Equipment and Technology

Advancing development of environment-friendly, high-value-added products

Equipment and operational technologies

The major types of steel production equipment installed at the end of 2005 consisted of 28 blast furnaces, 63 basic oxygen furnaces, and 349 electric furnaces. A comparison with the status at the end of 2001 shows a particular concentration of electric furnaces.

In ironmaking, blast furnace capacity has been expanded as a result of relinings carried out in recent years. The average capacity of blast furnaces in operation in Japan now exceeds 4,000 m^3. Also, the pulverized coal injection (PCI) ratio has dropped to 118 kg/ton of pig iron because of recent increases in production runs and BF repairs. In 2004, three blast furnaces were relined.

In steelmaking, efforts are being made to further improve productivity and enhance product quality. To this end, steelmakers are working to upgrade BF hot metal pretreatment technology, BOF operation technology, and secondary refining technology such as vacuum treatment.

Moreover, technology is under development for recycling BF, BOF, and EF dust, sludge from rolling mills and the like, as raw materials in iron- and steelmaking processes. Applications to actual equipment have gone into operation one after another. Further, waste plastics and tires disposed of by communities and other industries are reused as they are recycled as energy resources in such production facilities as blast furnaces and coke ovens. Thus these technologies are meant to contribute to addressing global warming.

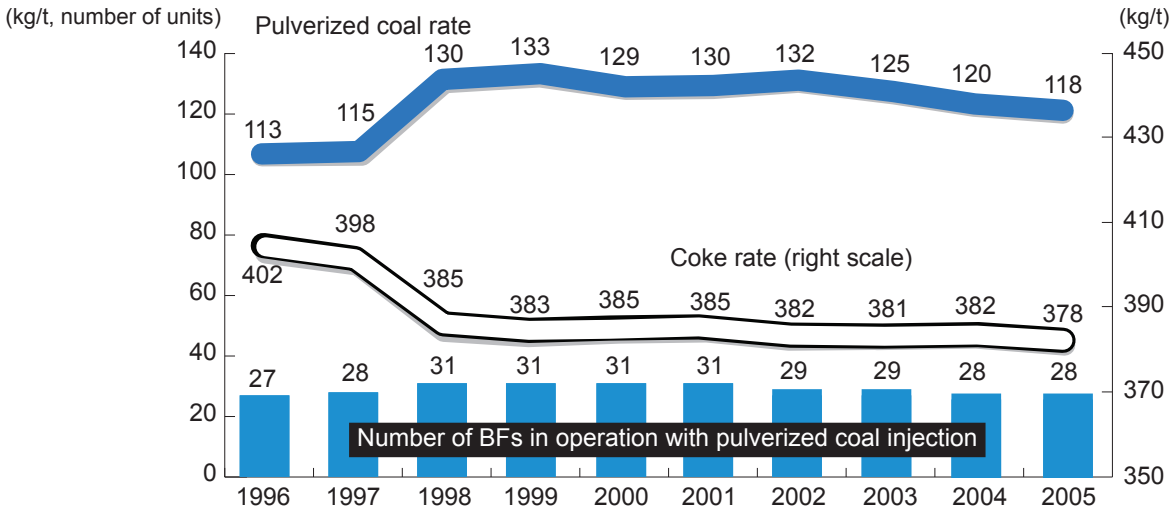
・ Furnaces and Continuous Casting Machines

(Number of units)

Equipment \ Year	2001	2002	2003	2004	2005
Blast furnaces	38	35	30*	28	28
(No. of BFs in operation)	31	29	29	28	28
Basic oxygen furnaces	64	63	62	62	63
Electric furnaces	407	366	354	353	349
Continuous casting machines	135	134	133	133	131

Source: Ministry of Economy, Trade and Industry
* BFs shut down for a long time are excluded in 2003.

· BFs in Operation with Pulverized Coal Injection, Pulverized Coal Rate and Coke Rate



Source: The Japan Iron and Steel Federation

· Rates of Raw Material and Fuel Consumption by Blast Furnace Operations

Item	Year	2001	2002	2003	2004	2005
Pig iron output rate (t/m³/day)		1.95	1.93	2.04	2.02	2.03
Raw material consumption	Sintered ore (kg/t)	1,201	1,193	1,177	1,166	1,182
	Pellets (kg/t)	104	94	85	99	93
	Iron ore (kg/t)	314	328	348	338	333
Ore rate (kg/t)		1,619	1,615	1,610	1,603	1,608
Fuel rates	Coke rate (kg/t)	385	384	381	382	378
	Pulverized coal rate (kg/t)	130	129	125	120	118
	Total (kg/t)	515	513	506	502	496

Source: The Japan Iron and Steel Federation

Research and development

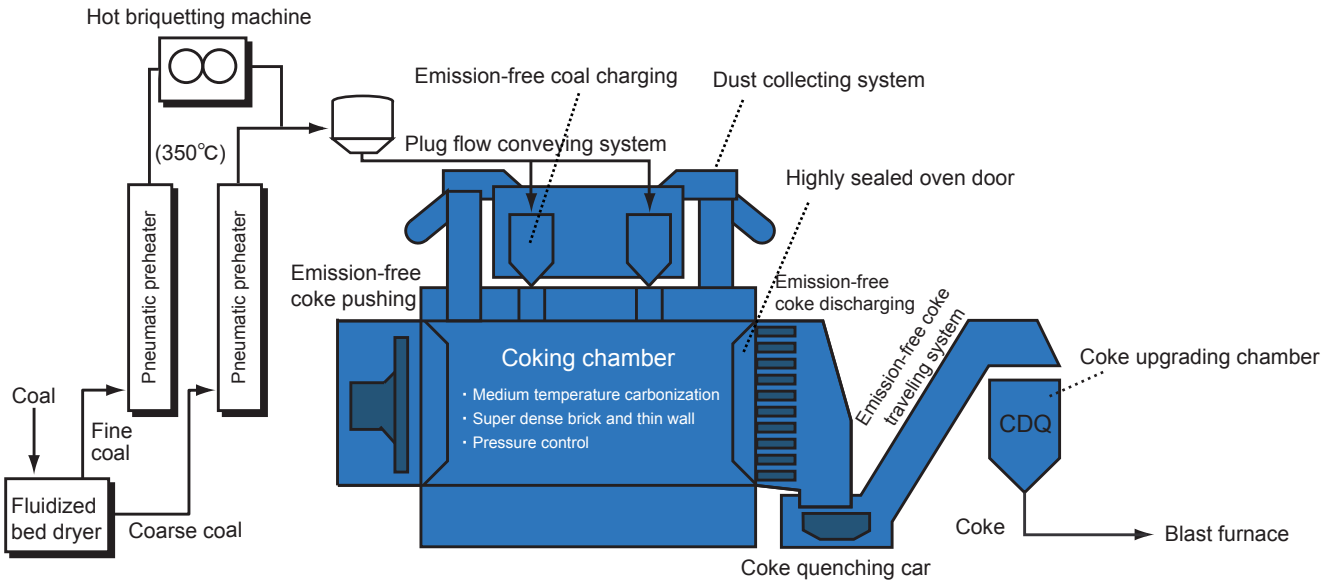
SCOPE 21 (Super Coke Oven for Productivity and Environment Enhancement in the 21st Century) was successfully completed in fiscal 2003. This was a national project to develop an innovative, next-generation coke oven process that features environmental friendliness, energy-saving, and high productivity. In fiscal 2006, Nippon Steel Corporation plans to start constructing a new coke oven at its Oita Works that applies the technology.

With the basic research stage of the research and development of Ultra Steel already completed, studies are currently under way to put the steel into practical use. The new steel offers twice the strength of ordinary structural steel and more than double its service life.

Many other innovative R&D programs are also being carried out. These include development of technology for producing hydrogen by reforming coke oven gas and basic technology for creating ultrafine-grained steel, as well as R&D aimed at making effective use of steel slag in marine areas.

Meanwhile, R&D efforts are under way to develop environment-friendly, high-value-added new products. Among them are high-strength steel featuring excellent press formability and weldability, weather-resistant steel offering outstanding corrosion resistance, coated sheets that provide excellent characteristics without containing environment-loading substances such as chromium and lead, and steel products with surface coatings that offer enhanced fungus resistance, heat radiation, and light reflection. These products have been commercialized one after another.

· SCOPE 21 Process Flow



Source: The Japan Iron and Steel Federation