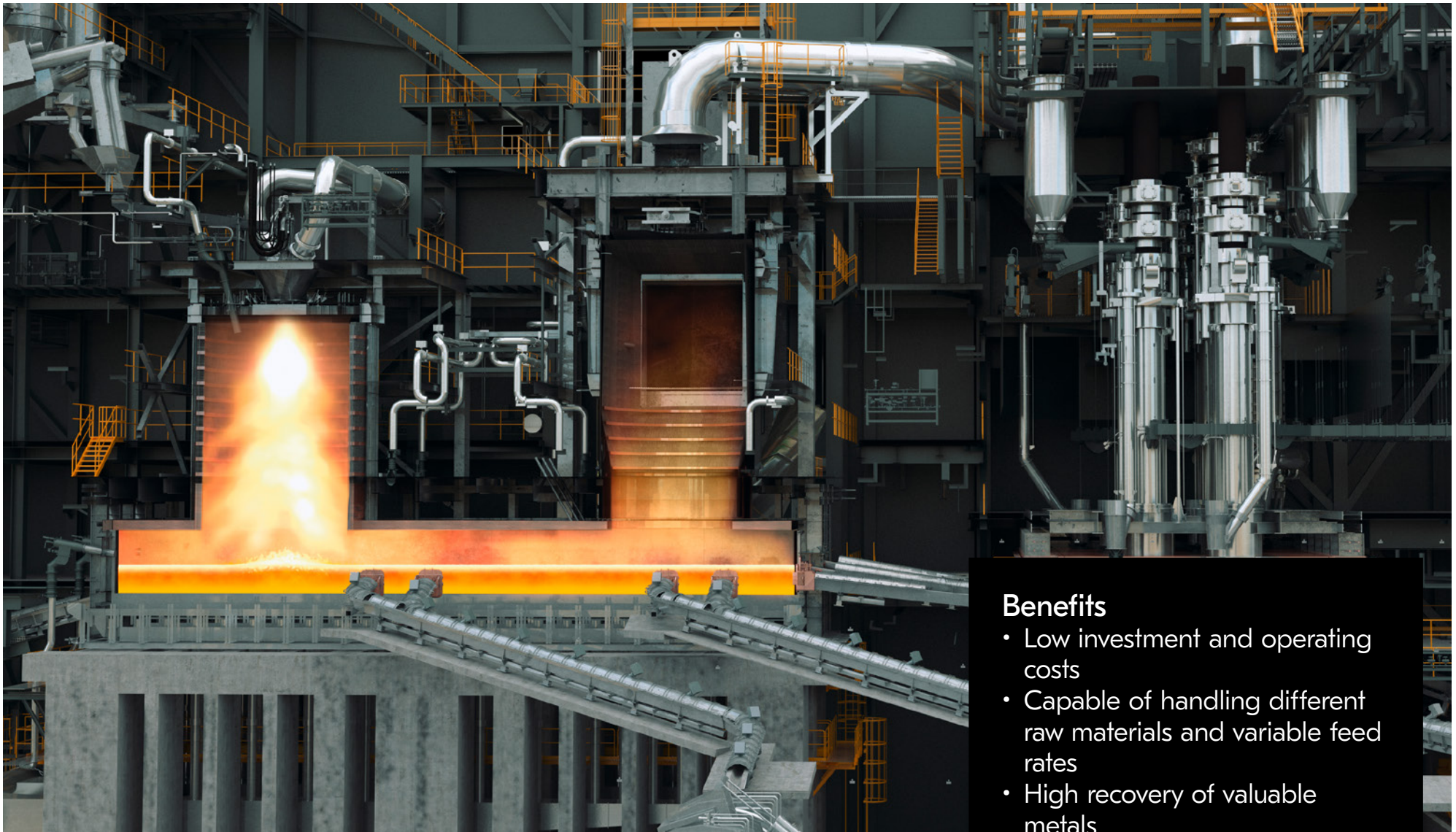


Metso

Flash Smelting Technology





Our proven Flash Smelting technology is the cleanest and most efficient smelting method for the production of copper and nickel from sulfide concentrates. Suitable for both new and existing smelter operations, it guarantees superior performance and output while helping producers comply with ever more stringent environmental regulations. We support customers worldwide with a comprehensive services offering through our global network of service centers.

Benefits

- Low investment and operating costs
- Capable of handling different raw materials and variable feed rates
- High recovery of valuable metals
- Meets the strictest environmental requirements
- Safe and hygienic working environment
- Long campaign times between major shutdowns

An introduction to Metso's Flash Smelting

With flexibility, low energy consumption, high sulfur capture, and excellent economy of scale, Metso Flash Smelting technology is the world's leading method for copper and nickel smelting. More than half of the world's primary copper and nickel is produced using Metso's proprietary process.

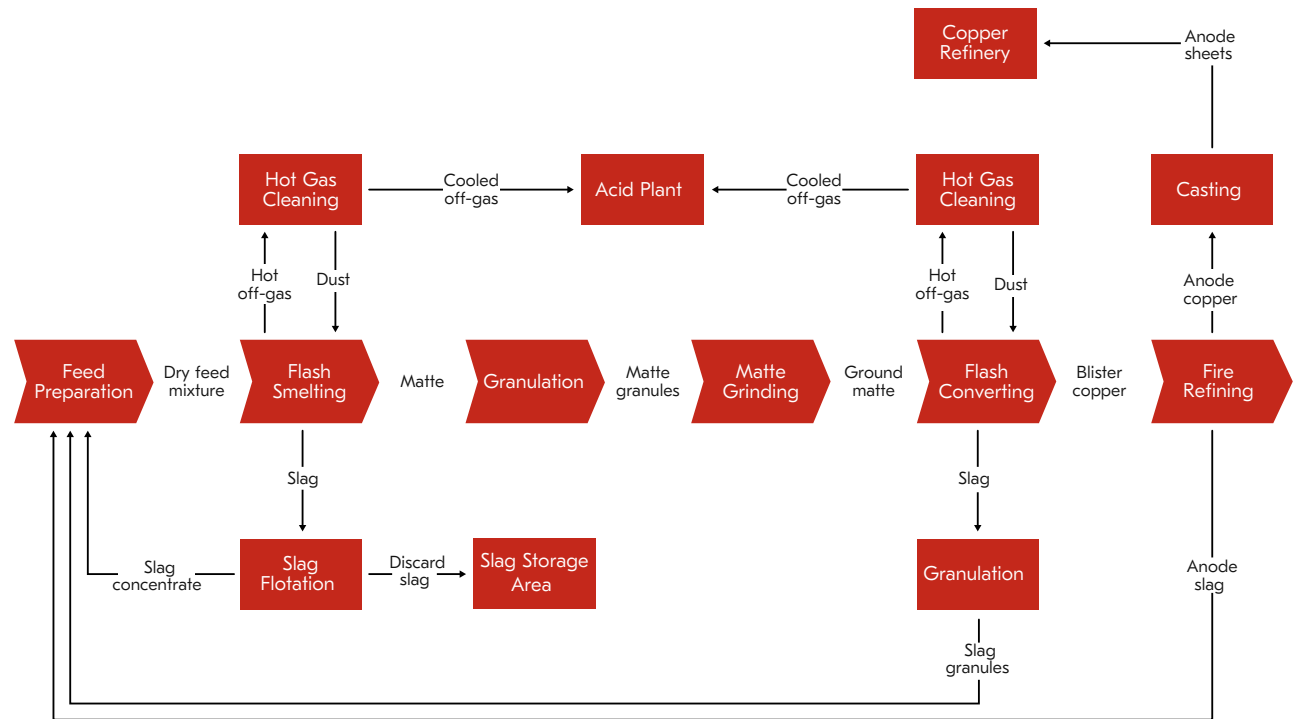
The process is highly energy efficient because it makes full use of the reaction heat of the concentrate, meaning that no external fuel is required for smelting. The high sulfur capture rate of more than 99.9 percent is achieved by using low-volume process gas, a compact layout, and a sealed furnace. For these reasons, Metso Flash Smelting has been awarded ASM Historical Landmark Status, and is rated as a BAT (Best Available Technique) production method by the European Union.

Metso Flash Smelting technology is suitable for both new installations and modernization and expansion of existing copper and nickel plants. Retrofitting Metso's technology at existing smelting sites can result in a threefold increase in capacity and internal efficiencies.

We continuously develop our Flash Smelting process in collaboration with customers and research partners at our network of research centers, which have world-class facilities for analytical laboratory and pilot-scale testing.

Superior environmental performance

- Energy efficient process
- Sulfur dioxide capture rate of more than 99.9%
- Low off-gas volumes
- Sealed furnace and safer working conditions
- Process heat recovery and utilization



Flash Smelting and Flash Converting process.

We continuously develop our Flash Smelting process in collaboration with customers and research partners.

Metso Flash Smelting technologies for the copper and nickel industries

Metso Flash Smelting and Kennecott-Metso Outotec Flash Converting for copper

Metso Flash Smelting combined with Kennecott-Metso Flash Converting is an integrated solution for high-capacity smelters. Matte from the flash smelting furnace is granulated and fed to a flash converting furnace in the same fashion as concentrate. The technology enables the use of intensive processing units and a compact layout for maximized efficiency. The closed process and the elimination of the ladle transportation of molten materials improve safety and reduce emissions. The technology also enables high sulfur recovery thanks to the constant flow of highly concentrated SO₂ process gas from the furnaces.

Metso's Production Network concept provides economic flexibility by decoupling the smelting and converting processes, providing the possibility for them to be operated independently at separate locations.

Metso Direct Blister Flash Smelting for copper

With this process, blister copper is produced directly in a flash smelting furnace without the need for separate converting phases and ladle transportation. This method opens up the possibility to use different raw materials and optimize plant layout while minimizing capital investment, operating costs, and environmental impact. Direct Blister Flash Smelting is a natural choice for higher-grade copper concentrates due to its lower capital investment costs.

Metso Direct Nickel Flash Smelting (DON)

This process enables high-grade nickel matte to be produced using a single flash smelting furnace. It allows higher recovery of nickel, cobalt, and precious metals than conventional nickel processes when processing phases and material recirculation are kept to a minimum. In addition, the elimination of the ladle transportation of molten materials improves safety and minimizes emissions.

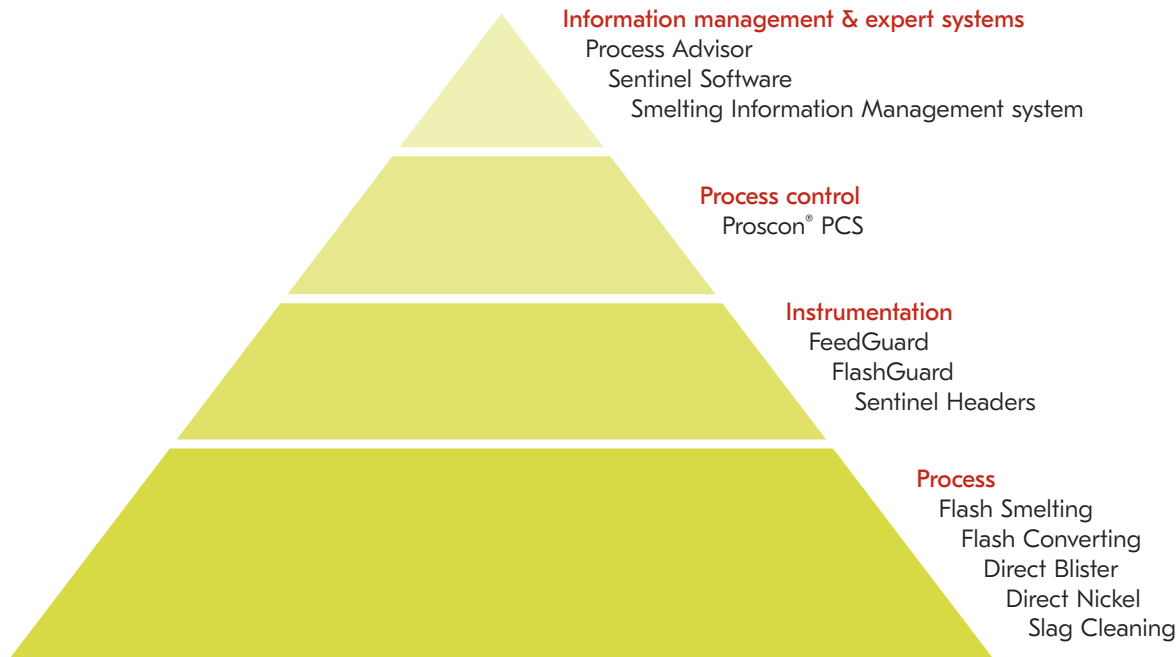
Metso Slag Cleaning

Slag cleaning at copper and nickel smelters is typically done using an electric furnace process. The design of Metso slag cleaning furnaces is based on our extensive experience with different slag compositions and understanding of how to optimize the process for maximum recovery. Our energy efficient furnace design incorporates material handling, granulation, and off-gas treatment.



Metso's Production Network concept provides economic flexibility by decoupling the smelting and converting processes.

World-leading automation solutions



Metso is a world leader in developing innovative automation solutions for the metals processing industry, from advanced instrumentation and control solutions for individual equipment to plant-wide control and information management systems. As well as increasing the sustainability and efficiency of operations, automation also improves health and safety at your plant.

Metso's automation solutions are designed to provide greater transparency in your daily operations and to stabilize process conditions while optimizing overall process efficiency. Automation and improved information management also enable predictive maintenance planning and remote process support. Early identification of disturbances in key process areas means more time for maintenance planning and implementation, and therefore reduces downtime.

Benefits

- Improved health and safety
- Increased transparency in daily operations
- Stable process conditions and optimized overall efficiency
- Minimized downtime

Flash Smelting technology transfer package

Metso Flash Smelting technology transfer package is a complete solution for new and existing plant operations that covers all aspects of smelter design, project management, engineering and installation, and ongoing technical support. It includes:

- Feasibility studies and R&D services
- Basic and detail engineering, and equipment supply
- Project implementation supported by Metso experts on site
- Supervision of integration engineering and installation
- Complete shutdown management
- Operator training, commissioning
- Plant capacity and product quality guarantees
- Plant lifecycle services

Global expertise delivered locally

Our goal is to build long-term relationships with our customers to help them get the most from their assets in terms of operational and capital efficiency. Metso's global network of service centers provides process and maintenance support to customers around the clock, 365 days a year. Through these service centers, plant operation and maintenance personnel have access to invaluable process and equipment expertise as well as data that supports them in maximizing performance and minimizing downtime.

Plant and process support services

Metso's advanced plant and process assessment services help you identify areas with the greatest potential for improvement. We can assess everything from individual equipment, automation systems, and metallurgical processes, to complete plants. With our extensive knowledge of process demands and equipment requirements, we can ensure that proposed modifications and upgrades can be seamlessly integrated into your existing operations to avoid unnecessary downtime and costs.

Equipment services

High-intensity processes require reliable equipment. As an original equipment manufacturer, Metso can guarantee the supply of high-quality, fit-for-purpose spare parts through our efficient global distribution network. Our specialist teams work closely with you to develop tailored maintenance programs that will optimize plant availability and reliability.

Metso plant services

- Plant assessments
- Operation and maintenance support services
- Upgrade and modernization solutions
- Shutdown management
- Demolition

Metso process support services

- Troubleshooting
- Process control analysis
- Simulation
- Optimization
- Design
- Technology transfer
- Integration
- Training
- Commissioning



Total furnace rebuild solution

Metso offers a comprehensive range of full service solutions for Flash Smelting customers. For furnace upgrade projects, our solutions can encompass everything from concept engineering to supply, installation, commissioning, and start-up. Follow-up services include equipment inspections and audits, process audits, and remote process monitoring.

1. Planning & engineering

- Furnace rebuild scope development
- Basic & detail engineering
- Rebuild & shutdown planning

2. Supply

- New equipment & steel structures
- Refractory & cooling elements
- Mechanical & piping components
- Instrumentation & control equipment

3. Construction

- Construction/shutdown management
- Furnace demolition
- Mechanical, refractory & control installation

4. Commissioning & start-up

- Furnace heat-up
- Mechanical and E&I controls commissioning
- Start-up process support

5. Follow-up audits

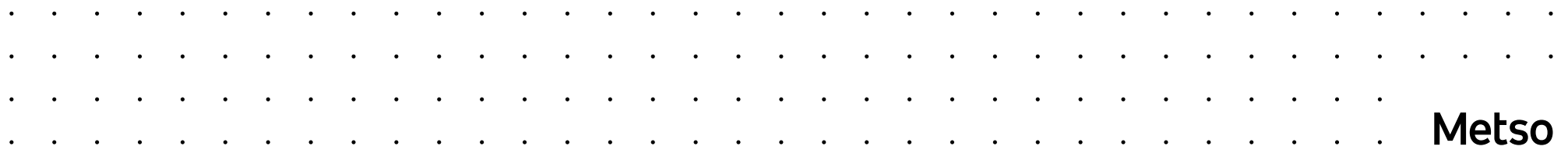
- Equipment inspection & audit
- Furnace condition and process audits
- Campaign life assessment
- Remote process monitoring

Customer benefits

- Safe working environment
- Proven furnace technology
- Integrated project solution
- Enhanced furnace productivity
- Improved campaign life
- Mechanical and process performance guarantees
- Best implementation and safety practices
- Reduced downtime
- Process expertise
- Smooth, fast ramp-up
- Enhanced ROI
- Improved furnace availability
- Increased production
- Lifecycle service

Metso is a frontrunner in sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. We improve our customers' energy and water efficiency, increase their productivity, and reduce environmental risks with our product and service expertise. We are the **partner for positive change**.

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