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**FINEX<sup>®</sup> 2.0M PLANT FOR  
2 MILLION T/A OF HOT METAL**  
POSCO, POHANG, SOUTH KOREA

# FINEX® 2.0M PLANT FOR 2 MILLION T/A OF HOT METAL

Third-generation FINEX 2.0M plant for environmentally sound and economical hot metal production

## MAIN BENEFITS

- Direct utilization of sinter feed iron ore (<8 mm)
- Favorable economics
- Environmental benefits
- Direct utilization of non-coking coal
- Highly valuable export gas
- Production of high-quality hot metal
- Flexibility in operation



FINEX 2.0 M Plant, POSCO

## THE CUSTOMER

Name. POSCO

Location. Pohang, South Korea

POSCO (formerly Pohang Iron and Steel Company) is a multinational steelmaking company headquartered in Pohang, South Korea. It had an output of 41.4 million tons of crude steel in 2014, making it the world's fifth-largest steelmaker. It currently operates two integrated steel mills in South Korea, in Pohang and Gwangyang.

POSCO and Primetals Technologies started to jointly develop the FINEX process in 1992, which resulted in the erection of three FINEX plants: the FINEX #1 demonstration plant, the FINEX #2 plant (FINEX 1.5M) and the FINEX #3 plant (FINEX 2.0M) with annual hot metal capacities of 0.6 million t, 1.5 million t and 2.0 million t, respectively.

Rising energy demand and the steadily decreasing quality of raw materials due to global resource depletion are great challenges facing the steel industry today.

The FINEX process was developed jointly by POSCO of South Korea and Primetals Technologies Austria to provide the ironmaking sector with the capability to lower hot metal production costs and environmental pollution on the one hand, and to increase flexibility in terms of operation and the choice of raw materials on the other.

In April 2007, the first FINEX 1.5 million t/a (1.5M) commercial plant commenced operations and soon demonstrated its competitiveness as an alternative ironmaking route. A third-generation 2.0 million t/a (2.0M) FINEX plant was recently installed at POSCO's Pohang Works, and it has been operating satisfactorily since its blow-in in January 2014.

After start-up, operation optimization and facility stabilization, the productivity of the FINEX 2.0M plant achieved its target value of 5760 t/d in April 2014. Since then, operation targets have been achieved and optimization measures are under progress.

With the well-proven plant concept, new process features, highly competitive production costs and environmental advantages, the FINEX process can be considered a competitive alternative to the conventional blast furnace ironmaking route.

## THE FINEX PROCESS

The FINEX smelting-reduction process is perhaps the most exciting ironmaking technology on the market today. It is distinguished by the production of high-quality liquid hot metal on the basis of directly charged iron ore fines, with coal as the reductant and energy source.

The process begins with the charging of fine iron ore with a grain size of up to 8 mm to a three-stage fluidized-bed reactor system. The ore, which descends through the system by gravity, is reduced in counter-current flow to DRI using a reducing gas produced from the gasification of coal with oxygen in a separate melter gasifier. The reactor system has a pressure of about 4.0 bar (g) and the prevailing temperature in the final, lowermost reactor is in the range of 760°C. Additives are added to the FINEX plant simultaneously with the charging of the fine ore. The intermediate product is reduced fine ore, which includes calcined additives.

After exiting from the reactor series, the reduced iron product is then hot-compacted to hot-compacted iron (HCI).

The HCI is transferred to a lock hopper system positioned above the melter gasifier, followed by gravity charging to the melter gasifier where it is melted. The final product – liquid hot metal – is equivalent in quality to the hot metal produced in a blast furnace or COREX® plant.

The FINEX export gas is a valuable by-product that can be used for electric power generation and heating purposes.

## SCOPE OF SUPPLY

- Basic and detail engineering of the process, automation and plants
- Basic data for civil works
- Supply of proprietary key components
- Supervision of plant start-up and commissioning

## FINEX 2.0M PLANT

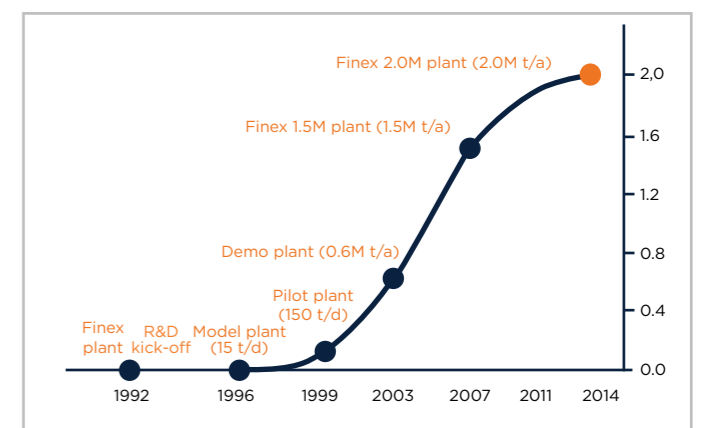
The design of the third-generation FINEX 2.0M plant is characterized by a simplified plant concept resulting in decreased construction weight compared to the FINEX1.5M concept. Major design features of this development include:

- Pneumatic ore charging to the fluidized bed reactors including a three-stage fluidized bed reactor system resulting in a decreased building height of more than 30%
- Simplified system configuration in the hot-compacting system and implementation of dry de-dusting equipment
- Elimination of the HCI bin and related top gas system in the melter gasifier tower
- Installation of a center charging system for hot HCI and coal, allowing for homogeneous charging of feed materials to the melter gasifier. The distribution on the char bed surface is realized via a dynamic gimbal distributor.

Implementing these improvements to the Process reduced the overall construction weight of the FINEX 2.0M plant by approx. 9% compared to the FINEX 1.5M plant, with no increase in footprint requirements within the plant.

## PLANT DATA

Annual hot metal capacity	2,000,000 t
Number of cast houses	2
Export gas quantity	335,000 m <sup>3</sup> (STP)/h
Export gas net calorific value	5,500 – 6,250 kJ/m <sup>3</sup> (STP)
Specific iron ore consumption	1,500 – 1,650 kg/t <sub>HM</sub>
Fuel rate	750 – 800 kg/t <sub>HM</sub>
Oxygen	485 – 500 m <sup>3</sup> (STP)/t <sub>HM</sub>



FINEX scale up history

**Primetals Technologies Austria GmbH**

A joint venture of Mitsubishi Heavy Industries and partners

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