



## Mind the gap! Why Predictive Maintenance is key for process critical machines in the heavy industry.

*Mind the gap! With auxiliary equipment it is similar to a car's windshield wiper: It is classified as non-critical until it stops, forcing you to stop... So, auxiliary equipment can be process critical for the whole production. Therefore, constant monitoring of it and its key components is unavoidable to ensure maximum machine availability and reliability. This is the key focus of production plants in the heavy industry and therefore also the focus for the machine manufacturer. But how to implement it and establish smart machines? In our latest article, we explain why Predictive Maintenance is crucial for process critical machines and mention key factors to establish Predictive Maintenance successfully in the heavy industry.*

The challenge for every manufacturing responsible person is called "Performance". Independent of the industry or the location of the facility, a **top performance** must be achieved. However, the definition of performance varies depending on the economic situation. For the ones who operate under high market demand, output is key and consequently, **availability and production rate are the key indicators**. If environmental footprint is your company's focus, **electrical and thermal energy consumption** will be a driving force. And if your margin is under pressure, you will be asked to **get your operational and maintenance costs down**.

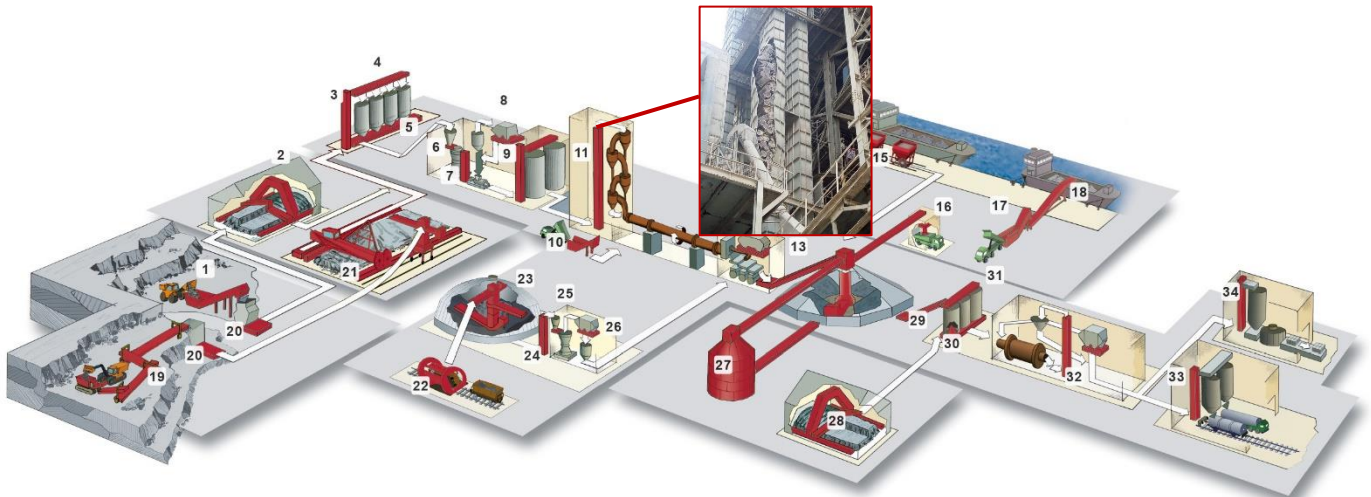
### **The dilemma between operation and maintenance**

Whatever your performance target is, the wellbeing of your machines plays a key role for goal achievement. Because of this well-known context, maintenance processes, maintenance education, and maintenance systems are applied to keep the machinery in good condition. Now, you could do as much as possible or as less as necessary to keep the operation running. The "**effort versus result**" dilemma plays an essential role in the definition of your **maintenance strategy**. This dilemma gets even more emphasized with the **shortage of qualified technicians**, which is a reality in nearly every manufacturing site.

In a perfect maintenance world, you would have enough qualified technicians to maintain the equipment according to OEM's instructions and routines. Machines would be available for maintenance, even for detailed investigations and replacement of weak components. As you are not acting in wonderland, your CEO will do his job asking for optimization. Now, reality kicks in and you are cutting down resources, evaluating and taking risks related to the

reliability of your machines. Often, this results in a focus to the main equipment or the large and expensive machines, leaving the auxiliary equipment behind, getting maintained if time permits.

**With this, you will achieve the goals of decreasing costs, and low staffing. In the long term, however, this strategy is highly likely to fail due to high risks for unforeseen downtimes, high failure costs and therefore, decreasing productivity and performance!**



— AUMUND Group equipment

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## AUMUND Group EQUIPMENT IN THE CEMENT INDUSTRY

- |  |   |   |   |   |
|--|---|---|---|---|
| 01 Limestone intake and transfer to stationary crusher (Samson® Feeder)                  | 07 Raw mill circulation (Bucket Elevator)                       | 14 Automatic clinker discharge (MOLEX®)                       | 22 Coal/petcoke unloading and reclaim (Rotary Wagon Tipper)       | 30 Discharge and reclaim of clinker and additives (Silo Discharge Gate/CENTREX®/Rotary Discharge Machine) |
| 02 Storage and reclaim of shale/clay (Portal Reclaimer)                                  | 08 Filter dust reclaim (En Masse Chain Conveyor)                | 15 Grab unloading (Eco Hopper)                                | 23 Storage and reclaim of coal/petcoke (Circular Stockyard)       | 31 Distribution of clinker and additives (Pivoting Pan Conveyor)  |
| 03 Feeding pre-blending silos (Bucket Elevator)  | 09 Raw meal silo feeding (Bucket Elevator)                      | 16 Truck loading of clinker (Telescopic Spout)                | 24 Bucket elevator to coal mill                                   | 32 Cement mill feeding (Bucket Elevator)  |
| 04 Distribution of limestone and aggregates (En Masse Chain Conveyor)                    | 10 Reception and transfer of alternative fuels (Samson® Feeder) | 17 Clinker intake and transfer to shiploader (Samson® Feeder) | 25 Proportional feeding of coal mill (En Masse Chain Conveyor)    | 33 Filter dust reclaim (En Masse Chain Conveyor)  |
| 05 Discharge and reclaim of limestone and aggregates (CENTREX®/Rotary Discharge Machine) | 11 Raw meal feeding to pre-heater (Bucket Elevator)             | 18 Clinker loading with Mobile Shiploader                     | 26 Coal dust reclaim (En Masse Chain Conveyor)                    | 34 Cement silo feeding (Bucket Elevator)  |
| 06 Proportional feeding of raw mill (Weigh Feeder)                                       | 12 Clinker dust reclaim (En Masse Chain Conveyor)               | 19 Link Conveyor with mobile face crusher                     | 27 Clinker storage in steel plate silo                            |   |
|  | 13 Clinker transport from cooler to storage (Pan Conveyor)      | 20 Limestone crusher reclaim (Arched Plate Conveyor)          | 28 Gypsum storage and reclaim (CENTREX®/Rotary Discharge Machine) |   |
|  |   | 21 Limestone blending bed (Stacker/Reclaimer)                 | 29 Clinker transfer to mill hoppers (Pan Conveyor)                |   |

Figure 1: Mind the gap! Conveying equipment is categorized and perceived as auxiliary equipment in the cement production. Less important, less focus of production and maintenance. But if it comes to root causes of production stops the conveying equipment ranks under the top reasons. E.g. if a belt bucket elevator feeding the kiln has a breakdown, the whole clinker production will be down. Picture: AUMUND Group

So, how to solve this Gordian knot between operation and maintenance? With smart machines based on Predictive Maintenance!

## Win-win for machine manufacturers and maintenance managers – how Predictive Maintenance breaks the Gordian knot between operation and maintenance

Many machine manufacturers have been successful in the market for decades based on robust machines, stable markets, and loyal customers. With the growing globalization and transparency, market rules constantly change. Plants expect high machine reliability, state-of-the-art products and services, and cost-efficiency.

With the latest developments of IIoT technology and algorithms, Predictive Maintenance can change how business can be done and create a win-win-situation for both: machine manufacturers and machine owners. Smart machines with its insights enable us to learn from the past, predict the future and thus, proactively act instead of reacting.

- ✓ Based on Predictive Maintenance, the machine operator will **know ahead of time when a failure develops and can initiate the related maintenance work**. At the same time, the OEM gets notified too. He prepares the required parts and plans the service staff. **This does not only reduce the unplanned downtime but also reduce the maintenance and warehousing costs due to optimized planning and less emergency cases.**

- ✔ If the machine is still maintained in a reactive way, Predictive Maintenance opens the door to **offer new proactive service models aiming for maximum production** and supporting the maintenance team best possible. The OEM might even offer a full service, backed up by the online machine information or 24/7 support. **This helps to reach maximum production by optimized maintenance without taking unnecessary risks.**
- ✔ Another starting point can be **new operation models** like “pay per use” or “pay per outcome”. Specifically, if CAPEX funding is a topic, these models can be the OEM’s answer to support Maintenance Managers keeping their budgets.
- ✔ Thanks to the well-known machine performance and condition, the OEM can detect machine weaknesses and **improve the quality and reliability of his machines and spare parts**, which is key for the maintenance manager. Furthermore, he can offer **new products and services** like machine optimization, refurbishments, or apply the observations for new developments. **This helps maintenance managers to keep machine reliability high and optimize costs by upgrading existing machines.**

**So, how can this look like as a real case? An example:**

A ball mill for cement grinding is running 24/7. A failure of the discharge elevator will result in a production stop and is therefore categorized “process critical”. So, how to detect anomalies on time to prevent a possible breakdown without doing regular maintenance? This is a typical case for a Predictive Maintenance Solution monitoring the condition of the elevator. It informs about the condition of the machine in real-time, sends push notifications in case of anomaly detection, and provides a prediction of the estimated service life of critical machine components (e.g. it predicts the point in time for a chain shortening or chain replacement). Of course, it does not eliminate all of the maintenance routines nor replaces the maintenance team. However, it is the best buddy enabling to set priorities in maintenance, decide what to do next, and act!

**Preparation is key to create value from Predictive Maintenance**

For a successful implementation, there are several requirements to be fulfilled or established. Choosing the right maintenance strategy and a careful preparation of its implementation is key. Carefully think about your challenges and select the machines you want to upgrade accordingly.

- **Consideration 1:** Define the appropriate maintenance strategy for each of your assets. Reactive Maintenance for non-critical equipment; Preventive Maintenance for well-known equipment under control; Predictive Maintenance for process critical machines.
- **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.
- **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 know-how is missing, it will not be feasible to take the effort of own development. In these cases, the machine OEM or a specialist system provider may support with the required sensors, systems, and predictive algorithms.

**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
- the machine is process critical and a breakdown has a massive impact (costs, revenue, and/or reputation)





## Fit for the future with Predictive Maintenance

Predictive Maintenance can be a good solution to plan and do regular maintenance activities, detect, and optimize machine weaknesses at an early stage and proactively ensure maximum production without taking risky compromises in maintenance. With a closer collaboration between machine manufacturers / OEMs and customers, the combination of optimal maintenance and maximum production is achievable. The integration of digital technologies, such as Predictive Maintenance, enable new forms of data collection and analysis, which can be used to

gain insights and make more informed decisions. A win-win-situation for both: machine manufacturers and customers.

### Smart conveying – Prevent downtime with PREMAS® 4.0 Predictive Maintenance Solution

Developed by PREMAS AG for AUMUND Group, PREMAS® 4.0 is specially made for AUMUND and Non-AUMUND-conveying machines in the heavy industry. PREMAS® 4.0 feels the pulse of your machine, keeps an eye on it, and informs you when action is required. It keeps you informed in real-time about the condition of your machine, sends push notifications in case of anomalies, provides a monthly machine report, and gives a forecast of the expected lifetime of critical machine components. Thus, it enables you to plan your maintenance, act in time, and prevent possible problems before your operation is affected. PREMAS® 4.0 is your best buddy enabling you to set priorities in maintenance, decide what to do next, and act – wherever you are, whenever you want to make the invisible visible.

More information: <https://aumund.com/en/premas-maintenance-solutions/premas-4-0>



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Pictures: PREMAS AG unless otherwise mentioned

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**Want to know more?** PREMAS AG enables machine manufacturers to go new ways in their business based on Predictive Maintenance.

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