voith.com

VOITH

Let’s look into your future
OnCare.InSight with integrated AI

Innovation that works for you

AI makes your data work harder: more figures, more findings, and much more efficient processes. The dynamic power of AI marks a huge shift in operational capabilities. It's time to seize on this potential.

By leveraging its extensive expertise of heavy industry processes and advanced AI technologies, Voith delivers bold AI-powered solutions in multiple fields such as predictive maintenance. These enhance overall equipment effectiveness and minimize costs – all while maintaining the highest data security standards.

Key benefits of Voith AI solutions

Expertise and innovation

Voith's decades of experience in heavy industry, combined with cutting-edge digital solutions, make our AI portfolio a powerful tool for predictive maintenance. Our deep understanding of industrial processes and advanced AI technologies enables us to deliver unmatched insights and innovations, enhancing equipment efficiency and reducing downtime.

Human-AI collaboration

Our AI solutions provide a unique feature that facilitates direct interaction between maintenance engineers and the AI via incremental learning. By labeling events and refining models, users can improve the accuracy and relevance of the system. This allows the AI to continuously adapt to specific operational requirements.

Proactive problem solving

Voith AI excels in providing early warnings and precise fault localization for comprehensive root cause analysis. Our solutions help customers optimize maintenance schedules and spare parts management, preventing unexpected breakdowns and minimizing downtime. This proactive approach extends the equipment lifespan and saves costs through better resource allocation.

Versatility across industries

With its industry-agnostic design, Voith AI is suitable for diverse applications in power, oil, and gas, as well as in petrochemicals, steel, and mining. The adaptability of our solutions to various use cases is underpinned by our dedicated service team: Customized setups and support tailored to individual requirements ensure optimal performance and reliability.

Predictive maintenance plays a major role in preventing unplanned downtime for heavy industry.

Voith's AI-powered system predicts potential failures before they occur. By analyzing trends and anomalies, it projects future equipment conditions.

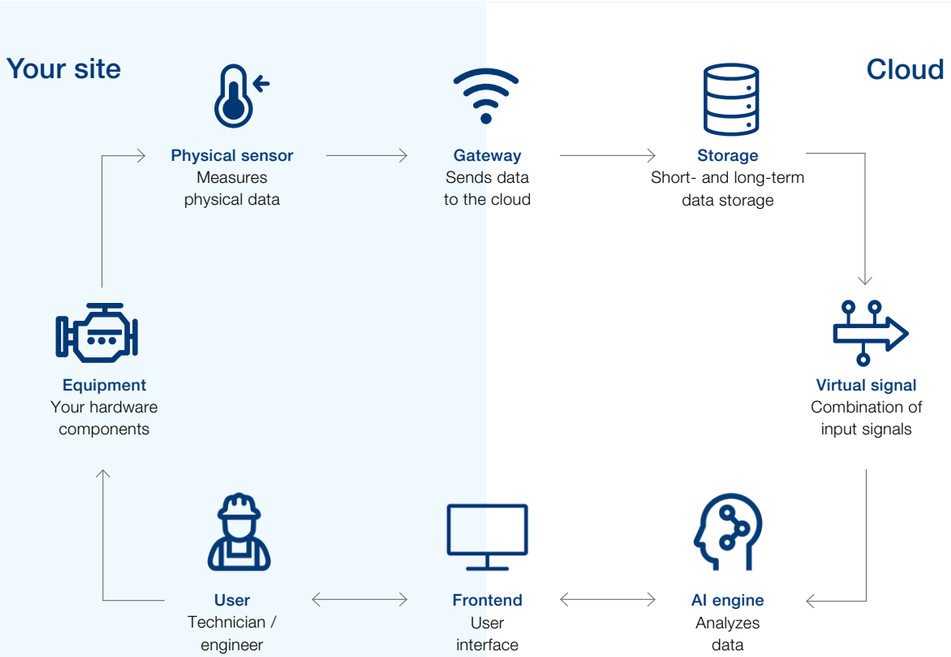
This advanced technique uses real-time monitoring and data analysis to detect issues. In this way, it optimizes processes, reduces costs, enables timely maintenance, and promotes smooth long-term operations.

Monitoring	None	Descriptive	Diagnostic	Predictive
Information	No sensors, so no health data available for asset or component. **Result: Interruption**	Digital sensor data shows that a specific component is broken. **Result: Alarm**	Component data shows signs of potential failure based on predefined thresholds. **Result: Warning**	AI-based system detects a specific drivetrain signal trending toward an abnormal state. **Result: Early detection**

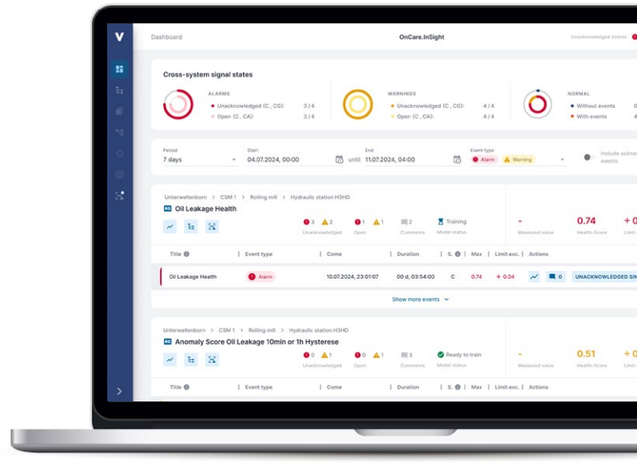
OnCare.InSight

OnCare.InSight is a manufacturer-agnostic predictive maintenance system from Voith. Powered by advanced industrial AI, it offers insight into current equipment behavior and anticipates potential failures. All features and benefits are accessed via an intuitive frontend.

For perfect tailoring to your processes, Voith experts perform custom system setup based on an initial proof of value (PoV). Early detection with OnCare.InSight saves money on more extensive repairs that might otherwise be needed. It also reduces the opportunity cost of downtime by shifting maintenance to planned intervals.



Frontend functionalities



01

Event dashboard

The event dashboard features an overview of all alarms and warnings for the connected asset. It provides a summary of the current state of all signals and of the events that still require acknowledgment. In addition, a list of previously acknowledged events can be sorted by type, timestamp, and other aspects.

02

Signal details

Users can view how a particular signal is trending and examine historical data relating to this signal, such as alarms and warnings. Various input signals that impact a specific event are ranked by their respective relevance. The information in this section can be used for root cause analysis.

03

Event handling

Benefit from one-click bulk acknowledgment of multiple events, which can be labeled by type and component. It is also possible to input measurements for event resolution. Users can select whether a specific event constitutes an anomaly and whether the system should begin incremental training that incorporates this event. Retraining can be performed in the case of false positive or false negative events to enhance performance of the AI models.

04

Asset structure

View a process map of all monitored components and signals connected to OnCare.InSight, showcasing the asset hierarchy and relationships. Featuring details on unacknowledged events, alarms, and warnings, the asset structure differentiates between signal types. By highlighting signals with anomalous behavior, it also aids root cause analysis and enhances the efficiency of maintenance processes.

05

Model overview

The frontend provides an at-a-glance overview of all models, which can then be sorted or filtered by their type and status. Users can access a full history of all model versions, view the corresponding training queue, and reinstate a previous model version from the Model Versions page.

Industry applications in power, oil, and gas

Power

AI-based predictive maintenance in the power sector offers significant benefits by reducing downtime, optimizing performance, and extending equipment lifespan. Voith's solution is applicable across various power plants, such as combined cycle power plants, nuclear power plants, and biomass power plants. Key use cases include monitoring oil pressure, temperature, and vibration to detect wear in actuators, converters, and bearings. Early detection of issues such as gear tooth damage and actuator failure enables timely intervention. By minimizing expensive repairs and operational disruptions, this enhances efficiency and reliability in power generation.

Oil and gas

In the oil and gas sector, the extraction, processing, and refining of petroleum and natural gas requires complex machinery and infrastructure. Voith's AI-based predictive maintenance solution is ideal for applications on offshore rigs, FPSOs, onshore wells, refineries, and pipeline gas compression systems. Key monitoring use cases include tracking differential pressure, bearing temperature, and shaft vibration to detect issues like valve drive failure, compressor bearing coking, and seal damage. Early intervention prevents costly repairs and severe failures, ensuring continuous and safe operation.

Maximizing reliability with predictive maintenance

Proof of value in vibration analysis

Industry	Energy
Facility	Biomass power plant
Use case	Steam turbine monitoring
AI models	1
Signals	13

Challenge

We conducted a proof of value using offline data to identify the root cause of increased gear vibration in a biomass power plant. Steam extraction, part of a neighboring operation, seemed to affect the turbine's gear vibration target signal. Correlations between steam extraction, changes in the generator output, pressure, and gear vibration fluctuations were analyzed. The steam turbine set was monitored to pinpoint the cause of high housing vibrations.

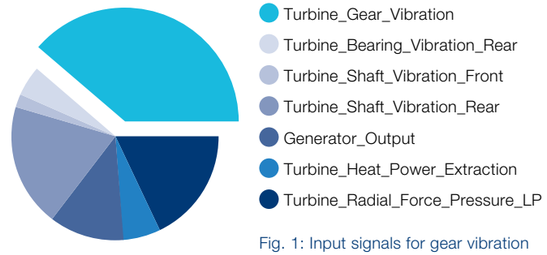


Fig. 1: Input signals for gear vibration

Added value from Voith

Gear vibrations were modeled as a target signal for operating states including summer, winter, steam extraction, and no steam extraction. Through root cause analysis, we identified which signals impact gear vibration (see Fig. 1). By adjusting turbine radial force pressure, turbine heat power extraction, and generator output – signals closely related to steam extraction – the rear shaft vibration can be controlled. This signal, in turn, significantly affects turbine gear vibration. By modeling the difference between measured and expected signals (see Fig. 2), we can determine the optimum steam extraction to positively influence target signals and reduce vibrations. Based on this analysis and the prediction of vibration levels, a steam extraction plan can be established to effectively control turbine gear vibration.

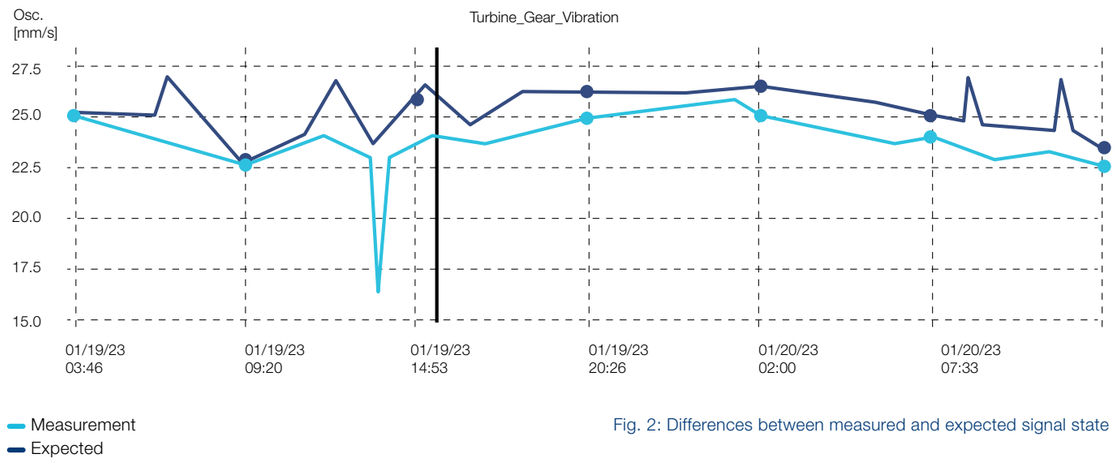


Fig. 2: Differences between measured and expected signal state

Enhancing offshore efficiency

AI-powered predictive maintenance on FPSOs

Industry Oil and gas

Facility Floating production storage and offloading unit (FPSO)

Use case Vorecon HP compressor drive

AI models 1

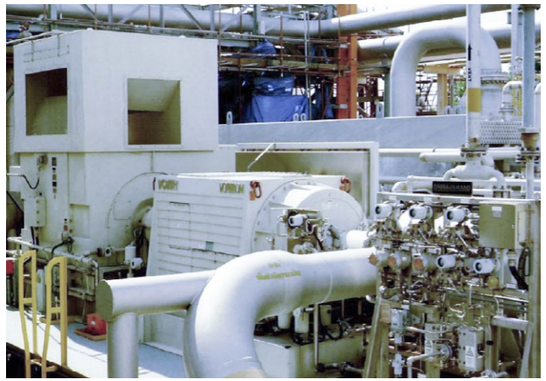
Signals 29

Challenge

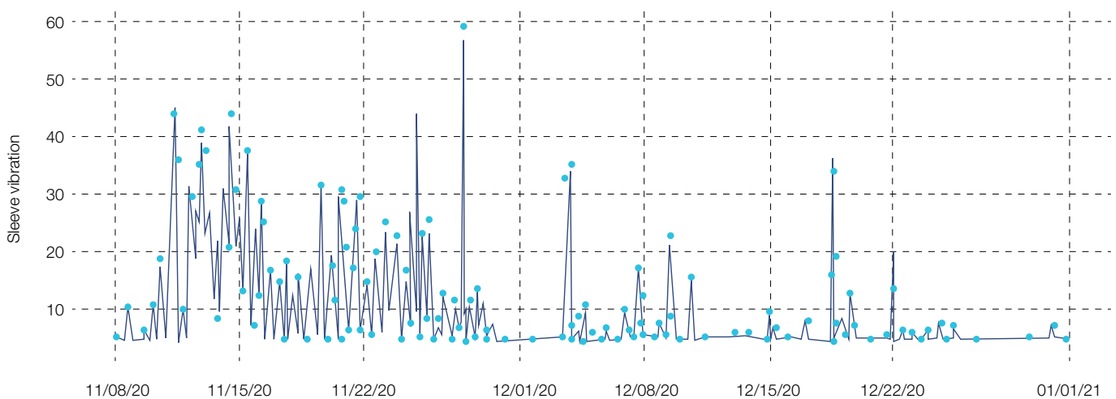
Voith aimed to demonstrate the potential of its AI solution for early detection of issues such as increased coupling sleeve vibration, which had previously caused a trip in a Vorecon at a floating production storage and offloading unit (FPSO) managed by a leading OEM collaborating with Voith. Voith is currently establishing a strategic partnership with this OEM to jointly develop and deploy advanced AI applications. Although the data provided was post-incident, an offline AI analysis was conducted to assess the system's ability to identify anomalies and predict potential trips, illustrating the broad applicability and effectiveness of Voith's AI in predictive maintenance.

Added value from Voith

Proactive maintenance with highly accurate AI models enables early anomaly detection to prevent downtime and damage. Root cause analysis provides data-driven insights by identifying key signals for optimized maintenance. This improved performance minimizes unplanned trips while maximizing efficiency. Voith found that the AI predictions for this use case were sufficiently accurate. It can therefore be assumed that the model would have detected the incident.



Voith partners with a leading OEM to harness AI for early anomaly detection and enhanced maintenance in oil & gas.



Display of predicted and actual signals for this use case

Petrochemicals

Predictive maintenance powered by AI helps boost efficiency in petrochemical processes.

In the petrochemical industry, converting raw materials like natural gas and crude oil into valuable chemicals and products is essential. The efficiency and reliability of machinery are critical for preventing costly downtime and ensuring safe operations.

Our AI-based predictive maintenance solution offers early detection of potential failures, reducing downtime and enhancing safety. It is suitable for natural gas processing, agrochemical production, and petrochemical plants. Key monitoring use cases include detecting diaphragm coupling damage, turbo gear tooth or bearing damage, and overheating of compressor bearings.

Safety and performance in steel and mining

Steel

By enhancing equipment reliability and reducing unplanned downtime, AI-based predictive maintenance is critical for maintaining production efficiency in the steel industry. Our solution is applicable across various steel production processes including cold rolling mills, heavy profile mills, and hot strip mills. Key monitoring use cases include detecting oil leakage, hydraulic system health, correct roll changes, and vibration issues. By analyzing signals such as oil pressure, engine speed, and vibration, our system provides early warnings and helps schedule maintenance. It therefore minimizes disruptions and extends equipment life.

Mining

In the mining sector, the extraction, transportation, and processing of raw materials require highly reliable and efficient machinery to maintain productivity and safety. Predictive maintenance is critical for preventing unexpected equipment failures, which can cause significant downtime and financial losses. Our AI-based solution can be applied across the entire mining process, from extraction and crushing to material handling and processing. Key monitoring use cases include detecting drivetrain fractures, bearing damage, and material flow issues. By analyzing signals such as vibration, bearing temperature, and torque, our system provides early warnings, ensuring timely maintenance and minimizing operational disruptions.

Hydraulic system integrity
Proactive leak detection

Industry	Steel
Facility	Section rolling mill
Use case	Oil leakage detection
AI models	2
Signals	42

Challenge

Oil leaks in the hydraulic system lead to sudden production interruptions and therefore unplanned downtime. The early detection of leaks shortens this downtime and enables operators to shift production interruptions to planned maintenance periods. It also reduces the resulting losses.

Added value from Voith

Avoiding unplanned downtime and extending production time serves to boost output. Early detection saves money by reducing the amount of oil that is lost and the need for subsequent clean-up work. In addition, identifying the specific component that caused the leak ensures better-quality results and a more targeted response.

> “Oil leakage detection is crucial for advancing predictive maintenance. The basic model, developed over months, will be optimized with incremental learning.”
>
> Florian Goll
> Project Manager, Stahlwerk Thüringen GmbH

Hydraulic leakage at V-roll locking cylinder

7 minutes	for leak detection in OnCare.InSight
69 minutes	earlier than customer system
29.54 liters	oil loss theoretically prevented

Preventing gearbox failure
Early anomaly detection

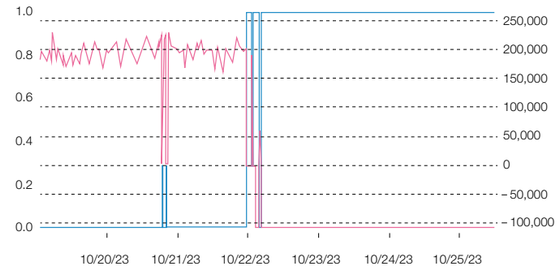
Industry	Mining
Facility	SAG mill for initial crushing
Use case	Monitoring of motor, coupling, gearbox
AI models	1
Signals	5

Challenge

A customer operates two different SAG mill configurations: one driven by a variable frequency drive (VFD) and another using a standard setup with coupling and gearbox. The rotational speed of the SAG mill with the standard arrangement should be variable, but the current configuration — which does not feature any Voith components — is experiencing failures. The goal is to identify the root cause of these failures and establish long-term monitoring of critical influencing signals.

Value proposition from Voith

Using offline data modeled after a real-world scenario, we aim to demonstrate the maximum achievable performance and how to completely prevent failures in the drivetrain. The monitoring solution uses key signals such as power, feed rate, theoretical torque, and more to optimize performance and ensure the reliability of the SAG mill.



Added value at every stage

Offline: preparation and testing

Planning begins with the joint definition of use cases, signals, and success criteria for the proof of value. Once these framework conditions are established, you supply the offline data to Voith for thorough investigation.

We then conduct an investigative analysis of the production data to prepare the data and AI model. This process includes detecting optimization parameters and culminates in a detailed result report, providing insights and recommendations for enhancing system performance.

Online: deployment and training

In the online phase, deployment and training begin with the setup and testing of the cloud connection. The dataPARC suite is also configured and installed. This is followed by AI training, during which the historical data is prepared and the algorithm is trained and validated.

The setup also includes model visualization in the OnCare.InSight frontend. Continuous monitoring of selected parameters is provided through an annual subscription, which also includes an optional KPI evaluation phase.

PoV planning → Data analysis → Closing report → Deployment → AI training → Continuous monitoring

Big data, big security

Data security is paramount for industry 4.0. Voith's AI-based predictive maintenance system meets the highest security and privacy standards, backed up by official certification. It maintains security processes at every step to ensure data integrity and confidentiality.

The advanced cloud infrastructure keeps users' data safe, with encrypted data transfer and measures to block any unauthorized activity. Interfaces are robust, user-friendly, and feature access controls for continuous data security.

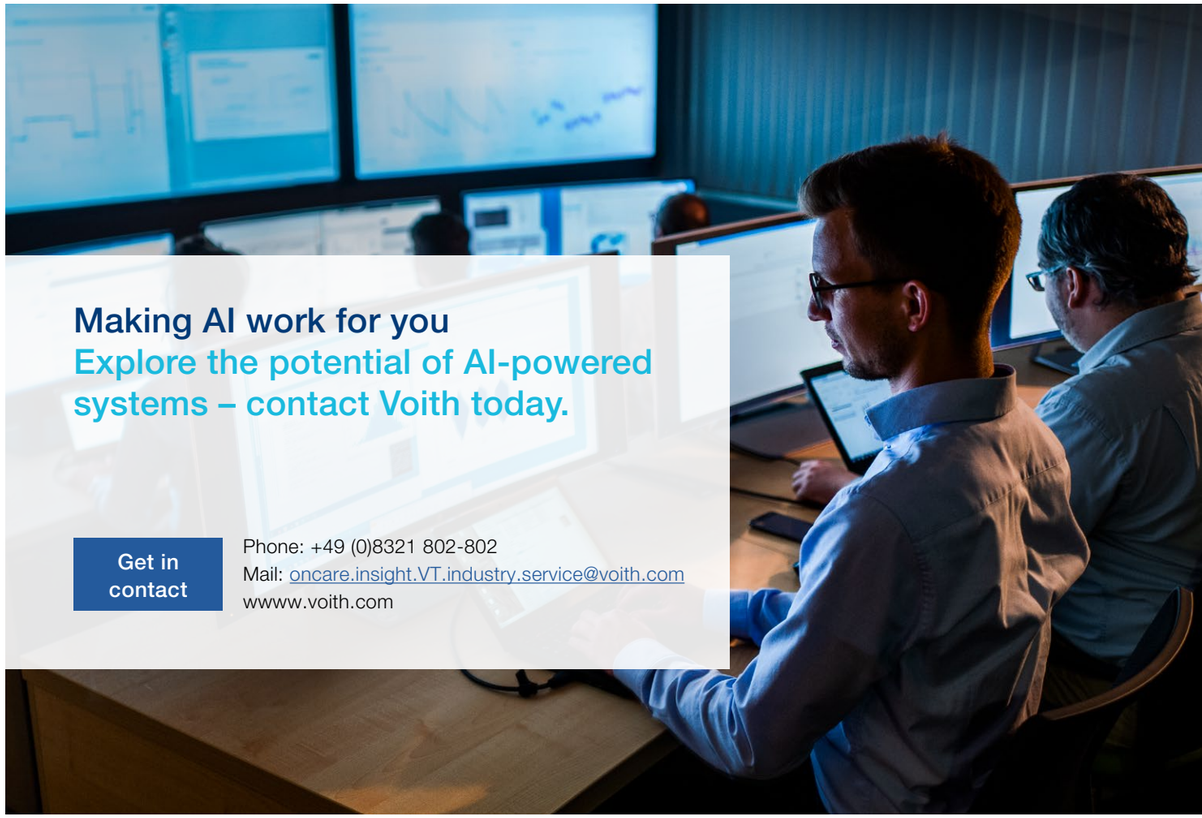
Data protection guaranteed

- EU-based data centers
- ISO 27001, IEC 62443
- Encrypted cloud storage

The OnCare family

The Voith OnCare family of digital condition monitoring and maintenance tools reduces costs while boosting availability. Both OnCare.Health and OnCare.InSight are self-learning, with the latter now pushing the boundaries of the possible in new ways. Each of these tools is supported by the Voith OnPerformance.Lab portfolio of digital service solutions.

OnCare.Health	OnCare.InSight
Voith component expertise	Voith industry and process expertise
Condition and efficiency monitoring of components	Early detection of anomalies leading to failures in assets
Reduction of unplanned downtime	Reduction of unplanned downtime



Making AI work for you

Explore the potential of AI-powered systems – contact Voith today.

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