and any influence to the environment [10]. The procedures, activities, resources, and time are considered in the maintenance plan structured.

The main key indicators are found in European Standard EN 15341:2007 [11]. The objectives of the key indicators are to measure the status, compare (internal and external benchmarks), diagnose (analysis of strengths and weaknesses), identify objectives, and define targets to be reached, plan improvement actions, and continuously measure changes over time. There are three main groups of indicators: economic [12], technical [13], and organizational [14]. They are set considering endogenous (company culture, industry, life cycle of the components, criticality, etc.) and exogenous (location, society culture, market, laws, regulations, etc.) variables [15].

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