Metris
ANDRITZ Digital Solutions

FEED & BIOFUEL

PELLETING CONTROL

AUTOMATED PRODUCTION WITH RISK MONITORING

EFFORTLESS AUTOMATION.
TOTAL PEACE OF MIND

ANDRITZ
ENGINEERED SUCCESS

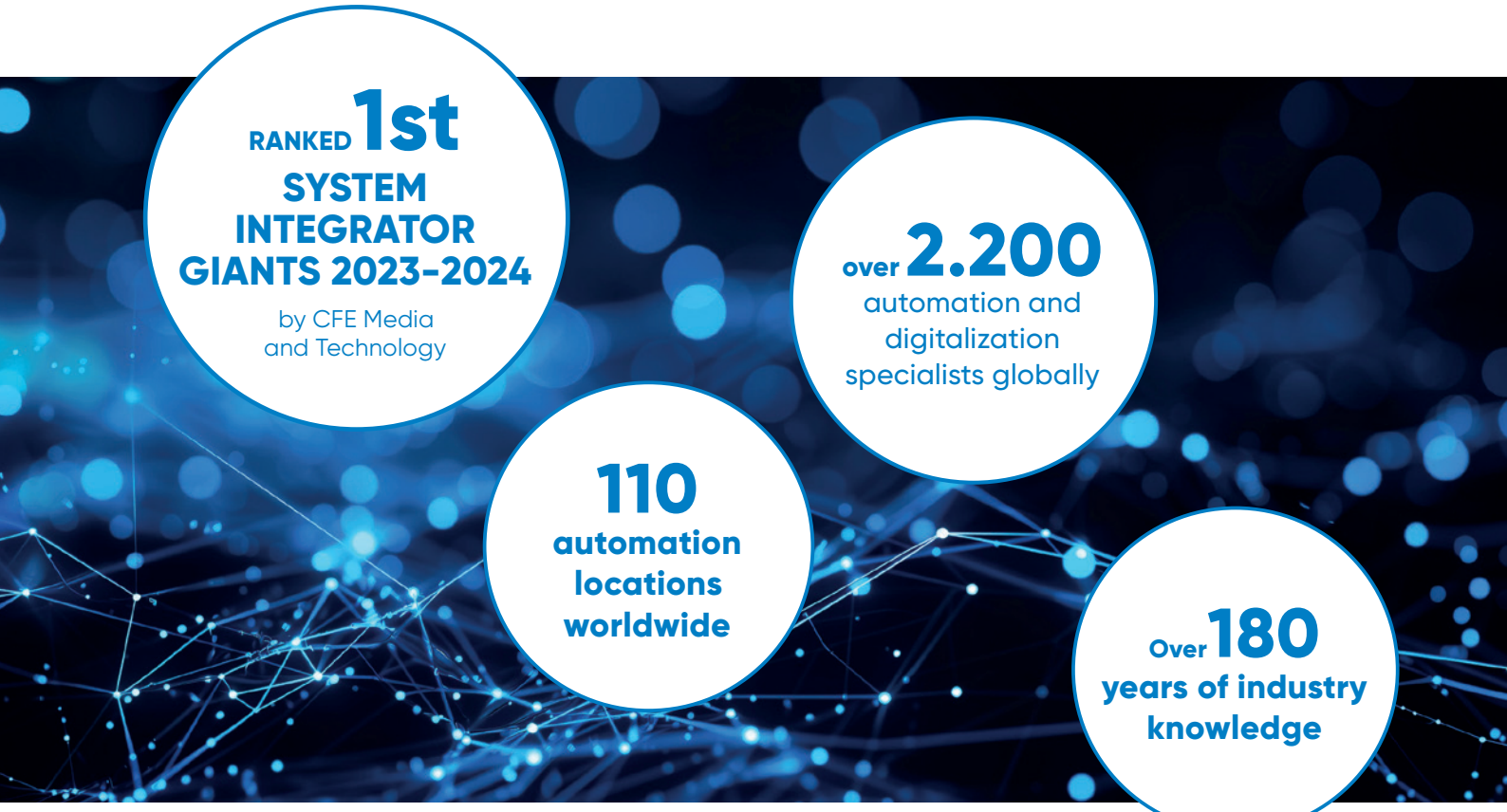
NEVER STAND STILL

At ANDRITZ, we understand the challenges the feed and biofuel industry faces today. With volatile raw material prices, emerging outbreaks, and a competitive marketplace, the need for innovative solutions has never been greater. Our Automation & Digitalization solutions, powered by the Metris Digital Platform, are designed to upgrade your operations, ensuring profitability, reducing total cost of ownership, and enhancing operational excellence.

Leveraging our 40 years of cross-sector success, our platform blends human and digital intelligence to enhance processing efficiency and support growth, while delivering 7 - 16% throughput increases.

Our solutions encompass an evolving, vendor-neutral solution supported by state-of-the-art automation and digitalization technology.

ANDRITZ will be with you every step of the way in your digitalization journey, ensuring your plant and your business **NEVER STAND STILL.**



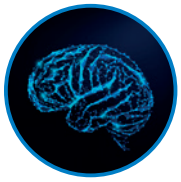
FOUR PILLARS OF SUCCESS

Through our global industry-specific expertise and deep understanding of the challenges our customers face, we deliver automation and digitalization solutions based on four key pillars.

AUTOMATION
The 'Muscle'

Achieve peak performance over the entire lifetime of your lines

The automation suite encompasses a broad spectrum of control solutions ranging from basic to fully automated systems, including production management, real-time plant simulation, condition monitoring, process optimization, and life cycle management.
These components maximize plant throughput, simplify maintenance, and optimize resource use.



DIGITALIZATION
The 'Brain'

Maximize your plant's potential while minimizing investment risk

The digitalization suite offers a holistic digital infrastructure for process optimization, asset management, operator training and knowledge management, ensuring a turnkey approach to feed and biofuel processing operations.
Our digitalization platform transforms operational data into robust, actionable analytics, maximizing your plant's potential while minimizing investment risk.

DEEP INDUSTRY EXPERTISE
The 'Heart'

Over 180 years of industry expertise and a global footprint ensure our solutions are adaptable and regionally attuned.
We preconfigure solutions based on our deep process knowledge, giving you immediate access to our know-how, our portfolio, and our service infrastructure all in one place.

AUTONOMOUS OPERATIONS
The 'Vision'

We strongly believe that the journey to autonomous operations is paved with bold steps by those who embrace every facet of automation and digitalization, turning challenges into opportunities for growth.
By taking that initial leap, you can unlock a world of possibilities. We can help you achieve a fully autonomous feed plant by 2027.

PELLETING CONTROL

This document is intended as a comprehensive introduction to ANDRITZ's automation and control solutions for pellet production lines. Whether the interest lies in the feed or biofuel sectors, it provides essential insights into production control and automation, and the extensive capabilities of ANDRITZ's solutions. The emphasis is on the practical features of these solutions in various pellet production scenarios.

Pelleting Control System

User-friendly solution, designed to facilitate the production of high-quality feed or biofuel pellets. It seamlessly integrates state-of-the-art machinery and complex processes with an intuitive, easy-to-use interface, simplifying operations and enhancing planning and decision-making capabilities.

Market-proven automated control solutions trusted worldwide

OVER 550 PELLETING CONTROL SYSTEMS have been installed globally

CUSTOMERS IN OVER 60 COUNTRIES, enhancing their operational efficiency and reliability with us

- **Unmatched Expertise:** In-depth knowledge of process automation.
- **Tested Excellence:** High-quality, industry proven solutions.
- **Plug & Play Preconfigured Solutions:** Delivering adaptable solutions for your exact needs.
- **Global Support Structure:** Prompt and effective assistance for any challenges.
- **Secure Compliance:** Upholding industry cybersecurity standards.

Effortlessly integrates into existing systems

Easy-to-use, intuitive interface

Simplifies operations

Enhances planning and decision-making capabilities

5

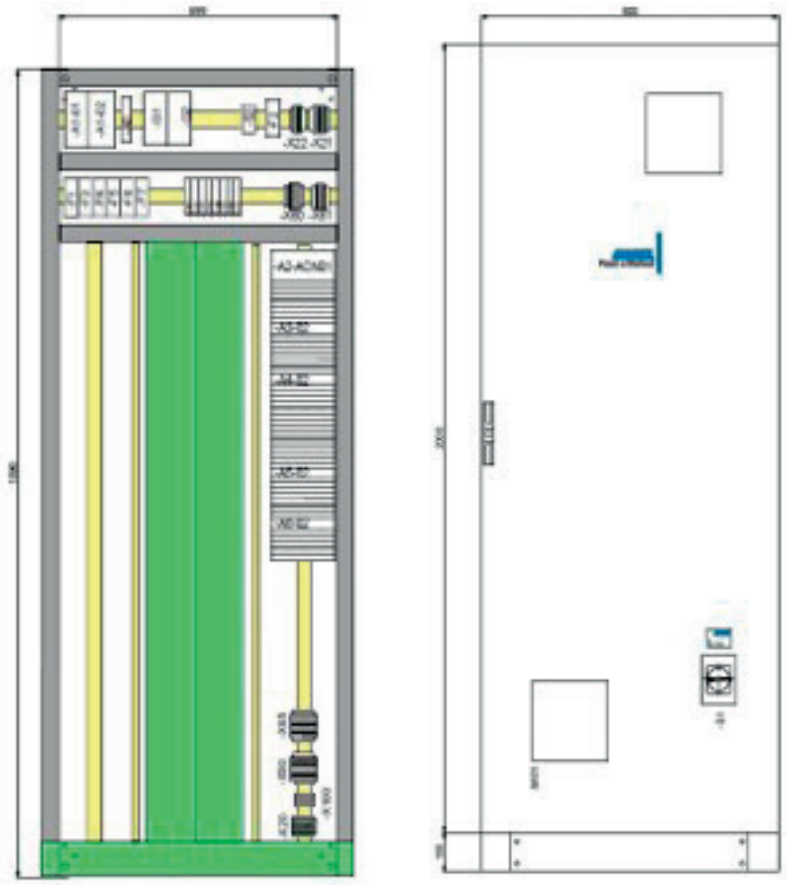
Control Options

Two distinct control systems are available to meet diverse needs: Management System and Panel System.

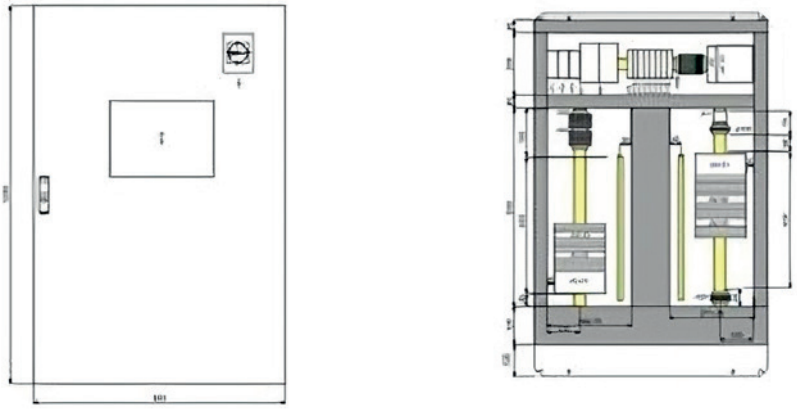
Management System is a network-based, modular solution capable of controlling up to four processes.
It supports multiple control stations, offering enhanced operational flexibility, and is designed with future scalability in mind.

Alternatively, **Panel System** is a cost-effective choice that provides an optimal balance between performance and expenditure. It includes an ergonomic user interface that displays relevant information, enabling direct monitoring and control of manufacturing operations. It also supports add-ons, offering flexibility to adapt to evolving needs.

Both systems are designed with a focus on operational success, offering control, flexibility, and growth potential.



Management system



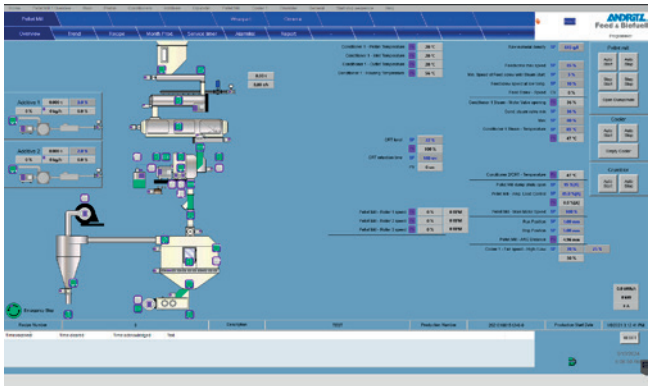
Panel system

Management System

Management System is a modular system specifically designed to manage ANDRITZ Feed & Biofuel production machines or parts of a production line. It can also be configured to interface with third-party machines. This system enables remote monitoring and control of the entire process from a control room. Furthermore, it provides additional control options and configurable parameters directly from the interface. This makes it an excellent choice for comprehensive operation and maintenance insights.

SYSTEM DESCRIPTION

Management system, centered around a PLC based system, manages all machine electrical signals, and communicates with a computer running the Scada system via Ethernet. Scada allows process monitoring, management, and data storage for future access. It's network-based, allowing multiple clients to connect to the same server, enabling multiple control stations.



FEATURES

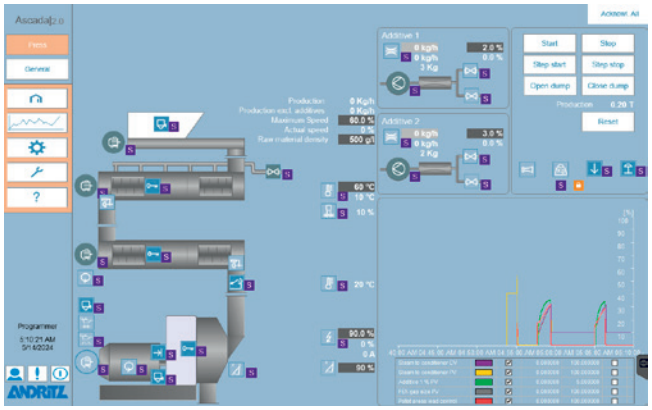
- **Extensive Human-Machine Interface:** Management System's Overview tab offers an intuitive, comprehensive graphical interface. It provides a color-coded visual representation of the entire installation and all its components, allowing for real-time status monitoring. The interface is designed for direct control, with fields for adjusting recipe parameters and displaying current values.
- **Efficient Control:** Auto Start and Auto Stop execute preprogrammed steps to make sure the machines start in the correct order. Step Start and Step Stop offer granular control, initiating or halting individual steps as needed.
- **Flexible Management Options:** The system provides three user levels - Operator, Maintenance, and Programmer, each with unique access for efficient operation, configuration, and testing.
- **Real-Time Connection Monitoring:** The system provides instant visual feedback on the PLC connection, ensuring seamless operation and immediate fault detection.
- **Detailed Component Insights:** Clickable objects on the overview screen open pop-up windows, providing in-depth information about motors, valves, and controllers. This feature allows for manual control of the individual components.
- **Dynamic Trend Analysis:** Management System provides trend curves for numerous variables, offering insights like temperature, speed, and retention time. This feature aids in monitoring system performance and making informed decisions.
- **Event Logger:** The system logs its events, enabling backtracking and comparison of current process parameters with past ones for comprehensive process review and analysis.

Panel System

Panel System is a standalone, cost-effective solution that is installed in the field near the machines. The system includes a PLC, a panel PC and this approach reduces costs and complexity. It doesn't offer remote control, but instead prioritizes direct, localized control. The system is adaptable, allowing for future additions.
It's designed for smaller operations, providing real-time control and data collection from process functions.

SYSTEM DESCRIPTION

Panel System consists of a wall mounted panel with a 12" touchscreen computer and a PLC with input and outputs. It is Ethernet-based and has a 5-port switch where all network units are connected.



FEATURES

- **Interactive Display:** This feature offers a graphical representation of your setup. It includes a control section for line operation and an alarm bar. It allows access to pop-ups for adjustments via touchscreen inputs. The display aligns with your system configuration, mirroring the actual installation managed by the Panel System.
- **Function-Based Control System:** The system utilizes a function block-based approach, enhancing process visibility and allowing more granular control. It supports various functions and allows simulations for testing the functionality of the program.
- **Interactive Function Pop-ups:** Clickable functions open configurable pop-ups, providing detailed information and allowing parameter adjustments. Color coding offers immediate visual feedback, enhancing user control and system understanding.
- **Trend Displays:** The system features trend displays, showing parameter development over time. This powerful tool aids in tuning PID controllers and analyzing process issues, enabling efficient problem-solving and system optimization.
- **Historic Alarm List:** Tracks all past alarms, aiding in process analysis and understanding system behavior.
- **Analytics Indicator:** Showcases key metrics such as work hours, production quantity, and software version.

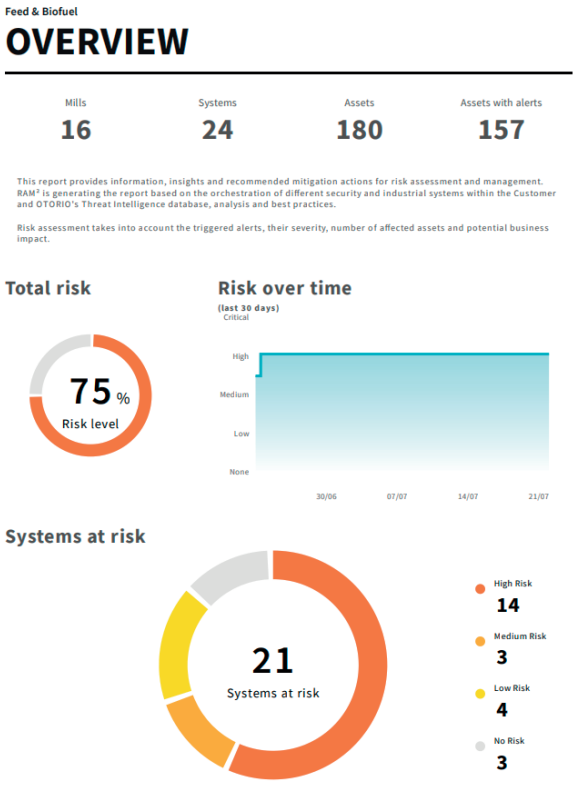
Cybersecurity Offerings

THE CYBERSECURITY PROBLEM

The digital revolution has boosted operational efficiency but also heightened cyber-attack risks. Such attacks, now common across sectors including feed and biofuel, pose significant threats.

IMPACT OF CYBERATTACKS

Cyberattacks are highly destructive. These attacks disrupt supply chains, halt production, and affect operations, leading to significant losses. On average, a cyber-attack causes a 5-day production halt, costing approximately $4.47 million.



OUR SOLUTION

ANDRITZ helps its global customers minimize digital and cyber risks through its partnership with leading OT security provider OTORIO. ANDRITZ provides combined, advanced cybersecurity and automation options integrated into its systems, safeguarding operations against cyber threats and disruptions, ensuring smooth, uninterrupted production.

STANDARD PLATFORM - OTORIO spOT™

ANDRITZ utilizes spOT™, a unique technology developed by its OT security partner OTORIO. spOT™ is an integral part of the machine delivery and quality procedures, supporting system hardening. By checking the full machine against the relevant IEC62443 / NIST / NERC standards or additional standards required by customers, spOT creates a cyber security "machine fingerprint" and automatically generates machine-specific IEC compliance letters.

FEATURES

ANDRITZ conducts factory acceptance tests for all equipment. With Otorio spOT integration, these processes become less time-consuming and more cost-effective, ensuring that products meet all required standards before shipment.

- All equipment delivered by ANDRITZ, including Windows PCs and servers, is IEC62443 compliant helping organizations understand and mitigate system risks.
- Comprehensive complaint reports are provided for all Windows PCs and servers, keeping you informed about your system's security state.

OPTIONAL FEATURES:

- Updating the equipment with new patches: Regular updates are crucial for maintaining the security and functionality of your equipment. They help to fix vulnerabilities, improve performance, and add new features.
- Implementing additional hardening, per spOT's security overview and compliance reports: Hardening your systems can significantly enhance your security posture. It helps to reduce system vulnerabilities and protect against potential threats.

ADDITIONAL OPTION - OTORIO RAM²

Otorio RAM² is a distinct, advanced OT cybersecurity platform for organizations looking to further invest in their cybersecurity governance. It integrates seamlessly with existing systems, serving as an overlay or standalone solution for industrial control systems (ICS) and cyberphysical systems (CPS). Please note that the platform would be a separate acquisition on the part of the customer.

FEATURES

- **Unparalleled Visibility:** RAM² orchestrates data from cross-domain sources, providing a consolidated view of your entire operational network. This feature makes monitoring and risk management more efficient and proactive.
- **Correlated correlates sources, insights:** RAM² data from various reducing noise and providing actionable "insights". This enhances focus and effectiveness in threat response.
- **Non-intrusive attack simulations:** With the help of cyber digital twin technology, RAM² forms a virtual duplicate of your OT network. This allows security teams to simulate potential breaches and attacks, helping to foresee and prepare for possible threat paths.
- **Integrated overlay:** RAM² can be used as an overlay or a standalone OT security solution, maximizing ROI from your existing operational security stack.
  This feature prevents downtime and financial losses.
- **Powerful noise reduction:** RAM² reduces unimportant and irrelevant alerts by up to 80%, eliminating alert fatigue and making sure that genuine threats are not obscured.

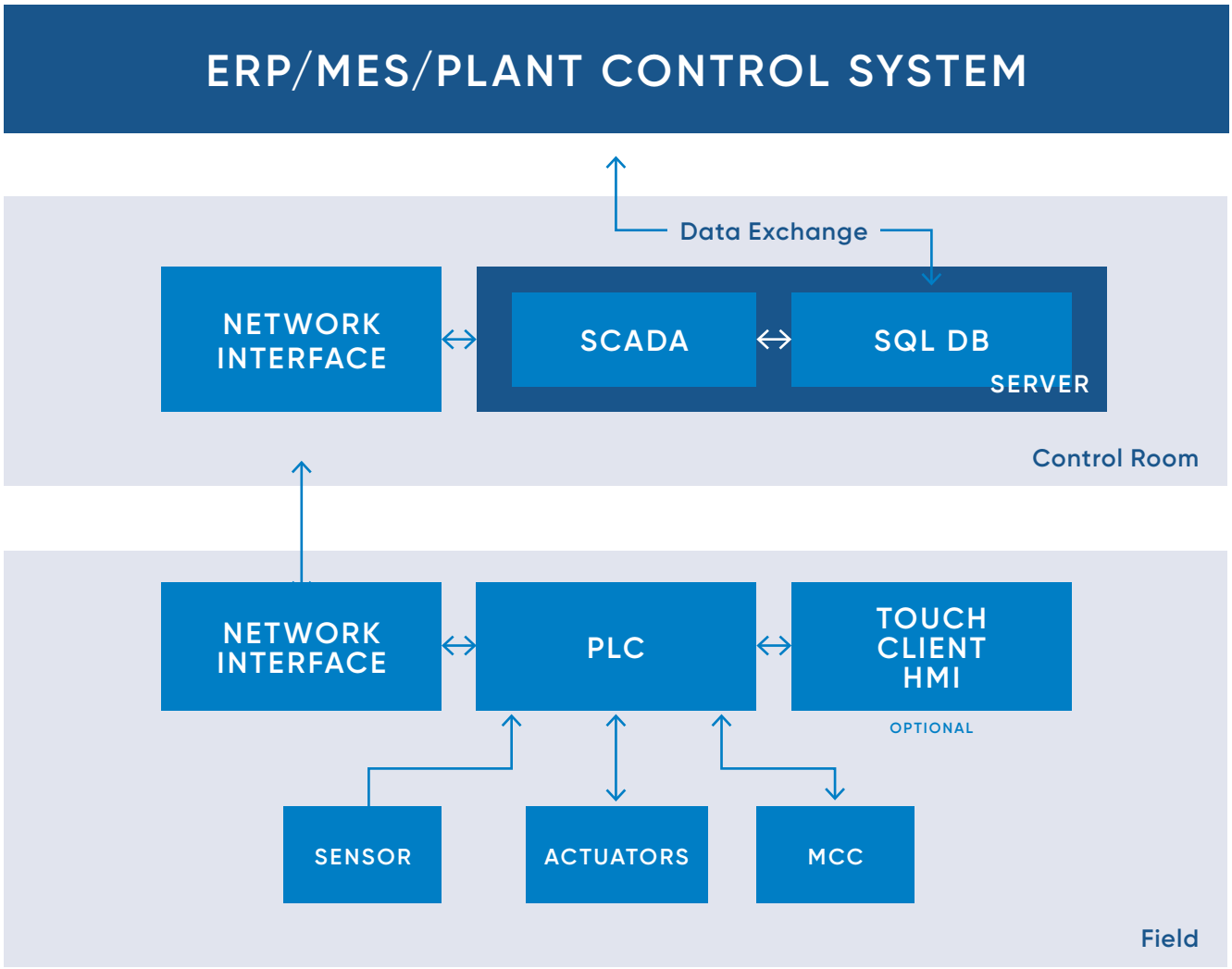
WHAT IS THE RIGHT CHOICE FOR YOU?

- **Otorio spOT:** for a strong security foundation in your operation. Otorio spOT ensures essential protection, provides on-demand reports, and is a cost-effective solution. Additional, bonus features can be acquired if you wish to further strengthen your operation's security.

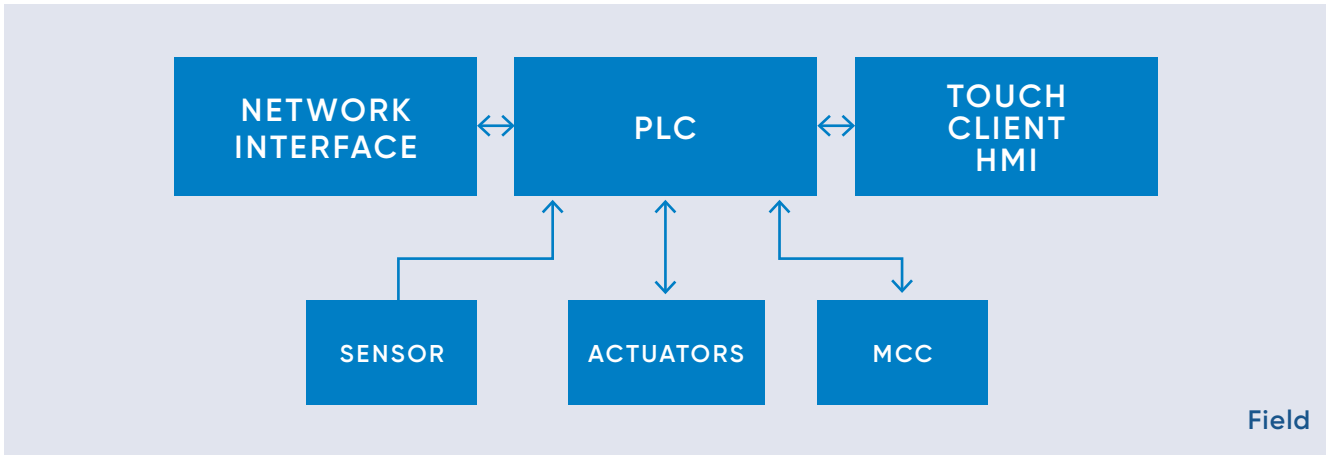
- **Otorio RAM²:** if you wish to invest in enterprise-wide security strategy, have preexisting cybersecurity options that can be integrated, and desire total and comprehensive control and monitoring of your cybersecurity, Otorio RAM² is the ideal acquisition.
  It integrates with existing systems, maximizing return on investment.

  Remember, the right choice is the one that best fits your specific needs and objectives, and we're here to help you make that choice.

Control System Architecture

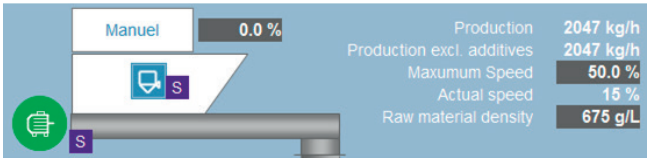


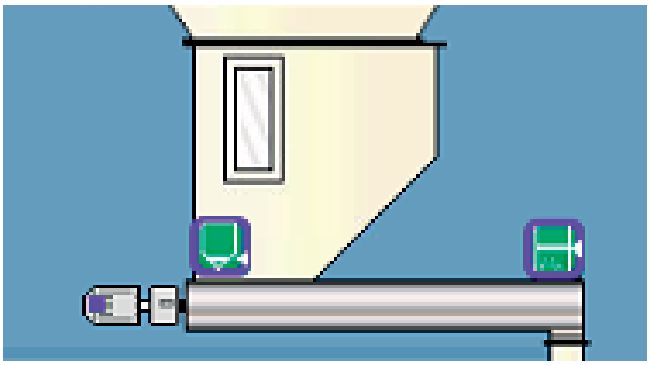
Management System Architecture



Panel System Architecture

Pelleting Control Functions





SAFETY FEATURES

At ANDRITZ, we plan, engineer, and develop our products with a commitment to meeting the highest safety and environmental standards. Our control systems are designed with an extensive array of safety features, including comprehensive safety systems, absolute and limited interlocks, and operational monitoring. These ensure that every aspect of the operation runs smoothly and safely, protecting both people and processes.

DOSING

The Goals of the dosing control functions are optimizing control, ensuring the desired output, and accurately recording the production amounts. These functions take user inputs and adjust the control of a dosing screw accordingly:

- **Variable Speed Control:** Allows the setting of speed parameters in the pop-up window for precise control and improved metering accuracy. In automatic mode, it ensures efficiency by stopping when the prebin is empty. Continues operation in manual mode even if prebin is empty.
- **Volumetric measurement:** Allows setting the material density in the prebin. Calculates production based on screw's volume and speed.
- **Loss-in-weight measurement:** Calculates the total production accurately by measuring the loss-in-weight in the pre-bin.

CONDITIONING

ANDRITZ offers the following benefits with its conditioning control systems:

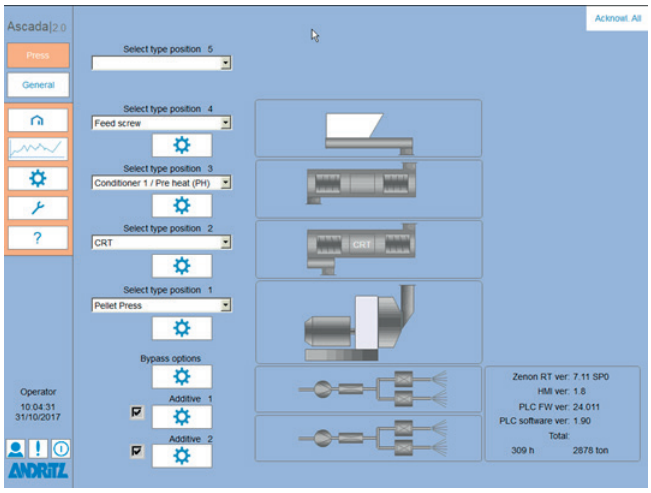
- **Flexible and effective management:** Offers both fully automated and manual control.
- **Comprehensive control:** Enables precise tailoring of conditioner's parameters to your operation's needs. This ensures that our system can be perfectly adapted to meet your specific requirements.
- **Consistent quality:** The systems ensure correct machine operation for maximum efficiency and use extensive controls to achieve desired product temperature, humidity, and hygiene for consistent quality.
- **Efficient production:** The controls adhere to pre-programmed steps, guaranteeing correct machine start-up and shutdown, thus maximizing efficiency. This ensures that the production process is not only effective but also resource-saving.

Conditioning Control Options

STANDARD FEATURES

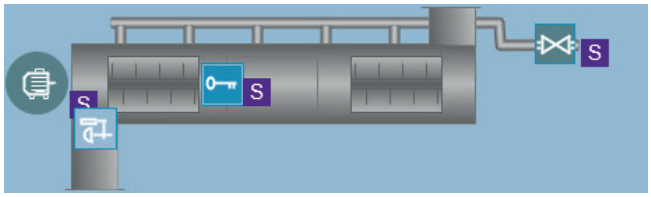
The following features are standard for most of our conditioning control systems:

- **Precise outlet temperature measurement:** The system measures the outlet temperature, compares it with the set point, and uses a PID to adjust the steam valve if needed to match the set temperature.
- **Automatic temperature probe cleaner:** Controls a pneumatically operated cleaning device. Cleaning cycle can be configured. Ensures that the probe is clean, and that steam addition is fast and precise.
- **Door safety circuit monitoring:** The system monitors the door safety switches and prevents the entering of the machine during operation.



CM CONDITIONERS

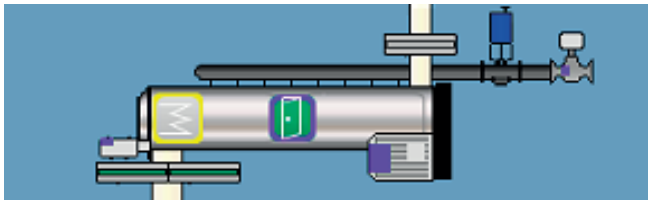
The standard conditioner option. Includes the following control features:



- **Precise outlet temperature measurement**
- **Automatic temperature probe cleaning**
- **Door safety circuit monitoring**
- **V-belt protection** uses sensors to monitor V-belt position and speed. In case of belt failure, the motor operation is immediately halted. This ensures optimal performance and system longevity.

CM902PH HOT START CONDITIONERS

The standard pre-heat conditioner. Includes the following control features:



- **Precise outlet temperature measurement**
- **Automatic temperature probe cleaner**
- **Door safety circuit monitoring**
- **Control of the pre-heating sequence of the product:** adjustable pre-heating sequence, the temperature of the cape heater can be adjusted in the user interface.
- **Control of inlet and outlet slide gates:** Monitors Inlet and Outlet temperatures. Controls the inlet and outlet slide gates ensuring the product leaves only when the desired temperature is achieved.

CRT CONDITIONERS

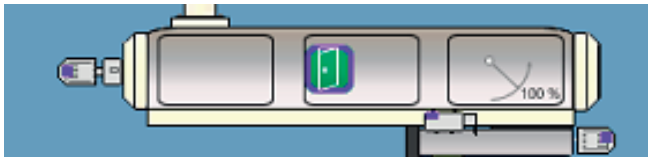
Our maximum hygiene option. Includes the following control features:

- **Precise outlet temperature measurement**
- **Automatic temperature probe cleaning**
- **Door safety circuit monitoring**
- **Screw speed control:** The speed of the conditioner's screw can be adjusted depending on the retention time needs.
- **Control of the pre-heating sequence of the product:** adjustable pre-heating sequence, the temperature of the cape heater can be adjusted in the user interface.
- **Level process value in outlet:** Monitors the level of filling inside the conditioner to adjust for the desired retention time.
- **Variable speed of equalizer screw according to level and pellet mill main motor:** Uses a PID controller to change the speed of the conditioner screw based on level process.

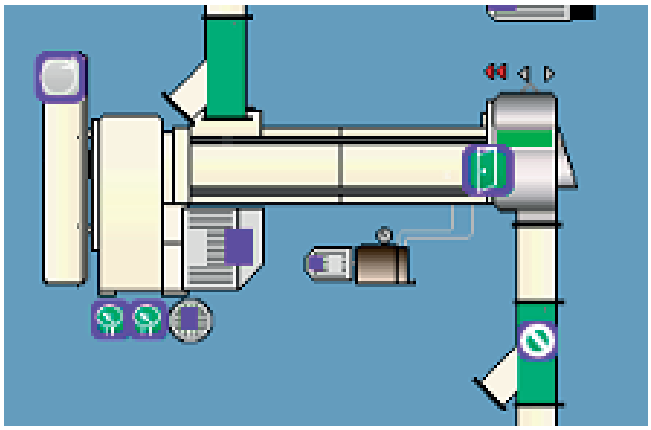
FEED EXPANDERS

Includes control functions for the feed expander and the attached crumbler:

- **Precise outlet temperature measurement**
- **Door safety circuit monitoring**
- **2-way distributor control before feed expander and after wing crumbler:** Allows the bypass of the expander/crumbler. Allows for a more flexible production chain.
- **Main motor amperage process value:** Controls the capacity of the crumbler from the set point motor capacity.
- **Oil Pump Control:** Automatic oil pump control for lubricating and cooling the motor.
- **Control of 2-speed hydraulic gap opening according to main motor amperage set point/energy consumption:** Uses a pulse controller to adjust the pressure inside the expander to achieve the desired amount of product expansion.
- **V-belt protection:** uses sensors to monitor V-belt position and speed. In case of belt failure, the motor operation is immediately halted. This ensures optimal performance and system longevity.



CRT CONDITIONER CONTROL



FEED EXPANDER CONTROL

STEAM ADDITION CONDITIONER CONTROL

- **Steam addition relative to mass flow:** Measures the steam mass flow rate, compares it with the setpoint, and uses a PID to adjust the steam valve. The desired steam amount is then added to reach the set mass flow rate. This process is fully automatic.
- **Addition by temperature according to temperature measured in conditioner outlet:** Measures the outlet temperature, compares it with the set point, and uses a PID to adjust the steam valve. The desired steam amount is then added to reach the set temperature. This process is fully automatic.

LIQUID ADDITIVE CONTROLS

- **Liquid addition control:** A PID regulator is used to control the additive flow. The set point for the liquid addition is based on the total feed capacity and can be set in the control interface.

PELLET PRESS CONTROL

ANDRITZ provides advanced control options across all pellet mill models, ensuring longevity and safety is achieved through our extensive monitoring features. Can be configured to control stacked pellet mills (pre-pellet mills).

STANDARD FEATURES

The following features are standard for most of our Pellet press control systems.

- **Main motor amperage process value:** Controls the capacity of the pellet press from the set point motor capacity.
- **Speed monitoring of belt driven motors:** Includes shock absorbing v-belts with a hydraulic system for constant tension monitoring. Thus, slippage is eliminated, and the lifetime of the v-belts is extended.
- **Shear pin monitoring:** Monitors the status of the shear pin. Immediately stops the operation of the machine in case too much force is applied on the shear pin, preventing damage to the pellet mill.
- **Door safety circuit monitoring:** The system monitors door safety switches and prevents the entering of the machine during operation.

FEEDMAX OR PM SERIES FEED PELLET MILLS

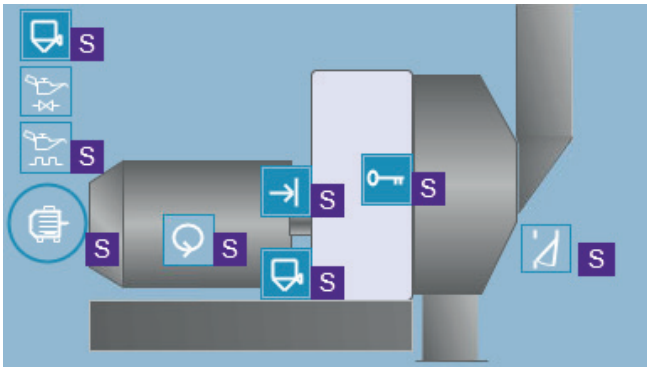
The standard feed pelleting mills. Includes the following control options:

- **Main motor amperage process value**
- **Speed monitoring of belt driven motors**
- **Shear pin monitoring**
- **Door safety circuit monitoring**
- **Dump chute control:** Controls the opening/closing of the dump chute based on the pellet press load.
- **Oil circulation and cooling control:** Automatic oil circulation control for effective cooling and lubrication.
- **Lubrication control**

THE BENEFITS OF A PELLET PRESS CONTROL SYSTEM

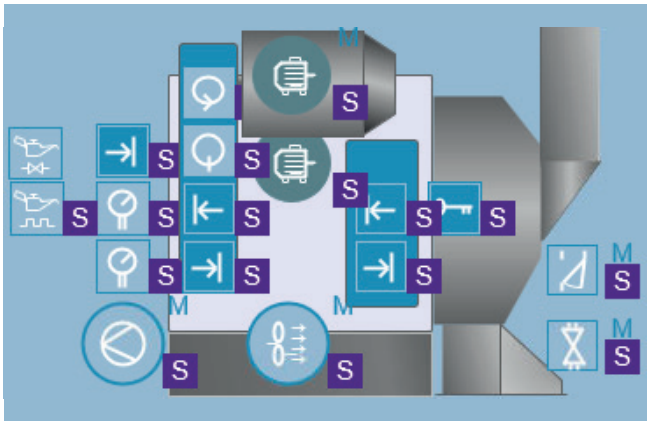
The pellet mill control system offers the following benefits:

- **Flexible and Effective Management:** The system provides both fully automated and manual control, allowing for a flexible and effective management approach that can be tailored to your specific operational needs.
- **Comprehensive Control:** The pellet mill control system enables precise adjustment of the mill's parameters according to the operation's needs. This ensures that our system can be perfectly adapted to meet all requirements.
- **Improved Part Longevity:** The pellet mill control system is designed to ensure correct machine operation, which not only maximizes efficiency but also improves the longevity of the parts. This results in less wear and tear and extends the lifespan of the mill.
- **Efficient, Automated Production:** The pellet mill control system adheres to pre-programmed steps, guaranteeing correct machine start-up and shutdown. This maximizes efficiency and ensures that your production process is not only effective but also resource-saving. The automated production reduces the need for constant supervision, freeing up resources for other important tasks.



PALADIN SERIES FEED PELLET MILLS

- **Main motor amperage process value**
- **Speed monitoring of belt driven motors**
- **Shear pin monitoring**
- **Door safety circuit monitoring**
- **Dump chute control:** Controls the opening/closing of the dump chute based on the pellet press load.
- **Control of belt and brake tension:** Automatically regulates the tension on the belts and brakes to ensure optimal functioning and prevent belt failure.
- **Panel door monitoring:** Monitors and prevents the panel door from being opened during operation.
- **Belt fan motor control:** Automatically cools the motor to prevent overheating.
- Lubrication control

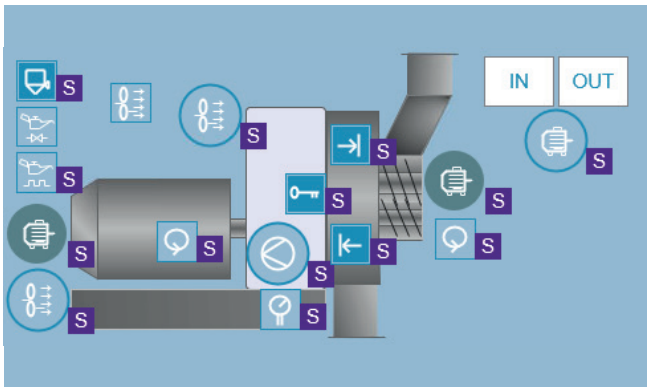


BIOMAX SERIES

- **Material bin control:** Monitors the level of the raw material. Controls the dosing to ensure an even flow.
- **Shear pin monitoring**
- **Forced feeding system:**
- **Rollers & Die control:** Uses position sensors for high-precision automatic and manual control of the individual rollers and die for maximum flexibility.
- **Access system:**
- **Main motor & gear control and monitoring:** Controls the capacity of the pellet press from the set point motor capacity.

PM30 SERIES BIOMASS PELLET MILLS:

- **Main motor amperage process value**
- **Speed monitoring of belt driven motors**
- **Shear pin monitoring**
- **Door safety circuit monitoring**
- **Temperature of Roller bearings:** Monitors the temperature of the roller bearings to prevent overheating.
- **Oil circulation and cooling control:** Automatic oil circulation control for effective cooling and lubrication.



SPECIAL FEATURES

ANDRITZ provides additional features with its pellet mill models. These features aim for better flexibility and reliability, save time and resources, and help extend the life of your components.

AUTOMATIC ROLLER ADJUSTEMENT

The automatic roller adjustment system precisely adjusts and monitors pellet mill rollers, enhancing their lifespan and efficiency. This eliminates the need for manual adjustments, which would require stopping the operation. Additionally, it offers an interactive user interface, which makes the control process simple and effective.

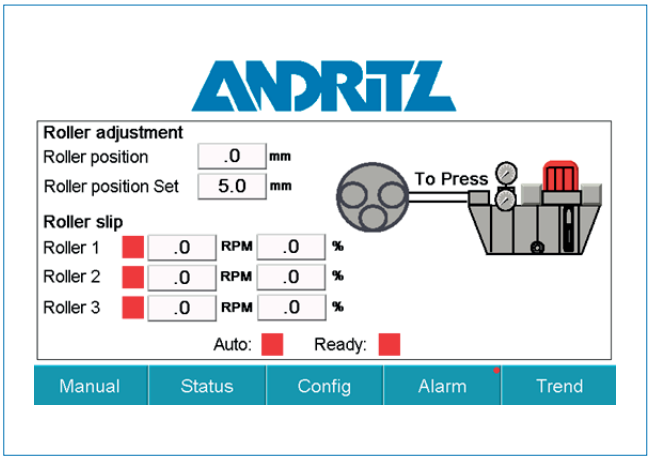
It includes the following features:

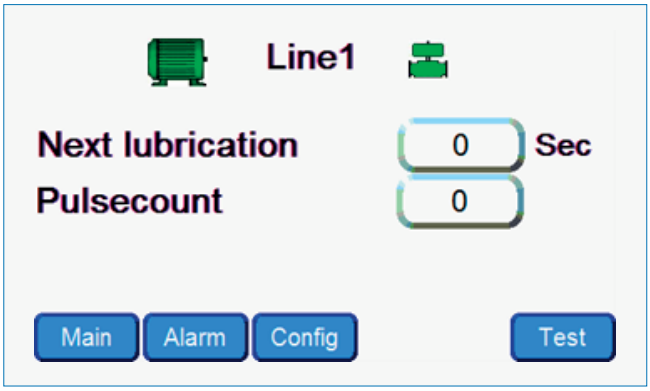
- **Hydraulic control of roller adjustment:** The system maintains the rollers in the right position during production and to retrack them from the die when the production is stopped.
- **Roller adjustment by mm:** The desired roller position can be set in the user interface. The adjustment is very precise. The systems monitor the position of the rollers and automatically adjusts it to the desired point.
- **Roller slip monitoring** / **Alarm:** Monitors the speed of the rollers. The system generates alarms to alert the operators. If roller slip is detected. The alarms are generated both for equipment failures and process failures.

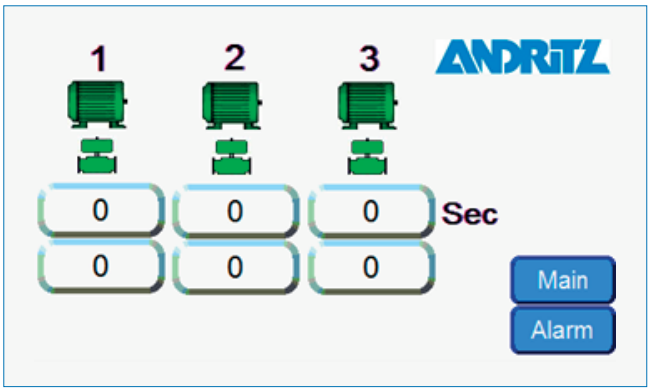
AUTOMATIC LUBRICATION SYSTEMS

Provides Lubrication control for multiple pellet mills. Contains the following features:

- **Lubrication of PM roller and main shaft bearings:** Monitors and automatically lubricates the PM roller and Main Shaft. Dispenses the optimal amount of lubricant. This saves resources and avoids waste, while extending the lifetime of your press.
- **Lubrication of up to 3 pellet mills:** A common lubrication control system can be shared by up-to 3 pellet mills. This makes the lubrication control more cost-effective.



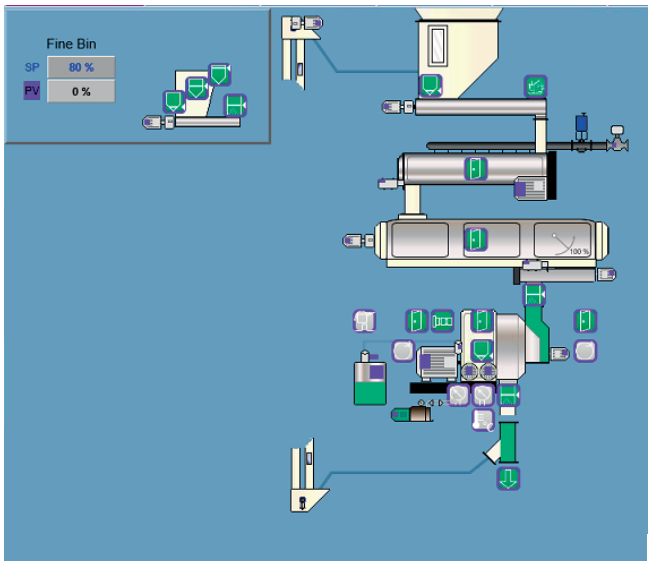




PRODUCT RECIRCULATION CONTROL

The rework control system is designed for the control and monitoring of product recirculation, ensuring that the process is done smoothly and efficiently. It includes the following features:

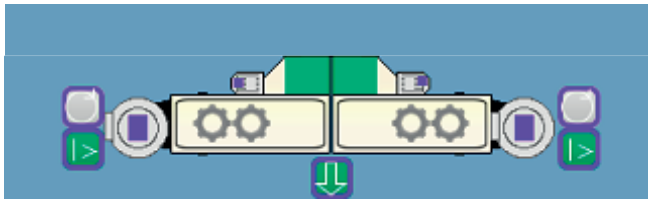
- **Bypass of cooler**
- **Transport screw with speed and overflow monitoring**
- **Elevator with speed, alignment & overflow monitoring**
- **Level monitoring in the fines bin**
- **Dosing screw with variable speed & overflow**



CRUMBLING CONTROL

ANDRITZ provides effective crumbler control and monitoring to ensure that the machine function efficiently and safely. It includes the following features:

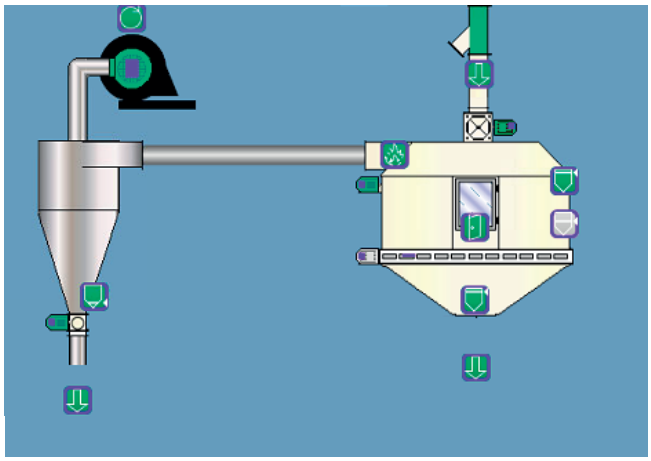
- **Variable speed of distributor motor:** The speed of the distributor motor can be controlled from the graphical interface. It allows changing the load on the crumbler.
- **Bypass control:** The 2-way distributor control can be set to either crumbling or bypass.
- **Overload monitoring of rollers:** Built-in alarm system in case of technical faults.
- **Precise roller adjustment:** The desired roller position can be set in the user interface. The adjustment is very precise. The systems monitors the position of the rollers and automatically adjusts it to the desired point.



COOLING CONTROL

The cooling control system allows for efficient control and monitoring of the coolers and their operations. It includes the following features:

- **Level monitoring:** The system uses multiple level sensors to measure the amount of the material in the cooler.
- **Dosing and distribution control:** Doses the material accordingly to the measured level in the cooler.
- **Cooling fan control:** Controls the cooling fan to prevent overheating.
- **Fire monitoring**
- **Level monitoring in hopper.**
- **Door safety circuit control.**
- **2-way distributor control for two coolers in parallel:** Controls the distribution of the material between multiple coolers.



COOLING CONTROL

PELLETING CONTROL

FUNCTIONAL SCOPE

Functional Unit	Unit Type	Functional description	Panel System	Management System
Dosing	Volumetric	• Variable speed of screw • Capacity calculated by the screws' volume and speed	●	●
	Loss-In-Weight	• Variable speed of screw • Capacity calculated by loss-in-weight in the pre-bin • Weight process value in pre-bin	–	●
Conditioning 1	Meal conditioning (CM)a	• Temperature process value in the outlet • Temperature probe cleaner • Door safety circuit monitoring • Speed monitoring of shaft (V-belt protection)	●	●
	Meal conditioning w/Preheat (CM902PH)	• Control of pre-heating sequence of product • Start and stop of cape heating. • Door safety circuit monitoring • Variable speed of motor • 3 temperature process values for preheating sequence • Control of inlet slide gate • Control of outlet gate • Temperature process value in the outlet • Temperature probe cleaner	●	●
Conditioning 2	Meal conditioning (CM)	• Temperature process value in the outlet • Door safety circuit monitoring • Temperature probe cleaner • Speed monitoring of shaft (V-belt protection)	●	●
	Controlled Retention time (CRT)	• Start and stop of cape heating. • Door safety circuit monitoring • Variable speed of the main screw according to set point of time. • Level process value in outlet (1 pr. pelleting process) • Temperature process value in the outlet • Temperature probe cleaner control • Variable speed of equalizer screws according to level and pellet mill main motor (1 pr. pelleting process)	●	●
Conditioning/ Expanding 3	Meal conditioning (CM)	• Temperature process value in the outlet • Door safety circuit monitoring • Temperature probe cleaner • Speed monitoring of shaft (V-belt protection)	–	●
	Controlled Retention time (CRT)	• Start/stop of cape heating. • Door safety circuit monitoring • Variable speed of main screw according to set point of time • Level process value in outlet (1 pr. process) • Temperature process value in the outlet • Temperature probe cleaner control • Variable speed of equalizer screws according to level and pellet mill main motor amperage load (1 pr. process)	–	●
	Feed expander w/ wing crumbler	• 2-way distributor control before feed expander and after wing crumbler • Door safety circuit monitoring • Speed monitoring of shaft (V-belt protection) • Main motor amperage process value • Control of 2-speed hydraulic gap opening according to main motor amperage set point/energy consumption • Oil pump control • Temperature process value in the outlet • Wing crumbler overload monitoring	●	●
	Feed pre-pellet mill (PM, Feedmax)	• Main motor amperage process value • Speed monitoring of belt-driven motors • Shear pin monitoring • Door safety circuit monitoring • Dump chute control • Oil circulation and cooling control • Lubrication control	–	●
	Feed pre-pellet mill (Paladin)	• Main motor amperage process value • Speed monitoring of belt-driven motors • Shear pin monitoring • Door safety circuit monitoring • Dump chute control • Control of belt and brake tension • Panel door monitoring • Belt fan motor control • Lubrication control	–	●

PELLETING CONTROL

FUNCTIONAL SCOPE

Functional Unit	Unit Type	Functional description	Panel System	Management System
Conditioning/ Expanding 3 Option 2	Lubrication	Lubrication of PM roller and main shaft bearings	★	★
Pelleting	Feed pellet mill Feedmax or PM series	• Main motor amperage process value • Speed monitoring of belt-driven motors • Shear pin monitoring • Door safety circuit monitoring • Dump chute control • Oil circulation and cooling control • Lubrication control	●	●
	Feed pellet mill Paladin series	• Main motor amperage process value • Speed monitoring of belt-driven motors • Shear pin monitoring • Door safety circuit monitoring • Dump chute control • Control of belt and brake tension • Panel door monitoring • Belt fan motor control • Lubrication control	●	●
	Biomass pellet mill Biomax series	• Material bin control • Forced feeding system • Rollers & Die control • Access system • Main motor & gear control and monitoring	–	●
	Biomass pellet mill PM30 series	• Main motor amperage process value • Speed monitoring of belt-driven motors • Shear pin monitoring • Door safety circuit monitoring • Temperature of Roller bearings • Oil circulation and cooling control	●	●
Pelleting Option 1	Automatic Roller adjustment	• Hydraulic control of roller adjustment • Roller adjustment by mm • Distance process value • Roller slip monitoring / Alarm	★	●
Pelleting Option 2	Lubrication	• Lubrication of PM roller and main shaft bearings • Lubrication of up to 3 pellet mills	★	★
Steam addition conditioner 1	Steam Train Conditioner 1	• Addition by flow percentage relative to capacity of dosing screw • Addition by temperature according to temperature measured in conditioner outlet	●	●
Liquid additive 1	Additive Unit for conditioner 1 or pellet mill die	• Addition by flow percentage relative to capacity of dosing screw	●	●
Liquid additive 2	Additive Unit for Conditioner 1	• Addition by flow percentage relative to capacity of dosing screw	●	●
Liquid additive 3	Additive Unit for Conditioner 1	• Addition by flow percentage relative to capacity of dosing screw	–	●
Liquid additive 4	Additive Unit for Conditioner 1	• Addition by flow percentage relative to capacity of dosing screw	–	●
Rework	Product recirculation	• Bypass of cooler • Transport screw with speed and overflow monitoring • Elevator with speed, alignment & overflow monitoring • Fines bin with 3 levels • Dosing screw with variable speed & overflow	–	●

PELLETING CONTROL

FUNCTIONAL SCOPE

Functional Unit	Unit Type	Functional description	Panel System	Management System
Cooling	1 single-layer cooler	• Dosing and distribution control • Layer control by 3x level monitoring and crank motor or hydraulic package • Cooling fan control or damper control • Fire monitoring • Level monitoring in hopper • Door safety circuit status monitoring	–	●
		• Dosing and distribution control • Double layer control by 5x level monitoring and crank motor and/or hydraulic package • Cooling fan control or damper control • Fire monitoring • Level monitoring in hopper • Door safety circuit status monitoring		
	2 single-layer coolers in parallel	• 2-way distributor control • Dosing and distribution control • Layer control by 3x level monitoring and crank motor or hydraulic package • Cooling fan control or damper control • Fire monitoring • Level monitoring in hopper • Door safety circuit status monitoring	–	●
	2 double-layer coolers in parallel	• 2-way distributor control • Dosing and distribution control • Double layer control by 5x level monitoring and crank motor and/or hydraulic package • Cooling fan control or damper control • Fire monitoring • Level monitoring in hopper • Door safety circuit monitoring	–	●
Crumbling	1 Crumbler	• Variable speed of distributor motor • Bypass control • Overload monitoring of rollers • Roller adjustment by mm • Distance process value	★	●
	2 Crumblers in parallel	• Variable speed of distributor motors • Bypass control • Overload monitoring of rollers • Roller adjustment by mm • Distance process value	★	●

● included
– not included
★ optional addition

GLOBAL SUPPLIER – LOCAL PRESENCE

ANDRITZ Feed & Biofuel is truly a global organization – with local presence. We are represented all over the world. The global market is served from five main locations in Denmark, China, Netherlands, USA, and Slovakia.

In addition, ANDRITZ Feed & Biofuel operates from several strategic regional sales, engineering, and service locations in Australia, Bangladesh, Brazil, Canada, Chile, Dubai, France, Germany, India, Italy, Mexico, Poland, South Africa, Thailand, Turkey, the UK and Vietnam – and is also represented locally by agents and distributors in many other markets.

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