USER MANUAL

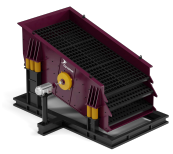
Asset Pro



Conveyor Belt

Number of assets

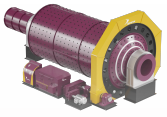
11



Vibrating Screen

Number of assets

11



Ball Mill

Number of assets

11

Dynamox_s.a | Dynamox | Dynamox.net

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1 First steps

Asset Pro is a strategic module of Dynamox Platform, specially developed for specialists and managers of Asset Monitoring Centers (AMCs) who seek a deep and accurate view of the operational health of their most critical assets. Through specialized dashboards, Asset Pro integrates critical data such as technical reports, condition monitoring, automated fault detection, and advanced KPIs, delivering robust and contextualized analysis for each monitored asset.

The product facilitates the tracking of complex indicators, operational availability, and other essential KPIs for predictive management and data-driven decision-making. Its intuitive and configurable interface allows managers to quickly visualize the performance of strategic assets, identify deviations, and prioritize maintenance actions focused on reducing costs, minimizing unplanned downtime, and increasing equipment reliability.

2 Installing and activating

The product is available as an option in the main menu of the Platform and becomes visible after activation by the commercial team.

3 Configuring

After activation, it is necessary to ensure that certain information on the machines is correctly configured in the following locations:

- **Asset Tree**
- **Machine Hub**
- **Spot Hub**

> ⚠ For the **Vibrating Screens Asset Pro**, minimum configurations in the Asset Tree are required to enable activation. The required conditions are detailed in the section **Typing for Vibrating Screen Activation**.

The complete list of mandatory information can be obtained through our support channel, via email **support@dynamox.net**.

3.1 Conveyor belt setup configuration panel

> ℹ Currently, only the Conveyor Belt has a custom configuration panel.

On the page listing the machines available for monitoring, you can access the panel where the machine components can be assembled. This panel offers the following main features:

Machine identification

- Displays the asset type as previously defined in the **Machine Hub**.
- Displays the machine name as previously defined in the **Machine Hub**.
- If the name is too long, it will be automatically adjusted to fit the available screen space.

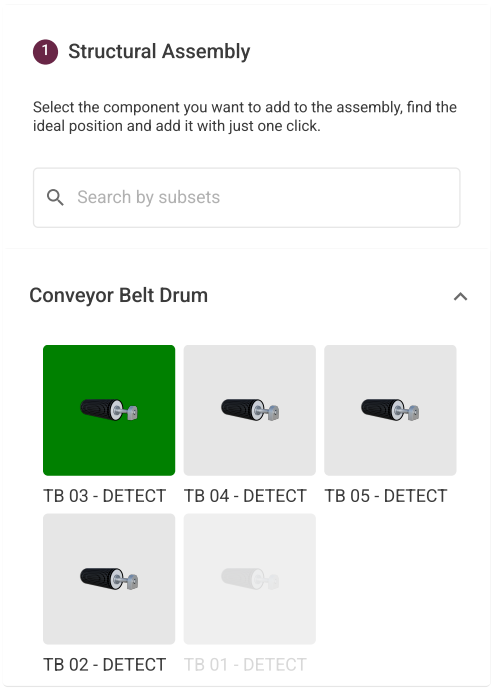
3.1.1 Structural Assembly

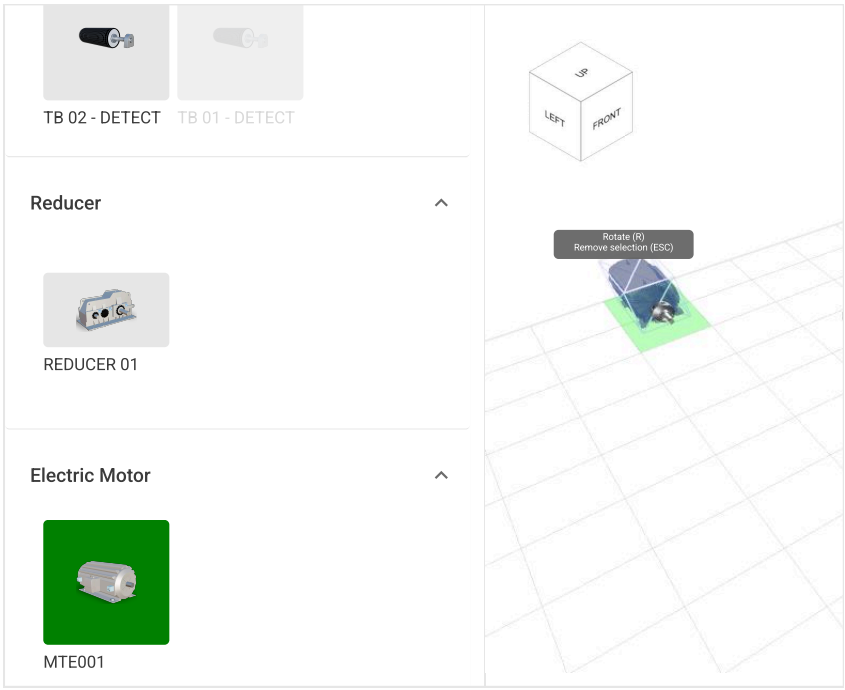
By selecting the **Structural Assembly** option, you will access a dedicated page where you can **select the desired components** select the desired components for machine configuration. This page also includes an **interactive board** that allows you to **visually organize and position** the selected components.

The number of **drums**, **gearboxes**, and **motors** is linked to the machine configuration in the **Asset Tree**.

You can find these components by selecting the corresponding categories or using the **quick search**. To successfully complete the assembly, at least two drums must be included.

When a component is selected, it will be **highlighted in green**. From that moment, you can **position the component** on the 3D **interactive visualization board** using the mouse.





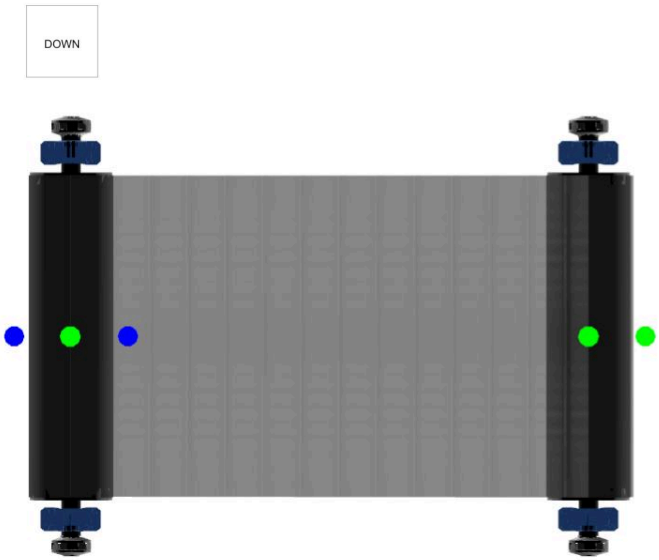
3.1.2 Belt Assembly

By selecting the **Belt Assembly** option, you will access a dedicated page where you can **position the belt in the correct direction** of the previously added drums for machine configuration. This page includes an interactive board that allows you to **organize and visualize the belt path in 3D**.

Currently, only **one belt option** is available for configuration.

Belt assembly **must be performed after structural assembly.**

To configure the belt path, follow these steps:



1. **Sequentially select** the blue points representing the desired path on the drums.
2. Once selected, the points **will turn green**.
3. The belt will become **visible after selecting at least two** direction points.

Blue points are located at all possible drum positions, allowing for various path configurations. However, **selecting all points is not mandatory** to complete the assembly.

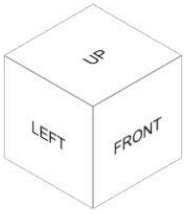
3.1.3 Spot Association

1. By selecting the **Spot Association** option, you will access a dedicated page where you can **associate previously added spots** (alert points) to the machine components. This page offers an **interactive board** for visualizing and managing the location of spots on the components.
2. In the machine view, **green points** indicate locations where alerts can be associated. Clicking a green point will display a list of available spots for that component. **Select the desired spot** to associate.
3. **Gray points** in the 3D view indicate locations where a spot can be associated but **no spot has yet been configured** for that component.



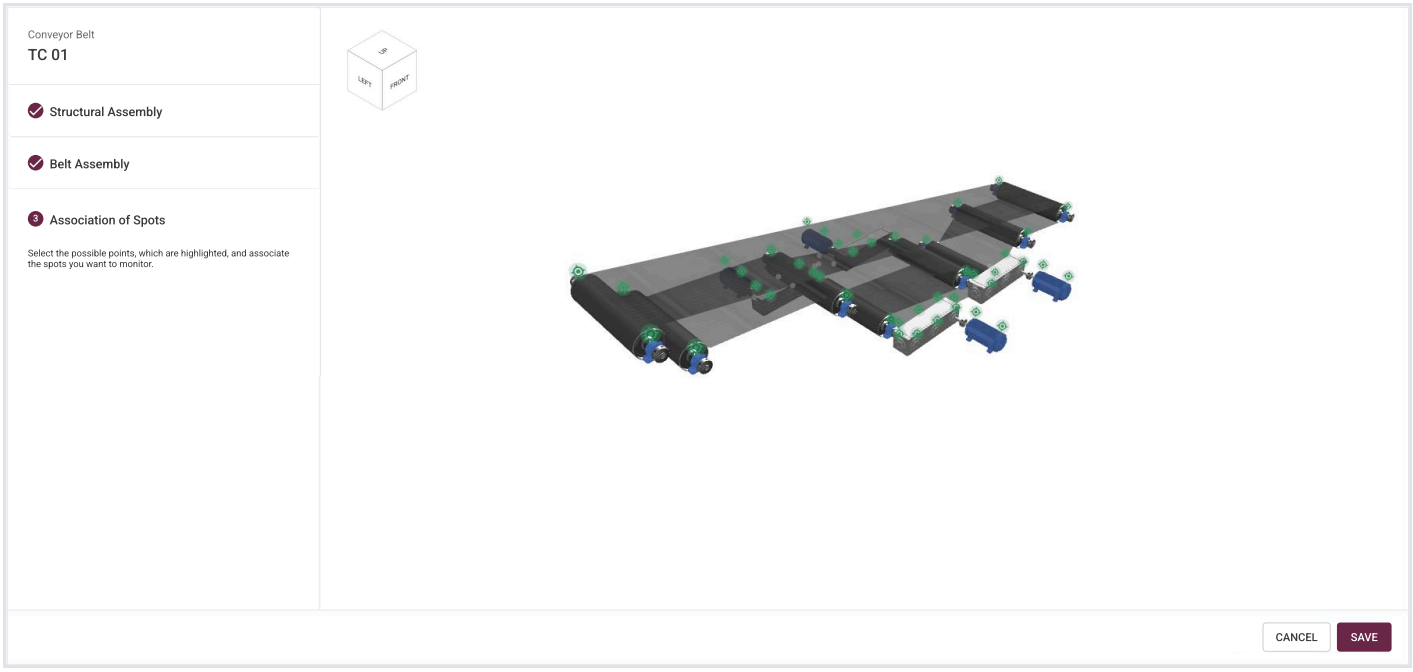
Finalizing machine configuration
After completing the **full 3D machine configuration**, select the **Save** option to confirm your assembly.

All 3D interactive boards offer the following main features:



- **Machine position controls**: Allow selection of predefined visual presentation options for the machine in 3D, speeding up access to different perspectives.
- **Navigation controls**: You can zoom in or out on the machine image within the board using either the mouse or the buttons at the bottom of the board, facilitating detail inspection or an overview.

The image below illustrates all the features and information described above.



3.2 Configuring the vibrating screen

The Vibrating Screen does not have an assembly panel. Therefore, the necessary configurations are available in:

- **Asset Tree**
- **Machine Hub**
- **Spot Hub**

To enable Asset Pro to generate analyses for the Vibrating Screen, it is essential that the required **hardware and software configurations** are properly established.

3.2.1 Dynalogger Compatibility

To ensure valid metrics and accurate analyses in Asset Pro, data collection must be triaxial and simultaneous. It is important to note that not all Dynaloggers are compatible, and some are only compatible under specific configurations.

Below is the compatibility of each Dynalogger type, highlighting whether it meets the requirement for simultaneous triaxial data collection:

New-Generation Dynaloggers:

- **[COMPATIBLE] HF+, HF+s, HF+s Portable, TcAs**: All these models are **fully compatible**. Compatibility is guaranteed because all their waveforms are simultaneous, ensuring the triaxial collection required for valid metric generation.
- **[INCOMPATIBLE] TcAg:** This model is **incompatible** with Asset Pro for valid metric generation, as this model does not have a spectral collection option.

Previous-Generation Dynaloggers:

- **[COMPATIBLE in specific configurations] HF:** This model is compatible **ONLY** when configured with **sampling frequencies of 1600 Hz or 3200 Hz and up to 8192 samples**. In these specific configurations, the waveform is simultaneous. In other configurations, data collection is sequential, making it incompatible for valid analyses.
- **[INCOMPATIBLE] TcA+**: This model is **incompatible** with Asset Pro for valid metric generation, as its data collection is **sequential in all configurations**.
- **[INCOMPATIBLE] AS**: Like TcA+, the AS model is **incompatible** for valid metric generation due to **sequential data collection in all configurations**.

Key-points

- Always prioritize **simultaneous triaxial data collection** as a criterion for metric validity.
- When providing guidance, highlight the **exact configuration requirements** for the HF Dynalogger.
- Ensure that teams and users are aware of the **incompatibility of TcA+ and AS models** for this type of analysis in Asset Pro, in order to avoid misaligned expectations and rework.

The table below summarizes the features available for each Dynalogger model:

Feature	TcA	TcA+	HF	HF+	TcAs	TcAg
Orbits	✗	✗	✓	✓	✓	✗
Structure and Performance	✓	✓	✓	✓	✓	✗
Recomendations	✓	✓	✓	✓	✓	✗
Metrics	✓	✓	✓	✓	✓	✗

Compatibility summary between Dynalogger and Asset Pro

3.2.2 Typing for vibrating screen activation

Before activating any vibrating screen, it is imperative to verify that it is correctly typed. Ensure the following elements are properly configured:

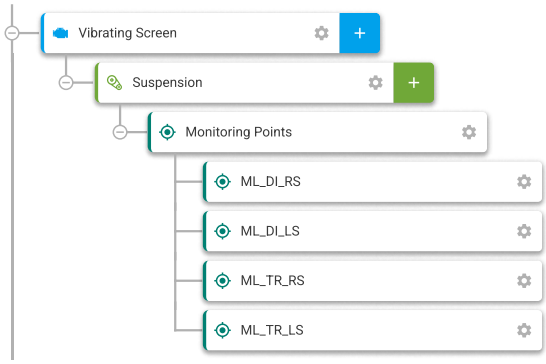
- Machine typing.
- Subassembly typing.
- Number of modules (if applicable).
- Type of screen motion.
- Spot monitoring location.

In the industry, vibrating screens are known for their **operational modularity**, allowing them to be configured and customized to meet specific sector needs. This guide outlines the steps to configure both modular and non-modular vibrating screens, ensuring that analyses are generated correctly.

In general, the hierarchical order in the **Asset Tree typing** must always be: **Screen > Suspension > Monitoring Spots**, and these must be **strictly nested one under the other**. There are different typing configurations for non-modular and modular screens. Below are the details for each type:

3.2.3 Configuring non-modular vibrating screens

For non-modular screens, the typing order in the Asset Tree should be as follows:



Below is a step-by-step guide for configuring screens that do not use modular components, with information organized by configuration level:

Machine Configuration (Characteristics Tab)
On this level, ensure the following fields are configured:

- **Asset type:** Select one of the following:
  - "Vibrating screen"
  - "Wet screen"
  - "Dry screen"
  - "Grain cleaning vibrating screen"
- **Module:** This field **must be left empty**, therefore **do not enter any value**.
- **Motion:** To enable spot metrics (such as stroke and angle), the motion must be set to "**linear**" ou "**elliptical**".

⚠ Currently, Asset Pro supports full analysis only for these two motion types.

Subassembly Configuration (Characteristics Tab)

While setting up the subassembly, keep the following points in mind:

- **Type of asset:** Select "**Vibrating Screen Suspension**".
- **Module:** This field **must be left empty**, therefore **do not enter any value**.

Monitoring Spot Configuration

The spot configuration is divided into two main tabs:

- **In the "Information" tab:**
  - Monitoring Location: Select one of the following:
    - “Left Discharge”
    - “Right Discharge”
    - “Left Feed”
    - “Right Feed”
- **In the "Monitoring" tab:**
  - **Axis orientation:** Select “**Horizontal**”, “**Vertical**” or “**Axial**”.

> **Important**
> Metrics are only calculated for spots with **simultaneous triaxial** data collection. For more details on sensor compatibility, refer to the table above.

DynaGateway Configuration

To ensure proper data collection, follow this setup:

- **Collections:** Configure collections so that each spot has a maximum interval of **40 minutes** between spectral data collections.

> **Attention to the performance and structural analysis processing**
>
> To correctly calculate performance and structural indicators for a screen, it is essential that the collection schedule for the four suspension spots remains within a **40-minute window**! If data is not collected from one or more spots within this interval: The analysis will not be processed, and the most up-to-date performance and structural indicators will not be available.
>
> **Tip:** Proper scheduling configuration in the DynaGateway is crucial to ensure data is always up to date. It is recommended to communicate this requirement to users to avoid changes in spot schedules that could compromise the desired interval.

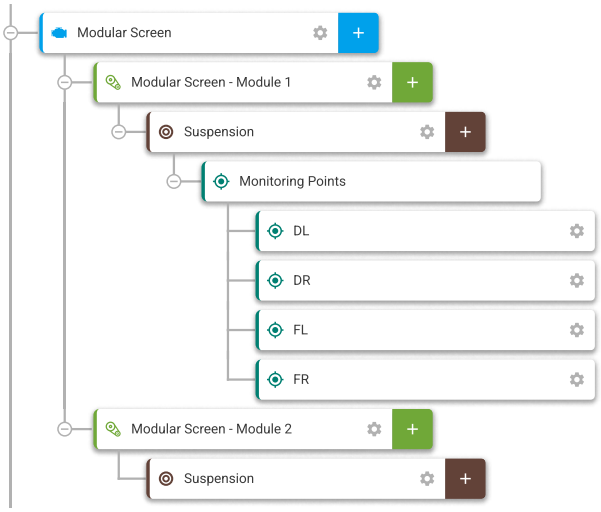
If data collection is not performed at one or more spots within the defined time window:

- The analysis **will not be processed**.
- The most up-to-date performance and structural indicators **will not be available**.

Proper scheduling configuration in the **DynaGateway** is **essential to ensure** your information remains current. To maintain continuous analysis processing, **avoid making changes to spot schedules that could compromise the 40-minute interval**.

Configuring modular vibrating screens

For modular screens, the typing order in the Asset Tree should be:



In this case, the machine level in the **Asset Tree** represents the screen module system. Each screen within this machine is composed of subassemblies and their respective components. In the "Module" field, enter the total number of modules the screen has.

Below, we present the step-by-step procedure for configuring the screens that use modules, with the information organized by configuration level:

Machine Configuration (“Characteristics” Tab)
Below, we present the step-by-step procedure for configuring the screens that use modules, with the information organized by configuration level:

- **Asset type:** Select one of the following:
  - “Vibrating Screen”
  - “Wet Screen”
  - “Dry Screen”
  - “Grain Cleaning Vibrating Screen”
- **Module:** Enter the **total number** of modules.

Subassembly Configuration (For Each Screen Module)
For each screen module, follow these steps:

- **In the "Information" tab**:
  - Name: It is recommended to use the format: "{screen_name} - Module N", where 'N' represents the number of the module. Example: “PN_01 - Module 1”, “PN_01 - Module 2”
- **In the "Characteristics" tab**:
  - **Asset type**: Select one of the following:
  - “Vibrating Screen”
  - “Wet Screen”
  - “Dry Screen”
  - “Grain Cleaning Vibrating Screen”
- **Module**: This field **must remain empty**, so **do not enter any value**.
- **Motion**: To enable the calculation of spot metrics (such as stroke and angle), the motion must be set to either “**linear**” or “**elliptical**”.

Component Configuration (“Characteristics” Tab)
Ao configurar o componente, observe os seguintes pontos:
- **Asset Type**: Select **“Vibrating Screen Suspension”**.
- **Module**: This field **must remain empty**, so **do not enter any value**.

Monitoring Spot Configuration (Spot)
The spot configuration is divided into two main tabs:

- **In the "Information" tab**:
  - **Monitoring Location**: Select one of the following:
    - “Left Discharge”
    - “Right Discharge”
    - “Left Feed”
    - “Right Feed”.
- **In the "Monitoring" tab**:
  - **Axis Orientation**: Select “**Horizontal**”, “**Vertical**” or “**Axial**”.

Important
Metrics are only calculated for spots with **simultaneous triaxial** data collection. For more details on sensor compatibility, refer to the table above.

Attention to performance and structural analysis processing

To ensure accurate calculation of performance and structural indicators for a screen, it is essential that the scheduled data collection period for the set of four suspension spots configured on the screen remains within a **40-minute interval**! If data is not collected from one or more spots within this defined interval, the analysis will not be processed, and the performance and structural indicators will not be available.

Tip: Proper scheduling configuration in the Gateway is crucial to ensure that information is always up to date. It is recommended that this requirement be communicated to users to prevent changes to spot schedules that could compromise the desired interval!

If data is not collected from one or more spots within the defined interval:

- The analysis **will not be processed**.
- Performance and structural indicators **will not be available**.

Proper scheduling configuration in the **DynaGateway** is **crucial** to keep your information continuously updated. To ensure uninterrupted analysis processing, **avoid making changes to spot schedules that could compromise the 40-minute interval**.

Best standard spectral configuration options

- HF: Dynamic range 16g, Triaxial, Maximum frequency = 800Hz, Duration = 5.12s
- HF+: Dynamic range 16g, Triaxial, Maximum frequency = 13140Hz, Duration = 24.93s or Dynamic range 16g, Triaxial, Maximum frequency = 571Hz, Duration = 57.34s
- TcAs: Dynamic range 16g, Triaxial, Maximum frequency = 1260Hz, Duration = 24.13s

3.3 Circular Screens

To accurately reflect the operational dynamics of circular screens, Asset Pro delivers specialized analysis with metrics that evaluate the quality and uniformity of vibratory motion. It empowers users with indicators that precisely track expected behavior, transforming previously fragmented data into an actionable, cohesive overview for maintenance, operations, and support teams.

3.3.2 Analysis Metrics for Circular Screens

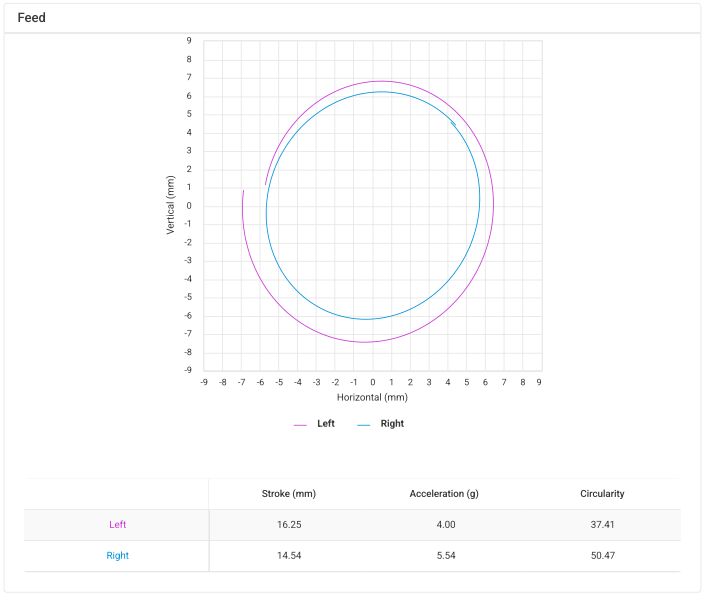
The Orbit Circularity metric gauges how closely the recorded vibration path matches an ideal circle—the baseline behavior for circular screens. It analyzes the measured orbit shape, translating the result into a precise motion quality indicator. Higher circularity drives more uniform and symmetrical equipment performance.

3.3.2.1 Interpreting Values:

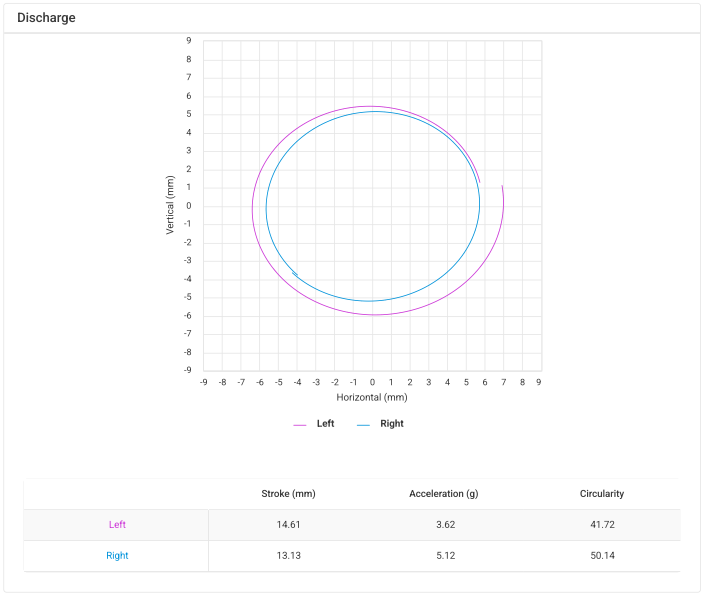
High values: Indicate an orbit closely matching the expected circular pattern.
Declining values: Point to a gradual loss of circularity.
Critical values: Suggest significant motion distortion, requiring immediate investigation.

3.3.2.2 Identifying Degradation:

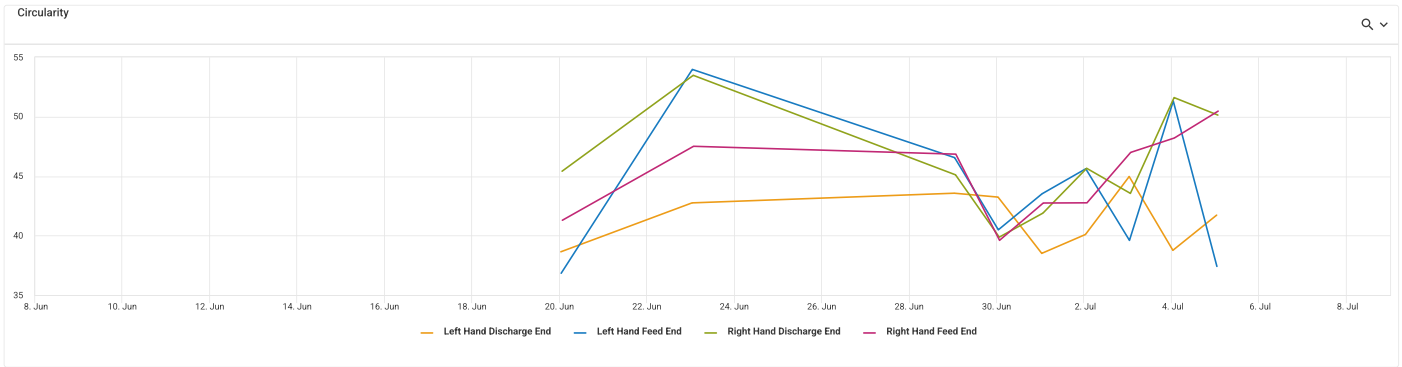
Orbit asymmetry, mechanical clearance, structural changes, shifts in stiffness, abnormal operating conditions, support spring issues, or unbalance in the vibratory system.



	Stroke (mm)	Acceleration (g)	Circularity
Left	16.25	4.00	37.41
Right	14.54	5.54	50.47



	Stroke (mm)	Acceleration (g)	Circularity
Left	14.61	3.62	41.72
Right	13.13	5.12	50.14



3.4 Alignment Index

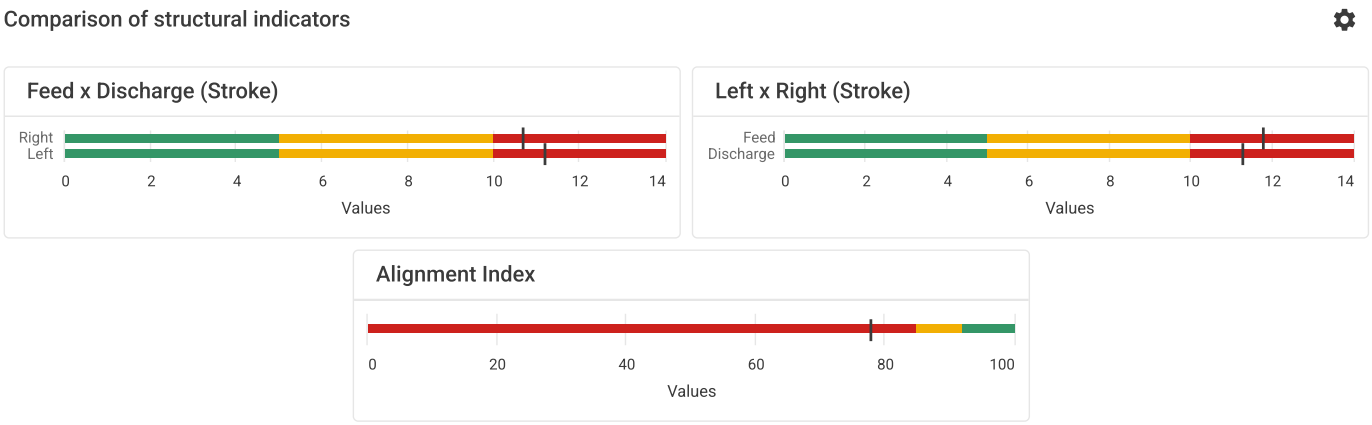
This index evaluates motion coherence by comparing orbits across various monitored points on the screen. It empowers users to accurately benchmark the feed and discharge ends, as well as the left and right sides. Higher indices drive greater orbital similarity, translating into optimal dynamic alignment for the equipment.

3.4.1 Interpreting the Index:

High values indicate well-overlapped orbits and consistent behavior across points; declining values highlight a loss of measurement coherence; critical values signal significant misalignment or an uneven dynamic response across the structure.

3.4.2 Identifying Degradation:

Response discrepancies between sides, misalignment across screen zones, shifts in structural stiffness, suspension issues, improper mounting, asymmetrical wear, or operational conditions affecting only specific sections of the equipment.



3.5 Identifying Degradation

- Users gain visibility into specialized indicators tailored for circular screens.
- Metrics can be tracked in history and trend.
- The system benchmarks values against A1 and A2 thresholds to streamline severity assessment.
- If a reliable calculation baseline is unavailable, the platform flags an insufficient data status.
- Metrics lacking physical relevance to circular motion are excluded from the primary indicators.

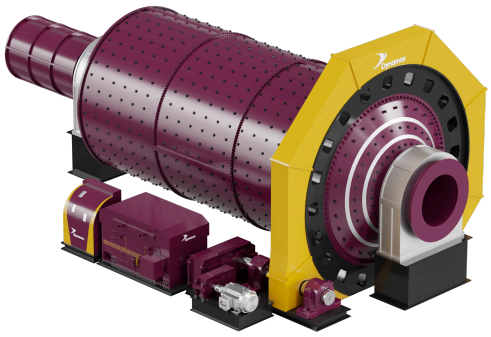
3.6 Configuring the Ball Mill

3.6.1 Overview

The Ball Mill specialist module in Asset Pro delivers a unified experience for condition monitoring and diagnostics. By leveraging interactive 3D visualization, specific operational metrics—such as Loading, Toe, and Shoulder angles, alongside regional energy—and automated severity prioritization, the module empowers maintenance and reliability teams to quickly spot abnormal conditions, optimize operations, and drive data-driven decisions. The platform consolidates critical asset insights into a single dashboard, eliminating the need for fragmented analysis across multiple tools.

Problem Solved: Currently, industrial plants lack continuous visibility into ball mill grinding performance. Without real-time metrics on grinding regimes, load distribution, and impact energy, teams rely on periodic manual inspections—exposing workers to safety risks and driving reactive decisions based on outdated data. The absence of continuous monitoring hinders the early detection of efficiency loss and prevents the correlation of trends with progressive liner wear.

Value Proposition: A unified grinding performance monitoring experience featuring 3D visualization, exclusive specialist metrics (Loading, Toe, Shoulder, Energies, Media Angle, Velocity), automated anomaly detection, and AI-driven smart summaries. These metrics empower operators to identify variations in the mill's operational regime and streamline the correlation of trends with progressive liner wear.



3.6.2 Target Audience

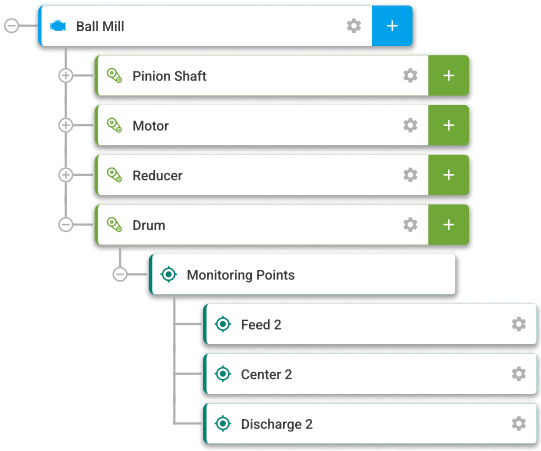
- **Vibration Analysts (Primary):** In-depth technical analysis, variable cross-referencing, and report generation.
- **Reliability and Maintenance Engineering:** Intervention planning based on trends and alerts.
- **Critical Asset Technical Management:** Strategic overview of asset health and investment decision-making.
- **Operations Managers/Coordinators:** Tracking availability and operational efficiency.

3.6.3 Prerequisites & Eligibility

- Asset Pro module active under the current contract.
- DynaDetect enabled and accessible for the asset.
- Ball Mill asset accurately configured in the Asset Tree (motors, gearboxes, pinion, drum, and modules, where applicable).
- Spots/sensors configured for simultaneous triaxial data collection to drive specialist metrics.

Supported Mill Models:

- **Number of Compartments:**
  - Single-drum mill, without module segmentation. Leverages steel balls as the grinding media for fine grinding operations.
  - Segmented drum mill with individualized modules, empowering independent condition monitoring for each section.
- **Grinding Media Types:**
  - Ball Mills, SAG and AG mills (both currently undergoing validation), and Rod Mills.
- **Mill Size:**
  - Large and medium-scale mills; small-scale mills (undergoing validation).
- **Liner Types:**
  - Hybrid (Rubber + Steel): Combines rubber's impact absorption with steel's structural toughness, resulting in lower vibration energy.
  - Metallic: Fully metallic liner with integrated lifters, yielding higher stiffness and vibration energy.
  - Profile Coverage: Supports various liner profiles, including lifter bar and double wave. Contact support to evaluate additional profile types.
- **Platform Asset Tree Structure:**



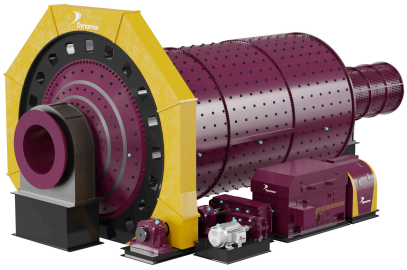
3.6.4 Sensor Installation Guidelines

1. Sensor Types and Requirements

- Deploy sensors capable of long-duration data collection (mandatory to drive specialist metrics).
- The system automatically excludes incompatible sensors from mill-specific calculations.

2. Recommended Quantity and Positioning

- Install a minimum of three sensors on the drum: feed, center, and discharge.
- For mills experiencing uneven wear within the same ring, deploy at least three sensors per region (feed, center, and discharge).
- In multi-compartment mills, instrument each module individually, installing at least two sensors per chamber.
- Map the monitoring spots according to the asset's operational hierarchy.



3. Orientation and Mounting

- Ensure clean mounting surfaces and rigid fixation to optimize vibration transmission.
- Align sensors with the equipment's primary axes to guarantee simultaneous triaxial data collection.

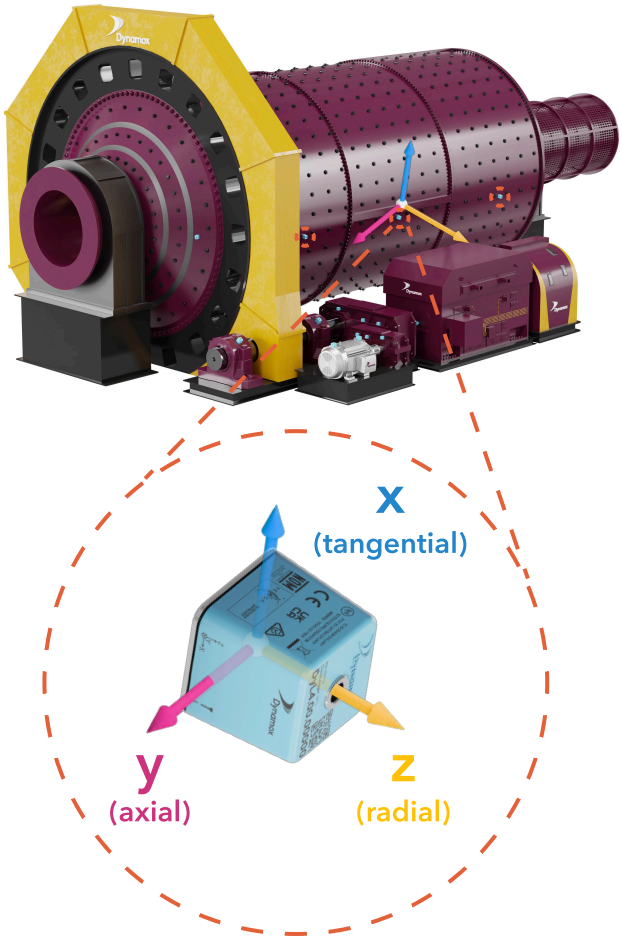
Axis Orientation Configuration for Drum Spots:

To ensure specialist metrics perform correctly, spots installed on the drum must strictly follow the axis orientation predefined in the project design.

Axis	Orientation
X	Tangential
Y	Axial, toward the feed
Z	Radial

Positioning Rule

The sensor must be positioned with the QR code tag pointing toward the discharge end, preserving the project's predefined axis orientation.



Important
For ball mills, deploy three HF+ sensors in-line across the feed, center, and discharge sections. Position the sensors away from flanges, rigid components, and bolts, optimizing placement at the segment's midpoint.

Drum Monitoring Deployment Examples:

- 1 line with 3 sensors.
- 2 lines with 3 sensors at 180°.
- 3 lines with 3 sensors at 120°.
- 4 lines with 3 sensors at 90°.

Important
Leverage multi-line configurations for mills experiencing uneven wear within the same ring.

Configure the sensor to capture at least four complete drum revolutions.

4. System Configuration and Registration
• Assign each sensor to the correct component/module within the Asset Tree.
• Validate the active status and triaxial data collection quality; optimize collection intervals to align with operational regimes.

5. Asset Typing for Ball Mill Enablement
To ensure the Asset Pro Ball Mill module operates seamlessly, the ball mill structure must strictly adhere to the required configuration. Asset typing leverages the following hierarchy:

Ball Mill → Motor, Gearbox, Pinion Shaft, Drum (Feed, Center, Discharge)

3.6.5 Configuring Motor Faults

Target Faults	• **Electrical fault**
Motor Subassembly Configuration	1. Click the + icon on the Ball Mill and select the Subassembly icon. 2. Select the Features tab. 3. In the Asset Type field, select Electric Motor. 4. Enter the correct value in the Line frequency field and click Save.
Spot Configuration (via Spot Center)	1. Select the Information tab. 2. In the Monitoring Location field, select Bearing Housing. 3. Enter the appropriate value in the RPM field and click Save.

Target Faults	• **Rotor bar fault** • **Stator fault**
Motor Subassembly Configuration	1. Click the + icon on the Ball Mill and select the Subassembly icon. 2. Select the Features tab. 3. In the Asset Type field, select Electric Motor. 4. Enter the correct value in the Number of rotor bars field. 5. Enter the correct value in the Number of stator slots field. 6. Enter the correct value in the Line frequency field and click Save.
Spot Configuration (via Spot Center)	1. Select the Information tab. 2. In the Monitoring Location field, select Bearing Housing. 3. Enter the appropriate value in the RPM field and click Save.

Target Faults:	• **Lack of lubrication**
Motor Subassembly Configuration:	1. Click the + icon on the Ball Mill and select the Subassembly icon. 2. Select the Features tab. 3. In the Asset Type field, select Electric Motor and click Save.
Spot Configuration (via Spot Center)	1. Select the Information tab. 2. In the Monitoring Location field, select Bearing Housing. 3. Enter the appropriate value in the RPM field. 4. Select the Monitoring tab. 5. In the Standard Spectral field, set a default spectral configuration. a. Under the Maximum Frequency column for the selected spectral, ensure the value is >= 3200 Hz and click Save.

3.6.6 Configuring Gearbox Faults

Target Faults:	• **Abnormal dynamic behavior** • **Unbalance** • **Lack of stiffness** • **Misalignment** • **Structural clearance**
Gearbox Subassembly Configuration	1. Click the + icon on the Ball Mill and select the Subassembly icon. 2. Select the Features tab. 3. In the Asset Type field, select Gearbox and click Save.
Spot Configuration (via Spot Center)	1. Select the Information tab. 2. In the Monitoring Location field, select one of the following: Bearing Housing, Gearbox Input, Gearbox Intermediate, or Gearbox Output. 3. Enter the appropriate value in the RPM field and click Save.

Target Faults:	• **Bearing wear**
Gearbox Subassembly Configuration:	1. Click the + icon on the Ball Mill and select the Subassembly icon. 2. Select the Features tab. 3. In the Asset Type field, select Gearbox and click Save.
Spot Configuration (via Spot Center)	1. Select the Information tab. 2. In the Monitoring Location field, select one of the following: Bearing Housing, Gearbox Input, Gearbox Intermediate, or Gearbox Output. 3. Enter the appropriate value in the RPM field. 4. Select the Bearings tab. 5. Click the + Bearing button, add a bearing model, and click Save.

Target Faults:	• **Gear mesh defect**
Gearbox Subassembly Configuration:	1. Click the + icon on the Ball Mill and select the Subassembly icon. 2. Select the Features tab. 3. In the Asset Type field, select Gearbox. 4. Enter the appropriate value in the Number of stages field. 5. Enter the appropriate value in the Number of pinion teeth field. 6. Enter the appropriate value in the Number of gear teeth field. 7. Enter the appropriate value in the Input RPM field and click Save.
Spot Configuration (via Spot Center)	1. Select the Information tab. 2. In the Monitoring Location field, select one of the following: Bearing Housing, Gearbox Input, Gearbox Intermediate, or Gearbox Output. 3. Enter the appropriate value in the RPM field and click Save.

Target Faults:	• **Lack of lubrication**
Gearbox Subassembly Configuration:	1. Click the + icon on the Ball Mill and select the Subassembly icon. 2. Select the Features tab. 3. In the Asset Type field, select Gearbox and click Save.
Spot Configuration (via Spot Center)	1. Select the Information tab. 2. In the Monitoring Location field, select one of the following: Bearing Housing, Gearbox Input, Gearbox Intermediate, or Gearbox Output. 3. Enter the appropriate value in the RPM field. 4. Select the Monitoring tab. 5. In the Standard Spectral field, set a default spectral configuration. a. Under the Maximum Frequency column for the selected spectral, ensure the value is >= 3200 Hz and click Save.

3.6.7 Configuring Pinion Shaft Faults

Target Faults:	• **Abnormal dynamic behavior** • **Unbalance** • **Lack of stiffness** • **Misalignment** • **Structural clearance** • **Lack of lubrication** • **Gear mesh defect**
Pinion Shaft Subassembly Configuration	1. Click the + icon on the Ball Mill and select the Subassembly icon. 2. Select the Features tab. 3. In the Asset Type field, select Pinion Shaft. 4. Enter the appropriate value in the Number of pinion teeth field. 5. Enter the appropriate value in the Number of gear teeth field and click Save.
Spot Configuration (via Spot Center)	1. Select the Information tab. 2. In the Monitoring Location field, select Bearing Housing. 3. Enter the appropriate value in the RPM field. 4. Select the Bearings tab. 5. Click the + Bearing button, add a bearing model, and click Save.

3.6.8 Configuring Rotary Drum Faults

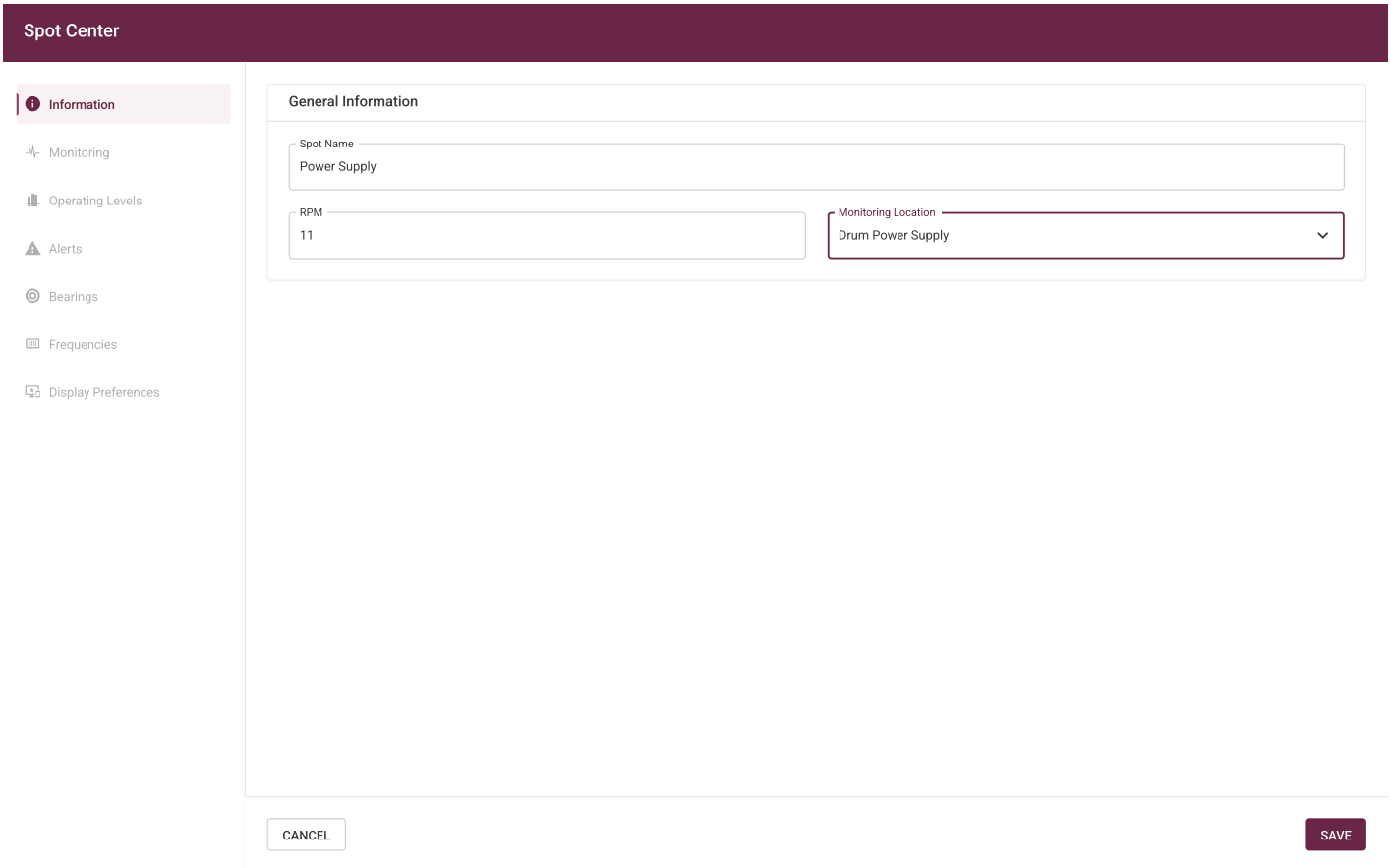
To configure a Drum Subassembly:

1. Click the + icon on the Ball Mill and select the Subassembly icon.
2. Select the Features tab.
3. In the Asset Type field, select Rotary Drum and click Save.

To configure the Spot via the Spot Center:

1. Select the Information tab.
2. In the Monitoring Location field, select Drum Feed, Drum Center, or Drum Discharge, and click Save.

> **Important**
> Repeat this procedure for each spot installed on the drum, aligning it with its respective section.



Configure spots installed on the mill drum with the following monitoring locations, accessed via Spot Center > Information > Monitoring Location:

PT	EN	ES
Drum Feed	Drum Feed End	Alimentación del Tambor
Centro do Tambor	Drum Center	Centro del Tambor
Descarga do Tambor	Drum Discharge End	Descarga del Tambor

Mandatory Requirement

All drum spots require triaxial data collection. The system automatically excludes spots failing this criterion from specialist metric calculations (Loading, Toe, and Shoulder angles, Energies, Media Angle, Velocity).

For modular mills, individually configure spots for each module leveraging the monitoring location options listed above.

3.6.9 Auxiliary Component Spots

Auxiliary mill components (motor, gearbox, and pinion shaft) leverage the platform's standard subassembly asset typing:

Component	Monitoring Location	Mandatory Configurations
Motor	Bearing Housing	Asset type (Electric Motor), RPM, Bearing, Line frequency, Number of rotor bars, Number of stator slots, Standard spectral
Gearbox	Bearing Housing, Gearbox Input, Gearbox Intermediate, or Gearbox Output	Asset type, RPM, Bearing, Number of stages, Number of pinion teeth, Number of gear teeth, Input RPM, Standard spectral
Pinion Shaft	Bearing Housing	Asset type, Number of pinion teeth, Number of gear teeth, RPM, Bearing
Drum	Rotary Drum	Drum Feed End, Drum Center, Drum Discharge End

Standard Sensor Deployment per Component

Component	Recommended Deployment
Motor	2 sensors
Gearbox	4 or more sensors (depending on the model)
Pinion Shaft	1 sensor per bearing housing
Drum	Minimum of 3 sensors (feed, center, discharge)

Important Notes

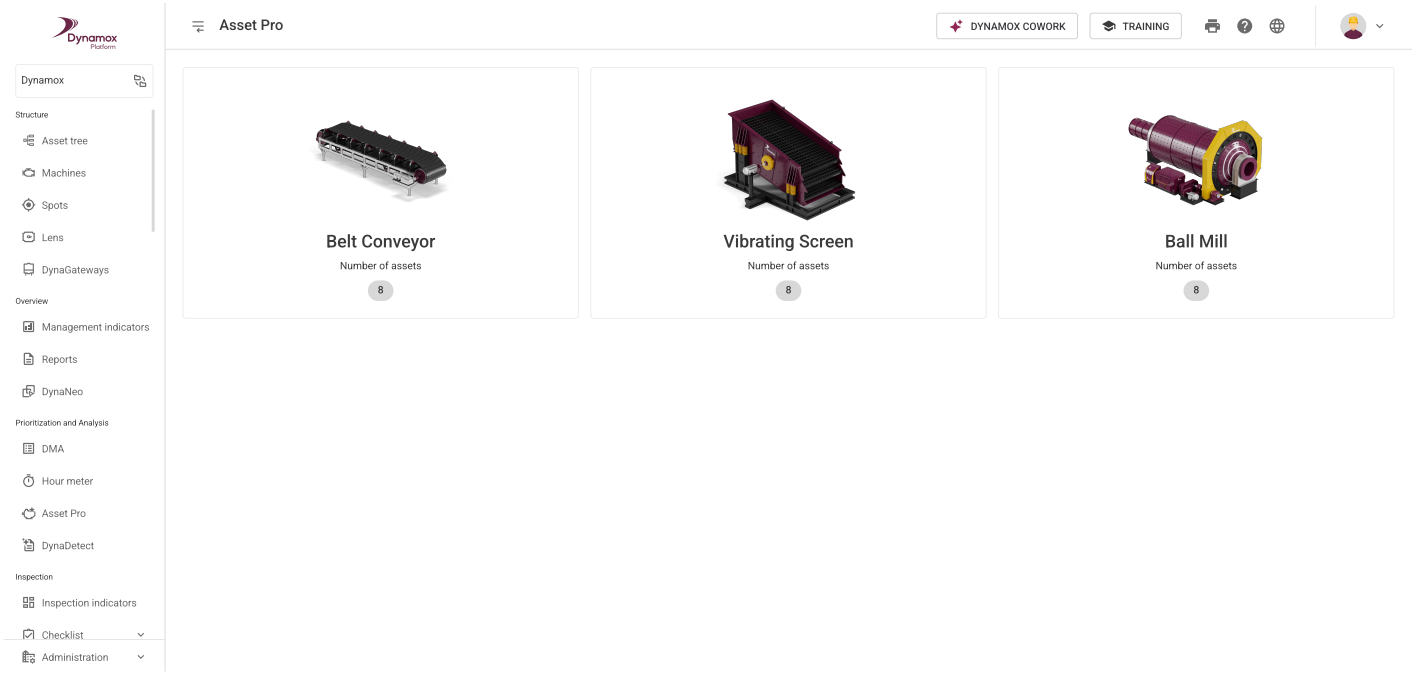
- When the motor utilizes plain bearings (sleeve bearings), bearing fault detection efficiency decreases. To prevent false positives, do not configure the bearing type in these scenarios.
- Set the gearbox standard spectral frequency to ≥ 3200 Hz to drive accurate gear mesh defect detection.
- Accurate asset typing is mandatory to enable DynaDetect and Asset Pro. The automated diagnostic system excludes spots with incorrect or incomplete typing.

Quick Summary: Deploy three triaxial sensors (feed, center, discharge), align them correctly, register them in the system, and validate data collection; the system automatically excludes non-compliant spots from specialist metrics.

4 Working

4.1 Locating monitored machines

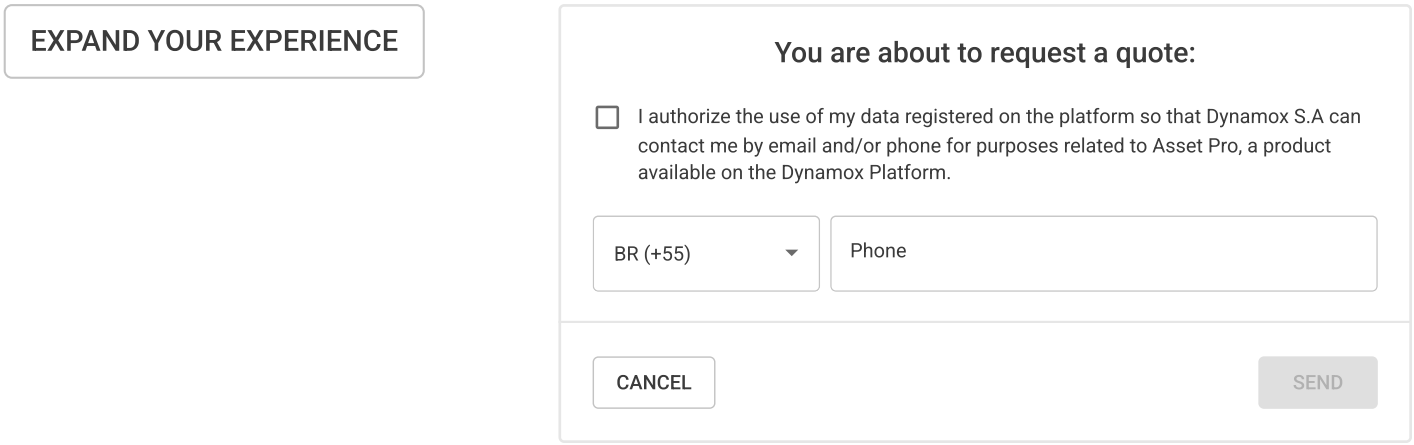
The **Machine Fleet Dashboard** page in Asset Pro allows you to view **all activated machines**, including those with issues or not yet evaluated. This dashboard offers the following key features:



This panel offers the following main features:

4.1.1 Expand your experience

By selecting this option, **you will access an interest form**. Filling it out will allow the **Sales team to get in touch**.



4.1.2 Monitored fleet cards

For each **type of activated machine**, a dedicated card groups and shows the **machine type and the number of units** being monitored.



4.1.3 Conveyor belt fleet card

The **conveyor belt** card displays a page with all machines activated in Asset Pro that are **available for monitoring**. This list may include:

- **Fully configured** machines
- **Partially configured** machines
- **Activated** machines **with no configuration**

By selecting this card, **you will access the panel that lists the individual cards of the machines under monitoring**. This panel offers the following main features:

List of machines available for monitoring

In this part of the page, machines are listed individually and display the following features and information visually:

- Image of the machine type
  - A generic visual image of a belt conveyor is shown. It is important to note that this image is not associated with the images available in the **Machine Center**.
- Machine identification
  - Displays the machine name as previously defined in the **Machine Center**.
  - If the name is too long, it will automatically adjust to the available screen space.
- Machine alert indicator
  - A visual symbol represents the current alert level of the machine based on the latest information. It shows the highest alert level identified, the machine's normal status, or that it is not yet configured for analysis.

The meanings of the symbols are:



Indicates a telemetry or spectral A2 alert. By definition, an alert classified as A2 represents an issue requiring more immediate attention from the analyst.



Indicates that the machine is **operating normally**, with no problems identified in the last analysis.



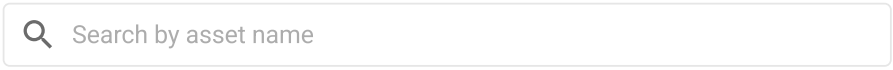
Indicates a telemetry or spectral **A1 alert**. By definition, an alert classified as A1 represents a point of attention for the analyst to monitor.



Indicates that the machine is activated but has **not yet undergone any configuration**.

Quick Search

Quick search is a simple way to locate a machine. However, it works best when the machine name is short and easy to remember.



Edit Menu

By selecting the **edit menu (represented by three dots •••)** at the top of the machine card, you will have the following options:

- Access the **Machine Viewer.**
- **Edit the machine's mounting settings.**
- **Remove the machine f**rom the monitoring list.

The image below illustrates all the features and information described above.



Select a machine for monitoring

When selecting a specific machine card, a panel with information will be displayed. This panel offers the following main features:



Return to the list of machines available for monitoring.

- **Button to navigate to the previous level.**

Asset tree navigation path

- The full path of the machine in the respective asset tree.



Access the Machine Center

- Allows access to the machine information configuration page.

Updating at 02:39

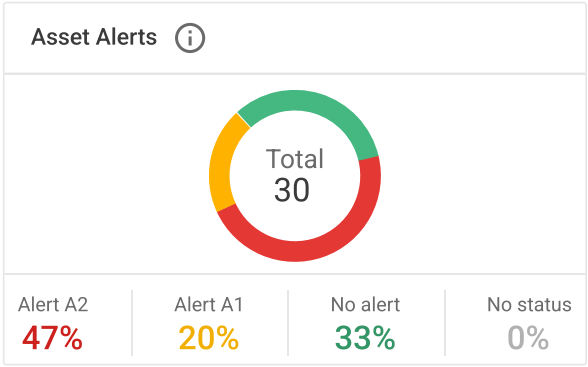
Automatic page update

- A **visual message** indicates how much time remains until the next automatic page update, which occurs every **5 minutes.**

⚠ This automatic update at regular intervals, however, **is not related to the scheduled collections in DynaGateway**. In other words, even if the page is refreshed, it **does not mean** that new collections have been performed or processed.

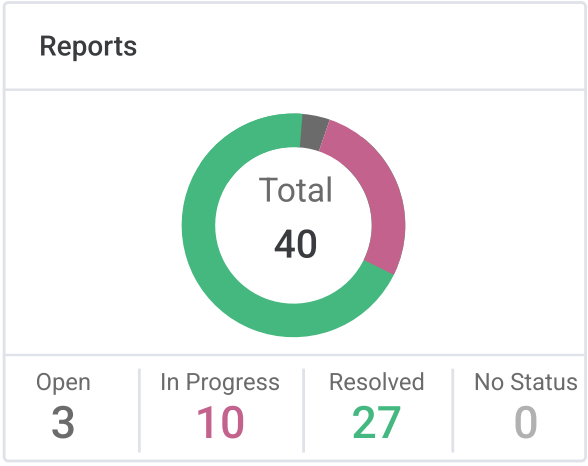
Machine Alerts

- In this section, you will see **detailed information about the alerts** configured for each machine, presented **visually and as percentages**. Data is displayed for **all alerts configured on the machine's components and at all levels (No status, No alert, A1, and A2)**.



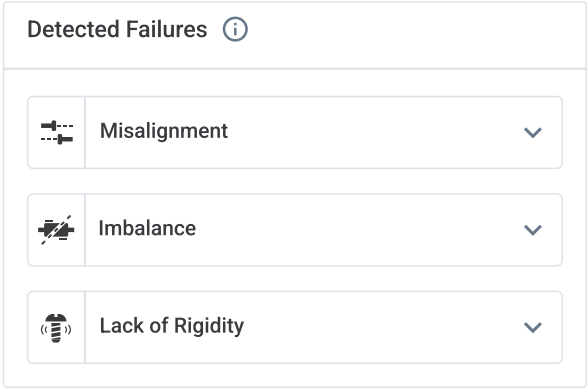
Machine Reports

- In this section, you will see **detailed information about the reports** related to the machine, presented visually and as percentages. Data is displayed for **all reports associated with the machine's components and in all statuses (Open, In Progress, Resolved, and No status)**.



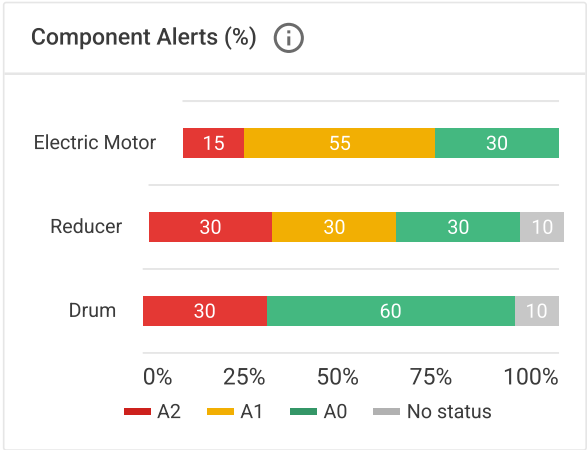
Detected Failures

- In this section, you will see **the types of defects and defective spots diagnosed** on the machine through DynaDetect. Data is displayed for **all diagnostics associated with the machine's components and at all severity levels (Emergency and Manageable)**.



Percentage of alerts by component type

- In this section, you will see **detailed information about alerts grouped by components** configured for each machine, presented **visually and as percentages**. Data is displayed for **all alerts configured on the machine's components and at all levels (No status, No alert, A1, and A2)**.



3D Machine View Panel

This panel is an **interactive workspace** that allows **3D visualization of the machine**, its configured components, and their respective statuses. Here you can **rotate the machine 360 degrees, zoom in on specific components**, and **visually monitor each type of alert associated with them**.

The 3D view panel offers the following main features:

- **Machine Position Controls**: Allow you to **select predefined visual presentation options of the machine in 3D**. This speeds up access to different perspectives.



- **Navigation Controls**: You can use two methods to **zoom in or out on the machine image** within the panel, making it easier to inspect details or get an overview. You can also **use the mouse** or the buttons available at the bottom of the panel.



Advanced Filter

The **Advanced Filter** lets you **select the type of alert you want to monitor in the machine's 3D view**, providing **greater control over the displayed results**. Alert options include: **DynaDetect**, **Telemetry**, or **Spectral**.

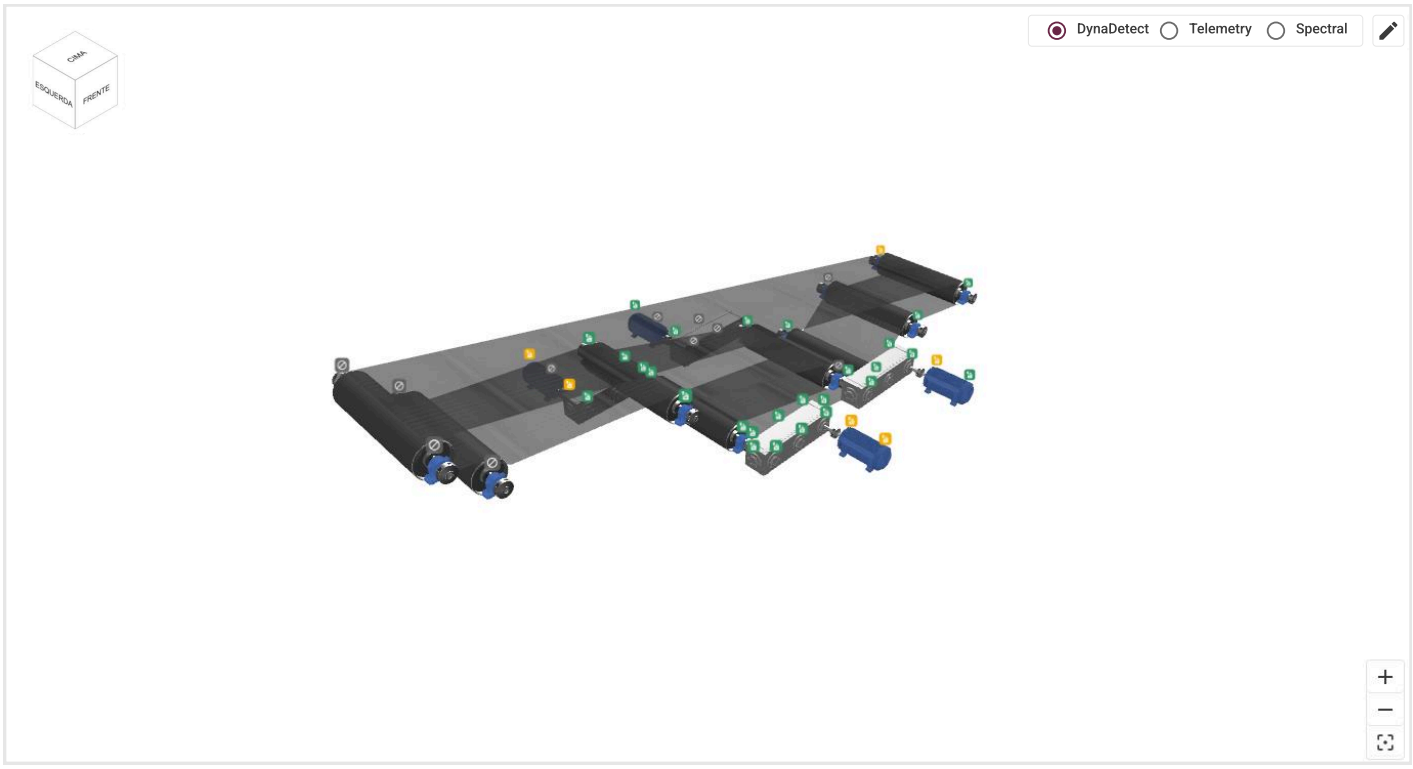


Machine Editing

The **Edit** option allows you to **access the machine configuration page**. Full details about configuration features were covered earlier.



The image below illustrates all the features and information described above.



4.1.4 Vibrating Screens Fleet Card

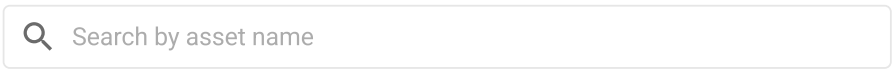
The **Vibrating Screens** card displays a page with all machines activated in Asset Pro that are **available for monitoring**. This list may include:

- **Fully configured** machines.
- **Partially configured** machines.
- **Activated** machines **with no configuration.**

By selecting this card, **you will access the panel listing individual cards of the machines under monitoring**. This panel offers the following main features:

Quick search

- Quick search is a simple way to locate a machine. However, it works best when the machine name is short and easy to remember.



List of machines available for monitoring
In this section of the page, machines are listed individually and display the following features and information visually:

- Machine type image
  - A generic visual image of a vibrating screen is presented. It's important to note that this image is not associated with the images available in the **Machine Hub**.
- Machine identification
  - Displays the machine name as previously defined in the **Machine Hub**.
  - If the name is too long, it will be automatically adjusted to fit the available screen space.
- Machine alert indicator
  - A visual symbol represents the machine's current alert level based on the latest information. It shows the highest alert level identified, the machine's normal status, or whether it has not yet been configured for diagnostics.

The alert symbol meanings are:



Indicates an **A2 alert** from telemetry or spectral analysis. By definition, an A2 alert represents an issue that requires immediate attention from the analyst.



Indicates the machine is **operating normally**, with no issues identified in the latest analysis.



Indicates an **A1 alert** from telemetry or spectral analysis. An A1 alert represents a point of attention for ongoing monitoring.



Indicates the machine is activated but has **not yet been configured**.

Selecting a machine for monitoring
When selecting a specific machine card, a panel with detailed information will be displayed. This panel offers the following key features:



Return to the list of machines available for monitoring

- **Button to navigate back to the previous level.**

Navigation path in the asset tree

- Displays the full path of the machine within the corresponding asset tree.



Access the Machine Hub

- Allows access to the machine configuration page.

Asset overview and performed analyses

The following information is presented regarding the machine and the analyses performed:

- **Asset Class**: Displays the machine class as previously defined in the **Machine Hub**. This information will not be shown if no class has been configured.
- **Asset Geolocation**: By selecting the coordinates, a new page with a map will be displayed, allowing access to the asset's geographic location. This information will not be shown if coordinates have not been previously configured in the **Machine Hub**.
- **Motion Type**: Displays the type of motion of the vibrating screen, as configured in the **Machine Hub**.

> ⚠ **Circular Screens**
> When the configured type of movement is "circular," the information related to the angle will not be displayed.

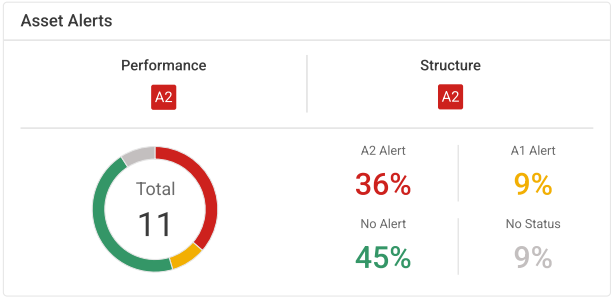
- **Last Analysis Performed**: Shows the date and time of the last analysis process that generated performance and structural data for the screen.

> ℹ Collections identified as machine downtime will not generate analyses.

The **Overview page** consolidates various pieces of information related to the screen. It is composed of the following features:

Asset alerts

This area provides a consolidated view of **all alert types** configured for your screen, presented in charts and percentages.



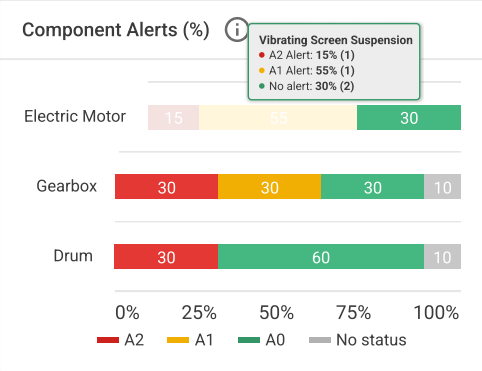
At the top, you'll find **the most critical** alerts related to performance and structural indicators.

Below, the donut chart and general percentages detail other telemetry or spectral metric alerts, including both those already configured in the **Spot Hub** and those not yet specifically configured.

> ℹ **This visualization is essential for:**
> - Proactively monitoring machine health.
> - Quickly identifying deviations.
> - Ensuring continuous performance and accurate indicator analysis.

Alert percentages by machine components

This bar chart displays the percentages of alerts configured for your screen. Alerts are grouped by types of subsets or components, as previously defined in the **Machine Hub**.

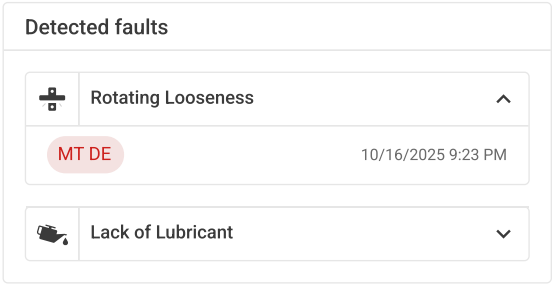


> **For more details on the bars**
> Hover over each bar to view individual alert percentages by component.

Detected failure diagnostics

This area presents defect diagnostics identified by the DynaDetect product. To ensure accuracy and proper functioning of these diagnostics, it is **essential** that your screen information is correctly configured in the following locations:

- **Asset Tree**
- **Machine Hub**
- **Spot Hub**



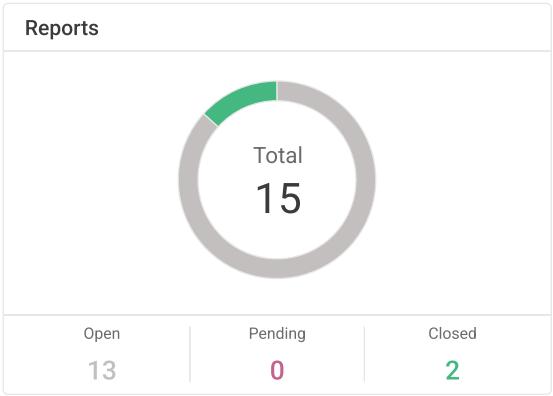
For a complete and detailed list of required information, please contact our **Support Team**.

Reports

This area provides a consolidated view of all reports issued for **your screen**, presented in charts and percentages.

At the top, you'll find the donut chart. Below, the values detail the number of reports by status:

- **Open**
- **In Progress**
- **Resolved**

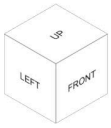


3D Machine visualization panel

This panel is an **interactive workspace** that enables **3D visualization of the machine**, its configured components, and their respective statuses. Here, you can **rotate the machine 360 degrees**, **zoom in on specific components**, and **visually monitor each type of associated alert**.

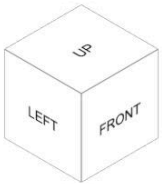
Key Features of the 3D visualization panel:

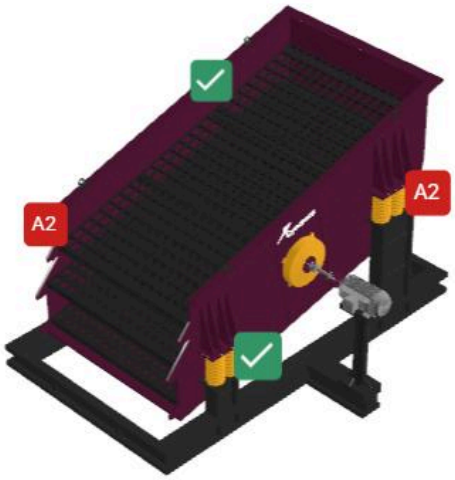
- **Machine position controls**: Allow **selection of predefined visual presentation options for the machine in 3D,** streamlining access to different perspectives.



- **Navigation controls**: You can **zoom in or out on the machine image** within the panel using two methods, facilitating detailed inspection or an overall view. You may also **use the mouse** or the buttons available at the bottom of the panel.

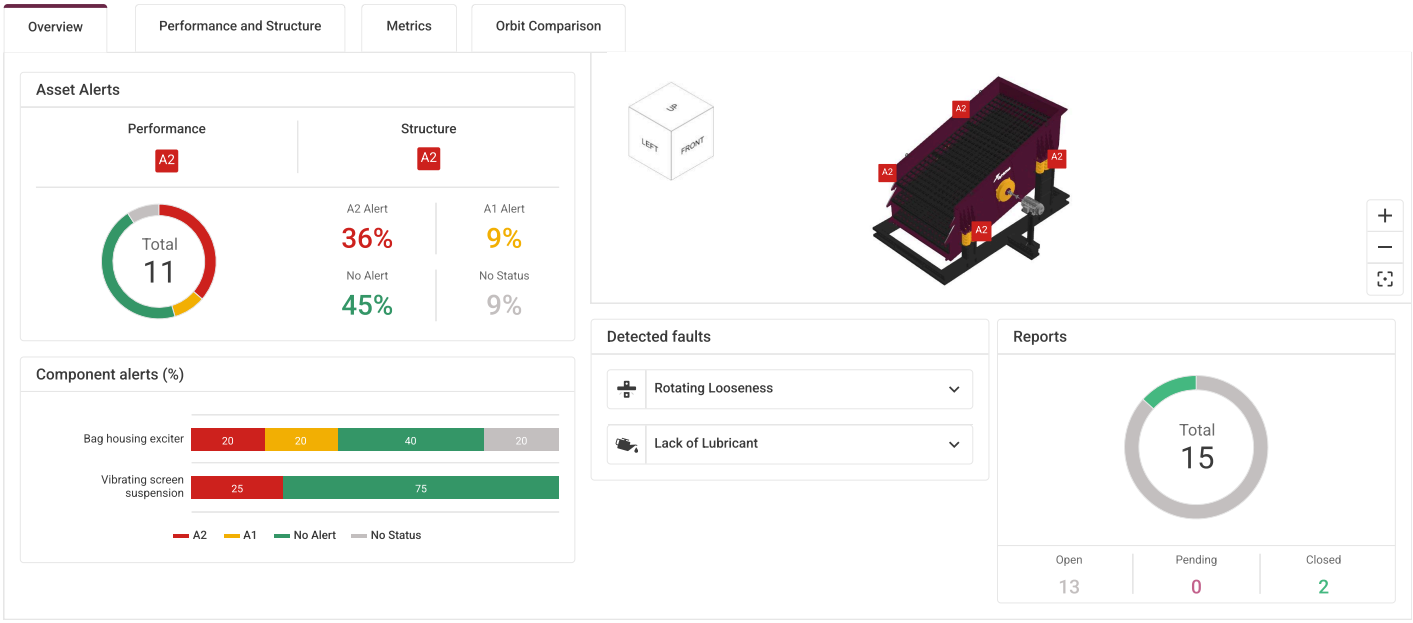








The image below illustrates all the features and information described above.

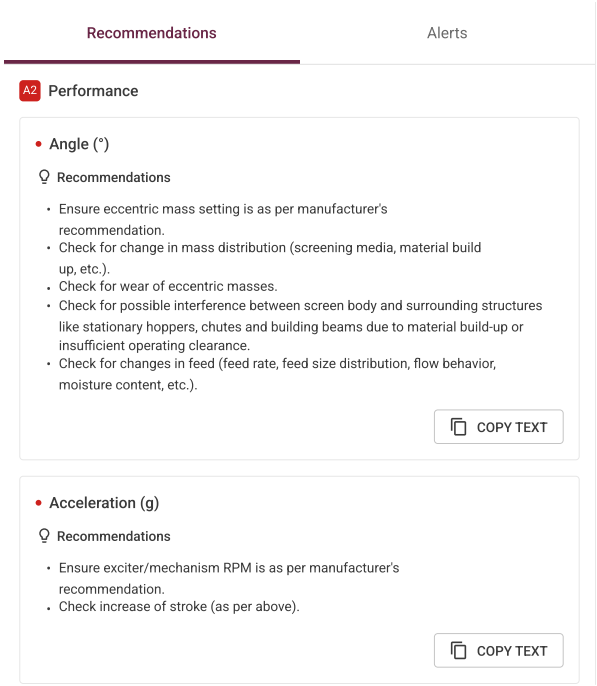


Performance and structure

This section provides detailed information about the **performance and structural conditions** of your screen. It includes the following features:

Inspection (Recommendations)

Here, you'll find various **inspection recommendations** suggested for your screen. These recommendations are grouped and prioritized according to the criticality level of performance or structural alerts previously configured.



Alerts

This section provides detailed tabular information about the **performance and structural** alert conditions configured for your screen. It includes:

Performance table

Gathers data on movement and suspension acceleration at different points (feed and discharge, left and right), allowing identification of variations that may indicate efficiency loss or the need for adjustment.

Structure table

Focuses on displacement and axial vibration, providing indications of possible wear or mechanical failures.

Colors play a key role in quick data interpretation:

- **Green** indicates that the value is **within the acceptable range**.
- **Yellow** value is **near the limit** of the acceptable range.
- **Red** value is **outside the acceptable** range, requiring immediate attention .

Performance

	Feeding		Discharge	
	Left	Right	Left	Right
Stroke (mm)	10.42	10.36	10.18	9.85
Angle (°)	68.26	77.95	22.10	54.75
Acceleration (g)	3.19	3.13	3.11	3.05

Structure

	Feeding		Discharge	
	Left	Right	Left	Right
Axial displacement (mm)	0.30	0.06	0.29	0.15
Axial acceleration (g)	0.20	0.04	0.20	0.10

The combined analysis of these data is essential for predictive maintenance and safe equipment operation.

In addition to viewing the measured alert values, you can configure the thresholds for structural or performance alerts. Simply select the **gear icon** to view and edit the current values for each threshold.

Default alert values
During the initial installation of Asset Pro, general values are pre-defined based on the expertise of our specialist team. However, it is **crucial** to review these values according to the specifications and conditions **established by your screen's manufacturer**.

Circular Screens
When the configured type of movement is "circular," the information related to the angle will not be displayed.

Shared Features

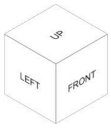
The following features are shared between the Inspection and Alerts sections and are visible in both:

3D Machine visualization panel

This panel is an **interactive workspace** that enables **3D visualization of the machine**, its configured components, and their respective statuses. Here, you can **rotate the machine 360 degrees**, **zoom in on specific components**, and **visually monitor each type of associated alert**.

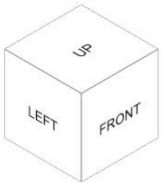
Key features of the 3D visualization panel:

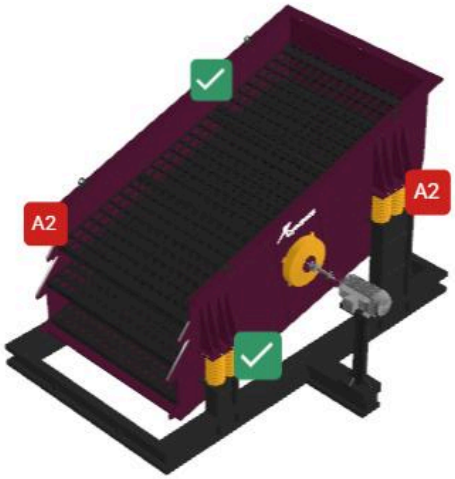
- **Machine position controls**: Allow **selection of predefined visual presentation options for the machine in 3D**, streamlining access to different perspectives.



- **Navigation Controls**: You can **zoom in or out on the machine image** within the panel using two methods, facilitating detailed inspection or an overall view. You may also **use the mouse** or the buttons available at the bottom of the panel.









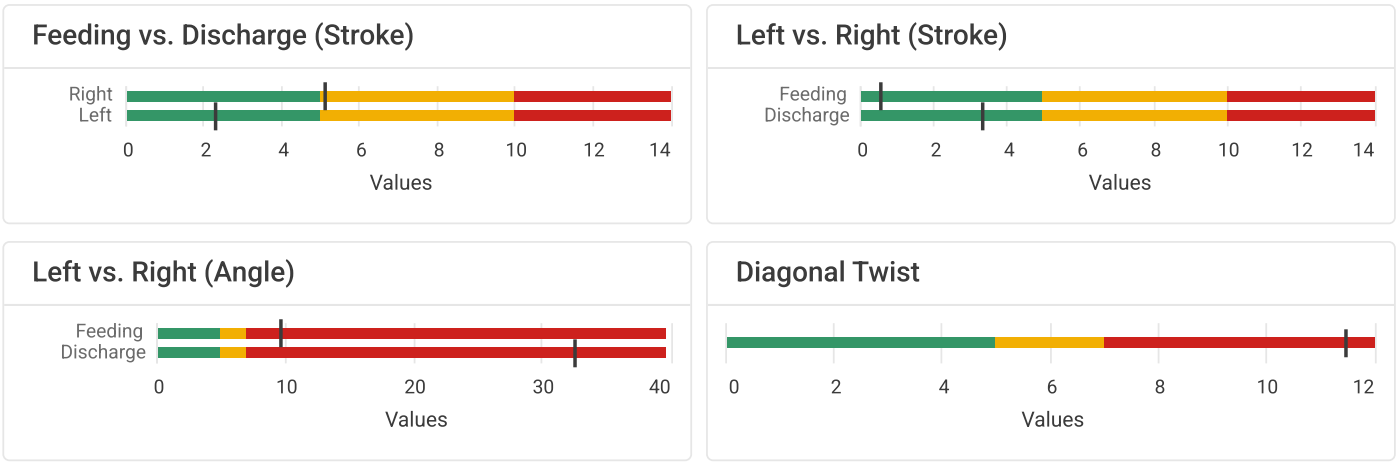
Structural indicator comparison
Displays four bar charts providing detailed information on the following structural indicators:

- **Stroke Percentages (Feed vs. Discharge)**
- **Stroke Percentages (Left vs. Right)**
- **Angle Percentages (Left vs. Right)**
- **Cross-Torsion Percentages**

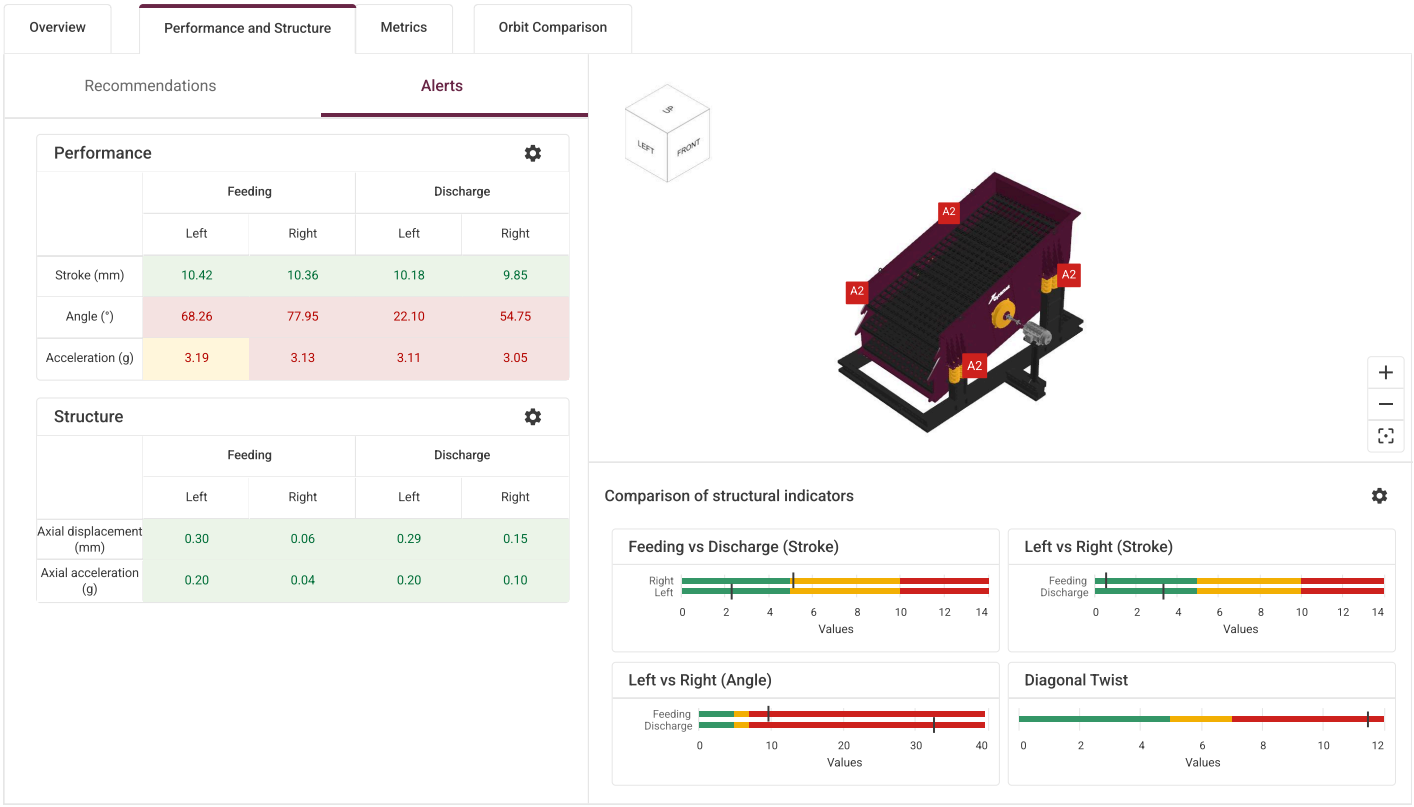
In addition to viewing the percentages, you can configure alert thresholds to compare these structural indicators. Simply select the **gear icon** to view and edit the current values for each threshold.

> **Default alert values**
> During the initial installation of Asset Pro, general values are pre-defined based on the expertise of our specialist team. However, it is **crucial** to review these values according to the specifications and conditions **established by your screen's manufacturer**.

Comparison of structural indicators



The image below illustrates all previously described features and information:



Metrics

This section displays information on various **performance and structural** metrics of your screen. It includes the following features:

Period search

Using the calendar search, you can customize the data display in the charts by increasing or decreasing the time range. Initially, data from the last 30 days is shown. However, by selecting the **period icon** (next to the calendar), you can choose from predefined options.



Chart manipulation and customization tools

To personalize the visualization of metric charts, you have access to the following functionalities:

- Remove chart grid.
- Choose between three display types: **List**, **Side-by-Side**, and **Mosaic** .



- Adjust zoom or set limits on each chart.



Performance metric charts

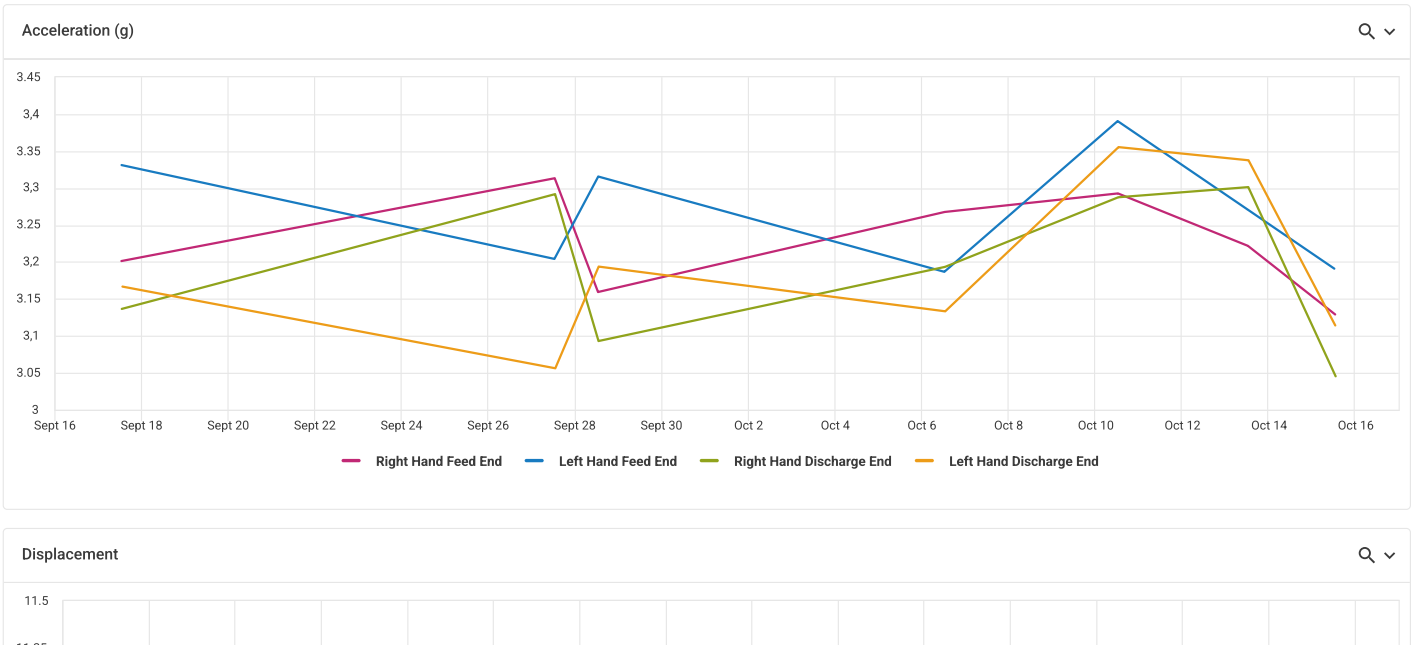
To analyze performance, you have access to three charts with information on **Stroke**, **Angle**, and **Acceleration**. For each metric, simply hover the mouse to view data for a specific day.



Illustrative example of available charts.

Structural Metric Charts

To evaluate screen structural health, users access six specific data charts: **Acceleration, Displacement, Stroke (Feed vs. Discharge), Stroke (Left vs. Right), Angle (Left vs. Right), and Cross Torsion**. Hover over any metric to instantly view specific daily data.



Illustrative example of some available charts.

> **Circular Screens**
> When the configured type of movement is "circular," the information related to the angle will not be displayed.

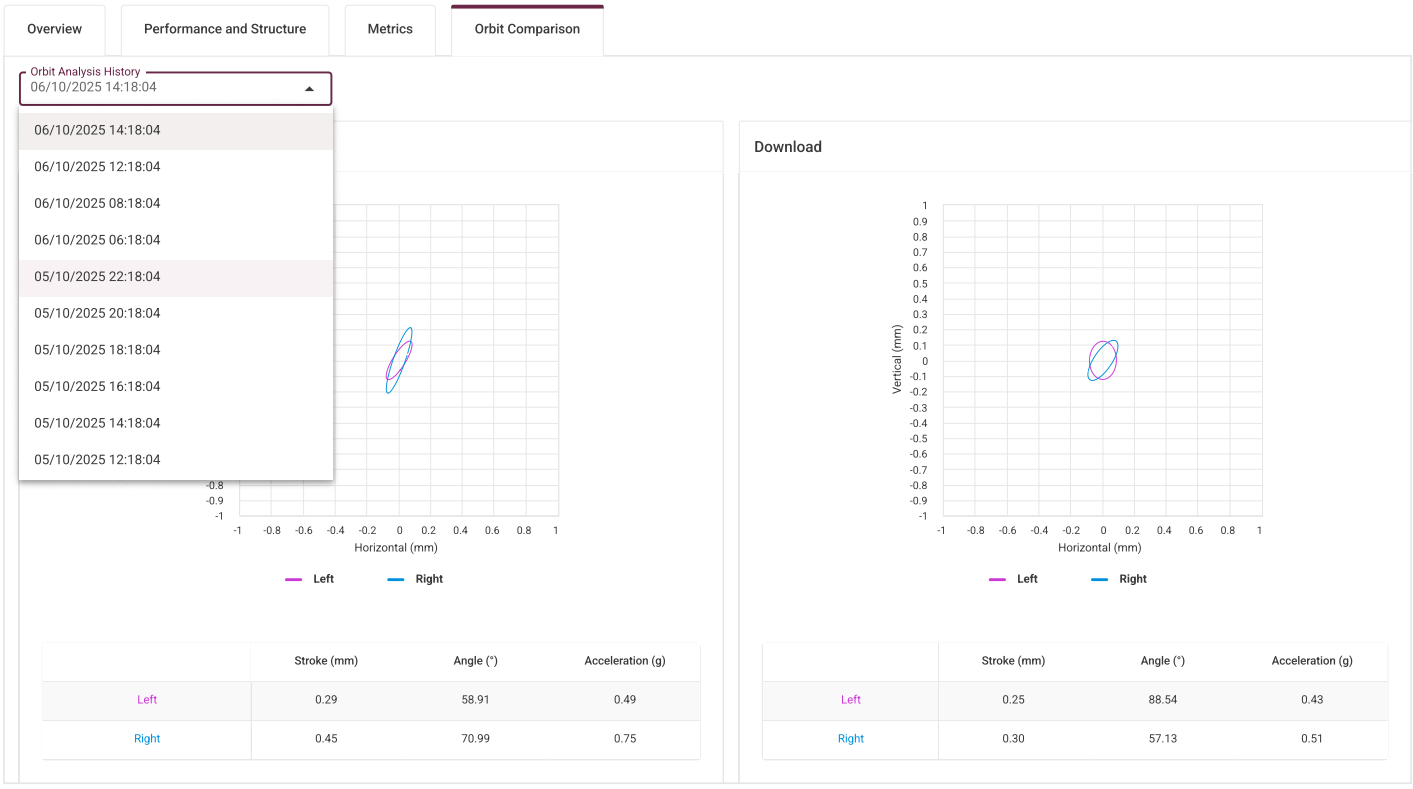
Orbit Comparison

This section allows you to view and compare the **suspension** orbits of your screen, both at the feed and discharge ends. It includes:

- **Feed Orbit Chart:** Displays both feed suspension orbits in a chart and provides a tabular view of the data.
- **Discharge Orbit Chart:** Displays both discharge suspension orbits in a chart and provides a tabular view of the data.

In the Orbit Analysis History, it is possible to select previous orbits and view them on the graph.

To analyze a specific angle axis, simply select the axis or orbit you want to disregard.



4.1.5 3D Viewer (Key Interactions)

Click components to focus and zoom; use the reset button to restore the default view.

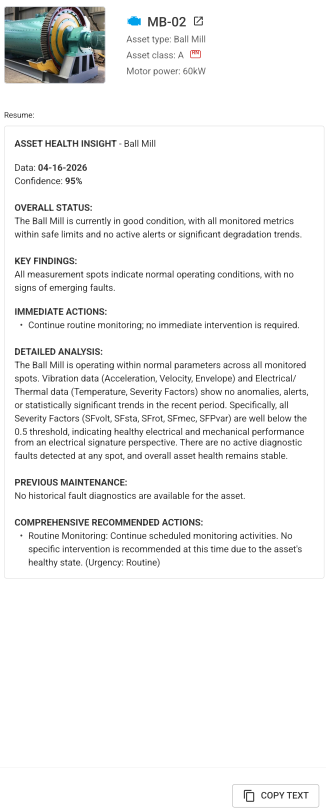


Tooltips

- Must display the spot name, severity, and reading timestamp.
- Never display null or empty fields.

4.1.6 Summary and Alerts (Prioritization and Quick Scan)

The Summary panel displays all monitored mill spots sorted by severity, empowering users to quickly prioritize critical conditions.



Severity Levels:

- **Critical (Red):** Condition demanding immediate action—risk of imminent failure or accelerated asset degradation.
- **Alert (Yellow):** Condition outside the normal range, requiring close monitoring and intervention planning.
- **Normal (Green):** Operation within expected parameters—no action required.

Recommended Prioritization Workflow:

1. Review Critical items first and take immediate action.
2. Evaluate Alert items to plan preventive maintenance.
3. Monitor Normal items for trend analysis.

> Ensure name consistency between the 3D Viewer and the Summary to streamline visual correlation.

4.1.7 Metrics (Definitions and Interpretation)

The Asset Pro Ball Mill module delivers a set of specialist metrics designed primarily to evaluate the mill's operational performance. These metrics are calculated by processing the waveform data collected by triaxial sensors deployed on the drum, empowering users to track the grinding regime, angular energy distribution, and trends that can be correlated with progressive liner wear.

How Metrics are Calculated

- Low-frequency signal (low-pass filter): Used to detect Z-axis maximum points, which serve as the starting reference for each revolution. This separation drives the extraction of the mill body's rotational speed.
- High-frequency signal (high-pass filter): Used to calculate the local vibration energy (local RMS), representing the intensity of ball impacts at each angular position.

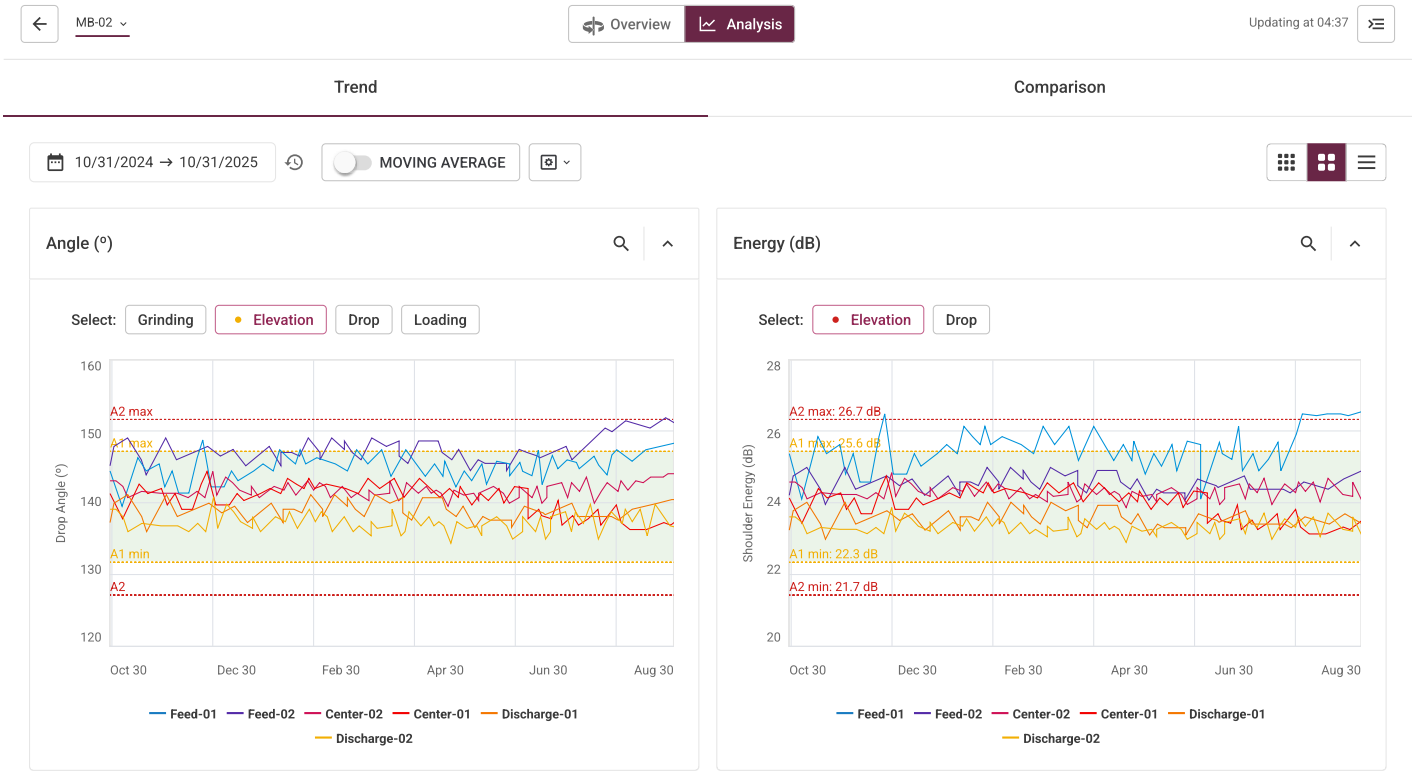
Specialist Performance Metrics

Dynamox engineered the Asset Pro Ball Mill specialist metrics based on cylindrical mill dynamics. Derived from the triaxial sensor waveforms on the drum, these metrics empower users to directly evaluate grinding performance. Furthermore, their trends drive the early detection of signs associated with progressive liner wear.

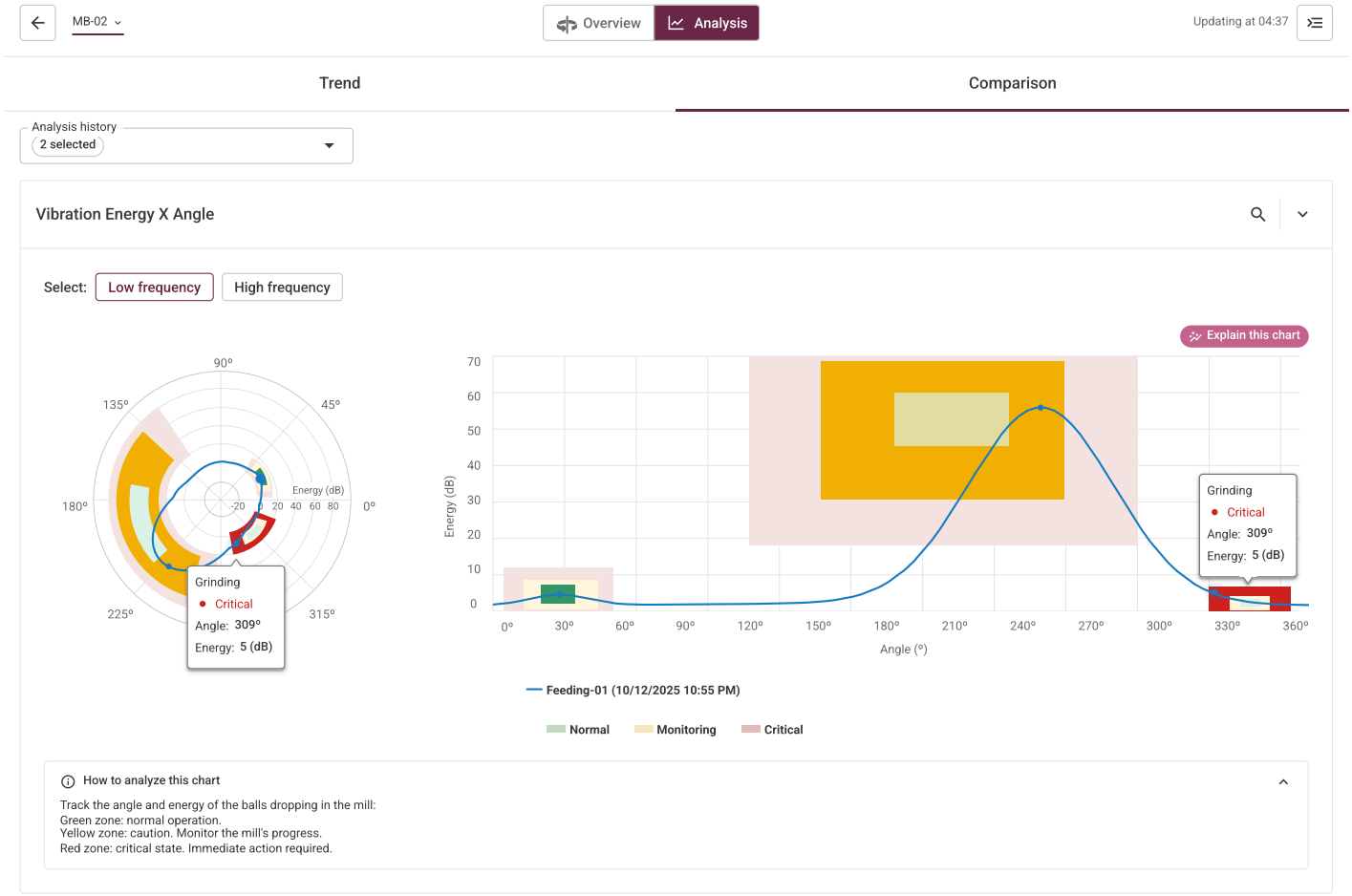
Metric	Unit	Technical Definition	Practical Application	Operational Correlation
Toe Angle	°	Angular position indicating the ball impact location (peak vibration) on the liner. This is generally driven by the angle associated with the maximum value in the energy profile across the liner (see polar/linear charts).	Evaluate grinding regimes and wear.	Inversely proportional to the filling level and correlated with grinding performance.
Shoulder Angle	°	Angular position indicating the ball departure location, typically driven by the angle associated with the second maximum value in the energy profile (see polar/linear charts).	Identify the onset of the lower energy region and charge departure.	Directly proportional to the filling level and correlated with grinding performance.
Loading Angle	°	Angular position indicating the location of minimum ball vibration on the liner, generally driven by the angle associated with the minimum value in the energy profile (see polar/linear charts).	Exclusive Dynamox specialist metric designed to track liner wear, highly resilient to process variations.	Strongly correlated with liner wear levels.

Metric	Unit	Technical Definition	Practical Application	Operational Correlation
Grinding Angle (Grinding)	°	Angular difference between the Shoulder and Toe.	Evaluates the distribution between impact and departure; shifts drive operational or wear diagnostics.	Strong correlation with liner wear.
Toe Energy (Toe)	dB	Vibration energy at the toe location.	Differentiates new versus worn liners (higher energy indicates wear).	Low direct correlation with filling level; reliable wear discriminator.
Shoulder Energy (Shoulder)	dB	Vibration energy at the ball departure location.	Tracks wear severity, delivering clear distinction in high-wear scenarios.	Weak correlation with filling level; robust for severe wear tracking.
Loading Energy (Loading)	dB	Energy at the ball loading location.	Delivers high correlation with liner wear.	Low correlation with operational changes.
Rotational Speed	RPM	Mill body RPM, derived from the time interval between revolutions.	Contextualizes other metrics to drive operational diagnostics.	Baseline reference to normalize angular metrics.

Specialist Metric Trend Charts:



Energy vs. Angle Polar and Linear Charts:



Complementary Readings:

- Temporal trends and correlation with process variables.
- Spatial distribution (e.g., comparing feed/center/discharge).

4.1.8 Auto-Refresh (5 min)

The dashboard auto-refreshes every 5 minutes, preserving the asset's context during reloads.

4.1.9 Permissions & Access Control

- Only authorized users can view asset data within the Ball Mill module.
- If access is restricted, the system must display an appropriate message without exposing underlying data.

4.1.10 Troubleshooting

Symptom	Probable Cause	Resolution
Missing metrics for specific spots	Non-simultaneous triaxial data collection or incompatible sensor	• Review spot/sensor configuration. • Adjust collection windows and synchrony.
Name mismatches between the Summary and 3D Viewer	Inconsistencies between the Asset Tree and visual mapping	• Standardize nomenclature across both contexts. • Redo mapping after making adjustments.
No access to the Ball Mill module	Insufficient permissions or module not enabled	• Request access from the administrator. • Verify commercial and technical module activation.

4.1.11 FAQ

- **Supported Sensors:** Strictly requires simultaneous triaxial data collection. Third-party sensors are supported provided they meet this prerequisite.
- **Interpreting Toe/Shoulder Variations:** Evaluate alongside rotational speed (RPM), energy, and historical trends. Increasing Toe angle = potential drop in filling level. Abrupt energy shifts = potential liner wear.
- **Critical Summary, but Normal 3D Status:** Verify spot mapping, trend history, and nomenclature consistency.
- **Performance vs. Structural Metrics:** Performance metrics (Loading, Toe, Shoulder, Energies, Media Angle, Velocity) evaluate operational behavior. Structural metrics (Peak-to-Peak Acceleration, Envelope) monitor mechanical health.
- **Understanding the Polar Chart:** Visualizes the angular energy distribution over one complete revolution, generated from the raw waveform by the R&D algorithm. It empowers users to benchmark the feed, center, and discharge regions.

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