PROCESS OPTIMISATION FOR LOESCHE GRINDING PLANTS
For over 100 years the company Loesche has been building vertical roller grinding mills for grinding:
- Coal
- Cement raw material
- Clinker / granulated slag
- Industrial minerals, and
- Ores

The core elements of these plants are the Loesche vertical mills for dry-grinding the above-mentioned grinding stock. Loesche has developed and built the largest and most efficient grinding plants for its customers. Loesche plants are specifically planned for the required process steps and equipped with the associated technology. This technology comprises:
- Processing plants and material storage
- Transportation and conveying systems
- Loesche vertical mills
- Loesche hot-gas generators
- Filter and separator systems
- Dosing and weighing systems
- Steel and piping constructions
- Overground and underground constructions
- Peripheral infrastructure
- Loesche electrical and automation engineering

Loesche Automation combines cutting-edge machine technology and intelligent process control for optimum and efficient plant operation.

We offer our customers customised engineering services for process, hardware and software development. These services cover all disciplines ranging from open-loop and closed-loop control engineering, through the full on-site electrotechnical equipment and down to service, maintenance and customer training.

Loesche has decades of experience in these fields, enabling the company to meet the often complex customer-specific requirements with intelligent, process and control engineering solutions.

Loesche Automation fills the gap by offering and supplying customers with Loesche grinding plants – as turnkey projects – from a single source and maintaining these plants in their capacity as a lifetime partner.

Our wealth of experience enables us to offer our customers products covering all aspects of Loesche grinding systems and to implement solutions such as LmMaster.
Loesche Automation – A Globally Operating Partner

‘Loesche Automation’ Products

LMmaster
The “Stand Alone” real-time optimisation solution for process-optimised operation of Loesche grinding systems with the main focus on efficient performance, throughput, product consistency and availability.

LMcontrol
The complete and open automation solution, based on standardised software modules for open- and closed-loop control and visualisation of Loesche grinding systems.

LOMAcontrol
Fail-safe PLC for hot gas generator standardized and verified sequences according to IEC 61511.

Services provided by ‘Loesche Automation’

Customer
- Tailored service agreements
- Preventive plant auditing
- Training courses / simulation training
- Optimisation
- Engineering
- Upgrade & migration
Continuous and Dynamic Process Optimisation

- is an online application for closed-loop control of a grinding plant. This involves integrated process optimisation which is based on a dynamic process model. This process model provides continuous real-time optimisation of the plant.

- has been developed to relieve the load on the operator in his/her routine functions and to provide support in his/her daily work.

- optimises and supports what you are doing. This is process optimisation from Loesche – state-of-the-art.

- is a real-time control optimiser for running the process in a state of optimum controller settings.

Control schematic for process optimisation
Challenges to the industry

- Cyclical markets must capitalise market fluctuations
- Passing up on short-term opportunities of a growing demand on account of concentration on large investments in new equipment in order to increase capacity
- Reduction of pressure on margins in worse times
- Rising energy costs
- Maximisation of profits by operating at maximum efficiency
- Losses of efficiency due to different operation philosophies from shift to shift
- Changes to raw material, clinker grindability and grinding aid composition or loss of internal know-how

Future in the eyes of the industry

Economic efficiency

- Safeguarding of sustained production equipment
- Safeguarding of the best possible return on investment
- Safeguarding of cost-efficient production

Productivity

- Guaranteeing of highest possible availability
- Maintaining of high efficiency through the complete production process
- Permanent opportunity to meet customer demands
- Delivery of absolute product quality

Workforce

- Hiring and retention of qualified staff within the company
- Training and development programmes for staff to maintain production know-how at the cutting edge and to motivate the staff
Control Parameters
for Loesche Vertical Mills

Manipulated variables
- Grinding stock feed
- Classifier speed
- Mill fan speed
- Water spraying
- Hot gas
- Fresh air

Disturbance variable
- Material grindability
- Material temperature
- Material moisture
- Mixture composition
- Composition of raw material
- Grinding roller wear

Process measured value
- Fineness (Blaine) or residue (VOA)
- Mill motor speed
- Mill air flow/mill differential pressure
- Temperature after the mill
- Pressure before the mill

Variable clocking
- 50/100 ms: Signal detection
- 1 second–10 minutes: Signal evaluation
Why Realtime Control?

- Rapid process dynamics are a challenge to operating a vertical roller mill (VRM)
- Surpasses the classic methods if the controlled process demonstrates significant disturbances
- A high degree of attention to the process states is required in order to make punctual corrections
- Process states are displayed and controlled continuously for real-time optimisation

- The key to mill optimisation is stable operation of the plant. Only with stable operation can greater performance be achieved and thus added value be generated for the customer
- Changing ONE parameter results in many variables being changed

LMmaster is the correct choice on account of its "Multiple In – Multiple Out" property of the realtime solution from Loesche Automation.

Principle of increasing performance by reducing the range of fluctuation
Loesche optimization tool for grinding plant

The LMmaster is a system designed by Loesche to optimize grinding plants from the start of the material feed onwards.

The LMmaster is a software based application which can either be installed in a PLC or on a separate PC. The communication to the existing infrastructure takes place via automation standard protocols.

The LMmaster monitors throughput, energy consumption and availability. Priorities can be set, by individual configuration.

The LMmaster is based on a thorough knowledge of grinding technology. The optimization takes place via traceable process sequences, which allow the operator to parameterize and configure independently at a later time.

The LMmaster can be either partially used or fully used, the extent of which may be configured. The changeover of setpoints between LMmaster and control system is bumpless.

The LMmaster guides the setpoint (external setting) of the configured control loops.

An integrated "step test" determines, how the process reacts and where the constraints are.

Varying feed compositions and hardness or environmental conditions can be handled via an integrated recipe function.

The actuators and sensors must be of the correct quality and control precision to fully utilize the LMmaster.
1. PID-Controller must be in automatic (closed loop)

2. Activation of functions by operator for start/stop and/or grinding mode

3. Individual time delay for automatic activation

4. Control-„Faceplates“

5. Steptest-„Faceplate“

Memory buffer (Dataset)
**Reasons for use – benefits to the customer**

**Benefits**

- Attainment of optimum throughput
- Optimisation of specific power input
- Simultaneous increase in efficiency, quality, safety and throughput in the face of increasing environmental requirements
- Consideration of simultaneously multiple influences and thus faster coordinated feedback on changes to the grinding process

**Features**

- Process control of vertical mills
- Control of grinding feed and of classifier speed to achieve the required throughput
- Improvement in mill stability
- Consideration of process disturbances and sustained control precision
- PLC or PC based solution
- Bumpless switch over between control system and LM Master
Example of a process overview
Loesche – global presence
This ensures that the latest knowledge and developments can be immediately utilised for new projects.

Our subsidiaries and representatives play a central role in the analysis, processing and solving of project-specific tasks for our customers.

Loesche is a proprietary, export-oriented company, founded in 1906 in Berlin, which today operates globally with subsidiaries, representatives and agencies.

Our engineers continuously develop new ideas and individual concepts for mill technology and processing methods for the benefit of our customers. They owe their expertise to the many decades of experience and our global information management.

The latest information about our overseas companies is available on our homepage www.loesche.com