MillMaster—Technical

Optimised control of your grinding processes

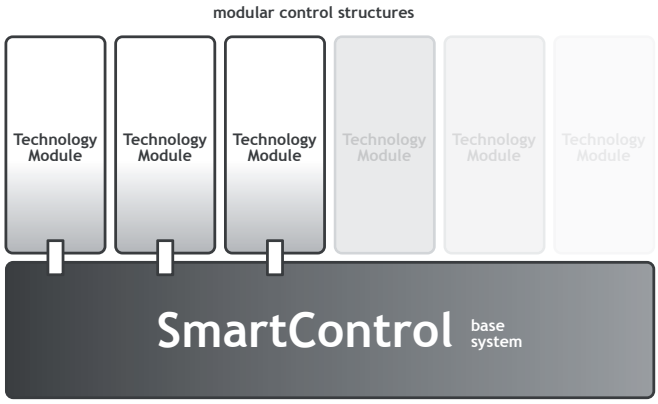
The control system for grinding processes

Modular design

The control system MillMaster consists of two different components:

- **Technology Module** (TM)
A smart compilation of mathematical and logical functions building high performant control structures.

- **SmartControl**
A powerful and flexible high-end control system offering basic building blocks. This is the basis for the MillMaster technology.



This combination allows a fast and flexible development with a sophisticated and target-oriented solution.

TM Ball Mill

The Technology Module ***Ball Mill*** has two different control loops:

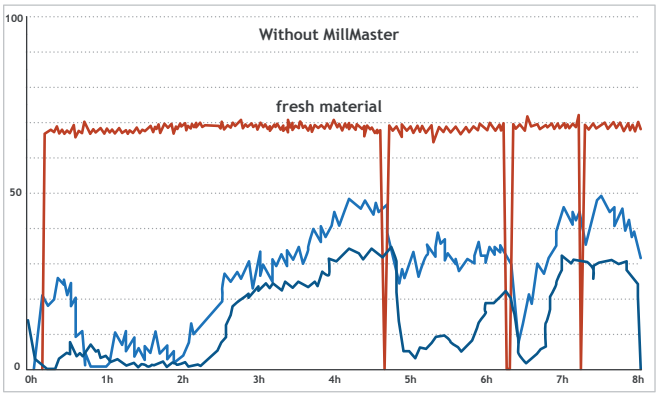
Set points (fill level 1 & 2)
For the fill level control there is a set point per chamber and the controller gets the deviations from these set points.

Limits (rejects, bucket elevator)
For the limits (rejects, bucket elevator) there are existing maximum values. That are the absolute maximum values for the mill. The MillMaster calculates set points based on these maximum values. The controller gets the deviation from that set point and the actual value.

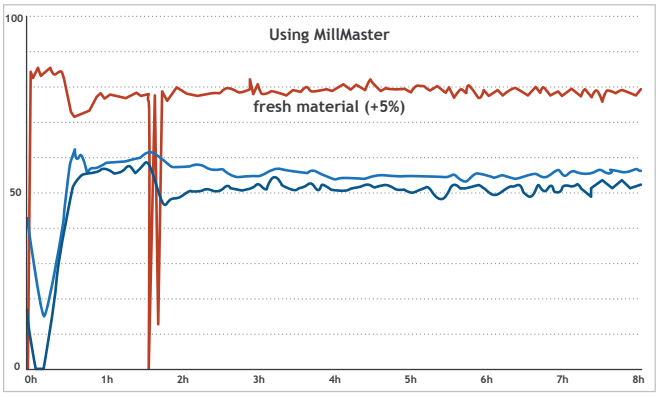
Controller
The controller changes the fresh feed depending on these deviations based on the fresh feed working point.
The new set point is calculated by a powerful multi-term controller. It is limited by a minimum and a maximum fresh feed value and a total feed also.

Auto optimisation
If the mill is stable the set points will be increased till the maximum level is reached and the actual fresh feed value is stored as new fresh feed working point.

Constant fresh material



Constant level



Properties

inputs (actual values)	fill level 1 fill level 2 rejects bucket elevator power fresh feed
inputs (limits)	fresh feed rejects bucket elevator power total feed
outputs	fresh feed

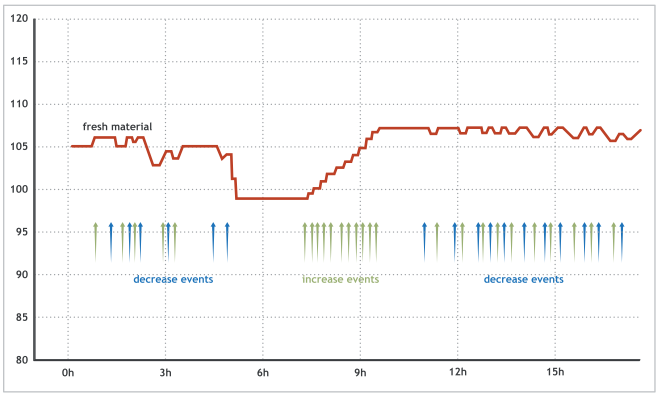
TM Vertical Roller Mill

The Technology Module ***Vertical Roller Mill*** has two different operation modes:

Save operation (for unattended operation)
High production (for maximal production)

In both cases it is an event based strategy that reacts with increase and decrease actions. The increase action will perform a slow increase of fresh feed and roller pressure if the mill is under normal operation. Each time a limit is violated the fast decrease action will decrease the fresh feed and the roller pressure.

Controlled decrease events



Properties

inputs (actual values)	mill vibration mill differential pressure main drive power main drive temperature torque signal roller pressure
inputs (limits)	mill vibration differential pressure main drive power main drive temperature torque signal roller pressure
outputs	fresh feed roller pressure (optional)

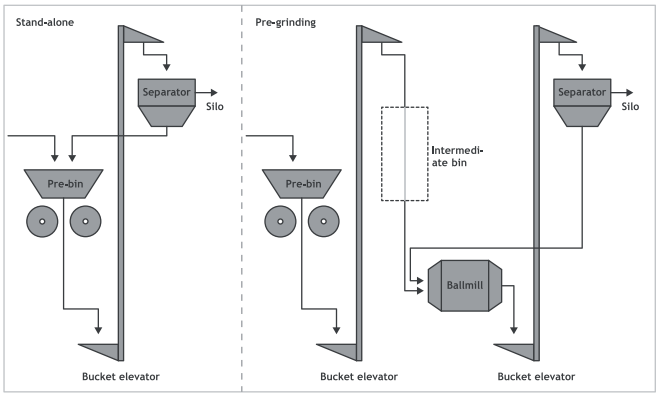
TM Roller Press

There are two different grinding facilities using roller presses.

Stand-alone and pre-grinding
The difference between these operation modes is that on the one hand the grinding processes are linked closely, and on the other hand they operate quite independent.

Pre-bin takes the focus
A very interesting information is the size of the intermediate bin. This is the key factor of the strategy. One of the most important tasks of the controller is to control the fill level of this bin.

Applied in many variants
KIMA provides different solutions for both operation types. If you operate your roller press in a special way KIMA can adapt the technology module for your needs.



Properties

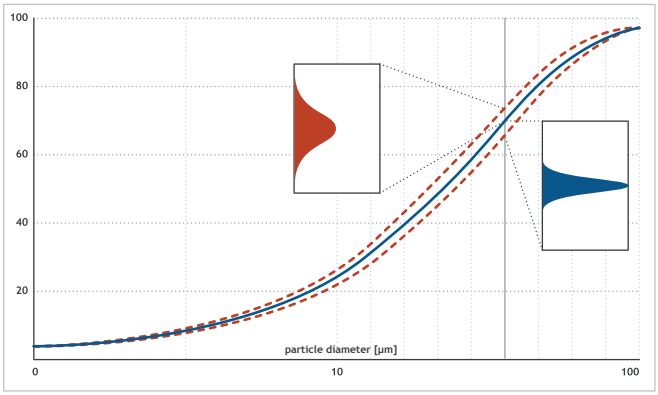
inputs (actual values)	fresh feed rejects roller speed pre-bin level
inputs (limits)	fresh feed rejects roller speed pre-bin level
outputs	roller speed fresh feed roller pressure

TM Separator

The Technology Module ***Separator*** takes care of a homogeneous product quality. Therefore the separator speed is adjusted everytime a new fineness value is available (laboratory or online).

Steadiness by small steps
Also, the controller corrects the separator speed, if the fineness is within the limits. This leads to many small adjustments and thus to a more stable grinding process.

Homogeneity by steadiness
Due to the more stable process and faster reaction on disturbances the variance of the product fineness (CoV) will be decreased.



Properties

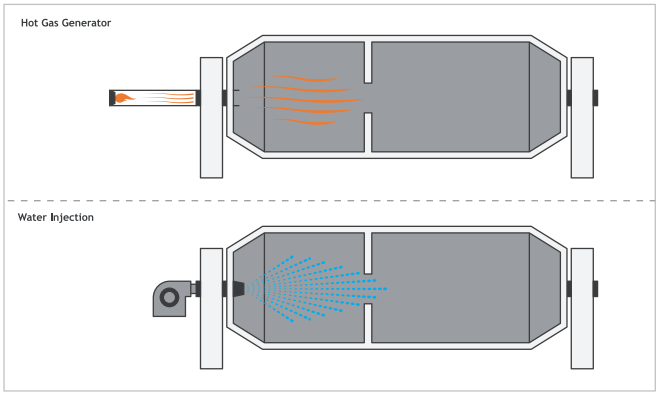
inputs (actual values)	fineness (blain or residue) separator speed
inputs (limits)	fineness (blain or residue) separator speed
outputs	separator speed

TM Hot Gas Generator

The Technology Module ***Hot Gas Generator*** adjusts the combustion of the burner in order to keep the air and the material temperature at constant level. This leads to a homogeneous drying of the material.

TM Water Injection

The Technology Module ***Water Injection*** controls the waterflow, so that the material temperature does not violate any limit.



Properties

inputs (actual values)	air temperature material temperature air flow *(hot gas)* burner temperature *(hot gas)*
inputs (limits)	air temperature material temperature burner temperature *(hot gas)*
outputs	fuel supply *(hot gas)* burner capacity *(hot gas)* waterflow (water injection)

Visual software tool

Visual gives you the possibility to operate and monitor your process with clearly arranged user interfaces. It gives you the opportunity to design an easy-to-use interface with modern layout and trending elements. Administration of recipe and control parameters is supported, as well as actual set points and switches.

Properties

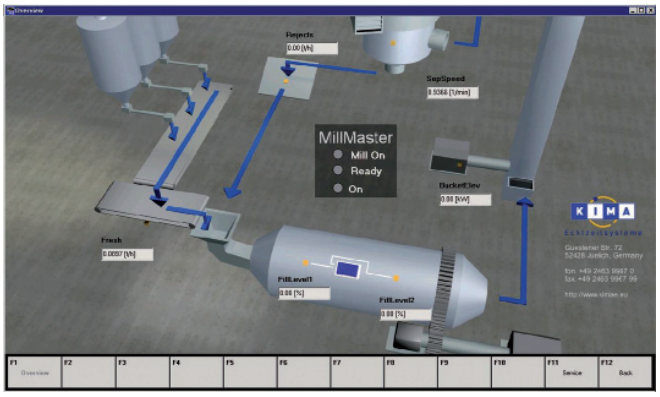
- unlimited number of views
- up to 3200 analogue values
- up to 3200 digital values
- value visualisation as bar graph or trend
- different views for operator & engineer

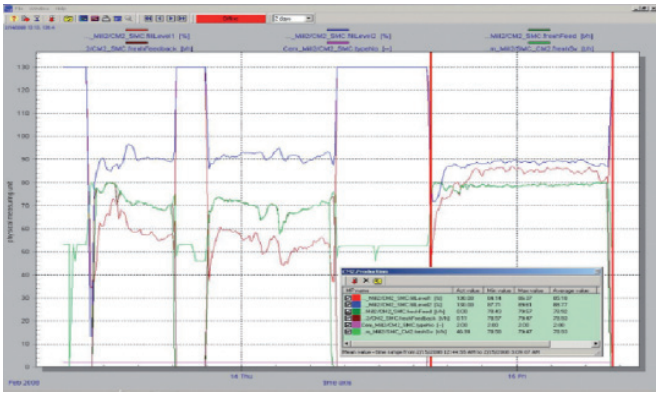
Trend software tool

The software ***Trend*** offers the possibility to display all data and intermediate results as trend. Therefore a historical database is accessed, which goes back up to two years depending on the resolution.

Properties

- up to 10 curves per graph
- unlimited number of graphs
- displays average
- displays standard deviation
- displays minimum and maximum
- continuously zooming
- historical data up to two years





Admin software tool

The software ***Admin*** allows you to add all OPC items of the OPC server via drag and drop to the system. These items are stored automatically in the database in chosen intervals. They are available for monitoring and evaluating by means of the tools on this page.
Connections to multiple OPC servers are also possible.

Alarm software tool

Alarm enables you to display and monitor historical bit states. You may create and save custom views for each user, which—for example—provide the most important switching states of a facility at a glance. The software calculates high and down time within any interval for any signal. Also, you may label the signals with different user defined severities (e.g. alarm, information).

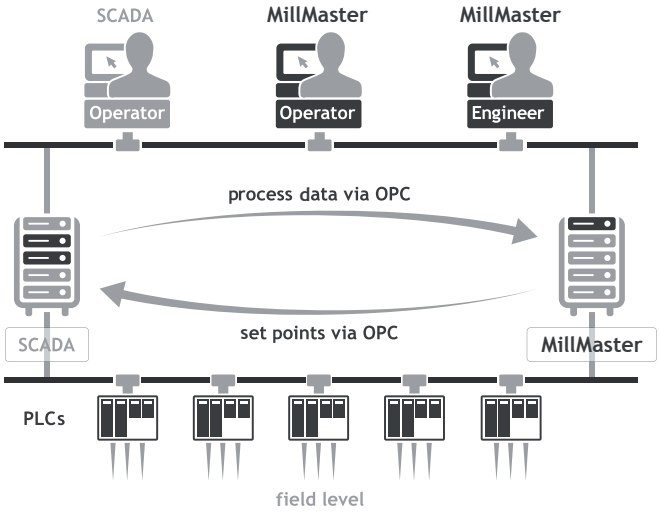
What is the scope of supply?

The system consists of the following components:

- **IBM server hardware**
  (Windows OS, Raid 5)
- **software**
  (all services installed)
- **technology module**
  (due to your needs)
- **software license**
  (authorized via USB dongle)

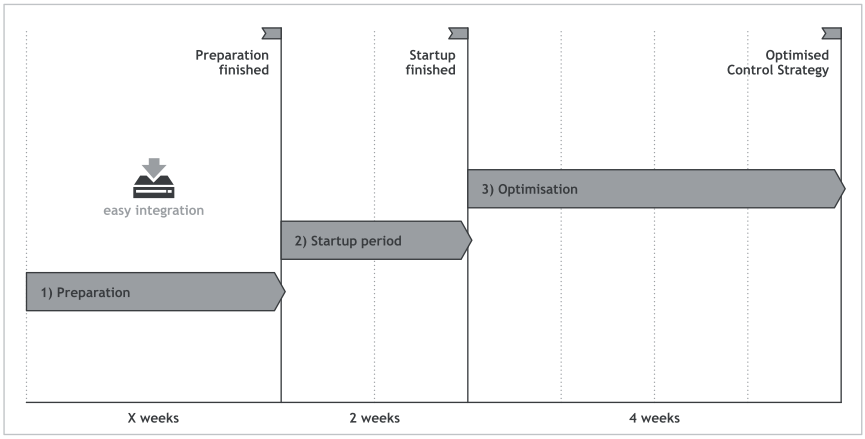
How to connect

MillMaster is running on a Windows server hardware, which is connected to the plant's PLCs via OPC-protocol.



Easy installation

The installation is easily done with just a few steps to switch to MillMaster:



1) Preparation
- connect server to the local network
- connect server to VPN
- establish OPC connection

2) Startup period
- VPN
- OPC items
- switching logic

3) Optimisation
- parametrisation for different types

Switching logic

After MillMaster is installed you still can switch back to your old control strategy for tests or to evaluate new products. In order to ensure this functionality a 'Switching Logic' is added, which switches between the MillMaster controller and the old one on PLC side.

Why using VPN?

We recommend our customers to set up a VPN tunnel for MillMaster. This enables us to make the major part of the commissioning from our position, which saves traveling costs and time. Also it allows us to help you fast and uncomplicated in case of upcoming questions and extensions.