

# IRON AND STEEL

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The U.S. steel industry was adversely affected by the 1997 Asian financial crisis as Asian demand for steel and ferrous scrap declined, Asian currency exchange rates declined, and inexpensive steel became available for export to U.S. markets from excess Asian steel-producing capacity. Domestic steel product manufacturers welcomed inexpensive imports, but domestic steel producers were forced to reduce production and scrap consumption, which led to an oversupply of scrap and a plunge of steel and scrap prices. Through 1999, the steel-producing and scrap industries were on the rebound owing primarily to resurging Asian economies and increasing steel demand in Asia and the United States. As 2000 began, steel producers and scrap suppliers were increasingly optimistic that they were on track for a slow but certain recovery to precrisis economic levels. However, to the detriment of these sectors, the U.S. 117-month economic expansion—the longest in U.S. history, beginning in March 1991—was showing signs of weakening. The nation's economy displayed an annual growth rate of 5.2% in the first half of the year, 1.6% in the second half of the year, and only 1% in the fourth quarter—the weakest performance since the second quarter of 1995 (Leo Kamp, The 2001 economy overview, TIAA-CREF Web Center, accessed October 12, 2001, at URL [http://www.tiaa-cref.org/siteline/archive/gen0104\\_065.html](http://www.tiaa-cref.org/siteline/archive/gen0104_065.html)). Concurrently, prices of electricity and natural gas were increasing significantly, and steel imports,

which declined in 1999 below the 1998 level, began to increase again in 2000. Prices for steel products and ferrous scrap again plunged to record levels. Although for relief the U.S. steel industry filed trade cases against dumped hot-rolled carbon steel from 11 countries, it was becoming clear that a more fundamental problem was that the world had excess steelmaking capacity. Steelmakers can produce 15% more steel than the world market demands, but are adding 2% more capacity each year (Iron and Steelmaker, 2001; Matthews, 2000). Data regarding U.S. production of iron and steel and shipments of steel mill products were reported by the American Iron and Steel Institute (AISI). These data can be regarded as representing 100% of the raw steel producers in the United States. World production of iron and steel is reported by the International Iron and Steel Institute (IISI) and by foreign government agencies. Consistent with international usage and Federal Government policy, the U.S. Geological Survey reported all data on iron and steel in metric units, unless otherwise noted.

## Environment

In December, the U.S. Environmental Protection Agency (EPA) proposed new waste water release and treatment standards for iron and steel manufacturing facilities involved in cokemaking, ironmaking, integrated and nonintegrated

## Steel in the 20th Century

By early 1900, the United States led the world in steel production contributing about 36% of the world's output, followed by the German Empire (23%), the United Kingdom (17%), and Russia (10%). The Bessemer, open hearth, and crucible furnaces were used in the United States for 67%, 32%, and 1%, respectively, of steel production. Iron and steel scrap was usually 45% to 55% of the charge used in open hearth furnaces, although a 100% scrap charge was possible. Industries in the United States entered a period of extraordinary prosperity beginning in 1899. Labor, both skilled and unskilled, had never been in greater demand in the United States, and wages increased significantly. Demand for all types of manufactured products increased as labor wages increased, and mills and factories operated at their fullest capacities to satisfy demand. The steel industry shared in this prosperity because it satisfied a growing demand for steel in consumer goods; locomotives, rail cars, and rails for expanding railroads; railroad and road bridges; ships; public buildings; electricity generation plants; and water supply facilities. Imports of steel mill products (1.8 million tons) exceeded exports (0.7 million tons) as domestic demand for U.S. steel increased and European demand decreased.

In 2000, the United States ranked third in the world as a

producer, accounting for 12% of world production. The steel production of China and Japan exceeded that of the United States with 15% and 13% of world output, respectively. The Bessemer, open hearth, and crucible furnaces were replaced in the steelmaking process by the basic oxygen and electric arc furnaces, which made 53% and 46% of U.S. steel production, respectively. The charge of the electric arc furnaces was usually nearly 100% iron and steel scrap. January 2000 marked the 105th month of an unprecedented period of economic growth, during which U.S. industry, including the steel sector, successfully met the challenges of high domestic demand and global competition. The prosperity of steelmakers was marred when declining Asian demand for steel, excess Asian steel-producing capacity, and unusually low steel prices that began with the Asian financial crisis of 1997 brought about a major influx of steel from Asia to the United States. Imports of steel mill products (34.4 million tons) exceeded exports (5.9 million tons) in 2000 and accounted for 29% of U.S. apparent consumption of steel. Domestic steel producers sought relief in the form of tariffs and quotas imposed by the U.S. International Trade Commission in an effort to reduce imports.

steelmaking, steel finishing, direct-iron reduction and briquetting, and forging (Bourge, 2001). EPA estimates that the changes would reduce pollution by at least 952,000 metric tons per year with the value of benefits ranging from \$1.1 million to \$2.7 million. Estimated compliance costs range from \$56.5 million to \$61.4 million per year.

## Production

Production of raw steel in the United States increased to 102 million metric tons (Mt) from 97.4 Mt in 1999 (table 1). AISI estimated raw steel production capability to be 118 Mt, up from 116 Mt (revised) in 1999. Production represented 86.1% of estimated capability, compared with 83.8% in 1999.

Integrated steel producers smelted iron ores to liquid iron in blast furnaces and used basic oxygen furnaces to refine this iron with some scrap to produce raw liquid steel. The basic oxygen process was used to make 54.0 Mt of steel (American Iron and Steel Institute, 2000, p. 74). The use of this process declined slightly to 53.0% of total steel production in 2000 from 53.8% in 1999. The integrated steel industry in the United States consisted of 13 companies operating ironmaking and steelmaking facilities at 19 locations (Iron and Steelmaker, 2000). Several of these companies also operated nonintegrated plants and/or other steelmaking facilities at the same locations.

Minimills and specialty mills are nonintegrated steel producers that use electric arc furnaces (EAFs) to melt low-cost raw materials (usually scrap). They also employ continuous casting machines and a hot-rolling mill that are often closely coupled to the casting operation. Specialty mills include producers of stainless, alloy-electrical, and tool steel; high-temperature alloys; forged ingots; and other low-volume steel products. The nonintegrated sector of the industry, 79 companies having 120 steelmaking plants, used the EAF steelmaking process to produce 47.8 Mt of steel, an increase of about 6% compared with that of 1999, and accounted for 47% of total steelmaking (American Iron and Steel Institute, 2000, p. 74; Iron and Steelmaker, 2001).

Raw liquid steel is mostly cast into semifinished products in continuous casting machines. Only 3.6% of U.S. production was cast in ingot form and subsequently rolled into semifinished forms; this represented a decrease of nearly 8% compared with that of 1999. Continuous casting production was 98.1 Mt, or 96.4% of total steel production, compared with 93.4 Mt, or 95.9%, in 1999 (American Iron and Steel Institute, 2000, p. 75).

## Consumption

Steel mill products are produced at a steel mill either by forging or rolling into forms normally delivered for fabrication or use. Some companies purchase semifinished steel mill products from other steel companies and use them to produce finished steel products. To avoid double counting steel mill product shipments under these circumstances, steel mills identify any shipments of steel mill products to other companies that are reporters of steel mill product shipments. The accumulated shipments of all companies less the shipments to other reporting companies are identified as “net” shipments.

The 6-year trend of steadily increasing net shipments of steel products to satisfy domestic demand ended in 1998, but resumed its upward course in 1999 and 2000 (American Iron and Steel Institute, 2000, p. 27). Shipments of steel mill products by U.S. companies increased by 2.7%, to 98.9 Mt, compared with those

of 1999. Export shipments by AISI reporting companies increased to 5.9 Mt from 4.9 Mt in 1999 (American Iron and Steel Institute, 2000, p. 45). Shipments to domestic customers increased by 2.3% during 2000 (American Iron and Steel Institute, 2000, p. 30). Shipments of construction and contractors’ products, the largest single end-use market, increased 10%. Automotive product shipments decreased by 4.2%. Oil and gas, mining, quarrying, and lumbering industries shipments increased by 29%. Shipments of industrial and agricultural machinery, equipment, and tools decreased 8.4%. Steel service center shipments, appliance shipments, and containers, packaging, and shipping material shipments increased by 5.9%.

## Prices

The Bureau of Labor Statistics Producer Price Index for steel mill products was up 3% to 108.4 from 105.3 in 1999 (1982 base=100) (Bureau of Labor Statistics, Producer Price Index-Commodities, accessed June 17, 2001, at URL <http://146.142.4.24/cgi-bin/surveymost>). The index increased steadily from about 105 throughout 1999 to a high of 110.2 in May 2000 and then decreased steadily to 105.5 at the end of 2000.

## Foreign Trade

Exports of steel mill products increased to 5.9 Mt from 4.9 Mt in 1999 (American Iron and Steel Institute, 2000, p. 45). Canada again received the largest amount of U.S. exported steel, 3.8 Mt, up from 3.2 Mt in 1999. Mexico was again in second place, receiving 1.3 Mt, up from 1.1 Mt in 1999. Imports of steel mill products increased by 6.1% to 34.4 Mt from 32.4 Mt in 1999 (American Iron and Steel Institute, 2000, p. 55). Brazil, Canada, the European Union (EU), Japan, the Republic of Korea, Mexico, and Russia were major sources of steel mill product imports.

Despite rising domestic steel mill capacity, imports of steel mill products have increased 140% since 1991 and imports of semifinished steel have nearly tripled. Domestic producers have been unable to keep up with demand for semifinished products and finished steel, and an unfavorable currency exchange rate has made foreign steel prices much more competitive. Although U.S. steelmakers have viewed imported finished steel as competing directly with domestic products, imports of semifinished products have not been perceived as rivals. This dichotomy is based on the need for imported semifinished steel to make up for the domestic shortage of hot-metal capacity to satisfy the U.S. market demand for finished steel mill products.

Imports of semifinished steel by steel companies must be taken into consideration in evaluating apparent consumption (supply) of steel mill products in the United States and the share of the market represented by imported steel. To avoid double counting the imported semifinished steel and the products produced from it, the amount of semifinished steel consumed by companies that also produced raw steel must be subtracted from domestic consumption. Between 1993 and 1998, annual imports were estimated to be 2.5 Mt to 7.8 Mt. Prior to 1993, the annual amount was less than 0.2 Mt. By taking the import semifinished steel into consideration, the share of the U.S. steel market represented by imported steel was an estimated 29% in 2000 compared with 28% in 1999.

Regarding the reporting of imports and exports, “fabricated steel products” are produced from steel mill products, but do not

include products that incorporate steel products with other materials. Examples of fabricated steel products are fabricated structural steel and steel fasteners. "Other iron and steel products" refer to products that are not produced from steel mill products. Examples of other iron and steel products include iron or steel castings and direct reduced iron (DRI).

The year 1997 was the first time the AISI reported an indirect steel trade surplus since AISI began tracking the measurement in 1984. The measurement (comprising imports minus exports of steel-containing products by world areas and steel-consuming markets, expressed in metric tons of steel) accounts for virtually all products made with steel, such as automobiles, machine tools, and appliances. According to AISI, this surplus of 1.1 Mt, when compared with the 1986 indirect steel-trade deficit of 8.4 Mt, confirmed that in 1997 U.S. manufacturers were among the world's most competitive producers of high-quality, steel-containing goods. This surplus was followed by 3 years of increasing deficits—1.2 Mt, 4.7 Mt, and 5.8 Mt in 1998, 1999, and 2000, respectively.

## World Review

World production of pig iron totaled about 571 Mt, 6.1% greater than that of 1999 (table 10). In Asia, China continued to be the leading producer of pig iron in the world, producing more than 131 Mt, a 4.8% increase from that of 1999. Japan and the United States followed with 81 Mt and 48 Mt, respectively. The Republic of Korea's production increased slightly. Russia and Ukraine were the only major pig iron producers in the Commonwealth of Independent States (CIS). Production in Russia increased by 9% since 1999 and was the highest in the past 5 years. During 2000, Ukrainian production continued a rising 5-year trend. In North America, the only major producer of pig iron was the United States, where production was 3% more than that of 1999. In South America, the only major pig iron producer was Brazil, producing nearly 28 Mt. Germany was the top producer in the EU producing about the same as in 1999. India's production increased by more than 6% of that of 1999.

DRI production worldwide was about 42 Mt, a 9% increase from that of 1999, and a 27% increase compared with that of 1996 (table 10). The leading technology was the Midrex process, followed by the HYL I and the HYL III processes. Because of the demand for charge materials and the growth of thin-slab casting, interest in DRI by steel producers continued to increase. The leading producer was Venezuela, followed by Mexico, India, and Iran (table 10). World capacity for DRI production was estimated to be nearly 52 million metric tons per year (Midrex Direct Reduction Corp., 2000). Additional DRI capacity of nearly 1.4 Mt was under construction in Iran and the Republic of Korea.

World production of crude steel exceeded 845 Mt, a 7.0% increase from the 789 Mt (revised) produced during 1999 (table 11). As in previous years, production varied widely among major regions of the world. Asian countries produced about 38% of the world's steel; the EU, 17%; and North America, 14%. During 2000, China was again the world's leading steel producer, exceeding 127 Mt, a gain of more than 2% compared with that of 1999. In descending order, the leading producers behind China were the United States, Japan, Russia, Germany, and the Republic of Korea. These six countries accounted for more than one-half of the world production. The combined steel production of the seven steel-producing countries in the CIS was over 98 Mt, an increase of nearly 18% compared with that of

1999. Russia and Ukraine remained the top producers, continuing to increase production over recent lows in 1998 (table 11).

## Outlook

For 2001, the IISI forecast increasing world steel consumption of about 2.3% from that of 2000 (Steel Times International, 2000). The independent steel research unit, World Steel Dynamics, forecast that global demand for steel products will increase at a rate of 2.6% per year to 2010 (Kakela, 2000, p. 6). According to IISI, apparent consumption in the United States will decrease about 0.1%. Apparent consumption will increase, according to the IISI, in Brazil by 6.3%; the Republic of Korea, 4.7%; China, 7.3%; the EU, 0.4%; the CIS, 1.2%; and other Europe, 5.0%. Consumption will decrease in Japan by 0.7%. The IISI also predicted that by 2005 apparent consumption will increase more than that of 2001 in China, 3.8%; other Europe, 3%; the CIS, 2.8%; the EU, 0.8%; and North America, 0.9%. Consumption will decrease in Japan by 1%.

At the close of 2000, Government and industry economists and steel industry analysts were beginning to suspect that the record-breaking business expansion might be coming to an end. At the time of the Asian financial crisis of 1997-98, the U.S. economy was growing at a rate of about 5% per year and steel demand was very strong. By the end of 2000, the growth rate had declined by nearly one-half and demand for steel had diminished (Sacco, 2000). It was becoming increasingly apparent that the health of the domestic steel industry might improve, not by continuing to rely on antidumping trade laws, but by the consolidation of mills, especially the integrated mills, and even, perhaps, the minimills (Robertson, 2000). Large companies formed by the consolidation of small capitalization companies should be able to reduce overhead, achieve purchasing scale, eliminate unnecessary product duplication, and control pricing better while attracting investors to finance modernization. Only by closing inefficient capacity, reducing costs, adopting the latest steelmaking technology, and improving return on invested capital will these new companies become competitive with foreign mills. The industry would also need to decide whether it wants to produce less raw steel than domestic demand requires and continue to import supplementary quantities of semifinished steel to emphasize downstream product lines (Berry, 2001). To some observers, relinquishing significant raw steelmaking capacity to foreign countries by closing down coke ovens and blast furnaces raises national security concerns.

Minimills continued to improve efficiency and competitive capability, which supports the commonly held view that the EAF will eventually be the primary steel production method in the United States and the world. At least in the United States, blast furnaces will continue to face closure because of environmental restrictions, U.S. steelmakers are increasingly reluctant to make long-term maintenance expenditures on blast furnaces, and the EAF is more energy efficient and pollution free. Minimills cost less to build and operate, are more flexible in satisfying customer requirements, and satisfy the growing demand for recycling. Minimills will increase their efforts to conserve energy, which is about 75% less than for integrated mills. The minimills will increase usage of some form of iron—DRI, pig iron, hot metal—with the scrap charge to improve the quality of the steel they produce to serve broader

markets. Thin slab casting in minimills eliminated the need for traditional hot-rolling facilities to reduce slab to hot-rolled sheet. Similarly, newly developing thin-strip casting may produce light-gauge sheet steel without several hot and cold reduction steps. This new technology will reduce the need for capital investment and will enable minimills to enter new markets.

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TABLE 1  
SALIENT IRON AND STEEL STATISTICS 1/

(Thousand metric tons)

	1996	1997	1998	1999	2000
United States:					
Pig iron:					
Production 2/	49,400	49,600	48,200	46,300	47,900
Exports 3/	60	86	87	82 r/	72
Imports for consumption 3/	2,660	3,150	5,140	4,990	4,970
Direct-reduced iron:					
Production 4/	450	510	1,600	1,670	1,560
Exports 3/	3	8	5	3	2
Imports for consumption 3/	1,050	987	939	950	988
Raw steel production: 5/					
Carbon steel	84,900	87,000	88,000	87,600	92,500
Stainless steel	1,870	2,160	2,010	2,190	2,190
All other alloy steel	8,710	9,290	8,600	7,650	7,510
Total	95,500	98,500	98,600	97,400	102,000
Capacity utilization, percent	91	89	87	84	86
Steel mill products:					
Net shipments 2/	91,500	96,000	92,900	96,300	98,900
Exports 3/	4,560	5,470	5,010	4,920	5,920
Imports 3/	26,500	28,300	37,700	32,400	34,400
Producer price index for steel mill products (1982=100.0) 6/	115.6	116.4	113.8	105.3	108.4
World production: 7/					
Pig iron	516,000 r/	540,000 r/	534,000 r/	538,000 r/	571,000
Direct-reduced iron 4/	33,000 r/	36,200 r/	378,000 r/	38,000 r/	41,900
Raw steel	751,000	797,000	776,000	789,000 r/	846,000

NA Not available. r/ Revised.

1/ Data are rounded to three significant digits, except prices; may not add to totals shown.

2/ Data from American Iron and Steel Institute (AISI).

3/ Data from U.S. Census Bureau.

4/ Data from Midrex Direct Reduction Corp., government, and companies.

5/ Raw steel is defined by AISI as steel in the first solid state after melting, suitable for rolling.

6/ Data from Bureau of Labor Statistics.

7/ Data from U.S. Geological Survey and International Iron and Steel Institute.

TABLE 2  
MATERIALS CONSUMED IN BLAST FURNACES AND PIG IRON PRODUCED 1/

(Thousand metric tons)

Material	1999	2000
Iron oxides: 2/		
Ores	645	345
Pellets	59,400	61,800
Sinter 3/	10,900	10,600
Total	70,900	72,800
Scrap 4/	1,550	1,470
Coke 2/	18,700	19,200
Pig iron produced	46,300	47,900

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ American Iron and Steel Institute.

3/ Includes sintered ore and pellet fines, dust, mill scale, and other revert iron-bearing materials; also some nodules.

4/ Mainly briquetted turnings and borings, shredded scrap, etc.; scrap produced at blast furnaces and remelt not included.

TABLE 3  
DISTRIBUTION OF SHIPMENTS OF STEEL MILL PRODUCTS, BY STEEL TYPE, PRODUCT, AND MARKET 1/

	Quantity (thousand metric tons)		Quantity (percentage)	
	1999	2000	1999	2000
<b>Shipments by steel type:</b>				
Carbon steel	89,500	92,100	92.9	93.1
Alloy steel	4,920	4,880	5.1	4.9
Stainless steel	1,890	1,930	2.0	1.9
Total	96,300	98,900	100.0	100.0
<b>Steel mill products:</b>				
Ingots, blooms, billets and slabs	1,020	1,220	1.06	1.24
Wire rods	4,750	4,420	4.94	4.47
Structural shapes-heavy	5,200	6,040	5.40	6.10
Steel piling	363	--	.38	--
Plates-cut lengths	4,530	5,100	4.70	5.16
Plates-in coils	2,910	2,990	3.02	3.02
Rails	454	593	.47	0.60
Railroad accessories	121	144	.13	0.15
Bars, hot-rolled	7,160	6,990	7.44	7.07
Bars, light-shaped	2,140	1,410	2.22	1.43
Bars, reinforcing	5,940	6,270	6.16	6.33
Bars, cold finished	1,640	1,580	1.70	1.60
Tool steel	48	41	.05	0.04
Pipe and tubing-standard pipe	1,140	1,210	1.18	1.22
Pipe and tubing-oil country goods	895	1,620	.93	1.64
Pipe and tubing-line pipe	1,230	885	1.27	0.89
Pipe and tubing-mechanical tubing	885	943	.92	0.95
Pipe and tubing-pressure tubing	20	34	.02	0.03
Pipe and tubing-stainless	19	15	.02	0.02
Pipe and tubing-structural	108	136	.11	0.14
Pipe for piling	44	36	.05	0.04
Wire	579	526	.60	0.53
Tin mill products-blackplate	210	285	.22	0.29
Tin mill products-tinplate	2,370	2,290	2.46	2.31
Tin mill products-tin-free steel	747	739	.78	0.75
Tin mill products-tin coated sheets	90	82	.09	0.08
Sheets, hot-rolled	16,900	17,900	17.60	18.13
Sheets, cold-rolled	12,700	13,500	13.17	13.62
Sheets, and strip hot dip galvanized	13,500	13,500	14.01	13.64
Sheets, and strip electrogalvanized	3,420	3,170	3.55	3.21
Sheets, and strip other metallic coated	1,910	1,940	1.98	1.96
Sheets, and strip electrical	510	480	.53	0.49
Strip, hot rolled	890	788	.92	0.80
Strip, cold rolled	1,860	2,050	1.93	2.07
Total	96,300	98,900	100.00	100.00
<b>Shipments by markets:</b>				
Service centers and distributors	25,500	27,300	26.45	27.61
Construction	16,700	18,400	17.35	18.61
Automotive	15,200	14,600	15.79	14.73
Machinery	1,560	1,620	1.62	1.64
Containers	3,490	3,360	3.62	3.40
All others	33,900	33,600	35.17	34.02
Total	96,300	98,900	100.00	100.00

-- Zero.

1/ Data are rounded to no more than three significant digits, except percentages; may not add to totals shown.

Source: American Iron and Steel Institute.

TABLE 4  
U.S. IMPORTS AND EXPORTS OF STEEL MILL PRODUCTS, BY COUNTRY 1/

(Thousand metric tons)

Country	1999		2000	
	Imports	Exports	Imports	Exports
Argentina	437	8	417	4
Australia	850	6	737	5
Brazil	3,440	10	3,280	16
Canada	4,570	3,230	4,770	3,790
China	698	24	1,350	24
European Union	6,010	201	6,400	281
Finland	222	1	--	1
Japan	2,780	9	1,930	14
Korea, Republic of	2,670	11	2,430	20
Mexico	3,190	1,050	2,950	1,350
Russia	1,140	--	1,370	--
South Africa	535	3	585	3
Sweden	183	2	175	1
Taiwan	876	8	1,150	12
Turkey	364	--	609	--
Ukraine	713	--	1,410	--
Venezuela	468	24	433	30
Other	3,260	333	4,430	375
Total	32,400	4,920	34,400	5,920

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

Source: American Iron and Steel Institute.

TABLE 5  
U.S. EXPORTS OF IRON AND STEEL PRODUCTS 1/

(Thousand metric tons)

	1999	2000
<b>Steel mill products:</b>		
Ingots, blooms, billets, slabs	125	102
Wire rods	63	58
Structural shapes-heavy	376	346
Steel piling	14	25
Plates-cut lengths	371	466
Plates-in coils	207	401
Rails-standard	14	28
Rails-other	10	6
Railroad accessories	12	15
Bars, hot-rolled	343	386
Bars, light-shaped	101	104
Bars, concrete reinforcing	116	117
Bars, cold-finished	99	118
Tool steel	12	9
Pipe and tubing-standard pipe	59	74
Pipe and tubing-oil country goods	142	157
Pipe and tubing-line pipe	173	161
Pipe and tubing-mechanical tubing	5	5
Pipe and tubing-stainless	27	37
Pipe and tubing-nonclassified	293	341
Pipe and tubing-structural	82	116
Pipe for piling	4	3
Wire	149	146
Tin mill products-blackplate	11	5
Tin mill products-tinplate	265	289
Tin mill products-tin-free steel	30	47
Sheets, hot-rolled	337	448
Sheets, cold-rolled	502	638
Sheets, and strip-hot-dip galvanized	252	417
Sheets, and strip-electrogalvanized	199	262
Sheets, and strip-other metallic coated	144	155
Sheets, and strip-electrical	74	60
Strip, hot-rolled	87	102
Strip, cold-rolled	223	278
Total	4,920	5,920
<b>Fabricated steel products:</b>		
Structural shapes-fabricated	263	244
Rails-used	26	33
Railroad products	63	48
Wire rope	13	14
Wire-stranded products	40	41
Wire-other products	18	51
Springs	110	96
Nails and staples	31	28
Fasteners	423	339
Chains and parts	24	27
Grinding balls	19	33
Pipe and tube fittings	32	33
Other 2/	56	61
Total	1,120	1,050
Grand total	6,040	6,970
<b>Cast iron and steel products:</b>		
Cast steel pipe fittings	32	33
Cast iron pipe and fittings	73	65
Cast steel rolls	15	18
Cast grinding balls	17	12
Granules-shot and grit	27	29
Other castings	39	45
Total	203	202

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes shapes-cold formed, sashes and frames, fence and sign post, and architectural and ornamental work, and conduit.

Source: American Iron and Steel Institute.

TABLE 6  
U.S. IMPORTS OF MAJOR IRON AND STEEL PRODUCTS 1/

(Thousand metric tons)

	1999	2000
<b>Steel mill products:</b>		
Ingots, blooms, billets and slabs	7,780	7,760
Wire rods	2,510	2,700
Structural shapes-heavy	1,290	1,760
Steel piling	118	182
Plates-cut lengths	829	897
Plates-in coils	1,440	1,410
Rails and railroad accessories	258	249
Bars, hot-rolled	1,360	1,580
Bars, light-shaped	265	319
Bars, reinforcing	1,660	1,520
Bars, cold-finished	277	373
Tool steel	149	162
Pipe and tubing-standard pipe	777	1,160
Pipe and tubing-oil country goods	154	653
Pipe and tubing-line pipe	842	809
Pipe and tubing-mechanical tubing	399	510
Pipe and tubing-pressure tubing	47	51
Pipe and tubing-stainless	76	88
Pipe and tubing-nonclassified	25	25
Pipe and tubing-structural	431	476
Pipe for piling	19	34
Wire	670	669
Tin mill products-blackplate	151	131
Tin mill products-tinplate	447	359
Tin mill products-tin-free steel	186	167
Sheets, hot-rolled	4,500	5,360
Sheets, cold-rolled	3,100	2,630
Sheets, and strip-hot-dip galvanized	1,910	1,590
Sheets, and strip-electrogalvanized	171	236
Sheets, and strip-other metallic coated	209	237
Sheets, and strip-electrical	104	111
Strip, hot-rolled	73	59
Strip, cold-rolled	181	165
Total	32,400	34,400
<b>Fabricated steel products:</b>		
Structural shapes-fabricated	532	639
Rails-used	348	271
Railroad products	115	102
Wire rope	104	100
Wire-stranded products	172	179
Springs	517	523
Nails and staples	545	573
Fasteners	1,030	1,170
Chains and parts	95	99
Pipe and tube fittings	125	148
Other	439	436
Total	4,020	4,240
Grand total	36,400	38,700
<b>Cast iron and steel products:</b>		
Cast steel pipe fittings	125	148
Cast iron pipe and fittings	42	40
Other products	338	369
Total	505	557

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

Source: American Iron and Steel Institute.

TABLE 7  
U.S. IMPORTS OF STAINLESS STEEL 1/

(Metric tons)

Product	1999	2000
Semifinished	313,000	312,000
Plate	68,100	74,200
Sheet and strip	72,500	55,500
Bars and shapes	86,800	126,000
Wire and wire rods	79,800	102,000
Pipe and tube	75,600	87,700
Total	696,000	757,000

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

Source: American Iron and Steel Institute.

TABLE 8  
U.S. SHIPMENTS OF IRON AND STEEL CASTINGS 1/

(Thousand metric tons)

	1999	2000
Ductile iron castings	4,230	4,140
Gray iron castings	5,400	5,220
Malleable iron castings	188	169
Steel castings	1,090	943
Steel investment castings	69	78
Total	11,000	10,600

1/ Data are rounded to no more than three significant digits; may not add to totals shown

Source: U.S. Census Bureau.

TABLE 9  
COAL AND COKE AT COKE PLANTS 1/ 2/

(Thousand metric tons)

	1999	2000
Coal, consumption	25,500	26,600
Coke: 3/		
Production	18,200	19,100
Exports	814	1,040
Imports	2,920	3,430
Consumption, apparent	20,300	21,300

1/ Data are rounded to no more than three significant digits.

2/ Includes furnace and merchant coke plants.

3/ Coke production and consumption do not include breeze.

Source: Energy Information Administration, Quarterly Coal Report, DOE/EIA-0121 (2000/4Q)

TABLE 10  
 PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/ 4/

(Thousand metric tons)

Country 5/	1996	1997	1998	1999	2000
Albania e/	10	10	10	10	10
Algeria e/	800	700	700	500	500
Argentina:					
Pig iron	1,966	2,080 r/	2,122 r/	1,985 r/	2,188 p/
Direct-reduced iron	1,422	1,496 r/	1,538	989 r/	1,420 p/
Australia	7,774	7,884	7,724	7,468 r/	7,000 e/
Austria	3,416	3,965	4,022	3,913	4,318
Belgium	8,628	8,077	8,730	8,472	8,472
Bosnia and Herzegovina e/	100	100	100	100	100
Brazil:					
Pig iron	23,978	25,013	25,111	25,060	27,723
Direct-reduced iron	335	323	336	400	418
Bulgaria	1,513	1,644	1,389	1,130	1,220
Burma:					
Pig iron	1	--	2	2	2
Direct-reduced iron	40	40	40 e/	40	40
Canada:					
Pig iron	8,638	8,670	8,937	8,783	8,904
Direct-reduced iron	1,420	1,390	1,240	920	1,130
Chile	996	941	993	1,033	1,026
China 6/	107,225	115,110	118,600	125,390	131,030
Colombia	286 r/	324 r/	256	264 r/	285
Czech Republic	4,898	5,195	4,982	4,022	4,621
Egypt:					
Pig iron e/	1,050	1,000	1,334 r/ 7/	700 r/	700
Direct-reduced iron	827 r/	1,190	1,610	1,670	1,530
Finland	2,457	2,786 r/	2,912 r/	2,954	2,983
France	12,108	13,424	13,603	13,854	13,621
Germany:					
Pig iron	30,012	30,939	30,162	27,931	30,846
Direct-reduced iron	370	470	450	400	400 e/
Hungary	1,496	1,141	1,258	1,309	1,340
India:					
Pig iron	19,864	19,898	20,194	20,139	21,321
Direct-reduced iron	4,830	5,250	5,260	5,220	5,440
Indonesia, direct-reduced iron e/	1,800	1,600	1,400	1,500	1,740
Iran:					
Pig iron	1,867	2,053	2,087 r/	2,147 r/	2,202
Direct-reduced iron	3,778	4,380	3,690	4,120	4,740
Italy	10,347	11,348	10,704	10,509	11,223
Japan	74,597	78,519	74,981	74,520	81,071
Kazakhstan	2,536	3,040	2,594	3,438	4,000
Korea, North e/	500	500	250	250	250
Korea, Republic of	23,010	22,712	23,229	23,329	24,937
Libya: Direct-reduced iron	862	990	1,200	1,330 r/	1,500 e/
Luxembourg 8/	829	437	--	--	--
Macedonia e/	20	--	--	--	--
Malaysia, direct-reduced iron e/	1,049 7/	1,720	1,700 r/	1,000 r/	1,200
Mexico:					
Pig iron	4,229	4,450	4,532	4,808 r/	4,856
Direct-reduced iron	3,794	4,440	5,584	6,070 r/	5,589
Morocco e/	15	15	15	15	15
Netherlands 8/	5,545	5,804	5,561	5,320	4,969
New Zealand	619	534	609	620	600 e/
Nigeria, direct-reduced iron e/	20	--	--	--	-- 7/
Norway e/	70	70	70	60	60
Pakistan e/	1,500	1,400	1,500	1,500	1,500
Paraguay	104	79 r/	66	61 r/	82
Peru:					
Pig iron	273	264	283	237	327
Direct-reduced iron	22	120	110	50	80
Poland	6,581	7,296	6,128	6,128	6,492
Portugal	421	431	365	389	382

See footnotes at end of table.

TABLE 10--Continued  
 PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/ 4/

(Thousand metric tons)

Country 5/	1996	1997	1998	1999	2000
Qatar, direct-reduced iron	632	570	706	670	620
Romania	4,025	4,557	4,541	2,969 r/	3,069
Russia:					
Pig iron	36,061	37,327	34,827	40,854 r/	44,618
Direct-reduced iron	1,500	1,730 e/	1,550	1,880	1,900 e/
Saudi Arabia, direct-reduced iron	2,296	2,110	2,268	2,343	3,090
Serbia and Montenegro	535	907	826	135	563
Slovakia	3,300 e/	3,072	2,756	2,987	3,000 e/
South Africa:					
Pig iron	6,876	6,192	5,650	4,587	4,573
Direct-reduced iron	900	1,120 r/	1,070	1,260 r/	1,530
Spain	4,128	3,926	4,278	4,146	4,059
Sweden	3,255	3,060	3,373	3,212	3,146
Switzerland e/	100	100	100	100	100
Taiwan	6,050	8,870	9,374	9,020 r/	10,927
Trinidad and Tobago, direct-reduced iron	954	1,140	1,073	1,379	1,530
Tunisia	145	153	123 r/	178	192
Turkey	490 r/	577 r/	456 r/	315 r/	300
Ukraine	18,143	20,561	20,840	21,937	25,700
United Kingdom	12,830	13,057	12,574	12,399	10,989
United States:					
Pig iron	49,400	49,600	48,200	46,300	47,900
Direct-reduced iron	450	510	1,600	1,670	1,560
Venezuela, direct-reduced iron	5,732 r/	5,608 r/	5,424 r/	5,071 r/	6,412
Zimbabwe e/	210	216	217	228	240
Grand total	549,000 r/	576,000 r/	572,000 r/	576,000 r/	612,000
Of which:					
Pig iron	516,000 r/	540,000 r/	534,000 r/	538,000 r/	571,000
Direct-reduced iron	33,000 r/	36,200 r/	37,800 r/	38,000 r/	41,900

e/ Estimated. p/ Preliminary. r/ Revised. -- Zero.

1/ World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Production is pig iron unless otherwise specified.

3/ Direct-reduced iron is obtained from ore by reduction of oxides to metal without melting.

4/ Table excludes ferroalloy production except where otherwise noted. Table includes data available through August 2, 2001.

5/ In addition to the countries listed, Vietnam has facilities to produce pig iron and may have produced limited quantities during 1996-2000, but output is not reported and available information is inadequate to make reliable estimates of output levels.

6/ Figures reported by State Statistical Bureau that the Chinese Government considers as official statistical data.

7/ Reported figure.

8/ Includes blast furnace ferroalloys.

TABLE 11  
RAW STEEL: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/

(Thousand metric tons)

Country 4/	1996	1997	1998	1999	2000
Albania e/	20	20	15	15	180
Algeria	620	427	400 e/	400 e/	400
Angola e/	9	9	9	9	9
Argentina	4,075 r/	4,169 r/	4,216 r/	3,805 r/	4,474
Australia	8,415	8,769	8,798	8,158	7,812
Austria	4,442	5,196	5,298	5,213 r/	5,725
Azerbaijan	25	25	24 e/	25 e/	25
Bangladesh e/ 5/	37	36	35	36	35
Belarus	886 e/	1,220	1,299	1,345	1,500
Belgium	10,773	10,738	11,427	10,972	11,637
Bosnia and Herzegovina e/	115	115	115	150	150
Brazil 6/	25,237	26,153	25,760	24,996	27,752
Bulgaria	2,457	2,628	2,216	1,846	1,900
Burma e/	40 7/	-- 7/	24	24	24
Canada	14,735	15,554	15,930	16,300	16,500 e/
Chile 6/	1,178	1,167	1,171	1,291 r/	1,352
China 8/	101,241	108,940	115,590	124,260	127,240
Colombia	695 r/	734 r/	636 r/	534 r/	660
Croatia	46	69	105	77	68
Cuba	231 r/	342	283 r/	303 r/	336
Czech Republic	6,257	6,495	6,498	5,613	5,700
Denmark	737	787	790	748	783
Dominican Republic	42 r/	82 r/	36 r/	43 r/	36
Ecuador	20	44	46	53	65
Egypt	2,618	2,717	2,870 r/	2,619	2,820 e/
El Salvador	41 r/	45 r/	43 r/	34 r/	41
Finland	3,301	3,687	3,932 r/	3,956	4,096
France	17,630	19,773	20,126	20,211	20,980
Georgia	85	104	50 r/ e/	100 r/ e/	-- 9/
Germany	39,791	45,009	44,046	42,056	46,376
Greece	848	1,016	1,109	951	1,056
Guatemala	--	--	--	--	152 p/
Hong Kong e/	350	350	350	450	500
Hungary	1,969	1,829	1,821	1,813	1,871
India	23,753	23,748	23,480	24,269	26,924
Indonesia e/	4,100	3,800	2,700	2,890 r/	3,010
Iran	5,415	6,322	5,608 r/	6,070 r/	6,600
Iraq e/	300	200	200	200 r/	200
Ireland	340	337	358	335 r/	375
Israel e/	246 r/	268 r/	244 r/	280 r/	285
Italy	23,922	25,537	25,798	24,964	26,544
Japan	98,801	104,545	93,548	94,192 r/	106,444
Jordan	30 e/	--	--	-- e/	--
Kazakhstan	3,142	3,900	3,089	4,116	4,770
Kenya e/	30	33	25	25	25
Korea, North e/	1,500	1,000	1,000	1,000	1,000
Korea, Republic of	38,903	42,554	39,896	41,042	43,107
Latvia	293	465 r/	469 r/	484 r/	500
Libya	863 e/	897	925 r/	945	1,055
Luxembourg	2,501	2,580	2,592	2,477	2,571
Macedonia	27	30 e/	--	-- e/	--
Malaysia	3,216	2,962	1,921 r/	2,200 r/	2,430
Mexico	13,172 r/	14,218 r/	14,182 r/	15,243 r/	15,659
Moldova	646	810	718	796	905
Morocco e/	5	5	5	5	5
Netherlands	6,325	6,640	6,379	6,075	5,667
New Zealand	680	680	756	744	765
Nigeria e/	--	--	2	--	--
Norway	511	570	644	611	620
Pakistan	416	479	494	500 e/	500 e/
Paraguay	96	66	56	56 r/	77
Peru	678	607	631	559 r/	749
Philippines	920	950	880 r/	530 r/	530 e/

See footnotes at end of table.

TABLE 11--Continued  
RAW STEEL: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/

(Thousand metric tons)

Country 4/	1996	1997	1998	1999	2000
Poland	10,433	11,585	9,915	8,853 r/	10,498
Portugal	871	905	854	1,044 r/	1,060
Qatar	626 r/	616 r/	646 r/	629	729
Romania	6,083	6,674	6,335	4,392 r/	4,770
Russia	49,193	48,499	43,822	51,524 r/	59,098
Saudi Arabia	2,683	2,539	2,356	2,610	2,973
Serbia and Montenegro	679	979	949	226	682
Singapore e/	500	500	500	500	500
Slovakia	3,602	3,835	3,428	3,569	3,600
Slovenia	328	373	405	405	450
South Africa	7,999	8,311	7,506	6,830 r/	7,019
Spain	12,036	13,644	14,827 r/	14,886 r/	15,920
Sri Lanka e/	30	30	30	30	30
Sweden	4,910	5,147	5,062 r/	5,075	5,227
Switzerland	854 r/	1,047 r/	1,018 r/	1,037 r/	1,140
Syria e/	70	70	70	70	70
Taiwan	12,650	15,478	17,192	16,027	17,302
Thailand	2,143	2,101	1,814 r/	1,547 r/	2,100
Trinidad and Tobago	695	736	777 r/	729 r/	741
Tunisia	187	195	171	229	237
Turkey	13,382	13,664	13,351	14,309	14,325
Uganda e/	12	15	15	15	7 7/
Ukraine	22,100	25,600	23,461	27,390 r/	31,780
United Kingdom	18,220	18,528	17,066	16,634	15,022
United States	95,500	98,500	98,600	97,400	102,000
Uruguay	34	39	52	45 r/	38
Uzbekistan	444	365	344	343 e/	420
Venezuela	3,956 r/	3,987 r/	3,553 r/	3,261 r/	3,835
Vietnam	311	314	306 r/	308 r/	306
Zimbabwe e/	212	214	212	255 r/	269
Total	751,000	797,000	776,000	789,000 r/	846,000

e/ Estimated. p/ Preliminary. r/ Revised. -- Zero.

1/ World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Steel formed in solid state after melting, suitable for further processing or sale; for some countries, includes material reported as "liquid steel," presumably measured in the molten state prior to cooling in any specific form.

3/ Table includes data available through August 2, 2001.

4/ In addition to the countries listed, Ghana and Mozambique are known to have steelmaking plants, but available information is inadequate to make reliable estimates of output levels.

5/ Data for year ending June 30 of that stated.

6/ Excludes castings.

7/ Reported figure.

8/ Figures reported by State Statistical Bureau that Chinese Government considers as official statistical data.

9/ Production appears to have sharply curtailed or to have ceased.