



2008 Minerals Yearbook

IRON AND STEEL [ADVANCE RELEASE]

IRON AND STEEL

By Michael D. Fenton

Domestic survey data and tables were prepared by Hoa P. Phamdang, statistical assistant, and world production tables were prepared by Linder Roberts (pig iron) and Glenn J. Wallace (steel), international data coordinators.

The leading domestic steelmakers earned large profits during the first half of 2008, and steel analysts and company officials were predicting higher steel prices and demand, especially from China, during the remainder of the year. However by September 2008, the global economic recession caused a reduction in steel demand in the construction, industrial equipment, and vehicle markets; a decline of steel prices; a reduction in steel production; a delay in expansion plans; and the furloughing of workers. By October 2008, the global index of all quoted steel stocks had fallen 4% compared with the world index of all publicly traded companies (Marsh, 2008).

Steel companies continued to invest in new systems to improve operations and yield, and to reduce carbon dioxide emissions (Steel Trade Today, 2008). The new FINEX iron-making process, developed by POSCO, uses both fine coal and fine iron ore, making it more cost effective than the similar Corex process, and emissions are almost 80% less than those of the blast furnace process (Ramstad, 2008). In blast furnaces, pulverized coal, natural gas, and recycled plastics are increasingly used to replace metallurgical coke as the primary reductant and chemical energy source. A reduction in energy use is made by heat recovery, and by the recovery and re-use of waste gases.

The American Iron and Steel Institute (AISI) reported U.S. production of iron and steel and shipments of steel mill products. These data can be regarded as representing 100% of the raw steel producers in the United States. World production of iron and steel was reported by the World Steel Association (WSA) 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

Climate change, allegedly influenced by manmade carbon emissions, continued to be a significant issue for the world steel industry. Developed and developing countries were expected to negotiate accords for the post-Kyoto period through 2013 and prepare for the United Nations Conference of the Parties in Copenhagen in December 2009. This global problem can only be addressed effectively by lowering carbon dioxide emissions globally, according to the American Iron and Steel Institute (2009b). In 2007, more than 2 billion metric tons (Gt) of carbon dioxide was emitted by steel producers around the world. Steel is the largest single-industry emitter of carbon dioxide, and global emissions could possibly double by 2050, should the per capita use of steel in developing countries such as China and India become comparable with levels in the developed countries (Christmas, 2008a; World Steel Association, 2008). More than 90% of global steel industry emissions came from

iron production in Brazil, China, the European Union (EU), India, Japan, the Republic of Korea, Russia, Ukraine, and the United States. China produced more than 50% of total carbon dioxide emitted by the steel industry (Christmas, 2007). The steel industry in the United States has the lowest energy consumption per ton of production and the lowest emissions of carbon dioxide per ton of production in the world (American Iron and Steel Industry, 2009b). The U.S. steel industry favored cooperating with foreign competitors to lower emissions, as long as U.S. competitiveness in the global marketplace was not reduced in doing so. Specifically, the U.S. steel industry indicated that carbon dioxide reduction legislation in the United States should be matched by the same level of regulatory stringency in other countries, such as China and India.

At yearend 2007, the WSA announced its new global steel sector approach to reduce carbon dioxide emissions. The WSA methodology used an intensity-based approach to measure carbon dioxide emissions produced per ton of steel rather than recording the total carbon dioxide emissions within a country or region. This globally consistent calculation methodology would allow production-normalized emission comparisons between plants and regions (World Steel Association, 2007). Steel plants worldwide began contributing emission data to WSA in 2008. By July 11, 106 steel plants had contributed data, and the WSA expected to receive data from about 400 steel plants worldwide, which would account for more than 50% of WSA membership production (Christmas, 2008b).

In August 2006, the U.S. Environmental Protection Agency announced a national program to recover 80% to 90% of all available mercury switches from scrap automobiles by 2017 (U.S. Environmental Protection Agency, 2009). The National Vehicle Mercury Switch Recovery Program was designed to recover about 40 million mercury-containing light switches from scrap vehicles that are melted to make new steel. This would significantly reduce mercury air emissions from the fourth leading source in the United States—the furnaces used in steelmaking. By February 2008, one million mercury-containing automotive switches were collected, which represented more than one ton of mercury removed from the environment.

Production

Raw steel production in the United States was about 91.9 million metric tons (Mt) in 2008, down about 6.3% from that in 2007 (table 1). The AISI estimated raw steel production capability to be about 113 Mt, about the same as that in 2007. Production represented 81.4% of estimated capacity, down from 87.0% in 2007.

Integrated steel producers smelted iron ores to make liquid iron in blast furnaces and used basic oxygen furnaces to refine the liquid iron with some steel scrap to produce raw liquid

steel. The basic oxygen process was used to make 39.1 Mt of steel in the United States (American Iron and Steel Institute, 2009a, p. 72). The use of this process increased to 42.6% of total steel production in 2008 from 41.8% in 2007. Blast furnace operations in the United States were operated by 7 companies at 15 locations (Iron and Steel Technology, 2008, p. 92).

Minimills and specialty mills are nonintegrated steel producers that use the electric arc furnace (EAF) to melt low-cost raw materials (usually scrap). They also employ continuous casting machines and hot-rolling mills that are often closely coupled to casting operations. Specialty mills include producers of alloy-electrical, stainless, and tool steel; high-temperature alloys; forged ingots; and other low-volume steel products. An estimated 47 companies operated about 98 EAF facilities in the United States during 2007 (Steel Business Briefing, 2007, p. 28). These U.S. mills used the EAF steelmaking process to produce 53.1 Mt of steel, a 7.4% decrease from that in 2007, and accounted for 57.4% of total steelmaking (American Iron and Steel Institute, 2009a, p. 73).

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 in 2008, and subsequently rolled into semifinished forms, about the same percentage as that of 2007. Continuous casting production was 88.5 Mt, or 96.4% of total steel production, about the same as in 2007 (American Iron and Steel Institute, 2009a, p. 73).

Essar Steel Minnesota, LLC (a subsidiary of Essar Steel Ltd. based in Hibbing, MN) was building an open pit mining, concentrator, and pellet plant operation to supply a new DRI plant and slab caster. This operation, formerly known as Minnesota Steel Industries, LLC, will be the first integrated mine-through-steel-making facility in North America.

Consumption

Steel mill products are produced at steel mills 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. The accumulated shipments of all companies less the shipments to other reporting companies are identified as net shipments to avoid double counting.

U.S. apparent steel consumption, an indicator of economic growth, decreased to 102 Mt in 2008 from 116 Mt in 2007. Shipments of steel mill products by U.S. companies decreased by 7.5% to 89.3 Mt compared with those of 2007 (American Iron and Steel Institute, 2009a, p. 25). Compared with those in 2007, shipments of construction and contractors' products, the largest single end-use market of steel, decreased by 14% in 2008; automotive product shipments decreased by 6%; shipments of agricultural and industrial machinery, equipment, and tools decreased by 18%; steel service center shipments decreased by 4%; lumbering, mining, oil and gas, and quarrying industries shipments decreased by 7%; and shipments of appliances and containers, packaging, and shipping material decreased by 5% (American Iron and Steel Institute, 2009a, p. 29).

Prices

The U.S. Department of Labor, Bureau of Labor Statistics (2009), producer price index for steel mill products was up by 21% to 220.6 in 2008 from 182.9 in 2007 (1982 base=100) (table 1). Hot-rolled steel sheet rose steadily from \$579 per metric ton in January to a high of \$1,068 per ton in July, before declining steadily to a December price of \$566 per ton (Purchasing Magazine, 2009).

Foreign Trade

Export shipments of steel mill products by AISI reporting companies increased to 12.2 Mt from 10.1 Mt in 2007 (table 1). Canada received the largest amount of U.S. exported steel, 6.3 Mt, 10% more than in 2007 (table 4). Mexico was again the second leading importer, receiving 2.7 Mt, 24% more than in 2007. Imports of steel mill products increased slightly to 28.9 Mt from 28.6 Mt in 2007. Brazil, Canada, China, the EU, Germany, Japan, the Republic of Korea, Mexico, Russia, and Ukraine were major sources of steel mill product imports.

Imports of semifinished steel (table 6) by steel companies should 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 should be subtracted from domestic consumption. Between 1993 and 2006, semifinished steel imports ranged between 2.5 million metric tons per year (Mt/yr) and 8.5 Mt/yr. Prior to 1993, the amount was less than 0.2 Mt/yr. Taking the imported semifinished steel into consideration, the share of the U.S. steel market represented by imported steel was an estimated 30% in 2008 compared with 26% in 2007.

In mid-January 2008, the European Commission introduced proposals for cutting EU carbon dioxide emissions by at least 20% from 1990 levels by 2020 (International Herald Tribune, 2008). The EU steel sector reportedly alleges that it will be facing higher costs than its foreign competitors, specifically Chinese, Russian, and United States steelmakers, because of the EU's determination to lead the world in climate protection. Thus, proposals have been made in Europe to establish a carbon tax on imports of steel and other products into the EU.

An unknown factor in the future of the steel industry is what China will do with its excess steel production (Pittsburgh Post-Tribune, 2008). The U.S. trade laws are alleged to be of little help in preventing dumping of lower grade steel products from China, as evidenced by inadequate duty collection. The U.S. General Accountability Office issued a report which said that between 2001 and 2007, Customs and Border Protection failed to collect more than \$600 million in antidumping/countervailing duties, with a significant percentage of these lost duties involving antidumping cases against China (American Iron and Steel Institute, 2008).

Regarding the reporting of imports and exports (tables 4–6), “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 structural steel and steel fasteners. "Other iron and steel products" refers 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).

World Review

World production of pig iron totaled about 932 Mt, slightly less than that in 2007 (table 9). The pig iron production of the EU was about 110 Mt, about the same as that in 2007. Germany was the leading producer in the EU, producing about 29 Mt, 6.5% less than that in 2007. China continued to be the leading producer of pig iron in the world, producing more than 470 Mt, slightly less than that of 2007. Japan, Russia, Brazil, the United States, and the Republic of Korea followed with 86 Mt, 48 Mt, 35 Mt, 34 Mt, and 31 Mt, respectively. The Republic of Korea's production increased 5.5%. Russia and Ukraine were the only major pig iron producers in the Commonwealth of Independent States. In North America, the only major producer of pig iron was the United States, where production in 2008 decreased 7.1% from that in 2007. In South America, the only major pig iron producer was Brazil. India's production was 29 Mt, about the same as in 2007.

World capacity for DRI production was estimated to be about 72 Mt/yr in 2008 (Midrex Technologies, Inc., 2009). DRI production worldwide was about 66 Mt in 2008, slightly more than that in 2007 (table 9). The leading producer of DRI was India, followed by, in descending order of tonnage, Iran, Venezuela, and Mexico. In 2008, additional DRI capacity of almost 17 Mt/yr was under construction in Egypt, India, Iran, Oman, and Pakistan. The leading technology was the Midrex process, followed by the HYL I and the HYL III processes.

World production of raw steel was 1.33 Gt, slightly less than that in 2007 (table 10). Steel production declined during 2008 in the CIS (7.7%), the EU (6.0%), North America (5.3%), and South America (1.6%). However, positive growth occurred in India (4.0%), the Republic of Korea (3.5%), and China (2.3%). China produced 38% of world total crude steel in 2008. As in previous years, production varied widely among major regions of the world. Asian countries produced about 58% of the world's steel; the EU, 16%; North America, 9%; and the CIS, 9%. During 2008, China was again the world's leading steel producer, exceeding 500 Mt. In descending order of production, the leading producers after China were Japan, the United States, Russia, India, and the Republic of Korea. These six countries accounted for 66% of world production. The combined steel production of the seven steel-producing countries in the CIS was about 115 Mt, a decrease of 7.7% from that in 2007. Russia and Ukraine remained the leading producers in the CIS. U.S. steel production during 2008 was 91.9 Mt, a decrease of 6.3% from that in 2007.

MEPS (International) Ltd. (Steel-grips Online, 2009) determined that the world steel capacity utilization was 87% during all of 2008. Steel capacity utilization in Asia, South America, North America, the EU, the CIS, the Middle East, and Africa in 2008 was 89%, 87%, 86%, 84%, 84%, 83%, and

79%, respectively. MEPS estimated that at yearend 2008, world maximum steelmaking production potential was 1.52 Gt.

Outlook

The expansion or contraction of gross domestic product (GDP) may be considered a predictor of the health of the steelmaking and steel manufacturing industries, worldwide and domestically. In June 2008, the World Bank cut its 2008 global GDP growth forecast to 2.7% from its earlier forecast of 3.3% (Lazzaro, 2008). Its global GDP growth forecast for 2009 and 2010 was 3.0% and 3.4%, respectively (World Bank, The, 2008). As early as November 2007, the U.S. Federal Reserve System expected the U.S. economy to expand far more slowly in 2008 than previously predicted, and that there was a larger-than-usual uncertainty around the forecast, owing to weak housing market and turmoil in international credit markets (Kirchhoff, 2007). By June 2008, the World Bank forecasted the U.S. economy to grow by 1.1% in 2008 (Lazzaro, 2008). The U.S. Federal Reserve forecast a U.S. 2008 GDP growth rate of between 1.3% and 2.0% (Felsenthal, 2008). The U.S. Federal Reserve Bank of Philadelphia (2009) survey of 34 forecasters showed the economy contracting at a rate of 2.6% in 2009, but expansions in 2010, 2011, and 2012 of 2.3%, 2.9%, and 3.2%, respectively. The International Monetary Fund (IMF) 2009 forecast of GDP growth in the United States and Japan was 0.1% and 0.5%, respectively (Stecyk, 2008). EU and Japan 2008 GDP growth rates were downgraded by the World Bank to 1.7%, and 1.4%, respectively, from 2.8%, and 2.0% (Lazzaro, 2008). The European Confederation of Iron and Steel Industries (2009) projected EU GDP growth of 0.9% in 2008 and a decline of 4.5% in 2009. The World Bank GDP growth forecast for China was 7.2% in 2009 (Finfacts Ireland, 2009).

According to MEPS forecast (2009), total world steel production in 2009 will be 12% below that in 2008. MEPS also forecast declining steel production in 2009 in the EU, South America, the CIS, Africa, and Asia, of 26%, 24%, 18%, 9%, and 3%, respectively. World Steel Dynamics (WSD) forecast world crude steel production to decrease by 9% in 2009, and increase by 14%, 6%, and 5% in 2010, 2011, and 2012, respectively (Locker Associates, 2009). WSD also forecast crude steel production for China to decrease by 25% in 2009, and increase by 21%, 3%, and 2% in 2010, 2011, and 2012, respectively.

According to the WSA (2009), the progression of the U.S. financial downturn into a global economic downturn brought about a global decline of steel demand in late 2008. Improvement through 2009 would depend on the effects of government stimulation packages, stabilization of financial systems, and a return of some consumer confidence.

World apparent steel consumption (ASC) was expected to decline by 8.6% to 1,100 Mt during 2009, after declining by 1.4% in 2008, and then increase by 9.2% in 2010. China's ASC was expected to increase by 19% to 526 Mt in 2009, and 5% in 2010. China was expected to account for 48% of world steel consumption. ACS in India was expected to increase by 9% and 12% in 2009 and 2010, respectively. The U.S. ASC was expected to decline by 39% in 2009, but increase by 18% in 2010. The EU ASC was expected to decline by 33% in 2009 and

increase by 12% in 2010. In Japan and the CIS, the 2009 ASC was expected to decrease by 31% each, and then increase by 16% and 8%, respectively in 2010. The European Confederation of Iron and Steel Industries (2009) forecast declining apparent steel consumption in the EU by almost 45% during the first half of 2009 and almost 30% during all of 2009. The outlook for the EU in 2010 showed little recovery.

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TABLE 1
SALIENT IRON AND STEEL STATISTICS¹

(Thousand metric tons)

	2004	2005	2006	2007	2008
United States:					
Pig iron:					
Production ²	42,300	37,200	37,900	36,300	33,700
Exports ³	48	51	813	71	51
Imports for consumption ³	6,400	6,030	6,730	5,220	4,980
Direct-reduced iron:					
Production ⁴	180	220	240	250	260
Exports ³	13	--	(5)	(5)	(5)
Imports for consumption ³	2,450	2,170	2,610	2,330 ^r	2,650 ^e
Raw steel production: ⁶					
Carbon steel	90,700	85,900	89,500	89,800	84,100
Stainless steel	2,400	2,240	2,460	2,170	1,930
All other alloy steel	6,560	6,710	6,190	6,140	5,810
Total	99,700	94,900	98,200	98,100	91,900
Capability utilization, percent	94.6	87.5	87.5	87.0	81.4
Steel mill products:					
Net shipments ²	101,000	95,200	99,300	96,500	89,400
Exports ²	7,200	8,520	8,830	10,100	12,200
Imports ²	32,500	29,100	41,100	30,200	29,000
Producer price index (1982=100.0) ⁷	147.2	159.7	174.1	182.9	220.6
World production: ⁸					
Pig iron	720,000	802,000	881,000 ^r	954,000 ^r	932,000 ^e
Direct-reduced iron ⁴	53,000 ^r	56,300 ^r	58,700	64,600 ^r	66,400 ^e
Raw steel	1,060,000	1,140,000	1,250,000	1,350,000 ^r	1,330,000

^eEstimated. ^rRevised. -- Zero.

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

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

³Data are from the U.S. Census Bureau.

⁴Data are from Midrex Technologies, Inc., government, and companies.

⁵Less than ½ unit.

⁶Raw steel is defined by AISI as steel in the first solid state after melting, suitable for rolling.

⁷Data are from the U.S. Department of Labor, Bureau of Labor Statistics.

⁸Data are from the U.S. Geological Survey and the World Steel Association.

TABLE 2
MATERIALS CONSUMED IN BLAST FURNACES AND PIG IRON PRODUCED¹

(Thousand metric tons)

Material	2007	2008
Iron oxides: ²		
Ores	--	--
Pellets	46,300	43,800
Sinter ³	6,830	6,380
Total	53,100	50,100
Scrap ⁴	2,780 ^r	2,660 ^c
Coke ²	15,000 ^r	14,200
Pig iron, produced	36,300	33,700

^cEstimated. ^rRevised. -- Zero.

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

²American Iron and Steel Institute.

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

⁴Mainly 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 MARKET¹

	Quantity		Percentage	
	(thousand metric tons)			
	2007	2008	2007	2008
Shipments by steel type:				
Carbon steel	90,500	83,400	93.78	93.29
Alloy steel	4,350	4,560	4.51	5.10
Stainless steel	1,700	1,380	1.76	1.54
Total	96,500	89,400	100.00	100.00
Steel mill products:				
Ingot, blooms, billets and slabs	1,920	1,120	1.99	1.25
Wire rods	2,180	2,100	2.26	2.35
Structural shapes, heavy	6,890	6,040	7.14	6.76
Steel piling	551	462	0.57	0.52
Plates, cut lengths	6,730	6,730	6.97	7.53
Plates, in coils	3,720	3,170	3.85	3.55
Rails	800	854	0.83	0.96
Railroad accessories	192	247	0.20	0.28
Bars, hot-rolled	6,590	6,710	6.83	7.51
Bars, light-shaped	1,800	1,600	1.87	1.79
Bars, reinforcing	7,280	7,010	7.54	7.84
Bars, cold finished	1,320	1,490	1.37	1.67
Tool steel	16	16	0.02	0.02
Pipe and tubing, standard pipe	981	919	1.02	1.03
Pipe and tubing, oil country goods	1,940	2,170	2.01	2.43
Pipe and tubing, line pipe	573	432	0.59	0.48
Pipe and tubing, mechanical tubing	908	821	0.94	0.92
Pipe and tubing, pressure tubing	29	47	0.03	0.05
Pipe and tubing, stainless	13	13	0.01	0.01
Pipe and tubing, structural	135	112	0.14	0.13
Pipe for piling	12	14	0.01	0.02
Wire	350	564	0.36	0.63
Tin mill products, blackplate	127	202	0.13	0.23
Tin mill products, tinplate	1,770	1,610	1.83	1.80
Tin mill products, tin-free steel	508	526	0.53	0.59
Tin mill products, tin coated sheets	91	91	0.09	0.10
Sheets, hot-rolled	18,000	17,800	18.65	19.91
Sheets, cold-rolled	11,400	10,300	11.81	11.52
Sheets and strip, hot dip galvanized	13,800	11,600	14.30	12.98
Sheets and strip, electrogalvanized	2,320	1,500	2.40	1.68
Sheets and strip, other metallic coated	1,560	1,220	1.62	1.36
Sheets and strip, electrical	456	481	0.47	0.54
Strip, hot rolled	38	39	0.04	0.04
Strip, cold rolled	1,510	1,340	1.56	1.50
Total	96,500	89,400	100.00	100.00
Shipments by markets:				
Service centers and distributors	24,000	23,100	24.87	25.84
Construction	21,600	18,500	22.38	20.69
Automotive	12,400	11,700	12.85	13.09
Machinery	1,270	1,040	1.32	1.16
Containers	2,640	2,560	2.74	2.86
All others	34,700	32,500	35.96	36.35
Total	96,500	89,400	100.00	100.00

¹Data 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 COUNTRY¹

(Thousand metric tons)

Country	2007		2008	
	Imports	Exports	Imports	Exports
Argentina	91	10	129	12
Australia	782	22	636	33
Brazil	2,080	107	1,200	318
Canada	6,110	5,710	6,430	6,290
China	4,180	155	4,380	263
European Union ²	5,140	845	2,620	653
Germany	1,100	83	1,080	85
Japan	1,540	34	1,600	32
Korea, Republic of	1,820	70	2,090	92
Mexico	2,860	2,150	2,900	2,670
Russia	1,080	--	1,020	--
South Africa	131	11	81	16
Sweden	276	7	255	10
Taiwan	999	20	600	56
Turkey	521	--	750	--
Ukraine	1,130	--	1,260	--
Venezuela	149	87	38	118
Other	171	807	1,900	1,570
Total	30,200	10,100	29,000	12,200

-- Zero.

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

²Excludes Germany and Sweden.

Source: American Iron and Steel Institute.

TABLE 5
U.S. EXPORTS OF IRON AND STEEL PRODUCTS¹

(Thousand metric tons)

	2007	2008
Steel mill products:		
Ingots, blooms, billets, slabs	383	517
Wire rods	95	139
Structural shapes, heavy	990	1,140
Steel piling	36	44
Plates, cut lengths	1,150	1,350
Plates, in coils	537	1,020
Rails, standard	107	86
Rails, other	24	31
Railroad accessories	39	60
Bars, hot-rolled	540	722
Bars, light-shaped	84	136
Bars, concrete reinforcing	304	629
Bars, cold-finished	175	190
Tool steel	16	18
Pipe and tubing, standard pipe	136	193
Pipe and tubing, oil country goods	340	419
Pipe and tubing, line pipe	226	382
Pipe and tubing, mechanical tubing	36	49
Pipe and tubing, stainless	46	44
Pipe and tubing, nonclassified	393	438
Pipe and tubing, structural	189	197
Pipe for piling	46	66
Wire	175	199
Tin mill products, blackplate	4	5
Tin mill products, tinplate	191	241
Tin mill products, tin-free steel	22	24
Sheets, hot-rolled	1,010	958
Sheets, cold-rolled	695	788
Sheets and strip, hot-dip galvanized	916	896
Sheets and strip, electrogalvanized	240	279
Sheets and strip, other metallic coated	230	296
Sheets and strip, electrical	167	278
Strip, hot-rolled	252	205
Strip, cold-rolled	323	190
Total	10,100	12,200
Fabricated steel products:		
Structural shapes, fabricated	431	529
Rails, used	33	51
Railroad products	59	100
Wire rope	18	21
Wire, stranded products	37	43
Wire, other products	86	88
Springs	134	129
Nails and staples	35	37
Fasteners	465	625
Chains and parts	27	34
Grinding balls	59	92
Pipe and tube fittings	36	42
Other ²	150	112
Total	1,570	1,900
Grand total	11,700	14,100

See footnotes at end of table.

TABLE 5—Continued
 U.S. EXPORTS OF IRON AND STEEL PRODUCTS¹

(Thousand metric tons)

	2007	2008
Cast iron and steel products:		
Cast steel pipe fittings	37	46
Cast iron pipe and fittings	74	120
Cast steel rolls	3	4
Cast grinding balls	11 ^r	18
Granules, shot and grit	27 ^r	34
Other castings	63	82
Total	215 ^r	304

^rRevised.

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

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

Source: American Iron and Steel Institute.

TABLE 6
U.S. IMPORTS OF MAJOR IRON AND STEEL PRODUCTS¹

(Thousand metric tons)

	2007	2008
Steel mill products:		
Ingots, blooms, billets, and slabs	6,040	5,420
Wire rods	1,400	1,120
Structural shapes-heavy	771	655
Steel piling	100	95
Plates, cut lengths	1,290	1,120
Plates, in coils	939	1,100
Rails and railroad accessories	371	305
Bars, hot-rolled	1,200	1,350
Bars, light-shaped	217	151
Bars, reinforcing	1,690	881
Bars, cold-finished	313	283
Tool steel	145	148
Pipe and tubing, standard pipe	1,290	1,070
Pipe and tubing, oil country goods	1,760	3,610
Pipe and tubing, line pipe	2,710	2,920
Pipe and tubing, mechanical tubing	643	551
Pipe and tubing, pressure tubing	110	128
Pipe and tubing, stainless	155	127
Pipe and tubing, nonclassified	21	15
Pipe and tubing, structural	615	442
Pipe for piling	37	17
Wire	732	643
Tin mill products-blackplate	44	21
Tin mill products-tinplate	471	291
Tin mill products-tin-free steel	111	96
Sheets, hot-rolled	2,430	2,510
Sheets, cold-rolled	1,630	1,310
Sheets and strip, hot-dip galvanized	1,820	1,650
Sheets and strip, electrogalvanized	181	170
Sheets and strip, other metallic coated	549	455
Sheets and strip, electrical	100	110
Strip, hot-rolled	82	44
Strip, cold-rolled	180	158
Total	30,200	29,000
Fabricated steel products:		
Structural shapes, fabricated	1,360	1,440
Rails, used	83	73
Railroad products	210	350
Wire rope	138	141
Wire-stranded products	323	329
Springs	423	310
Nails and staples	782	589
Fasteners	1,360	1,330
Chains and parts	158	150
Pipe and tube fittings	294	307
Other	635	518
Total	5,760	5,530
Grand total	35,900 ^r	34,500

See footnotes at end of table.

TABLE 6—Continued
U.S. IMPORTS OF MAJOR IRON AND STEEL PRODUCTS¹

(Thousand metric tons)

	2007	2008
Cast iron and steel products:		
Cast steel pipe fittings	293	307
Cast iron pipe and fittings	81	71
Other products	407	399
Total	781	777

¹Revised.

¹Data 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 STEEL¹

(Metric tons)

Product	2007	2008
Semifinished	131,000	124,000
Plate	137,000	84,800
Sheet and strip	57,600	72,100
Bars and shapes	117,000	116,000
Wire and wire rods	68,900	62,400
Pipe and tube	159,000	127,000
Total	669,000	586,000

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

Source: American Iron and Steel Institute.

TABLE 8
COAL AND COKE AT COKE PLANTS^{1,2}

(Thousand metric tons)

	2007	2008
Coal, consumption	20,600	20,000
Coke: ³		
Production	14,700	14,200
Exports	1,310	1,780
Imports	2,230	3,270
Consumption, apparent	15,700	15,400

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

²Includes furnace and merchant coke plants.

³Coke production and consumption do not include breeze.

Source: Energy Information Administration, Quarterly Coal Report, DOE/EIA-0121(2009/01Q).

TABLE 9
 PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY^{1,2,3,4}

(Thousand metric tons)

Country ⁵	2004	2005	2006	2007	2008 ^c
Algeria	994	952 ^e	1,093 ^r	1,193 ^r	690
Argentina:					
Pig iron	2,392	2,646	2,481	2,593	2,500
Direct-reduced iron	1,755	1,823	1,947	1,810	2,000
Australia	5,735	6,203	6,276	6,351 ^r	6,100
Austria ^e	4,847	5,444	5,547	5,808 ^r	5,815 ⁶
Belgium	8,224	7,254	7,516	6,576	6,500
Bosnia and Herzegovina ^e	60	60	60	60	243 ⁶
Brazil:					
Pig iron	34,558 ^r	33,884 ^r	32,452 ^r	35,571 ^r	34,969 ⁶
Direct-reduced iron ^c	440	411	376 ^r	362 ^r	302
Bulgaria	1,158	1,081	1,147	1,069	441 ⁶
Burma: ^e					
Pig iron	2 ^r	2 ^r	2 ^r	2 ^r	2
Direct-reduced iron	40	40	40	40	40
Canada:					
Pig iron	8,828	8,274	8,305	8,577	9,000
Direct-reduced iron	1,091	591	446	910	690
Chile	1,137	1,074	1,115	1,147 ^r	1,150
China ⁷	251,850	343,750	412,450	476,520 ^r	470,670 ⁶
Colombia	316	325	351 ^r	350	325
Czech Republic	5,385 ^r	4,627	5,191	5,289 ^r	4,737 ⁶
Egypt:					
Pig iron	1,000	1,100	1,100	1,000	1,000
Direct-reduced iron ^e	3,020 ^r	2,900 ^r	3,100 ^r	2,786 ^{r,c}	3,000
Finland	3,037	3,056	3,158	2,914	2,900
France	13,198	12,705	13,013	12,426	12,400
Germany:					
Pig iron	30,018	28,854	30,360	31,149 ^r	29,111 ⁶
Direct-reduced iron ^c	593	440	580	590	500
Hungary	1,351	1,329	1,335	1,394	1,289 ⁶
India:					
Pig iron	25,117	27,125	28,300	28,800	29,000
Direct-reduced iron	9,370	12,040	14,740	18,100	20,200
Indonesia, direct-reduced iron ^c	1,470	1,390	1,290 ⁶	1,400	1,300
Iran:					
Pig iron	2,136	2,300	2,041	2,118	2,200
Direct-reduced iron ^c	6,410	6,850	6,850	7,440 ^r	7,460
Italy	10,664	11,423	11,535	11,100	11,100
Japan	82,974	83,058	84,270	86,771	86,171 ⁶
Kazakhstan	4,283	3,581	3,400	3,240	2,761 ⁶
Korea, North ^e	900	900 ⁶	900	900	900
Korea, Republic of	27,556	27,309	27,559	29,437	31,043 ⁶
Libya, direct-reduced iron	1,580 ^c	1,669 ^r	1,633 ^r	1,660 ^r	1,569 ⁶
Malaysia, direct-reduced iron	1,710	1,349	1,277 ^r	1,840	1,940
Mexico:					
Pig iron	4,278	4,278	3,800	4,077	4,450 ^p
Direct-reduced iron	5,473	5,973	6,167	6,265 ^r	6,012 ^{p,6}
Morocco ^e	15	15	15	15	15
Netherlands ⁸	5,846	6,031	5,417	5,500	5,500
New Zealand ^e	650	652	664	679	600
Nigeria	--	--	150	200 ^r	--

See footnotes at end of table.

TABLE 9—Continued
 PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY^{1, 2, 3, 4}

(Thousand metric tons)

Country ⁵	2004	2005	2006	2007	2008 ^e
Norway ^c	100	100	100	100	100
Pakistan ^e	1,500	1,500	1,200	1,000	1,000
Paraguay	119	124	136	137	120
Peru: ^c					
Pig iron	286	263	306	351 ⁶	395 ⁶
Direct-reduced iron	81 ^r	78 ^r	84 ^r	90 ^r	72
Poland	6,399	4,477	5,333	5,804	4,934 ⁶
Portugal ^c	100	100	100	100	100
Qatar, direct-reduced iron	830 ^e	820	880	1,200	1,700
Romania	4,244	4,098	3,946	3,923	3,000
Russia:					
Pig iron	50,427	49,175	51,683	51,523	48,300 ⁶
Direct-reduced iron ^c	3,140	3,340	3,340	4,000	4,000
Saudi Arabia, direct-reduced iron	3,141	3,630 ^e	3,580	4,340 ^r	4,970 ⁶
Serbia	959 ⁹	1,115 ⁹	1,529	1,485	1,582 ⁶
Slovakia	3,765	3,618	4,145	4,012	3,529 ⁶
South Africa:					
Pig iron	6,011	6,130	6,159	5,358	5,358 ⁶
Direct-reduced iron	1,633	1,781	1,754	1,736	1,190 ⁶
Spain	4,036	4,160	3,432	3,974	3,995 ⁶
Sweden	3,871	3,730	3,577	3,815	3,800
Taiwan	10,198	9,854	10,500	10,550	9,800
Trinidad and Tobago, direct-reduced iron	2,337	2,055	2,000	2,000	2,050
Turkey	5,836	5,970	5,952	6,234	6,600
Ukraine	31,000	30,747	32,926	35,647	30,982 ⁶
United Kingdom	10,180	10,236	10,736	10,960 ^r	11,000
United States:					
Pig iron	42,300	37,200	37,900	36,300	33,700 ⁶
Direct-reduced iron	180	220	240	250	260 ⁶
Venezuela, direct-reduced iron	7,825 ^r	8,897 ^r	8,400	7,782 ^r	7,140
Zimbabwe ^e	125	129	38	-- ^r	--
Grand total	773,000	858,000	939,000 ^r	1,020,000 ^r	998,000
Of which:					
Pig iron ¹⁰	720,000	802,000	881,000 ^r	954,000 ^r	932,000
Direct-reduced iron ¹¹	53,000 ^r	56,300 ^r	58,700	64,600 ^r	66,400

^eEstimated. ^pPreliminary. ^rRevised. -- Zero.

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

²Production is pig iron unless otherwise specified.

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

⁴Table excludes ferroalloy production except where otherwise noted. Table includes data available through August 21, 2009.

⁵In addition to the countries listed, Vietnam has facilities to produce pig iron and may have produced limited quantities during 2004–08, but output is not reported and available information is inadequate to make reliable estimates of output levels.

⁶Reported figure.

⁷Figures reported by State Statistical Bureau that the Government of China considers to be official statistical data.

⁸Includes blast furnace ferroalloys.

⁹Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.

¹⁰Includes unspecified pig iron and direct-reduced iron.

¹¹Listed separately.

TABLE 10
RAW STEEL: WORLD PRODUCTION, BY COUNTRY^{1,2,3}

(Thousand metric tons)

Country ⁴	2004	2005	2006	2007	2008
Albania	120 ^r	180 ^r	206 ^r	263 ^r	300 ^e
Algeria	1,014	1,007	1,158	1,278	646
Argentina	5,133	5,386	5,533	5,387	5,400 ^e
Australia	8,353	7,788	7,937	8,047	7,777
Austria	6,530	7,031	7,129 ^r	7,578 ^r	7,630
Azerbaijan	90	286	54	273	300 ^e
Bangladesh ^{e,5}	25	20	10 ^r	-- ⁶	--
Belarus	1,900	2,076	2,100	2,214	2,660
Belgium	11,698	8,906	11,238	10,692 ^r	10,860
Bosnia and Herzegovina, ingot production	117	283	469	514 ^r	588
Brazil ⁷	32,918	31,631	30,901 ^r	33,782 ^r	33,713
Bulgaria	2,106	1,969	2,124	1,909 ^r	1,330
Burma ^e	25	25	25	25	25
Canada	16,305	15,327	15,493	15,569	15,100 ^e
Chile ⁷	1,579	1,536	1,627	1,679 ^r	1,560 ^e
China ⁸	272,450	353,240	419,150	489,290 ^r	500,490
Colombia	730 ^e	842	1,221	1,260	1,200 ^e
Croatia	80	74	81	76 ^r	85 ^e
Cuba	193	245	257	262 ^r	274
Czech Republic	7,033	6,189	6,862	7,059	6,386
Ecuador	72	84	85	87	85 ^e
Egypt	4,810 ^r	5,603 ^r	6,045 ^r	6,224 ^r	6,198
El Salvador	59	48	72	73	72 ^e
Ethiopia, all from scrap ^e	30	60	60	110	150
Finland	4,833	4,738	5,052	4,431 ^r	5,000 ^e
France	20,770	19,481	19,857	19,252	17,874
Germany	46,374	44,524	47,224	48,550	45,833
Ghana, all from scrap ^e	25	25	25	25	25
Greece	1,967	2,266	2,416	2,554 ^r	2,400 ^e
Guatemala	232	207	292	349	300 ^e
Hong Kong ^e	500	500	550	550	550
Hungary	1,944 ^r	2,005 ^r	2,144 ^r	2,317 ^r	2,096
India	32,600	45,800	49,500	53,100	55,200
Indonesia	3,682 ^r	3,675	3,759 ^r	3,900	3,600
Iran	8,682	9,405	9,789 ^r	10,051 ^r	9,960 ^e
Israel ^e	370	480	480	480	480
Italy	28,317	29,061	31,550	31,990	30,477
Japan	112,718	112,471	116,266	120,203	118,739
Jordan ^e	140 ⁶	150	150	150	150
Kazakhstan	5,372	4,477	4,245	4,784	4,286
Korea, North ^e	1,070	1,070	1,180	1,230	1,279 ⁶
Korea, Republic of	47,521	47,820	48,455	51,517	53,322
Latvia ^e	554 ⁶	550	550	550	550
Libya	1,026	1,255 ^r	1,151	1,151 ^r	1,137
Luxembourg	2,684	2,194	2,802	2,800 ^e	2,640
Macedonia	314 ^r	326 ^r	360 ^r	372 ^r	370 ^e
Malaysia	5,698	5,296	5,834	6,895 ^r	6,500 ^e
Mauritania	5 ^e	1	1	1 ^r	2
Mexico	16,737	16,202	16,313	17,573 ^r	17,230 ^p
Moldova	1,013	1,016	675	995	885

See footnotes at end of table.

TABLE 10—Continued
 RAW STEEL: WORLD PRODUCTION, BY COUNTRY^{1,2,3}

(Thousand metric tons)

Country ⁴	2004	2005	2006	2007	2008
Montenegro	151 ^{r,9,10}	104 ^{r,9,10}	163 ^r	174 ^r	175 ^e
Morocco	5 ^e	205	314	314	310
Netherlands	6,848	6,919	6,372	6,400 ^e	6,880
New Zealand	850	889	862	845	853 ^e
Norway ^c	695	701	679	680	680
Pakistan	1,145	825	1,040	1,090	1,100
Paraguay	107	101	115	95 ^r	85 ^e
Peru	725	790	896	881 ^r	1,150 ^e
Philippines	550 ^r	470	558	718 ^r	800 ^e
Poland	10,578	8,336	9,992	10,621 ^r	9,727
Portugal	730	1,400	1,400	1,400 ^e	1,400 ^e
Qatar	1,089	1,057	1,003	1,147	1,406
Romania	6,077	5,632	6,266	6,261	5,035
Russia	65,646	66,186	70,816	72,389	68,700
Saudi Arabia	3,902	4,185	3,974	4,644 ^r	4,670 ^e
Serbia	1,167 ^{r,9,10}	1,286 ^{r,9,10}	1,837	1,478 ^r	1,662
Serbia and Montenegro	-- ^{r,9,10}	-- ^{r,9,10}	-- ^r	-- ^r	--
Singapore ^e	610	572	607	620	600
Slovakia	4,564	4,242	4,848	4,800	4,800 ^e
Slovenia	566	583	627	638	670
South Africa	9,500	9,494	9,718	9,098 ^r	8,550
Spain	17,621 ^r	17,826 ^r	18,391 ^r	18,999 ^r	19,048
Sri Lanka ^c	30	30	30	30	30
Sweden	5,949	5,692	5,435	5,673 ^r	5,500 ^e
Switzerland	1,000 ^e	1,158	1,252	1,264	1,260
Syria ^c	70	70	70	70	63 ⁶
Taiwan	19,604	18,567	19,203	20,883 ^r	19,222
Thailand	4,533	5,161	5,210	5,470	5,470 ^e
Trinidad and Tobago	815	711	674	682 ^r	675 ^e
Tunisia	70	66	68	61	80
Turkey	20,478	20,960	23,308	25,750	26,400 ^e
Uganda	30	30	30	30	30
Ukraine	38,740	38,636	40,899	42,830	37,107
United Arab Emirates ^c	70	70	70	90	90
United Kingdom	13,766	13,210	13,931	14,300	13,538
United States	99,700	94,900	98,200	98,100	91,900
Uruguay	58	64	57	71	85 ^e
Uzbekistan ^c	602 ⁶	607 ⁶	730	740	680
Venezuela	4,561 ^r	4,907	4,864 ^r	5,005 ^r	4,240 ^e
Vietnam	689	890	1,860 ^r	2,024 ^r	2,020 ^e
Zimbabwe	135	107	24	23	10 ^e
Total	1,060,000 ^r	1,140,000 ^r	1,250,000 ^r	1,350,000 ^r	1,330,000

^cEstimated. ^pPreliminary. ^rRevised. -- Zero.

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

²Steel 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.

³Table includes data available through August 25, 2009.

TABLE 10—Continued
RAW STEEL: WORLD PRODUCTION, BY COUNTRY^{1, 2, 3}

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

⁵Data for year ending June 30 of that stated.

⁶Reported figure.

⁷Excludes castings.

⁸Figures reported by the State Statistical Bureau that the Government of China considers as official statistical data.

⁹Montenegro and Serbia formally declared independence from each other in June 2006 and dissolved their union.

¹⁰Production is reported individually now.