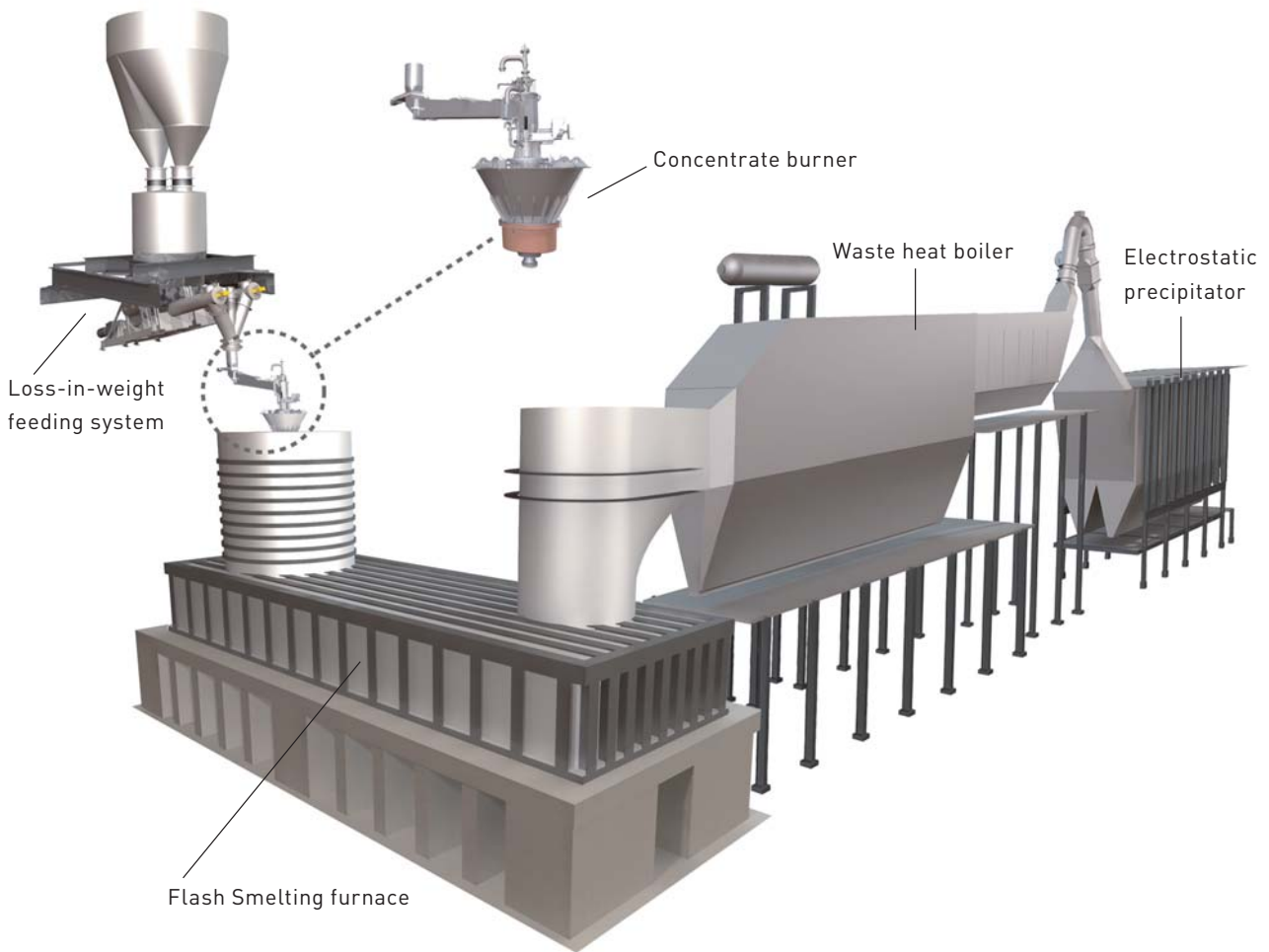


Outotec Flash Smelting technology

Outotec Flash Smelting technology is the cleanest smelting method available and the most feasible way of producing copper and nickel. Outotec's state-of-the-art technology enables meeting environmental requirements of today and tomorrow. Half of the world's sulfide-based copper and nickel is produced with Outotec Flash Smelting technology.

Outotec
More out of ore

Outotec Flash Smelting in brief



Outotec Flash Smelting technology has the leading position in the copper smelting business by virtue of its flexibility, low energy consumption, high sulfur capture and economy of scale. It has become a benchmark for both copper and nickel industry. Today, approximately 50% of the world's primary copper and nickel are produced with Outotec Flash Smelting technology. The Flash Smelting process has been developed more than half a century ago. It was first applied by Outokumpu in Harjavalta, Finland in 1949.

Outotec Flash Smelting technology is energy efficient since it makes use of the reaction heat of concentrate, and therefore external fuel is not needed. Outotec's technology allows a total of 99.9% of sulfur capture, due to the low volume process gas and compact and sealed equipment. Flash Smelting has been awarded the ASM historical Landmark Status and rated as BAT (Best Available Technology) production method by European Union due to its energy efficiency and environmental benefits.

Benefits of Outotec Flash Smelting

- Offers new business options for metal production
- Reliable and proven process and equipment
- Low investment and operating costs
- Capability to treat different qualities of raw materials with variable feed rates
- High recovery of valuable metals
- Meets the strictest environmental requirements
- The cleanest smelting method available
- Safe and easy working conditions

The Flash Smelting process is continuously developed in collaboration with our customers and Outotec's R&D. Therefore it has preserved and will preserve its position as the state-of-the-art technology.



Yanggu Xiangguang copper flash smelting and flash converting plant, China.

With improved efficiency and higher oxygen enrichment, also modernization of an old smelter can result in a 3-fold increased capacity with a relatively small investment cost.

Production Network – a new business option

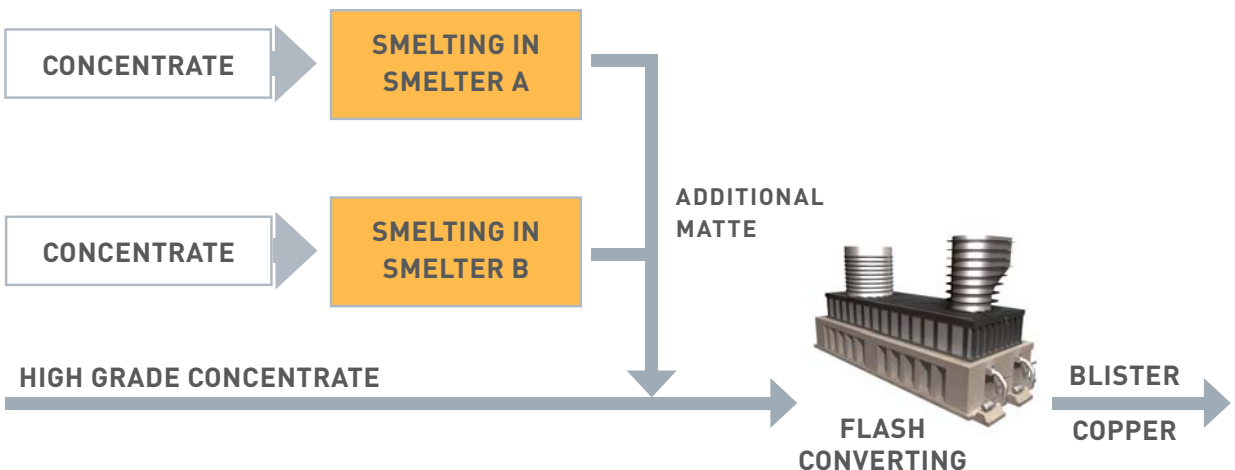
Production Network concept enables producing blister copper from mattes that are produced in different geographic locations. Solid matte produced in multiple flash smelters or in other type of smelters can be collected and used as a raw material for a single flash furnace, which converts the matte to blister copper. In fact, it is preferable to integrate matte smelting with a single mine site, which will reduce transportation costs and optimize the production chain from mine to smelter. Production Network concept will increase capacity utilization of the matte delivering smelters in the mine sites.

Outotec Flash Smelting technology transfer

Outotec Flash Smelting technology transfer package offers environmentally sustainable methods for copper and nickel production with low total investment and unit operating costs:

- Feasibility studies and R&D services
- Basic and detail engineering and supply of proprietary and key equipment
- Project implementation with Outotec experts on-site
- Supervision of detail engineering, installation and commissioning
- Training of operating personnel
- Guarantees for plant capacity and product quality
- Long-term commitment and extensive customer support and services

Production Network concept



Outotec Flash Smelting technology for the copper and nickel industries

Copper Flash Smelting and Kennecott-Outotec Flash Converting

Outotec Flash Smelting combined with Kennecott-Outotec Flash Converting is an integrated solution for high-capacity smelters using the minimum number of smelting units and effective emission control. High capacity combined with small unit size ensures low investment and operating costs. The Outotec technology improves the productivity of existing installations, such as sulfuric acid plant, further cutting down unit operating costs. Working conditions will improve and environmental emissions will decrease due to the compact process. High sulfur recovery will be achieved thanks to the constant flow of high-strength SO₂ process gas from the furnaces. Additionally, Production Network concept provides economic flexibility as smelting and converting can be operated independently. Therefore, a customer will realize lower transportation costs as well as advantages in plant design and operation.

Outotec Direct Blister Copper Flash Smelting

The Outotec Direct Blister Copper Process is one of the most advanced applications of Flash Smelting technology. In Direct Blister Flash Smelting the production chain is totally integrated. The process offers new options for using different raw materials.

Direct Blister Flash Smelting is suitable and profitable for higher grade concentrates. The process is currently used on a commercial scale in Poland, in Australia and most recently in Zambia.

Direct Outotec Nickel (DON)

In the DON process high-grade nickel matte is produced directly in a flash smelting furnace. Slag is cleaned in an electric furnace producing low-sulfur matte and waste slag. DON enables lower investment, operating and maintenance costs. The DON technology ensures higher recovery of nickel, cobalt and precious metals as the internal material circulations are minimized. The DON process also improves working conditions in the smelter because emissions are minimized and ladle transfer of molten material is eliminated. The first DON processes were introduced in Harjavalta, Finland in 1995 and in Fortaleza, Brazil in 1997.

Outotec Slag Cleaning

Electric furnaces are commonly used for slag cleaning in copper and nickel smelters. Based on our wide experience in smelter projects, Outotec provides solutions for the whole slag cleaning process unit, including secondary material handling, granulation and off-gas treatment.



Electric furnace designed by Outotec.



OUTOTEC FLASH SMELTING AROUND THE WORLD

More than 50 licences



Outotec – your technology transfer partner

Outotec Flash Smelting technology offers new opportunities for both greenfield projects and modernization and expansion of existing copper and nickel plants. When the complete process line is designed and delivered by Outotec the installation fulfils all process, operation, maintenance and environmental requirements.

Outotec Flash Smelting process and the smelter equipment are under continuous development. Intensive research and development work in the laboratory, bench-scale and pilot-scale tests enable finding innovative solutions for profitability improvements and environmental efficiency.

Outotec creates and maintains long-term partnerships ensuring that the latest technology developments are continuously available to customers.



Outotec organizes regular licensee congresses for the Flash Smelting Family to exchange information of improvements and technical developments.

Outotec is a worldwide technology leader in minerals and metals processing, providing innovative and environmentally sound solutions for a wide variety of customers in minerals processing, iron and steel, aluminum and non-ferrous metals industries. Outotec Oyj is listed on the Nasdaq OMX Helsinki.

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