Should machines produce when you need to? In the planned time and quality? We have improved data processing and created a tool for rolling bearings monitoring, including bearings of slow-moving machines! The Bearings module will help you produce as planned.

An overview of the condition of the rolling bearings, which are key parts of the machine, allows you to manage the availability of production capacities, protect the machine and reduce maintenance costs. The Bearings module gives you the opportunity to take action accurately and in a targeted way and maintain available production capacities.

The main benefits of the module are:
The availability of production capacities without unexpected downtime caused by partial failures in the machine starting weeks or even months before the major failure.

Protection of the machine against serious accidents caused mainly by overheating, choke and roll of the rolling bearing.

Reducing maintenance costs through smaller and targeted actions at the start of bearing damage, both by own maintenance and by external providers or machine suppliers.

Detailed data about the machine's behaviour allows for evaluation of procedures, machine utilization and more.
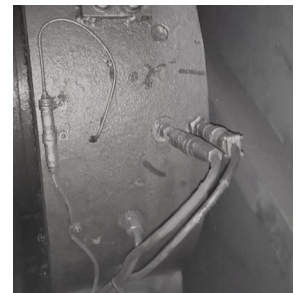
Module Bearings is suitable for all spinning machines such as motors, fans, conveyors, gearboxes, and with the use of MUSA (Multi Sensor Algorithms) analyses also for presses and rolling machines of all types and sizes.

Slow-running bearing after long-term lubrication failure

Sensors and wires used

Sensors installed on the press

Implementation

Vibration and temperature sensors are used to monitor rolling bearings. Vibrations carry most of the key information, but temperature is also used for detailed analysis. With patented MUSA analyses, one sensor per one or even multiple bearings is sufficient. Indirect bearing monitoring (with fewer sensors than bearings) is used for gearboxes and complex manufacturing machines.

Sensors are mounted with a special adhesive or attached with the M8 thread. A monitoring unit is installed to acquire and evaluate the data. You can use the touchscreen panel to directly visualize the analyses. To fit the machine with one to six sensors, one shift downtime is necessary.

Before setting analyses describing the condition of bearings, several measurements (RAW data measurements) must be performed. The analysis setup consists of two steps - 1. determining the method of processing the RAW data and 2. adjusting the limit values of the selected analysis. These limit values can be represented by the traffic light: good condition, warning, risk.

Basic analyses can be set up during the installation of a monitoring unit on the machine. For more complex machines or with more product types, analyses are first tuned using RAW data on 4dot servers, then uploaded to the monitoring unit.

Once the necessary analyses are set up, the data transfer to the customer's internal information system can start and workers will be introduced the web application IDA to remotely access the analysis outputs.

Working with the module

Working with the module in the Engineering variant or higher, 4dot sets up the analysis limits for the user. Analysis outputs can be accessed with the IDA web application. Together with the analysed data, specific notes about maintenance and repairs can be added and viewed. When the condition of the bearing gets worse and the warning limit is surpassed, the technicians at 4dot will check the analyses and condition of the bearing. Once the false alarm occurrence is ruled out, they switch the condition to an alert state and contact the user with advice on how to proceed.

If a bearing condition becomes more serious, e.g. a lubrication failure, the system will send an email notification to the authorised personnel immediately when the alert and hazard limits are exceeded. The unit can be set up to shut down the machine in a state of danger.

Output example: The bearing condition – lubrication failure
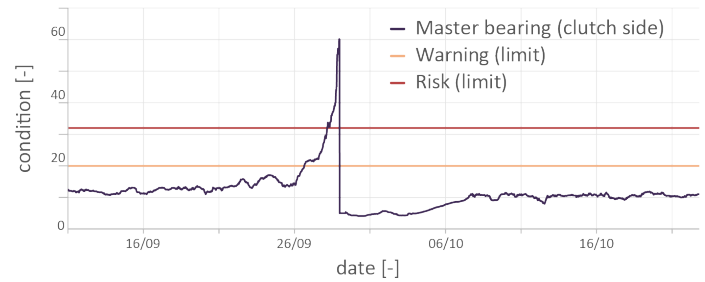
On the forging press, the system detected that the condition of the bearing worsened, which was caused by a blockage in the lubrication system. The problem was immediately brought to the attention of maintenance. The bearing was lubricated during the repair, leading to a significant decrease in vibrations. After settling down, the bearing condition returned to the standard range. Early detection of improper lubrication prevented more extensive damage to the bearing that served in the press until its repurposing. If the machine hadn't been tracked, the ungreased bearing would have been destroyed in a matter of weeks.

Plan – Edge

Analyses are processed directly on the unit and allow for machine safety shutdown. Analysis data can be shown on the touchscreen panel, sent to the internal information system and the machine state can be signalled with a signal tower. The unit is capable of processing and responding appropriately in term of milliseconds. For example, it is possible to shut down the machine immediately if there is a problem.

Plan – RAW

RAW data is used by 4dot technicians for the development and setting of analyses, we utilize this data for the control of limits and for the analysis of the cause of the deterioration in condition.

Plan – Engineering

The parameters for assessing the condition of both slow-moving bearings and bearings of production machinery may be influenced by the current production or state of other parts of the machine. To avoid false alarms, 4dot engineers process RAW data and then confirm the notification of worsening condition or adjust the limits to reflect the bearing condition.

Plan – Proactive

Key machines will negatively affect production in case of failure and should be checked proactively. 4dot engineers periodically evaluate RAW data to ensure proper limits for key machines to monitor the condition of rolling bearings.

	Edge	RAW	Engineering	Proactive	
Initial setting of analyzes and limits	✅	✅	✅	✅	Instalation
API monitoring unit	✅	✅	✅	✅	Instalation
RAW data sending	—	✅	✅	✅	IT
Online aplication	—	✅	✅	✅	IT
Notifications	—	—	✅	✅	IT
Checking analysis limits	—	$	L	P	Engineering work
Analysis of the cause of deterioration	—	$	$	L	Engineering work
Extended engineering support	$	$	$	$	Engineering work

✅ Yes　— No　$ Possibility to buy　L After exceeding the limits　P Periodically

Extended engineering support

Extended engineering support for RAW data and MUSA analyses allows our technicians to "see inside" of the machine. RAW data allows an unlimited amount of analysis, even retrospectively. Thanks to simultaneous data processing, MUSA analyses make it possible to separate signal and noise, for example information about the manufacturing process and condition of the bearing. Whether there are problems present in the manufacturing process or any other parts of the machine, extended technical support may be used to gain insight into the behaviour of the machine.

Key parts of 4dot technology are patented.