DYNAMOX PORTFÓLIO: Pumps
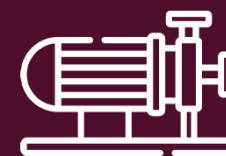
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Introduction

Pumps are fundamental assets in hydraulic installations and industrial processes. However, they also consume significant amounts of energy and generally incur **high maintenance costs**. Periodic readings of pump health indicators, such as temperature and vibration, may not be enough to have a complete overview of the operating state, as they only record a specific moment in a continuous process.

To **prevent failures** and **increase the reliability** of these assets, **24/7 online condition monitoring**, together with periodic sensitive inspections, is essential. In this portfolio, we will illustrate how **Dynamox's solution** helps to identify early signs of wear and potential failures in this type of asset, increasing the **reliability and availability of industrial plants.**
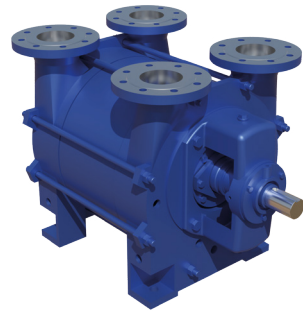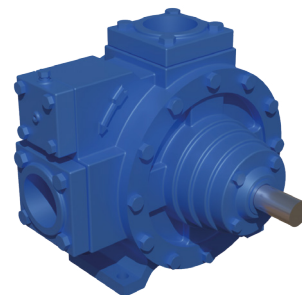
Types of Pumps

Vertical Pumps
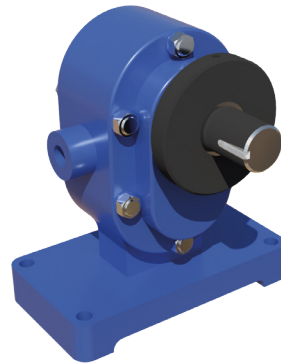
Gear Pumps

Piston Pumps

Vacuum Pumps
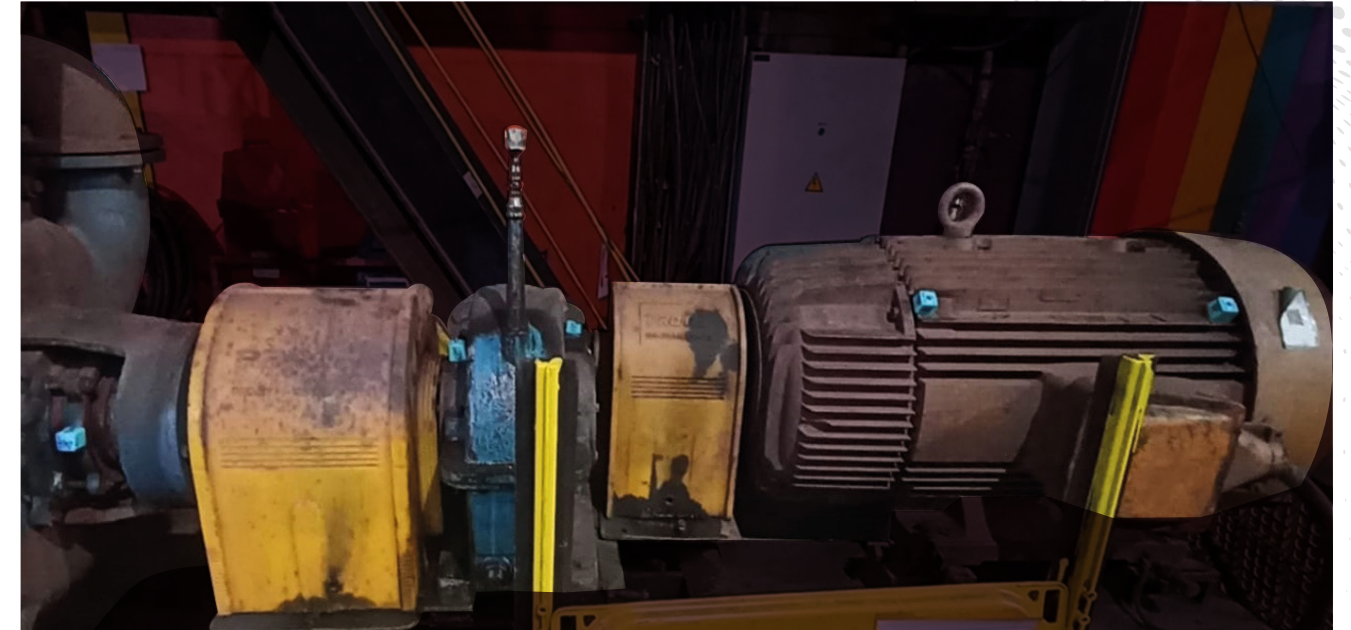
Vane Pumps

Centrifugal Pumps: water, pulp, etc.

And many others!

Is it possible to monitor all these types of pumps?

Yes! We will show how the **DynaPredict** System works in the identification of failures in the most diverse types of pumps.

Field installation

Vacuum pump set
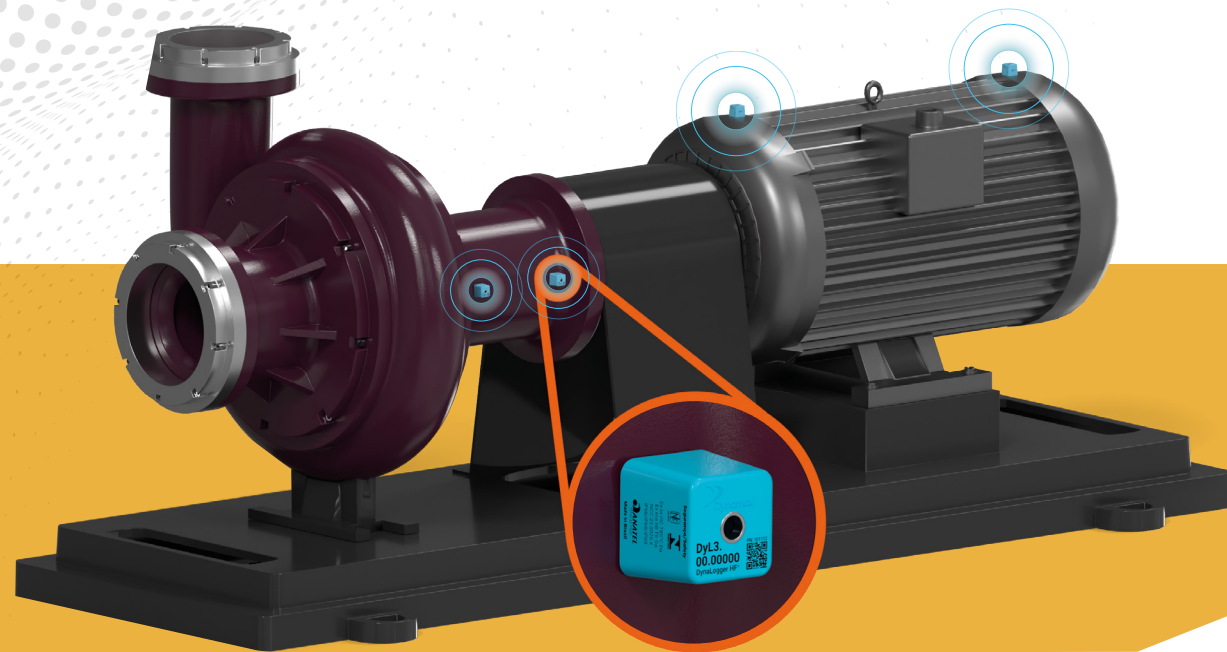
Centrifugal slurry pump cylinder

Multi-stage pump bearing housings

Motor pump set installation

DynaPredict Solution for Motor Pumps:

Dynamox Application

☑ DynaSens

▷ DynaNeo

⚡ DynaDetect

DynaPump

Data Integration

Web Platform

DynaGateway DUO

App

Personalized technical support

⬡ **4 to 10 HF+ or TcAs* DynaLoggers:** depending on pump configuration.

⌂ **DynaGateway:** device for automated collections.

⚡ **DynaDetect:** automated failure detection module.

☑ **DynaSens:** sensitive inspection module.

▦ **DynaPump:** specialist dashboard for pumps.

▷ **DynaNeo:** visual management dashboard.

* *With access to the App and Web Platform for analysis.

Sensors

⬡ **DynaLogger** HF+

- Wireless sensor for collecting temperature and triaxial vibration data of up to 13 kHz
- Bluetooth 5.3 communication and internal memory
- IP66 / IP68 / IP69 / EX Certifications
- Suitable for detecting early-stage bearing failures, lubrication failures, cavitation, frequency inverters, pump rotor wear...
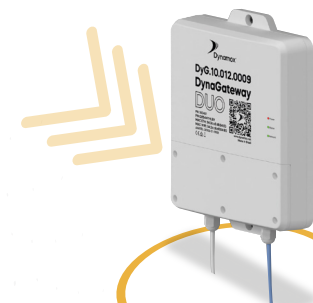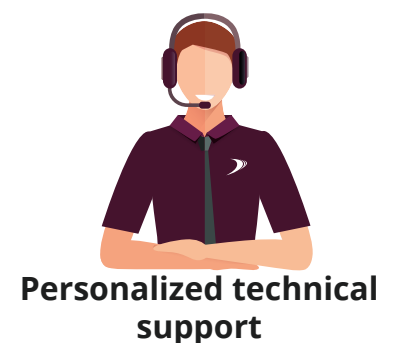
⬡ **DynaLogger** TcAs

- Wireless sensor for collecting temperature and triaxial vibration data of up to 2.5 kHz
- Bluetooth 5.3 communication and internal memory
- IP66 / IP68 / IP69 / EX Certifications
- Suitable for detecting bearing failures at an advanced stage, more severe lubrication failures, cavitation, pump rotor wear...
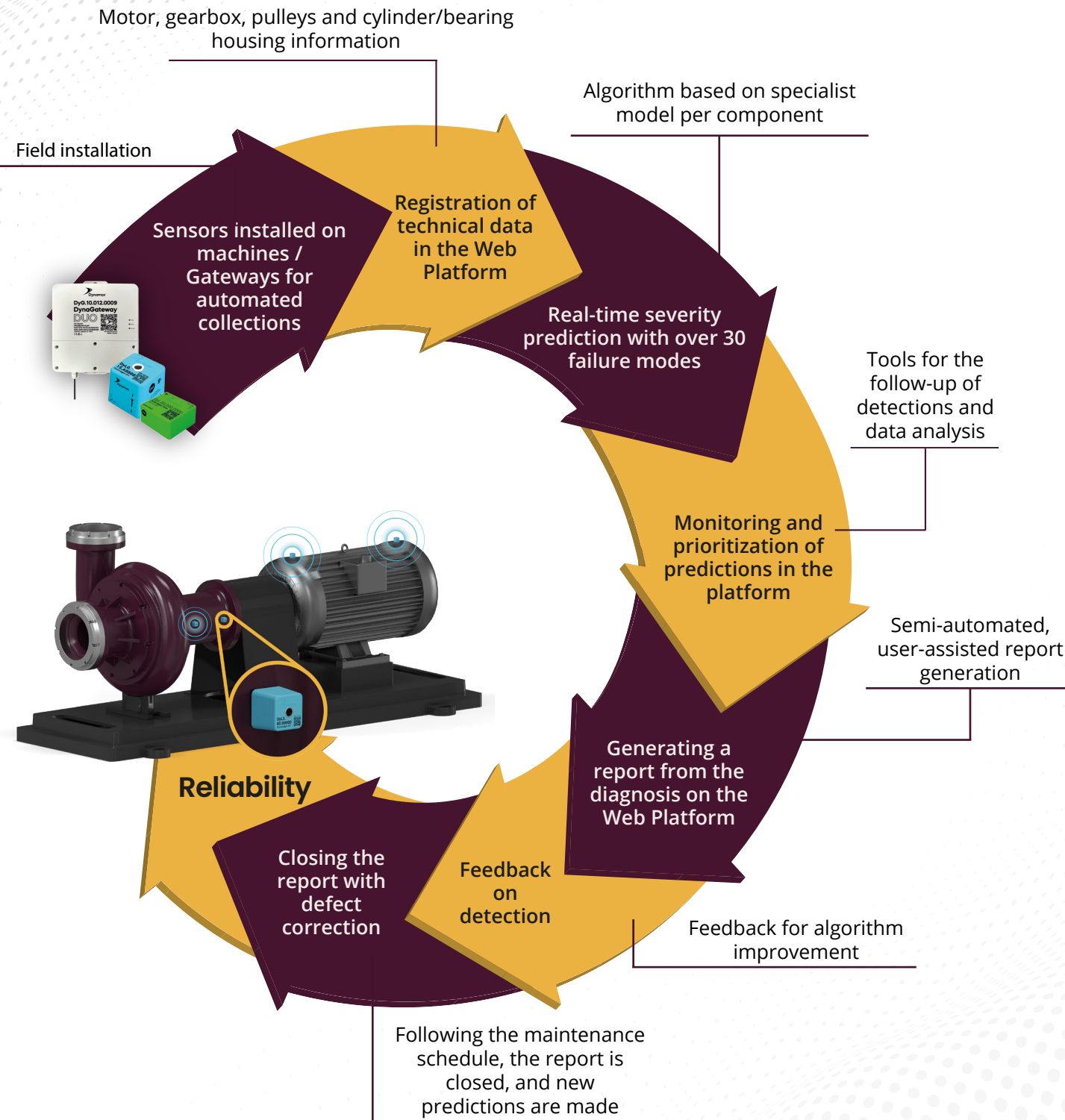
How does Dynamox's automated failure detection work?
Learn about DynaDetect

Motor, gearbox, pulleys and cylinder/bearing housing information

Field installation

Algorithm based on specialist model per component

Sensors installed on machines / Gateways for automated collections

Registration of technical data in the Web Platform

Real-time severity prediction with over 30 failure modes

Tools for the follow-up of detections and data analysis

Monitoring and prioritization of predictions in the platform

Semi-automated, user-assisted report generation

Reliability

Generating a report from the diagnosis on the Web Platform

Feedback on detection

Feedback for algorithm improvement

Closing the report with defect correction

Following the maintenance schedule, the report is closed, and new predictions are made
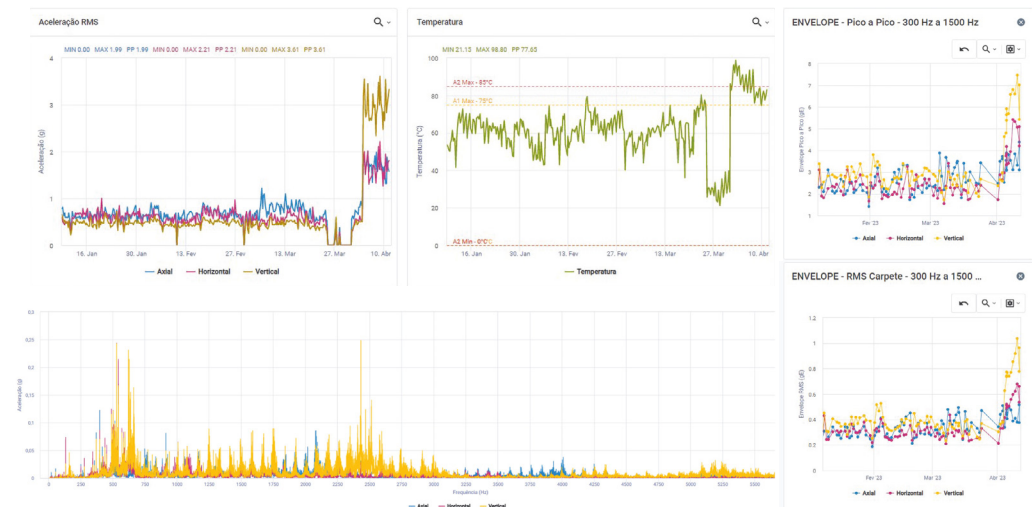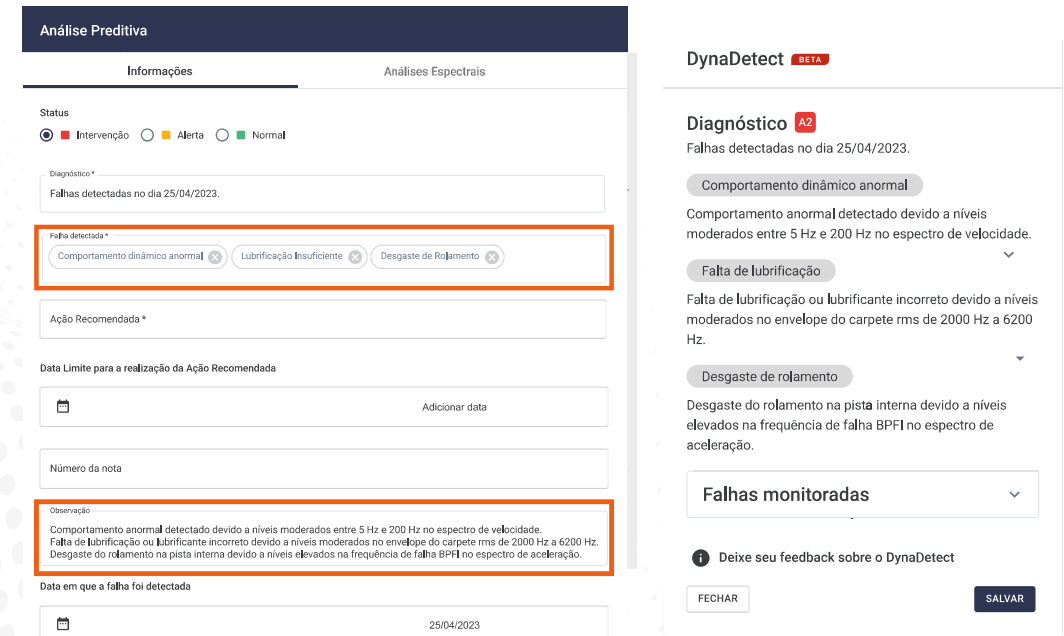
A practical example of DynaDetect on pumps

The automated detection system identified lubrication problems and bearing wear in motor-pump set monitored by Dynamox's system.
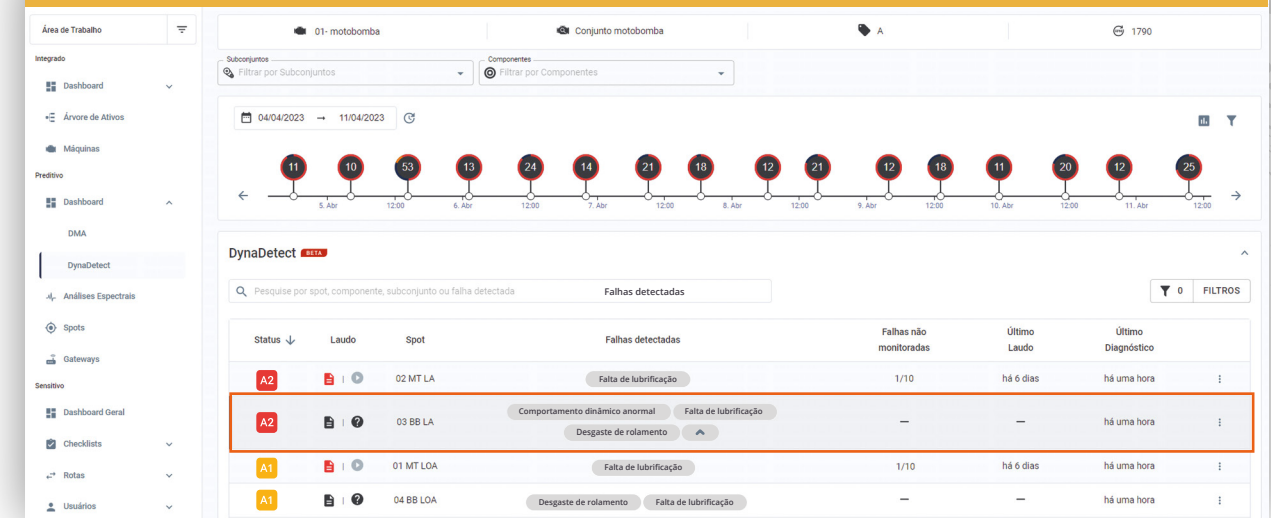
Vibration graphs confirmed the automated diagnosis. The spectral carpet elevation indicating lubrication failure of the pump bearing housing stands out.

A semi-automated report was generated with diagnosis information, thus speeding up the analyst's work.

How does Dynamox's Sensitive Inspection work?
Learn about DynaSens

- Periodic cycles
- Execution tolerance
- Start date
- Assets that make up the route
- Users in charge

Creation or use of standard checklist templates for pumps and components, which are incorporated into inspection routes

- ☑ Performed routes
- ❶ A2 Alert (severe)
- ❶ A1 Alert (moderate)
- ● No alert
- ● Justified routes

Route creation for inspectors with execution cycles and tolerance

Execution of routes via Mobile App (for Android or iOS) with geolocation

Software integration for opening Service Tickets

Analysis of reports generated in the field through dashboards with an overview of the plant's health

Follow-up on inspector's adherence, considering the areas included in the inspection, percentage of routes taken, justified or not taken

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Sensitive Inspection - DynaSens
Checklists, manual measurements and alerts

*How can **Sensitive Inspection** act to reduce risks during pump operation?*
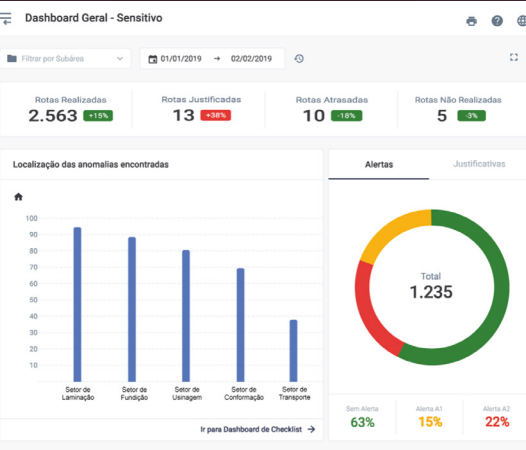
❶ Mounting

Checklist:	IM_OP_BOMBAS
Tipo:	Padrão
Usuário:	João Vitor De Jesus Oliveira (joao.oliveira@dynamox.net)
Localização na árvore de ativos:	00-BO-02-224-MTQ2B-MBC07
Rota:	FUT - PISO 0 TMP
Checklist Realizado:	19/04/2023 15:27
Sincronização:	19/04/2023 16:09
Total aproximado de tempo utilizado (h:min:s):	00:01:39
Geolocalização:	-24.0781 -49.7779

Pergunta 2:	HÁ ALGUMA ANOMALIA NA FIXAÇÃO DA BOMBA ?
Resposta:	ELEMENTO DE FIXAÇÃO AUSENTE
Observações:	-
Nível de Criticidade:	P5 – Risco de falhar entre 15 a 30 dias
Anexos:	

Imagem em 19-04-2023 10:59.jpg

❷ Operating noise

Pergunta 1:	HÁ ALGUMA ANOMALIA NAS CONDIÇÕES DE OPERAÇÃO DA BOMBA?
Resposta:	RUÍDO ANORMAL
Observações:	-
Nível de Criticidade	P5 – Risco de falhar entre 15 a 30 dias
Anexos:	

Imagem em 19-04-2023 15:06.jpg

Áudio em 19-04-2023 15:07.m4a

❸ Lubrication

Pergunta 1:	HÁ ANOMALIA NA LUBRIFICAÇÃO BOMBA ?
Resposta:	NÍVEL BAIXO DE ÓLEO
Observações:	-
Nível de Criticidade:	⚠ P5 – Risco de falhar entre 15 a 30 dias
Anexos:	

Imagem em 19-04-2023 09:59.jpg

❹ Sealing

Pergunta 3:	HÁ ALGUMA ANOMALIA NOS ELEMENTOS DE VEDAÇÃO ?
Resposta:	VEDAÇÃO IRREGULAR
Observações:	-
Nível de Criticidade:	⚠ P5 – Risco de falhar entre 15 a 30 dias
Anexos:	

Imagem em 19-04-2023 09:45.jpg

Specialist Dashboards
## DynaPump - Criticality and diagnosis overview per asset

Increase the efficiency and reliability of your industrial operations with our Alert Management and Diagnosis Dashboard for Pumps (DynaPump).

The solution offers a complete, real-time view of pump performance in terms of alerts, severity status, and failure diagnosis.

Through advanced filtering and selection of motor-pump components, analysis and alerting features, the dashboard allows you to identify problems early on and cross-reference information between other machine monitoring spots. This allows proactive measures to be taken to avoid critical failures, reduce maintenance costs, and minimize downtime.

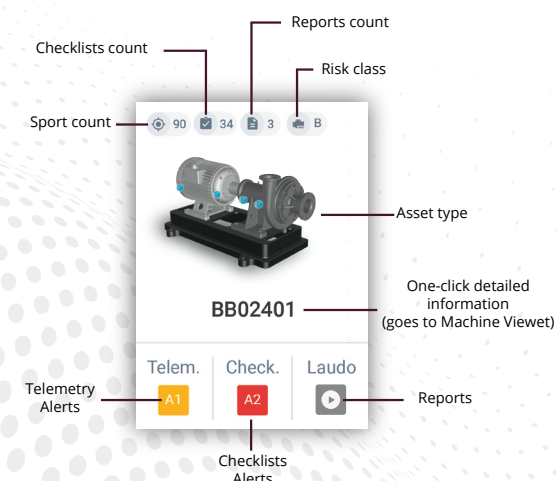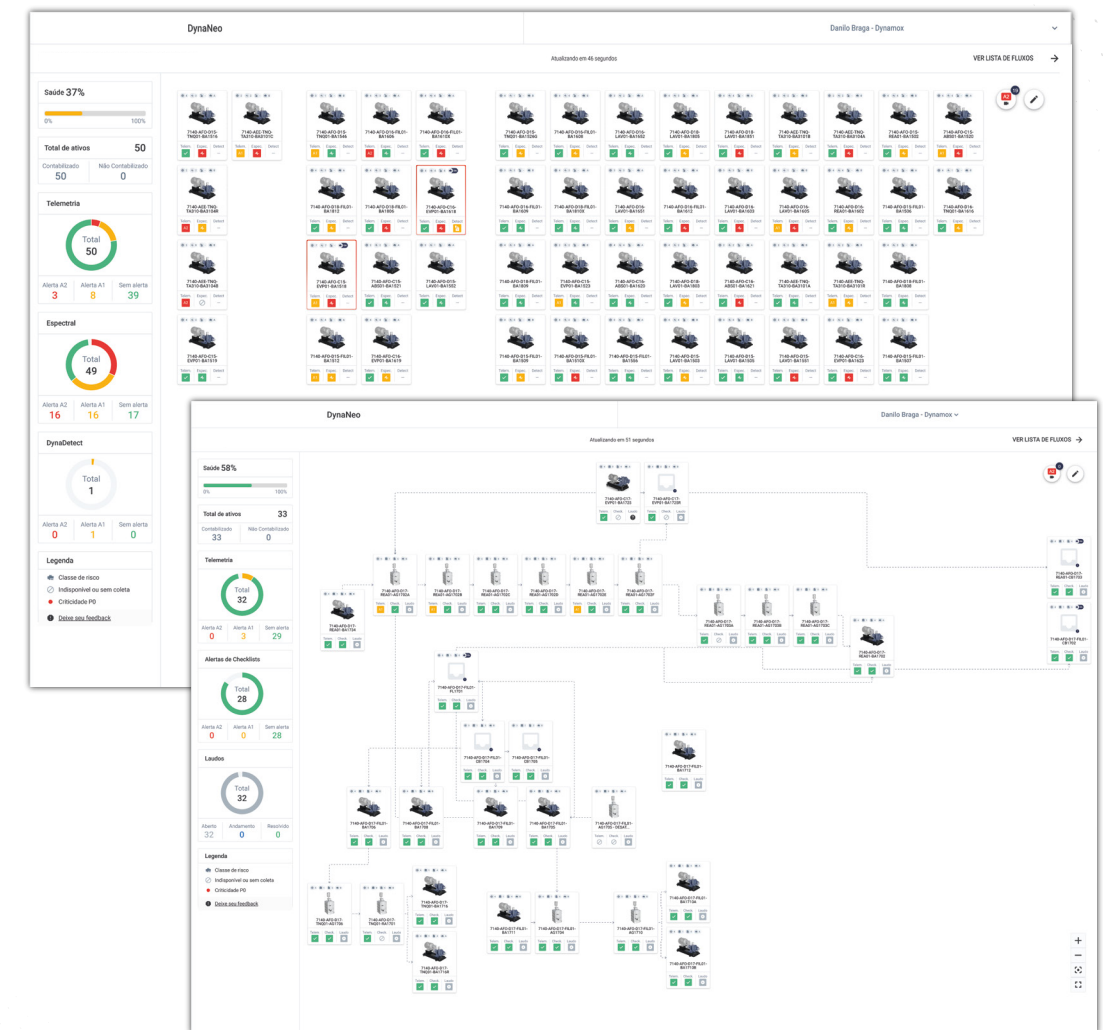Analytics with alert and detection overview per plant/sector
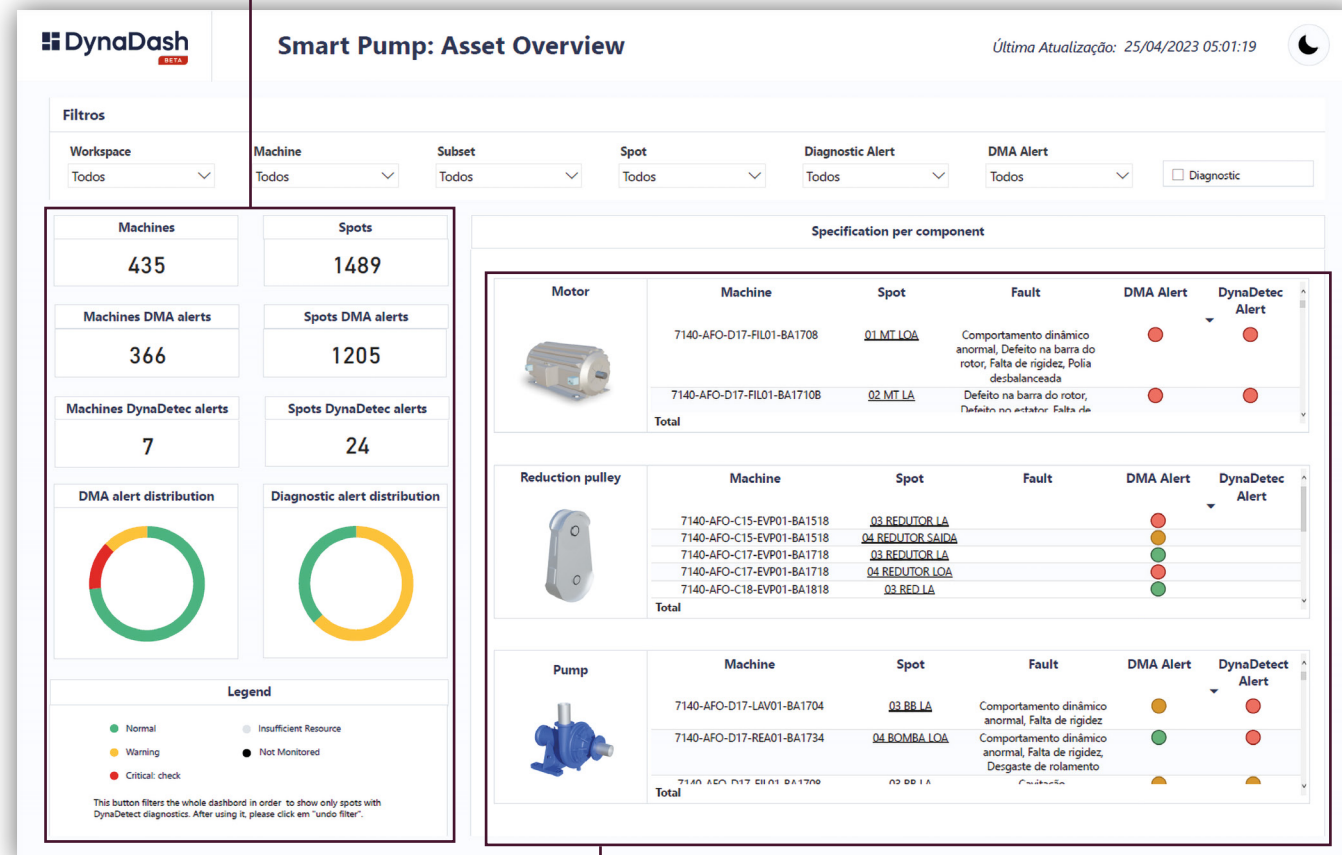
Alert follow-up and automated detection per pump subcomponent

Specialist Dashboards
DynaNeo – Process and criticality overview

DynaNeo is a visual management dashboard that combines information from the DynaPredict environment into an integrated visualization, allowing the health of a process to be calculated based on the indicators of interest to the user.

Set up your process as you wish! Add the assets that matter to your process and configure the health indicators that you need for the management of your maintenance plan.

Checklists count
Reports count
Risk class
Sport count
Asset type
One-click detailed information (goes to Machine Viewet)
BB02401
Telemetry Alerts
Telem.
Check.
Laudo
Reports
Checklists Alerts

- Quickly find alarmed assets.

- Easily visualize your maintenance process through a visual management dashboard

- Have a visual understanding of the consequences of machinery breakdown or maintenance.

What failure modes does the Dynamox system detect?

○ No coverage ● Full coverage

Components	Potential failure modes	Detection via Dynamox monitoring solution	Detection via Dynamox Sensitive Inspection	Detection via Enging technology*
Electric Motor	Spatial discharge	○	○	●
	Poor contact	○	○	●
	Short between windings	◐	○	●
	Low insulation	○	○	●
	Electrical unbalance	◐	○	●
	Overcurrent	◐	●	●
	Over-heating	●	●	○
	Mechanical Looseness	●	○	○
	Cracked/broken cage	●	○	○
	Bearing defect (Wear/Cracks)	●	◐	○
Frequency inverters	Panel heating	●	●	●
	Electronic components burnout	◐	◐	●
	Motor (stator) / stator wire burnout	○	○	●
Interconnection Element	Elastic element wear	◐	●	
	Looseness	●	●	
	Eccentricity	●	○	
	Misalignment	●	○	
	Unbalance	●	○	
	Pulley Slip	●	●	
	Rubbing	●	◐	
Gearbox	Bearing defect (Wear/Cracks)	●	◐	
	Inadequate lubrication	●	○	
	Structure, adapter sleeve and shaft looseness	●	◐	
	Mechanical stress	●	○	
	Lack of parallelism between housings	●	○	
	Inadequate contact between gear teeth	●	○	
	Cracked/broken teeth	●	○	
	Pitting teeth	●	○	
	Shaft crack	●	○	
	Oil leakage	○	●	
Bearing housings (cylinder)	Bearing defect (Wear/Cracks)	●	◐	
	Inadequate lubrication	●	◐	
	Structure, adapter sleeve and shaft looseness	●	◐	
	Mechanical looseness	●	●	
	Mechanical stress	●	○	
Rotor (impeller) / Frame	Wear	●	○	
	Loosening	●	○	
	Friction (coating)	◐	◐	
	Leaks in general	◐	●	
	Cavitation	●	◐	
	Foreign Object	◐	◐	

*For electric components, Dynamox has current and voltage measurement products in its portfolio. Contact us to learn more.

Pumps in adverse conditions
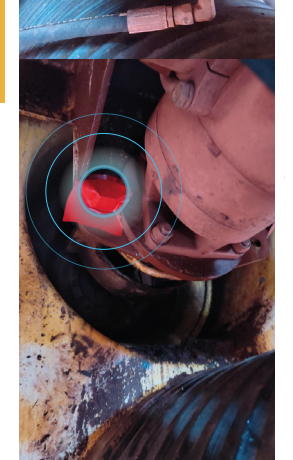## In what conditions can the solution be implemented?

✓ Sensor robustness, which are **IP66**, **IP68**, **IP69** and **EX certified**.
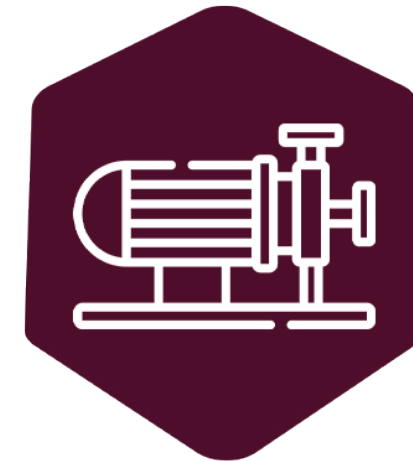

Application in submersible pumps.
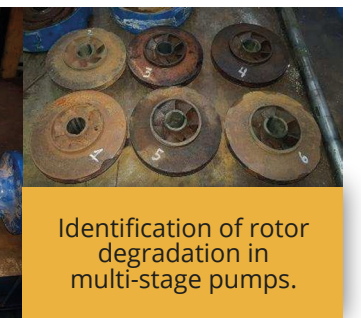

Application in pumps subject to high levels of contamination.

Gasket temperature monitoring to indicate leaks.

Positive displacement pumps, internal monitoring inside the bearing housing.

Lift pump and off-highway vehicle steering pumps (monitored by DynaTrigger).

Identification of rotor degradation in multi-stage pumps.

Case study:
Corroded Rotor

What else can the solution identify?
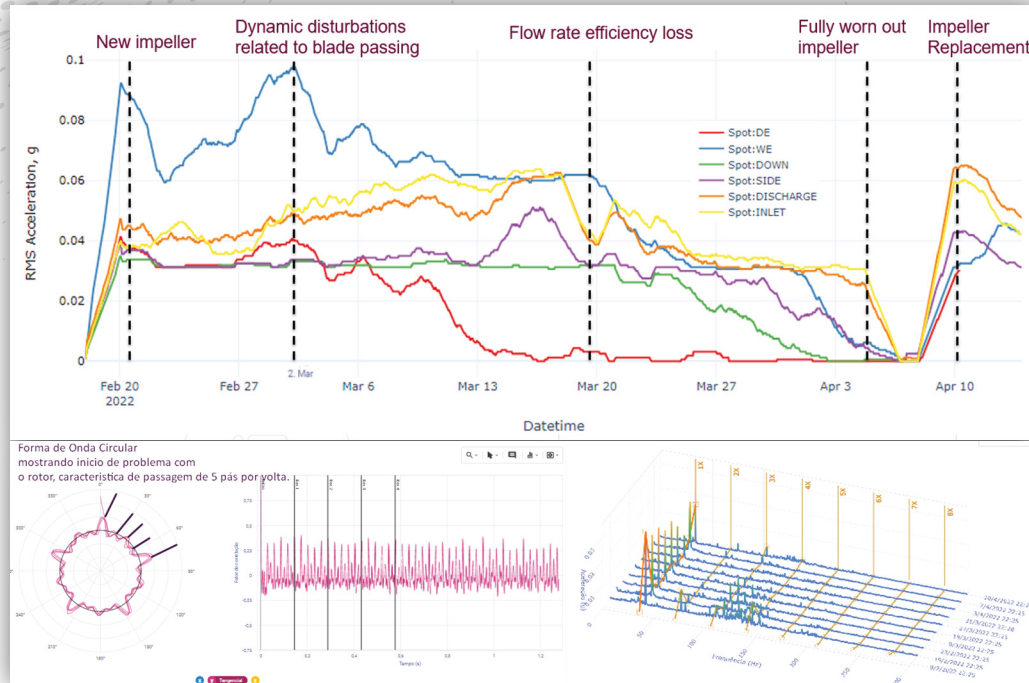
Report

In this case, uniform wear of the slurry pump rotor was identified (due to the corrosion process occurring uniformly), where the loss of mass throughout its diameter did not lead to rotor unbalance, but rather to a reduction in vibration levels. As wear progressed (reduction in rotor area), the trajectory of the particle through the pipes also decreased. Therefore, as the rotor area decreases, so does the mechanical stress and, consequently, the vibration amplitude. The effect of this reduction in rotor area was observed at various points throughout the pump.

Benefits
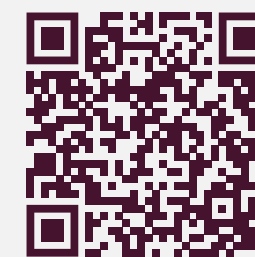
Complete monitoring of pumps and pipe installations

Wireless sensors and lean monitoring infrastructure.

24/7 pump remote monitoring.

Predictive defect detection, using automated diagnosis and advanced analysis tools.

Combining remote monitoring with sensitive inspection to increase reliability and improve maintenance planning.

Monitoring and management visualization for decision-making.

Possibility of integration of raw or processed data and pump vibration and temperature alerts with Plant Information Management System (PIMS).

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