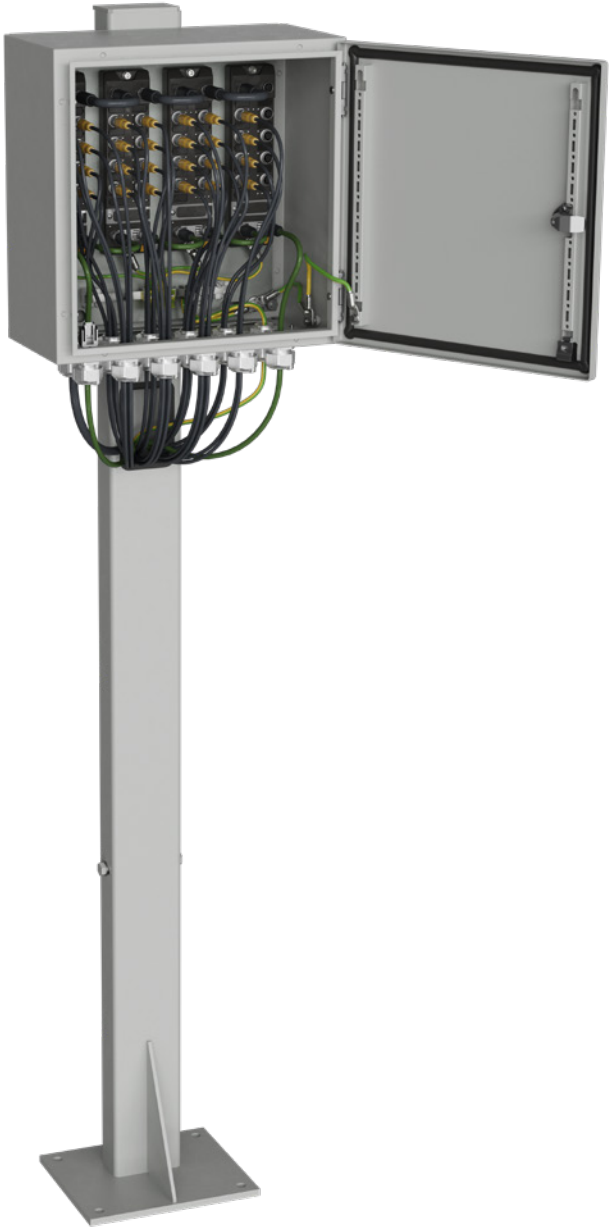
Metso:Outotec

Grinding mill solutions

Mill Control System

Metso Outotec Mill Control System

This system provides all control functions required for the safe operation of grinding mills and their associated ancillary equipment. It enables the opportunity to implement advanced condition monitoring strategies, such as remote expert support, to ensure maximum mill availability.



A safe, reliable solution with smart IO-Link instruments
The Metso Outotec Mill Control System is a modular solution comprising a local control panel with a fail-safe PLC and a large full-color touchscreen interface, as well as a robust distributed I/O network and smart mill instruments utilizing IO-Link technology:

- IO-Link is a standardized instrument interface (IEC 61131-9) using digital point-to-point communication.
- IO-Link utilizes long established standards such as 3-wire cables with M12 connectors.
- IO-Link enables digitalization by providing extended diagnosis of sensors and actuators.
- IO-Link allows simple and fast parameter setting due to bi-directional communication.

Increased mill availability
Diagnostic data from the IO-Link instruments are used to determine instrument health and detect installation problems before causing unnecessary downtime. Bi-directional communication minimizes instrument replacement time with automatic parameter setting.

The integrated condition monitoring system provides processed vibration data for the mill drive train and proactively detects anomalies and prevents equipment damage.

Remote connectivity hardware enables optional plug-and-play connection to Metso Outotec's connected services for remote diagnostics and support to resolve equipment-related issues. Plant owners can also take advantage of Metso Outotec's cloud-based analytics to gain valuable insights over the condition and performance of their assets. These insights can be used to develop a robust predictive maintenance plan.

The system uses standard hardware and software components that are common across Metso Outotec product lines for improved availability of support resources and spare parts. Cables manufactured with standard connectors for sensors, power and Ethernet connections, minimizes the need for manual wiring, resulting in improved installation quality. Superior system quality is ensured by standard product design and product lifecycle management.

Risk reduction with validated functional safety
The EU's Machinery Directive requires the manufacturer of a machine to perform a risk assessment for the purpose of identifying and addressing all risks associated with the machine. Risk reduction is a three-step process according to ISO 12100:

- Step 1: By inherently safe design
- Step 2: By safeguarding and/or complementary protective measures
- Step 3: By information for use

Should an identified safeguard or complementary protective measure be implemented by means of a control system, it shall be designed and implemented in accordance with one of the applicable standards governing the functional safety requirements of machinery control systems.

Metso Outotec has designed and implemented multiple safeguards and complementary protective measures in the Metso Outotec Mill Control System according to the requirements of ISO 13849-1. The safety functions performed by the fail-safe PLC and other safety-related parts of the control system (SRP/CS) have been evaluated and validated to meet the required Performance Level (PLr) as determined by the risk assessment.

Efficient and economical engineering
The modular control system structure results in reduced project-specific engineering as it is based on proven hardware and software modules.

The distributed I/O architecture allows for most of the mill instrumentation to be fully wired and tested at the factory, minimizing risks associated with commissioning. Installation time and cost is also reduced as most of the site cabling is limited to the power and Ethernet connections to the remote I/O panels. The IP67 modules with sufficient ingress protection are further protected by the enclosure, providing the most robust solution for even the harshest environments. Splitable cable glands allow standard instrument-, power- and Ethernet cables with factory fitted M12 connectors to enter the enclosure.

The use of IO-Link instruments contributes greatly to time and cost savings. Fewer I/O module spares are required thanks to a common signal interface, while the commissioning process is expedited by fast configuration and parameter setting.

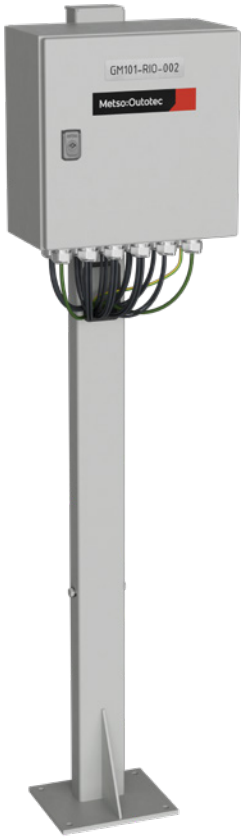
Project risks are mitigated with complete solution delivery under one contract.

Benefits

- Increased mill availability
- Risk reduction with validated functional safety
- Maximum data availability
- Efficient and economical engineering

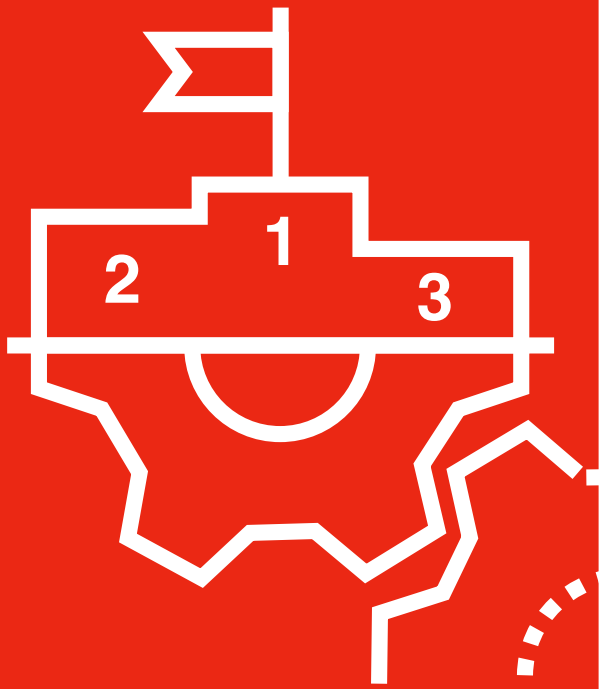
Features

- Four standardized and configured-to-order local control panel (LCP) products to suit operational and installation requirements, including a fail-safe PLC and multi-lingual human machine interface (HMI):
  - MLCP-SIE-S: Siemens-based platform, for standard ambient conditions
  - MLCP-SIE-E: Siemens-based platform, for extreme ambient conditions
  - MLCP-RA-S: Rockwell Automation-based platform, for standard ambient conditions
  - MLCP-RA-E: Rockwell Automation-based platform, for extreme ambient conditions
- Remote connectivity hardware and software pre-configured for Metso Outotec's cloud-based connected services and analytics.
- Standard interface protocols and safety signals to plant control system, main drive/starter, upstream switchgear, and motor control center (MCC).
- Remote I/O panels containing robust IP67-rated I/O modules with IO-Link masters (factory installed, wired to instruments, and tested on all skid-mounted components).
- Standardized smart IO-Link instruments on the mill and ancillary equipment.
- Advanced condition monitoring system integrated into LCP.



Typical scope

- Local control panel (LCP)
- Remote I/O panels
- Power and Ethernet cables between LCP and remote I/O panels
- Mill instruments and instrument cables
- Engineering, configuration, and factory acceptance testing (FAT)



Ensured compliance and reduced risk with state-of-the-art safety-rated hardware

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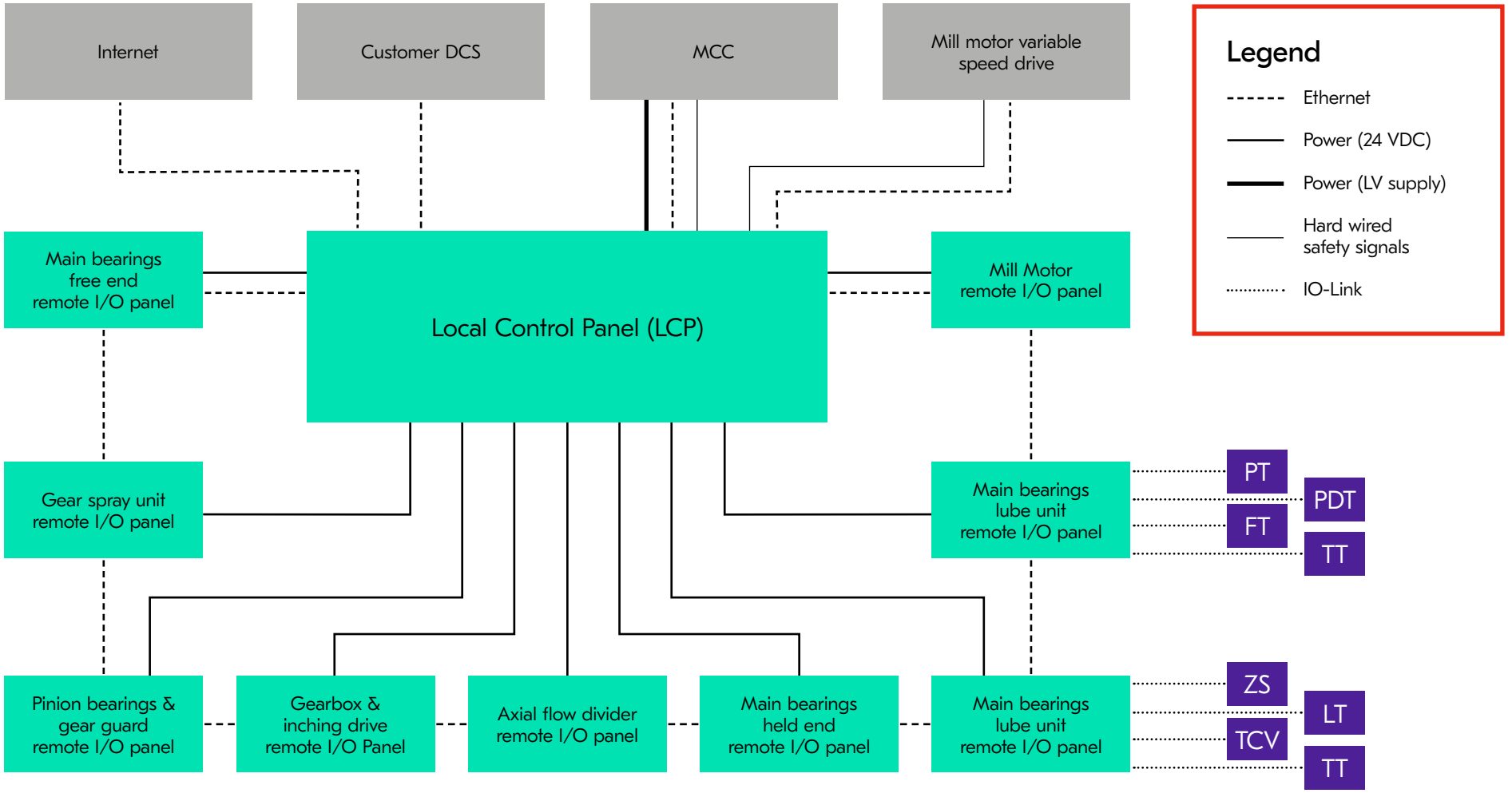
Typical system block diagram



System scope may vary. For illustration purposes, some components and instruments have been omitted. Specifications and components are subject to change without notice.

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Specifications

Metso Outotec Mill LCP	MLCP-SIE-S	MLCP-SIE-E	MLCP-RA-S	MLCP-RA-E
Short description	Siemens, standard ambient	Siemens, extreme ambient	Rockwell, standard ambient	Rockwell, extreme ambient
PLC	Siemens S7-1500F Fail-safe PLC		Allen Bradley GuardLogix Fail-safe PLC	
HMI	Siemens TP1500 Comfort 15" full color touch panel		Allen Bradley PanelView 5510 15" full color touch panel	
Mill automation network	PROFINET		EtherNet/IP	
Interface to PCS	Standard: PROFIBUS DP / PROFINET Option: Other protocols		Standard: EtherNet/IP Option: Other protocols	
Interface to mill MCC	Standard: PROFIBUS DP / PROFINET with PROFIsafe Option: Other protocols		Standard: EtherNet/IP with CIP Safety Option: Other protocols	
Interface to mill VSD (if applicable)	Standard: PROFIBUS DP / PROFINET with PROFIsafe		Standard: EtherNet/IP with CIP Safety	
Interface to cloud-based analytics	OPC UA			
Remote connectivity hardware	Optional *			
Vibration monitoring hardware	Optional: IFM VSE150 vibration diagnostic unit(s) with PROFINET interface		Optional: IFM VSE151 vibration diagnostic unit with EtherNet/IP interface	
Power supply	Option 1: Single phase 120 to 230 VAC, 50/60 Hz Option 2: Three phase 380 to 500 VAC, 50/60 Hz			
Operating temperature	0 – 40 °C	-15 – 55 °C	0 – 40 °C	-15 – 55 °C
Maximum relative humidity	90 %	99 %	90 %	99 %
Enclosure climate control	n/a	External wall-mounted cooling unit; internal panel heater	n/a	External wall-mounted cooling unit; internal panel heater
Enclosure	Standard: IP66/NEMA4, WHD: 800 x 2000 x 600 mm, Sheet steel Option: IP66/NEMA4X, WHD: 800 x 2000 x 600 mm, 304SS			

Specifications and components are subject to change without notice.

Metso Outotec horizontal grinding mills

Metso Outotec continues to pioneer innovations in horizontal grinding mills technology with over a century of leadership, exceptional performance and unmatched expertise by introducing the Premier™ mills and Select™ mills.

Read more on our horizontal grinding mills at mogroup.com/horizontal-grinding-mills

Metso Outotec is a frontrunner in sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. By improving our customers' energy and water efficiency, increasing their productivity, and reducing environmental risks with our product and process expertise, we are the **partner for positive change.**

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