Blast Furnace Cooling Systems
Efficient cooling is required to balance the thermal load and associated wear of the inner lining of the furnace, and to protect the shell and their cooling elements. Paul Wurth acquired, during decades of blast furnace design, a unique know-how in blast furnace cooling. Our system operates on more than 90 blast furnace installations world-wide. We offer in combination with our copper, steel and cast iron staves state-of-the-art cooling conditions for your blast furnace installation. Paul Wurth strives to optimize the cooling systems in order to reduce investment and running costs, while ensuring the necessary cooling efficiency and availability of the cooling elements and circuits.

The cooling systems of a blast furnace play a key role in blast furnace campaign life and therefore operating costs.

Closed Loop Cooling Circuits

Paul Wurth normally designs cooling systems with two or three nitrogen pressurized closed loop water circuits with forced recirculation. The advantages of such a system, as compared to an open loop cooling circuit are:

- Circuit can be operated with treated, softened water.
- No corrosion, fouling and clogging of pipes and cooling elements.
- Low cost for chemical additives.
- Low water consumption.
- No contact with oxygen of ambient air.
- Very sensitive leakage detection is possible.
- Increase of the evaporation temperature of the cooling water due to operation under adjustable nitrogen pressure. (Example: \( p=8 \) bar, \( T_{\text{evap}} = 170^\circ \text{C} \)).
- Low electrical power consumption, as only the pressure drop is to be covered by the pumps; the differential height is not to be considered.
- Easy flow adjustment and control for the different cooling elements.
- Low maintenance costs.
- Longer life time of circuit equipment and cooling elements resulting in high availability of and therefore high productivity.

Combined Closed Loop Cooling Circuits

are an economic, but still efficient, reliable and safe solution. The cooling water is used to cool serially different blocks of cooling elements, still respecting the operation requirements of the individual cooling elements. The total flow rate is considerably reduced while temperature difference of the cooling water is still in an acceptable range and the cooling tower operates more efficiently.

Semi-Closed or Open Loop Cooling Circuits or Evaporation Cooling Circuit

can also be supplied as an option and by customer request in accordance with site conditions. This is particularly ideal for minimum cost upgrades at existing plants.
Unique know-how and close relationship to Blast Furnace operators allow us to offer all services up to turn-key installations.

We study and implement improvement on the cooling circuit capacity and/or convert open loop cooling to closed loop cooling.

Our lengthy experience enables us to control and optimize the thermal load of the circuits. Studies and comparisons of different blast furnace types, sizes and operation modes are our specific know-how used to engineer the cooling of the different blast furnace zones.

This, in combination with expert project management and dedication to excellence, ensure fast project completion and rapid start-up.

Paul Wurth is using the latest generation of plant design solution named AVEVA PLANT™.

It improves the quality and accessibility of critical information, enabling Paul Wurth to make more accurate and precise decision, reducing time, project cost and minimize risk through:

- Improved planning and project control
- Effective information management and workflow
- Efficient data and document management
- Efficient Construction Management
- Accelerated and improved project handover
The Paul Wurth Group is today one of the world leaders in the design and supply of complete plants, systems and processes as well as specialised mechanical equipment for:

- **the iron & steel industry:**
  - Blast Furnaces & Auxiliary Plants
  - Coke Making Plants
  - Agglomeration Plants
  - Direct Reduction Plants
  - Environmental Protection, Recycling & Energy-Saving Technologies

- **other industries:**
  - Systems & Equipment for Non-Ferrous Pyrometallurgy, Electrometallurgy & Residue Treatment
  - Intralogistics Solutions for Heavy Loads
  - Engineering & Project Management for Civil Construction and Infrastructure Projects


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