KOBELCO

KAKOGAWA WORKS

KOBE STEEL, LTD.

A production system that combines state-of-the-art facilities with the last word in sophisticated technology

Situated on the banks of the clear-running Kakogawa River and surrounded by lush greenery, Kakogawa Works is blessed with a beautiful natural setting. Since the start of operations as a fully integrated steel-making plant in 1970, Kakogawa Works has consistently manufactured high-quality products to meet a wide range of user needs through constantly upgraded state-of-the-art facilities and highly refined technology. The plant, which covers a total area of 5.7 million square meters, has been logically laid out for efficient, computer-controlled production and includes mills for hot and cold rolling and surface finishing, as well as facilities for producing steel plates and wire rods.

At Kakogawa Works, we're providing the quality steel products necessary to build a rich and pleasant living environment. At the same time, we understand the importance of protecting the natural environment and taking into full consideration the mutual benefit of both the plant and the local economy. We are striving to carefully and efficiently utilize the earth's limited resources, including the recycling of energy, in order to achieve steel production, which should be gentle to the natural environment.

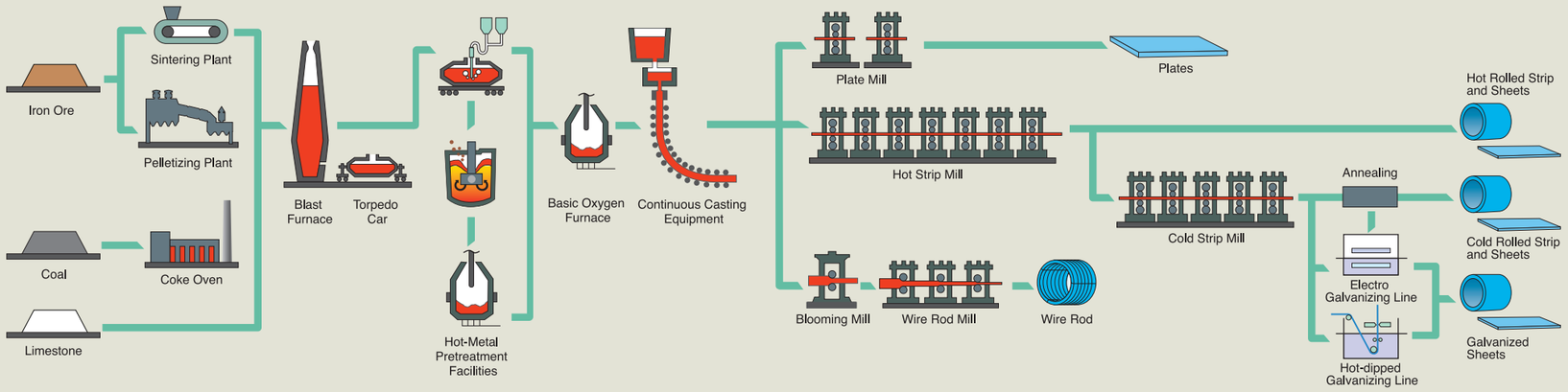
FEATURES OF KAKOGAWA WORKS;

- Customer confidence through quality control and faithful compliance with set delivery times
- Products based on state-of-the-art facilities and highly refined technology
- A production plant surrounded by greenery realized through measures to protect the natural environment
- A plant that benefits both the local economy and the company
- Integrated operation through the use of equipment designed and manufactured by Kobe Steel
- Efficient use of the earth's limited resources, including the recycling of energy
- A rational plant layout designed to accommodate production flow

KAKOGAWA WORKS: OUR PROGRESS OVER THE YEARS

- **April, 1968**
  Steel plate mill begins operation.
- **August 1970**
  Initial blow-in of No.1 blast furnace.
- **April 1971**
  Hot strip mill begins operation.
- **April 1972**
  Cold strip mill begins operation.
- **January 1973**
  Initial blow-in of No.2 blast furnace.
  No.8 Wire rod mill begins operation.
  No.1 Continuous casting equipment (slab) begins operation.
- **June 1974**
  No.1 Electrogalvanizing facilities begin operation.
- **October1974**
  The second blow-in of No.1 blast furnace.
- **July 1975**
  No.1 Hot-dipped galvanizing facilities begin operation.
- **February 1978**
  Initial blow-in of No.3 blast furnace.
- **February 1980**
  The second blow-in of No.2 blast furnace.
- **December 1980**
  No.2 Continuous casting equipment (bloom) begins operation.
- **March 1984**
  No.3 Continuous casting equipment (slab) begins operation.
- **October 1986**
  No.2 Electrogalvanizing facilities begin operation.
- **April 1987**
  No.1 continuous coating facilities begin operation.
- **January 1988**
  The third blow-in of No.1 blast furnace.
- **April 1988**
  Composite damping steel sheet manufacturing facilities begin operation.
- **June 1989**
  No.4 Continuous casting equipment (slab) begins operation.
- **January 1991**
  No.2 Hot-dipped galvanizing facilities begin operation.
- **June 1993**
  No.2 Continuous coating facilities begin operation.
- **April 1996**
  The second blow-in of No.3 blast furnace.
- **May 2007**
  The third blow-in of No.2 blast furnace.
- **April 2014**
  Hot metal treatment plant begin operation.
- **December 2016**
  The third blow-in of No.3 blast furnace.
- **January 2017**
  No.6 Continuous casting equipment(bloom) begin operation.
- **March 2021**
  No.3 Hot-dipped galvanizing facilities begin operation.

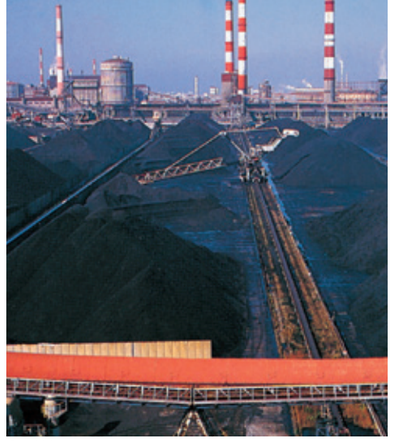
DIAGRAM OF PROCESSES



PRODUCT APPLICATIONS

- **PLATES:**
  Ships, Bridges, Buildings, Industrial machinery, Plant equipment, Line pipes.
- **HOT ROLLED STRIP and SHEETS:**
  Automobiles, Buildings, Ships, Industrial machinery, Pipes, Material for rerolling.
- **COLD ROLLED STRIP and SHEETS:**
  Automobiles, Household electric appliances, Steel household items, Material for galvanization.
- **GALVANIZED SHEETS:**
  Automobiles, Household electric appliances.
- **WIRE RODS:**
  Steel tire cord, Pre-stressed concrete and strand, Spring, Rope, Fasteners (bolts nuts), Welding electrodes.
- **TITANIUM:**
  Automobiles, Power plants, Chemical plants, Roofs.


Ore & Coal Wharf

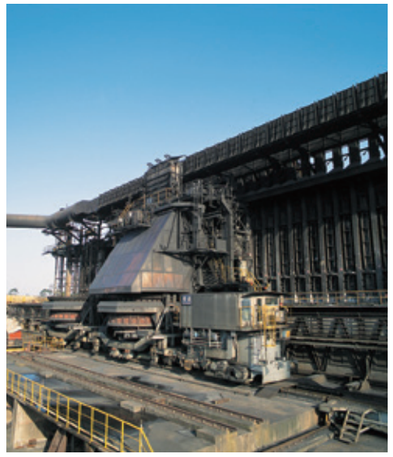

Coal Yard


Sintering Plant


Pulverized Coal Injection Equipment


Basic Oxygen Furnace


Stacker & Reclaimer in Materials Yard


Coke Oven


Pelletizing Plant


Blast Furnace


RH Vacuum Degassing Equipment


Continuous Casting Equipment

RAW MATERIALS FACILITIES

● MATERIALS FACILITIES

A vast majority of the raw materials used at Kakogawa Works are imported. Almost all of the iron ore is supplied by Australia, Brazil, and India, while about 90% of the coal comes from Australia, Canada, and the U.S.A. The materials are unloaded at the wharf facilities of Kakogawa Works, where the depth is 17 meters and 200,000-ton bulk carriers can come alongside, and are stock-piled in the appropriate storage yards.

● UNLOADER

Main materials	3,000／2,100 tons × 1 unit
	1,800 tons × 1 unit
	1,500 tons × 3 unit
	700 tons × 1 unit
Submaterials	700 tons × 1 unit

Wharfs	object	Wharf length	Depth
Main materials wharf	Iron ore and coal	1,250 m	14～17m
Submaterials wharf	Limestone	470 m	7～12m

● COKING FACILITIES

Coal is automatically fed from the coal yard to the mixing reservoir by a compu-ter programmed reclaimer. High-quality cokes and gases are then produced in the coke oven by baking the blended coal at the temperature of about 1,100℃ for about 20 hours.
A carbonized red-hot coke (1,000℃) is carried to the CDQ (Coke Dry Quenching), where it is cooled down to 150℃.
After screening, the coke is charged into the blast furnace.
At the CDQ the apparent heat of coke is recovered as steam for power generation, thereby contributing to energy saving.

Facilities	Type	Nominal capacity
Coke oven	Koppers	2,500,000 tons/year

Facilities name		Nominal capacity	Recovered steam
CDQ	No.1	150 tons／h	84 tons／h
	No.2	165 tons／h	90 tons／h

● PRETREATMENT FACILITIES

Iron ore is fed to the crushing plant where it is crushed and shaped. The granular ore is subsequently sintered at the sintering plant and the ore powder is pelletized and fired at the pelletizing plant.
Since Kakogawa Works incorporates both a sintering plant and a pelletizing plant, iron ore is used more efficiently and the quality of the pig iron is improved.
A part of the exhaust gas generated in the sintering plant is returned to the sintering plant, and its apparent heat is used as sintering heat.
And, for the purpose of minimizing the discharge of air pollutants, the dust and SOx contained in the exhaust gas are removed with the electric dust collector and desulfurizing facilities.

Facilities	Nominal capacity
Sintering plant	16,800 tons/day
Pelletizing plant	11,000 tons/day

IRONMAKING FACILITIES

● BLAST FURNACE

Coke and pretreated iron ore are fed into the blast furnace by conveyor belts. In the blast furnace, air heated to about 1200℃ is blown through the tuyeres to transform the ore into pig iron. The molten iron is then discharged into a torpedo car and transported to the steelmaking plant.
In place of coke, the low cost grained coal fuel is injected from the tuyere. This grained coal injection technology is most advanced technologies.
Further, the waste plastic is also injected from the tuyere as a reducer. The high-pressure energy in the furnace is recovered as an electric energy through the turbine, which is effectively used in the plant.

Facilities	Size	Nominal capacity
No.1	4,550m³	10,000 tons/day
No.2	5,400m³	11,200 tons/day
No.3	4,500m³	10,000 tons/day

STEELMAKING FACILITIES

● STEELMAKING PLANT

Within the torpedo car, molten iron still contains carbon, phosphorus, silicon, sulphur, and other impurities that must be either adjusted or removed. Desulphurization and dephosphorization devices provided in the torpedo car enable the removal of a portion of the phosphorus, silicon and sulphur before the molten iron arrives at the basic oxygen furnace. Inside the furnace, pure oxygen is blown on the surface of molten iron and simultaneously inert gas is blown into the molten iron through bottom tuyeres to adjust the carbon content and temperature as well as to remove impurities. The resulting molten steel is then refined by LF, CAS or RH degassers.

Facilities	Number	Heat capacity	Nominal capacity
Basic oxygen furnace (LD-OTB)	3	250 tons	567,000 tons/month

CONTINUOUS CASTING FACILITIES

● CONTINUOUS CASTING EQUIPMENT

After refining, molten steel is continuous- ly cast to produce such high-quality semi-finished products as slabs and blooms.
This streamlined production process eliminates the ingot making and blooming stages and results in energy savings as well as improved yields.
Kakogawa Works has four Kobe Steel-made continuous casting systems: three for producing slabs and two for producing blooms.

Facilities		Nominal capacity
No.2 (bloom)		140,000 tons/month
No.3 (slab)		220,000 tons/month
No.4 (slab)	1 strand	105,000 tons/month
	2 strand	135,000 tons/month
No.6(bloom)		140,000 tons/month

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