Wellness screening for your machine – Remote Condition Monitoring
Condition-based diagnostics: highest availability for lower operating costs

The objective was clear: to achieve 100 percent availability of machine tools, zero downtime during production, and the lowest possible maintenance costs.

The best way to get there is with IndraMotion MTX rcm, the Remote Condition Monitoring system from Rexroth. This software tool frequently analyzes drive data and further operating parameters without the need for additional sensors. It detects wear in advance and warns the operator of a potential failure in a timely manner. Major benefit: You remain in control of all of your data and can implement your security strategies here as well.

Machine life cycle

- Conception
  - Engineering and applications support
  - sercos Ethernet integration
  - Mechatronic support
- Design
- Engineering
  - Software and hardware engineering
  - Basic services
  - Process optimization
  - Web services
- Commissioning
  - Commissioning
  - Extended service
- Production/operation
  - Remanufacturing
- Modernization
  - Retrofit
  - Modernization

Machine tool

- Web services are an essential part of the entire range of services provided by Rexroth.
Rexroth accompanies machine manufacturers and users throughout the entire life cycle of machine tools by offering comprehensive services and know-how. To this end, we also leverage the time and cost-savings potential of Web services. Our modular offering opens the door for customized solutions, from design, engineering support, and installation through to comprehensive service contracts with routine condition monitoring and maintenance recommendations.

IndraMotion MTX rcm, the Remote Condition Monitoring system, allows you to centrally save and monitor measured values from networked CNC systems. Specific evaluation methods facilitate maintenance by detecting the need for it early on so that the work can be carried out as planned during production downtime. This, in turn, improves plant availability.

Web services

- Project management
- Engineering
- Installation and commissioning
- RCM – IndraMotion MTX system training
- Data collection/analysis report
- Service contract

Rexroth also caters to open programming standards and interfaces with the IndraMotion MTX rcm. Machine manufacturers can therefore optimally integrate it as an underlying technology and apply their know-how. We also develop customized solutions through to defined data storage and evaluation to meet individual user requirements.
Remote Condition Monitoring – transparent architecture with practical data collection

Be it machining centers, lathes, grinders, or rotary indexing machines: Wherever the CNC system solution IndraMotion MTX provides for maximum precision and productivity, Remote Condition Monitoring can improve availability.

The runtime program records the relevant data and values for decentralized, machine-specific preprocessing in the CNC control. In so doing, the software tool adapts to the machine in question and „learns“ about the entire machine life cycle with input provided by the user.

The IndraMotion MTX rcm system software on the central server PC of the user collects the data and compiles it into meaningful information about the status of all machines connected. Intuitive traffic light icons indicate the status of characteristic values and structure the evaluation. The system also provides an overview, with main errors arranged by plant section.

The server grants firewall-protected access to the data in line with the security strategy of the user: either via user-specific maintenance, the machine manufacturer, or Rexroth with the modular Remote Condition Monitoring service package.
**IT infrastructure**

<table>
<thead>
<tr>
<th>Web client</th>
<th>Data access and visualization</th>
</tr>
</thead>
</table>
| **Machine manufacturer, Rexroth** | ▶ Office PC with standard browser (Microsoft IE6.0, IE8.0, Mozilla Firefox)  
▶ Web server |

<table>
<thead>
<tr>
<th>Firewall</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Web client</th>
<th>Data access and visualization</th>
</tr>
</thead>
</table>
| **User instructions** | ▶ Office PC with standard browser (Microsoft IE6.0, IE8.0, Mozilla Firefox)  
▶ Web server |

<table>
<thead>
<tr>
<th>Web server</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Generic Data Server (GDS) Router</th>
<th>Data base</th>
</tr>
</thead>
</table>
| **Installation, commissioning** | ▶ Setup data  
▶ Characteristics  
▶ Grafic data  
▶ Raw data  
▶ ... |

<table>
<thead>
<tr>
<th>Function interface</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DA</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Machine</th>
<th>Data storage and provision</th>
</tr>
</thead>
</table>
| **Commissioning, launch support** | ▶ Server hardware/software and IT infrastructure (network)  
▶ IndraMotion MTX rcm system software  
› GDS data server  
› Web server for providing data  
› Option: Microsoft SQL server |

<table>
<thead>
<tr>
<th>Devices, components and sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLC</strong></td>
</tr>
</tbody>
</table>
Sensor-free data collection

Sensor-free collection of condition data wherever wear occurs: Remote Condition Monitoring detects changes without any additional hardware costs, evaluates drive and PLC data, and combines testing methods. This provides users with a very economical, yet comprehensive overview of the current condition of all connected machines whenever required.

Machine tools in particular must be extremely cost effective. This not only affects procurement costs, but also overall equipment efficiency. Remote Condition Monitoring helps both objectives to be achieved. Requiring no additional sensors, the tool uses a variety of methods such as the circularity test to record axis-specific values on a frequent basis. The software tool then calculates wear based on this information and issues a warning in a timely manner.

Numerous monitor settings track trends in the machine tool, such as temperature, hours of operation, and cycle times specific to the application. These functions can also issue maintenance notes for mechanical components respective of their travel path and operating time. Data is processed in the PLC or directly on the data server, depending on the configuration.

The software tool carries out active test runs for enhanced analytical methods. It also plots defined motions and records how the system responds. This allows Remote Condition Monitoring to track the trends of the parameters calculated.

The IndraMotion MTX acr action recorder also offers a log book function that transparently displays causes or fault triggers such as crashes or tool ruptures. Function monitoring and sequencer analysis of the PLC round off condition monitoring.
Standard analysis function in drive

- Vibration analysis – vibration analysis for axes and spindles
- Friction analysis – friction characteristic curve for axes and spindles
- Frequency response analysis – frequency response analysis
- Reversal error analysis – backlash for axes
Configurable, mature and proven many times over in practical duty

Remote Condition Monitoring has already proven to be an efficient instrument in overall productivity management for large-scale manufacturing of TIER 1 suppliers to the automotive industry.

The RCM system is modular, can be scaled to integrate with many different production conditions, and is capable of monitoring entire production lines. Authorized persons can view the entire plant topology, down to the actuator/sensor level of individual machines, via Web access.

By conducting routine analyses and evaluating drive and PLC data, your maintenance crew can effectively implement all measures by scheduling them to be carried out during designated production stops. Main errors arranged by plant section also indicate a strong need for action to maintain a consistently high level of availability along the entire production line.

You can also subsequently add new and already installed machines to the system. Rexroth also uses its international presence to assist you in deploying Remote Condition Monitoring on a global scale and extending it to include additional machine types.
Application example, IndraMotion MTX rcm

Production line with eight machining centers (22 axes each) – with IndraMotion MTX, the CNC system solution from Rexroth

Station 1  Station 2  Station 3  Station 4

Station 5  Station 6  Station 7  Station 8

Generic Data Server (GDS)
Router

- Analytical methods
- Configuration
- Web server
- Data base

- User administration
- NC programs
- Data capturing
- Periodic execution

Flexible cylinder head production
IndraMotion MTX – the CNC system solution from Rexroth for perfect machining and forming
Whether machine manufacturer or user, experienced Rexroth specialists are available every step of the way to help you implement Remote Condition Monitoring from a practical perspective. We start by understanding your requirements and factoring in the methods to be implemented during the planning phase. In the process, we assist machine manufacturers in devising and integrating machine-specific methods. We will assume all planning and system setup tasks independent of the location.

All required hardware and software measures are implemented during the installation and commissioning phase by our specialists, who configure and optimize the components and ensure secure networking.

In-depth training offers for operators/experts qualify your personnel to optimally leverage the benefits of Remote Condition Monitoring on a daily basis.

We will also compile a status report of the plants monitored, including a list of main errors and irregular parameters, if required. Maintenance recommendations are then made based on this information.

A wide variety of service modules that can be combined are offered with service contracts tailored to meet your needs. We routinely collect and evaluate your data on a global scale using interfaces defined by you. Central data repository systems are provided for storing machine and plant data and periodic analytical reports compiled. We also carry out all system maintenance and software updates.

Remote Condition Monitoring is a wellness program for the life of your machine tools and allows you to exploit the potential available with condition-oriented maintenance for better availability, greatly reduced machine downtime, and consistently high quality in all production steps.

We will gladly assist you in deploying Remote Condition Monitoring through to routine analyses of day-to-day operations. Simply combine our service modules to meet your requirements.
Installation and commissioning

Service contracts – services can be combined as required

System training for IndraMotion MTX
The data specified above only serve to describe the product. As our products are constantly being further developed, no statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

Find your local contact person here:
www.boschrexroth.com/addresses