



Make Predictive Maintenance happen –
crucial points to consider before you decide to do it.

Predictive Maintenance is nowadays in everyone's lips. Many companies are talking about data, digitalization, and industry 4.0 and want to benefit from data-based production and maintenance. However, its realization seems not to be as easy as expected. True to the motto "prevention is better than cure", we explain what's behind Predictive Maintenance, show in which case it can be a real benefit and focus on the most important points to consider before you decide for a predictive maintenance solution.

Predictive Maintenance and its benefits

Unplanned breakdowns of machinery and equipment are the nightmare of every maintenance manager. On the one hand, the pressure to keep the machines running without any downtime is high. On the other hand, time and resources are limited, especially for regular maintenance. Therefore, a predictive maintenance strategy is crucial for smooth production at a high level. Especially when it comes to critical, safety- or quality-relevant conveying equipment and wear parts.

This data-based strategy is taking into account all machine data in real-time (e.g. useful life, wear, load, external circumstances such as temperature and empirical values). A predictive maintenance system constantly measures the machine's condition, monitors key performance indicators (e.g. belt or chain lifetime), predicts when maintenance might be necessary, and informs maintenance managers about anomalies proactively.

Main benefit: The maintenance manager receives information about the condition of the machine and critical wear parts ahead of time. He knows immediately when and where to act. It's his knowledge base to act in time, plan maintenance needs, schedule repairs and do inspections before serious damage occurs.

Main disadvantage: Data is key, and the algorithm needs some time to learn from the machine. No data, no condition monitoring, and no predictive maintenance.

Preparation – the key to create value from Predictive Maintenance

If you are looking for an approach to know in advance about wear, remaining lifetime or failure of your machine, Predictive Maintenance can be the right solution for you. However, it doesn't come for free. There are several requirements to be fulfilled or established. Therefore, choosing the right maintenance strategy and a careful preparation of its implementation is key. Carefully think about your challenges and where Predictive Maintenance can support you. Carefully select the machines you want to upgrade accordingly.

Check-up: When Predictive Maintenance can support you

If the following statements are true for your maintenance, predictive maintenance can create real value for you.

- your machine requires a wear and/or spare part which leaves you with sleepless nights
- the respective part is expensive, has long delivery times but you can't put it on stock because of financial restrictions (networking capital)
- the respective part can hardly be observed during operation



In terms of maintenance strategy, we suggest the following rule:

- Reactive Maintenance for non-critical equipment.
- Preventive Maintenance for well-known machines and equipment, which is under control.
- Predictive Maintenance for process critical machines, machines running 24/7 or in case physical inspections are impossible to be made, and machines which are always good for an unpleasant surprise.

Consideration 1: Define the appropriate maintenance strategy for each of your assets. Reactive Maintenance for non-critical equipment; Preventive Maintenance for equipment well known and under control; Predictive Maintenance for critical machines and always good for a surprise.



The basic for Predictive Maintenance are data about the machine's operation, condition, up- and downstream process, and its environment. Consequently, sensors and measurements are required and must be available online and stored for further processing. Existing monitoring or control systems are a good starting point. However, additional sensors are often the key to success because the prediction may require information about certain aspects of the part to be observed. Example: if you want to predict the remaining lifetime of your car's brake pads, you need to monitor the thickness of the pads in relation to the kilometers driven so far with that pad.

Often a direct measurement of the required parameter is not possible. In this case, you need to find measurable parameters. They can be combined to measure the required parameters virtually (virtual or smart sensor) or to measure the symptom created by a damage or degradation (e.g. vibration, temperature, noise or the combination of all).

Consideration 2: Formulate precisely what you like to predict. List the available data, and involve people from operation, maintenance, and machine design to brainstorm about symptoms and failure modes. Finally confirm the available sensors and define which sensors are required additionally.



Collecting and storing the sensor data is the next step to think about. An existing control system may be used or extended but sometime the installation of a specific system may be required. A large choice of systems can be found on the market, serving many requirements: wireless/ wired, cloud based/ on premise, ATEX, standalone/ interfaced, LAN or cellular network. If you want to profit from big data learning and additional expertise you probably will go for a cloud solution, offered by your

machine OEM. If your machine is unique or you have many different machines, you may go to set up a system on premise and develop all analytics with your own team.

Consideration 3: The infrastructure of choice depends on the size and environment of your operation as well as on the existing control and IT systems. For auxiliary equipment or if knowhow is missing it will not be feasible to take the effort of own development. In these cases, your machine OEM or a specialist system provider may support with the required sensors, systems, and predictive algorithms.

While data are the base for Predictive Maintenance, the brain of it are the methodologies or algorithm. Watch out for the next articles, in which we will talk about industrial IoT solutions, Predictive Analytics, cloud and edge computing as well as the importance of data quality.

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