Preparation of a Preventive Maintenance Plan: A 5-step approach for operational efficiency in the industry

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Asset maintenance is essential to ensure operability and extend the lifespan of equipment, facilities, and systems. Designing an effective maintenance plan is the starting point to successfully achieve this goal.

By presenting five fundamental steps for structuring a preventive maintenance plan and emphasizing the convergence between preservation and optimization, the path for one of the most crucial aspects of industrial asset management that seeks operational excellence is outlined.

1. Asset Identification

The inaugural step in defining a maintenance plan that produces the intended results is the complete identification of assets requiring care. In this process, it is necessary to perform a comprehensive inventory, encompassing everything from complex equipment and machinery to critical facilities. To optimize efforts, assets should be classified based on their operational criticality. This classification facilitates a strategic and targeted approach, prioritizing the maintenance of equipment that has the most impact on production goals.

2. Assessment of Current Asset Condition

The step of assessing the state of an industrial asset in the context of preparing a maintenance plan involves a detailed analysis of its physical and operational conditions. Specifically, it includes:

- **Physical inspection**: a visual examination of the equipment to identify wear, damage, or any visible anomalies; verification of the integrity of components, such as mechanical parts, pipelines, electrical connections, among others.
- **Operational data analysis**: collection and analysis of operational data, such as temperatures, pressures, speeds, and other relevant parameters; identification of normal operating patterns and comparison with historical data to detect significant variations.
- **Maintenance history**: review of work history that provides information for identifying recurring failure patterns or chronic issues; evaluation of the performance of previous maintenance interventions and their effectiveness in extending the equipment's lifespan.
- **Tests and monitoring**: conducting specific tests to assess the performance of critical systems; implementation of continuous monitoring systems, when applicable, to collect real-time data on the equipment's condition.
- **Technical documentation**: review of manuals and manufacturer's technical documentation to understand specifications, maintenance recommendations, and operational limitations.

Analyzing the current state is essential to determine the overall equipment condition, identify areas of concern and support decisions regarding the type and frequency of interventions to be included in the maintenance plan.

3. Development of Maintenance Procedures

Following manufacturer recommendations, industry standards, and best practices, it is necessary to develop comprehensive procedures tailored to the specificities of each piece of equipment. Ensuring the continuous effectiveness, efficiency, and safety of maintenance operations over time requires the inclusion of detailed instructions, checklists, and resource forecasts, such as technical expertise and the time required to mobilize the necessary workforce, materials, and tools. Safety precautions for interveners, operators, the environment, and the equipment itself are also essential. The harmonious integration of these elements constitutes a fundamental pillar.

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December 2023

It is worth noting that the training and familiarization of the technical team with these procedures are as important as their initial creation.

4. Establishment of Maintenance Frequencies

The adequate determination of maintenance frequencies is crucial to ensure the effectiveness, efficiency, and alignment of the plan with the specific needs of industrial assets. Various elements must be carefully considered, from the critical nature of the asset, giving priority to the most relevant, to consulting manuals and maintenance history. It is also essential to consider operational conditions, such as environments and workloads. Additionally, it is imperative to consider technological advancements and ensure compliance with current regulations, conducting continuous assessments to ensure the plan's effectiveness.

This step plays an important role in preventing breakdowns and promoting a longer lifespan for assets. The key is to find a balance between the necessary frequency to prevent failures and minimizing the impact on regular operations.

5. Implementation and Monitoring

The implementation of the maintenance plan marks the beginning of its practical application. It is advisable to establish a record-keeping system to document all activities, including execution dates, inspection results, parts replacements, and, of course, any identified issues.

As mentioned, maintaining constant vigilance over the plan's effectiveness is essential for continuous adjustment – a maintenance management software can greatly facilitate such a monitoring methodology. Incorporating feedback from the maintenance team, analyzing key performance indicators and data, and considering changes in operational conditions are the recommended practices to ensure the continuous optimization of the maintenance plan.

This cycle of continuous monitoring not only strengthens plan adaptation but also perpetuates its alignment with constantly evolving operational dynamics. It is crucial to highlight the importance of flexibility: a maintenance plan must adjust permanently to operational conditions and maintenance requirements, which may change over time. Improvements will occur naturally and organically (based on lessons learned and as part of a continuous improvement approach, these improvements may include corrections to the frequency of maintenance activities, maintenance methods, resource allocation, procedures, among others), promoting an adaptable and effective maintenance management over time.

The definition of an effective maintenance plan requires a methodical and comprehensive approach, essential to ensure reliable performance and efficient resource management in organizations. The implementation of these key steps enables the creation of an integrated system that not only promotes operational reliability but also optimizes resource allocation, contributing to asset management excellence.

Well-structured maintenance plans, when executed correctly, contribute to reducing equipment unavailability. Additionally, by adding more value to organizations, they contribute to the sustainability and longevity of assets, assuming the most important role in the pursuit of operational excellence, backed by both industry best standards and maintenance management best practices.