

Process Control Systems / Level-2 Systems

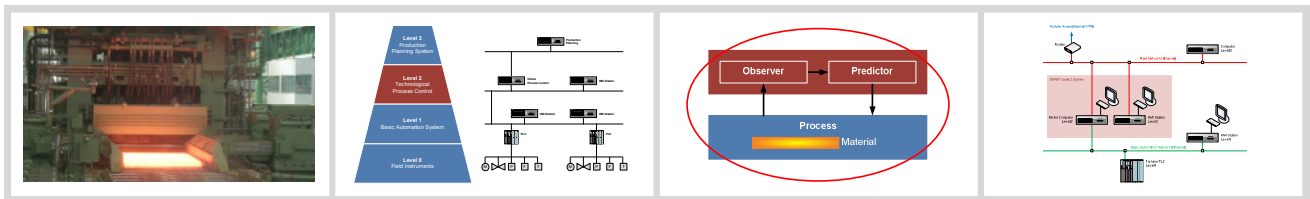
Since the late 1980ies GIWEP is developing and implementing – in those days as one of the first companies – computer based process control systems for optimization of thermal-metallurgical plants and is one of the leading companies in this sector to this day.

In the course of the years a large number of thermal-metallurgical plants of steel and nonferrous metal industry worldwide have been equipped with GIWEP process control systems – from reheating furnaces, heat treatment furnaces and melting furnaces up to cooling plants. The end products which will be produced in these plants are i. a. profiles, semi-finished products, seamless tubes, plate, steel bars, wires, hot strip and cold strip.

Rising energy costs, increasing diversity of end products and associated additional flexibility of production, optimization of plant throughput, improvement and stabilization of product quality, complete documentation of productions process and workload reduction of operating personnel are the motivation for the application of a GIWEP process control system.

Each of our process control systems will be designed according to individual requirements of plant, products to be processed as well as requests of our customers. Despite all this diversity there are a lot of commonalities regarding design and structure.

In the following we would like to give you a review of the fundamental configuration of our process control systems. However, not all mentioned features and functions can be transferred to each thermal-metallurgical plant.



Technological Classification

GIWEP's process control systems are computer based level-2 systems for technological process control and process optimization. In a plant's automation structure they have to be classified inbetween basic automation (level 1) and production planning (level 3).

Data exchange will normally occur with the basic automation as well as with production planning system.

Functional Principle

GIWEP's process control systems work according to **observer-predictor principle**:

- The **observer** continuously calculates current material condition (e. g. temperature). Here a mathematical-physical process model will be used, which will set actual process values as input parameters
- The **predictor** determines the setpoints for the process in that way, that material will be processed and treated according to its requirements.

That way a **control loop for material characteristics** will be established, ensuring that material will leave the process with required target conditions. (e. g. discharging temperature and temperature uniformity).

Hardware and Software

Hardware consists of one or more industrial PCs offering a high level of availability and data security. Windows, Unix or Linux will be used as operating system. For communicating to other systems preferably default network adapters via TCP or OPC are to be used. As far as data management is concerned, databases like ORACLE, MS SQL Server, PostGre SQL or binary files will be applied.

The exact configuration of computers and system software is determined by individual requirements of plant and our customers' requests.

The application software for our process control systems will be created in C++/C# or JAVA.

- Walking beam furnaces
- Walking hearth furnaces
- Pusher type furnaces
- Rotary hearth furnaces
- Roller hearth furnaces
- Double walking beam furnaces
- Floater furnaces
- Bell type furnaces
- Chamber furnaces
- Bogie hearth furnaces
- Electric arc furnaces
- Induction furnaces
- Cooling plants

Optimization of thermal-metallurgical processes



Properties

GIWEP's process control systems are characterized by the following:

- Use of a mathematical-physical model for process control
- High accuracy and reproducibility of process control
- Reduction of energy consumption and material usage
- Optimization of plant performance in relation to production conditions
- Automatic adaption of process control for new products
- Workload reduction for the operating personnel due to fully automatic plant operation
- Complete process documentation including calculation results of the model

Additional Functions

GIWEP's process control systems may be extended with various project-specific functions for an optimized adaption to technological requirements of corresponding process. The following list shows **options** of potential additional functions:

Plant-Specific Functions

- Gas flow setpoint instead of temperature setpoints for the bottom furnace zones
- Specification of air ratio for gas/air control loops
- Integration of an oxygen control of the furnace atmosphere
- Burner switchoff at low throughputs
- ...

Technological Functions

- Automatic heating down and up at weekends
- Heating of material considering holding times (e. g. annealing)
- Feedback of temperature and torque measurements from the rolling mill
- Long-term archiving and trending for quality assurance
- ...

Offline Functions

- Verification of furnace dimensioning
(for reference productions and calculation of energy consumption to be expected)
- Calculation of possible furnace power for new products with new alloys, new dimensions or new discharging temperatures
- Simulation of production programs (sequence of several charges) and evaluation of temperature setpoints, possible discharging cycles and calculated heating curves
- ...

Further Information

GIWEP's process control systems are designed for individual requirements of corresponding plant. Therefore, it is not possible to describe all aspects and potential functions within this product information.

For inquiries and further information we should be glad to pay a visit to your premises for a detailed discussion.

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