MEASUREMENT SOLUTIONS FOR THE STEEL INDUSTRY

Optimize your production throughput with increased safety and reliability

BERTHOLD

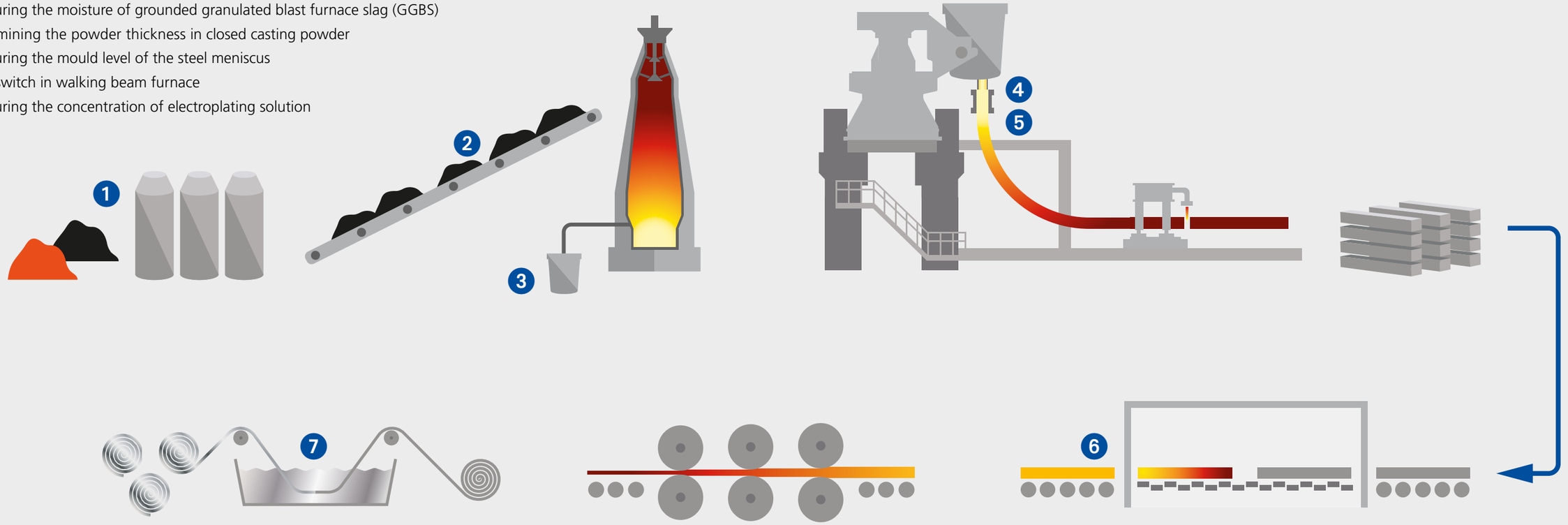
STEEL INDUSTRY
THE APPLICATIONS

Berthold Technologies' measurement systems are used in steel production all over the world to monitor critical processes and to improve production efficiency. As technology leader in radiometric and microwave technology we bring benefits to the steel industry by providing highly accurate and reproducable online measurements – the basis for major cost savings and reliable process management. We are renowned for our ability to provide both a wide range of standard products as well as tailor-made measurement solutions, thus perfectly adapting to our customers' needs in terms of geometry, measurement performance and economic requirements. The huge number of measuring systems in operation worldwide is the best proof of the high quality of Berthold products and services.

Non-contact perfect!

- Outside mounting of components
- Not exposed to the harsh process conditions
- Free of wear and maintenance
- Smooth handling and operation
- Lowest cost of ownership
- Easy to install on existing moulds and strands without modifications
- Perfect for all high temperature and high pressure applications

1. Measuring the moisture in silo/bunker (ore, coke, or coal)
2. Measuring the moisture at the conveyer belt (ore, coke, or coal)
3. Measuring the moisture of grounded granulated blast furnace slag (GGBS)
4. Determining the powder thickness in closed casting powder
5. Measuring the mould level of the steel meniscus
6. Limit switch in walking beam furnace
7. Measuring the concentration of electroplating solution



MEASURING THE POWDER THICKNESS
IN CLOSED CASTING

Precise knowledge of the powder layer thickness enables more accurate monitoring of the real liquid steel level in closed systems. This, in turn, allows for the exact dosing of powder via an automatic feeder, maintaining a consistent powder layer and reducing the need for manual intervention in hazardous working areas. The detector additionally uses silicon photomultiplier (SiPM) technology to ensure maximum robustness against interference from nearby electromagnetic stirrers and brakes, while providing outstanding temperature stability.

Application Profile

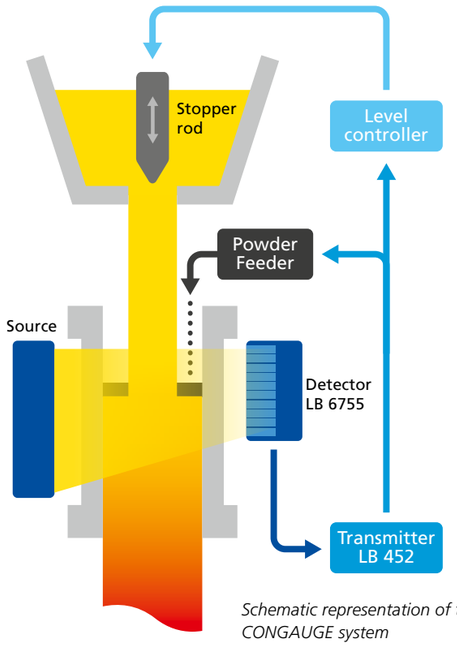
- **Measurement task**
  To measure simultaneous steel level and powder layer thickness
- **Location**
  In moulds of the continuous caster
- **Berthold Solution**
  Mould level detector CONGAUGE LB 6755

Customer Benefit

- Reduced number of broken strands
- High stability of mould level accuracy
- Improved steel quality level
- Process automation by integration of automated powder feeder
- One device, two signals (steel and powder)
- Robust against environmental influences like electromagnetic stirrers and brakes, high temperature, mechanical shock

Special Features

- 10 detectors within 1 housing
- Cycle time steel level: 5 ms
- Cycle time powder level: 250ms
- Communication of LB 452 with PLC:
  Current output via 4…20 mA,
  Profibus, ProfiNET



Schematic representation of the CONGAUGE system

MEASURING THE MOULD LEVEL
OF STEEL MENISCUS

A precise and quick measurement of mould level lays the foundation for the production of high quality steel and the reliable prevention of steel overflows and breakouts. The Berthold mould level systems fulfill this role reliably and accurately. Several thousand strands throughout the world are equipped with Berthold systems.
Berthold Technologies provides measuring systems to solve this challenging measurement application. Depending on the requirements and measurement conditions, the optimum technology is selected.

Application Profile

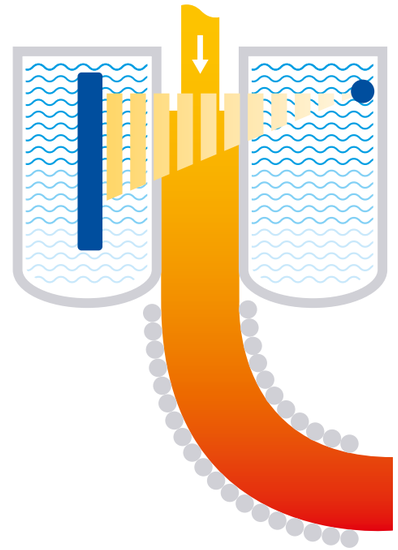
- **Measurement task**
  To measure the level of the steel meniscus during continuous casting
- **Location**
  In moulds of the continuous caster
- **Berthold Solution**
  GAMMAcast or CONGAUGE with castXpert

Customer Benefit

- Increased productivity and quality
- Optimized costs
- Can be used for all mould formats
- Can also be offered with continuous mould powder level measurement
- Maintenance-free

Special Features

- Reliable and extremely robust mould level measurement
- Radiometric based measurement
- Can be applied for all mould formats
- Fully compatible with electromagnetic stirrers or breaks
- Extremely short cycle time of 5 ms
- Mould powder measurement cycle of 0,5 s
- Most widely used system for mould level measurement in the world



Schematic representation of radiometric mould level measurement

LIMIT SWITCH
IN THE WALKING BEAM FURNACE

The walking beam furnace heats the unfinished steel products for further processing in the rolling mill. It is important to know when a steel bar has reached the back end of the walking beam furnace in order to keep the opening time of the furnace at a minimum. A fast limit switch is installed to give an alarm as soon as a steel bar has reached this position.

Application Profile

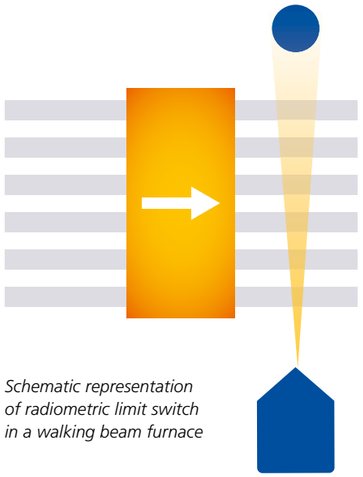
- **Measurement task**
  Signal an alarm as soon as a steel bar has reached a certain position
- **Location**
  Walking beam furnace
- **Berthold Solution**
  SENSseries LB 480 with SpeedStar software

Customer Benefit

- Saves energy and operating costs

Special Features

- Point detector – point source arrangement
- Due to the thick brick walls, the wall thickness is often reduced at the measurement points in order to keep radiation low



Schematic representation of radiometric limit switch in a walking beam furnace

MEASURING THE CONCENTRATION
OF ELECTROPLATING SOLUTION

Steel sheet in coils is tinned by leading it through a series of tanks containing electrolyte. The tin concentration of the electrolyte in the last tank is important for the surface quality of the product. A concentration of tin, which is too high, causes deposits on the roller leading to indentations in the surface of the steel sheet. Low concentration leads to voids and imperfections in the tin surface.

Application Profile

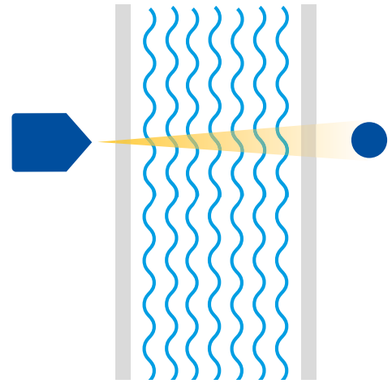
- **Measurement task**
  Measure concentration of the tin in the electroplating solution.
- **Location**
  Typical an inline measurement in a bypass at the dragout.
- **Berthold Solution**
  InlineSENS

Customer Benefit

- Online, real-time process information.
- Maintenance-free

Special Features

- Radiometric based measurement
- Easy installation or retrofit



Schematic representation of radiometric density measurement

MEASURING THE MOISTURE
IN BUNKER AND SILO

The moisture content in the coke and the iron ore/concentrate being fed to a blast furnace is of great importance for thermal control of the blast furnace process. An online moisture measurement at the bunker provides real-time information on the moisture content before the material enters the blast furnace.

Application Profile

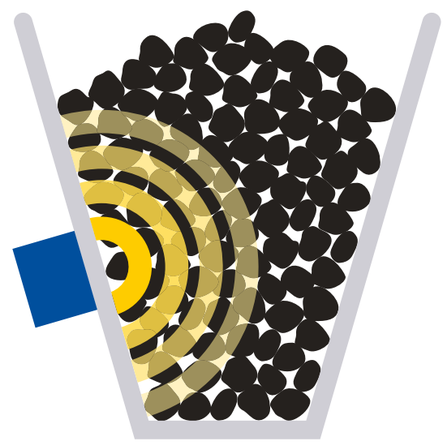
- **Measurement task**
  Moisture measurement of coke and iron ore/concentrate
- **Location**
  In bunker or in silo
- **Berthold Solution**
  LB 350 Neutron moisture measurement

Customer Benefit

- Improved thermal control the blast furnace operation
- Online, real-time process information
- High accuracy with very good reproducibility
- The measurement can be installed at, or into the bunker/silo wall.

Special Features

- A neutron source emits neutrons, which will be converted to “slow“ neutrons, when they impact on hydrogen atoms. The amount of backscattered “slow“ neutrons are proportional to the coke moisture.
- Non-contact measurement and no disturbance in the flow.
- Highly reliable, long-term solution
- Maintenance-free operation
- Easy to install or retrofit on existing bunkers or silos
- Large measuring volume provides representative measurement



Schematic representation of neutron moisture measurement in vessel

MEASURING THE MOISTURE
OF BLAST FURNACE SLAG (GGBS)

Grounded granulated blast furnace slag (GGBS or GGBFS) is produced when molten iron slag from the blast furnace is filled in a water basin. The GGBS is a byproduct in the steel industry and sold to the cement industry as aggregate. The producer of the GGBS has to guarantee not to exceed a specific moisture content.

Application Profile

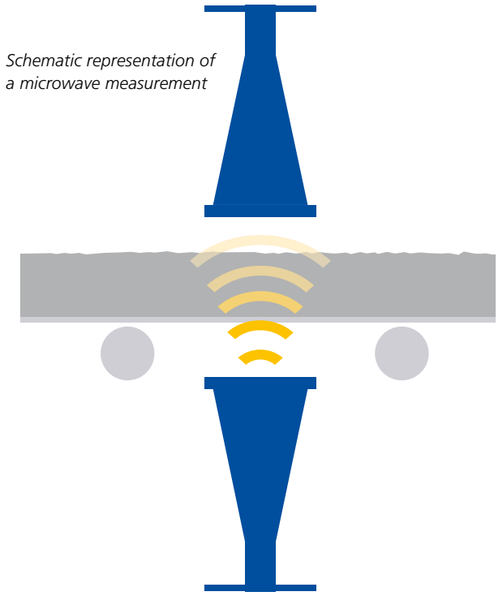
- **Measurement task**
  Moisture measurement of GGBS
- **Location**
  On product conveyer belt
- **Berthold Solution**
  LB 567 MicroPolar with ultrasonic product height compensation

Customer Benefit

- Online, real-time process information.
- The measurement can be installed at conveyer belt
- High accuracy with very good reproducibility

Special Features

- Microwave measurement application
- Measurement on a conveyor belt, using horn antennas
- Due to height variations on the belt, an ultrasonic height sensor is connected



Schematic representation of a microwave measurement

MEASURING THE MOISTURE
AT THE CONVEYOR BELT

The moisture content in the coke or the iron ore/concentrate being fed to a blast furnace is of great importance for thermal control of the blast furnace process. An online moisture measurement at the conveyer belt provides real-time information on the moisture content before the material enters the blast furnace.

Application Profile

- **Measurement task**
  Moisture measurement of coke and iron ore/concentrate
- **Location**
  On conveyor belt
- **Berthold Solution**
  LB 350 Neutron moisture measurement

Customer Benefit

- Improved thermal control the blast furnace operation
- Online, real-time process information
- High accuracy with very good reproducibility
- The measurement can be installed at conveyer belt

Special Features

- A neutron source emits neutrons, which will be converted to slow neutrons, when they hit hydrogen atoms. The amount of backscattered slow neutrons is proportional to the coke moisture.
- Non-contact measurement and no disturbance in the flow
- Highly reliable, long-term solution
- Maintenance-free operation
- Large measuring volume provides representative measurement

Schematic representation of neutron moisture measurement at a conveyer belt

THE EXPERTS
IN MEASUREMENT TECHNOLOGY

Berthold Technologies stands for excellent know-how, high quality and reliability. The customer is always the focus of our solution.
Using our varied product portfolio, our enormous specialized knowledge and extensive experience, we develop suitable solutions together with our customers for new, individual measurement tasks in a wide variety of industries and applications.

We are here for you – worldwide!
The engineers and service technicians from Berthold Technologies are wherever you need them. Our global network assures you fast and above all competent and skilled assistance in case when needed. No matter where you are, our highly qualified experts and specialists are ready and waiting and will be with you in no time at all with the ideal solution for even the most difficult measurement task.

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