STEEL

By Tony Sweeney

All things considered, 2002 turned out to be a much better year than the tea leaves would have suggested. The protective measures introduced by the US to curb imports did not prove to be as disruptive as first thought, mainly because many exceptions to the tariffs were allowed, the world steel market was stronger than expected, thanks to China, and the US dollar declined in an orderly manner.

International steel prices grew stronger as the year progressed, retracing all of the loss in 2001 and more, and most producers were profitable in the second half of 2002 – with some notable exceptions. World economic growth in 2002 was below its long-run average, but world crude steel production was 902 Mt, up 6.2% over 2001.

China once again amazed the galleries and produced more than 20% of total world crude steel output, and the whole Asian region produced 43.6% of that output. Such is the impact of China, that it is now common practice to have a 'World excluding China' line, and even that rump had a 3% growth in steel production in 2002.

Economic environment

World economic growth peaked in 2000 at 4.7%, significantly above the long-run average growth rate of about 3.6%/y. That year also signified the end of the longest unbroken expansion in US economic history, a ten-year period when the world's largest economy got its fiscal act together, significantly improved its productivity levels, and allowed the US dollar to strengthen against most other currencies. America's trading partners were willing to hold dollar-dominated assets. The other side of the coin was that the US ran a substantial trade deficit, but one that was considered to be manageable. In effect, the US was willing to accept the role of economic strongman and keep the world economy humming along. The other advanced economies, with the possible exception of Japan, played their part, and China, India and the smaller Asian countries thrived in this environment, except for the brief hiccup of what became known as the 'Asian Crisis' in 1998. Following the spectacular collapse of the Soviet Union in 1989-1993 and the liberation of Eastern Europe, these former centrally planned economies spiralled downwards but stabilised by the mid-1990s and began to recover by the end of the decade.

With a few exceptions, stock markets around the world were buoyant and most investors began to think that they might be financial geniuses. The Internet came of age and the dot.com boom took off. Even those investors who knew it couldn't last, had to get in on the boom, betting that they could make a quick profit before it collapsed. The markets peaked in early 2000 and we are now in the third year of a bear market. Stock market collapses do not

always presage an economic slowdown: the collapse in 1987, for instance, did not materially affect the real economy, but that dip, sharp as it was, was not the start of a bear market; it was all over in three months. Longevity is what saps confidence and this eventually spills over into economic activity.

As the froth in the stock markets subsided, world economic activity slowed in 2001 to 2.2% and world trade contracted by 0.1%, the first contraction since 1982. The Bush Administration took over the reins in the US at the beginning of 2001 and threw fiscal caution to the winds, and the terrible events of September 11, 2001 cast a pall that still lingers. The US slipped into a brief and shallow recession, Japan into a not-so-brief recession, and the economy of Western Europe slowed, with Germany, its biggest member, setting the pace. China and India, the world's two most populous countries, bucked this trend, as did the CIS. A world economic slowdown, which was probably going to happen anyway, had found reasons to do so.

A short and shallow economic slowdown is often followed by an anaemic recovery, and this proved to be the case in 2002. World economic growth of 2.8% in 2002 was hardly a rebound – in fact, it was weaker in the European Union (EU), the CIS and Japan – but North America, China and India were stronger than in 2001. World trade grew at 2.1%, well below its long-run average growth rate of about 7%.

Economic activity was strong in the early part of 2002, particularly in North America, but ran out of energy as the year progressed, with the exception of the Asian economies. The US dollar depreciated significantly against the euro and the yen, reflecting concerns about the current account deficit in the US and the diminishing attractiveness of dollar-denominated assets. Stock markets in the developed world continued to disappoint and, along with some spectacular failures at the company level, some of them due to financial chicanery, were enough to impact confidence, which in turn depressed investments and purchases.

Unemployment also rose and, for a while, a 'double dip' recession was a possibility. Hanging over all of this was the threat of war in the Middle East. Frenetic diplomatic activity was futile as it became increasingly obvious that the protagonists were determined to have their war. The threat of war leads to uncertainty, which can disrupt economies and hinder trade, and the prologue in this case was unusually divisive. War itself, even a one-sided war, is chaotic, and manifestation of its ramifications may take decades. The unintended consequences can only be guessed at.

The IMF outlook for 2003, made in September 2002, is for world economic output to bounce back to 3.7%, roughly its long-run average growth rate. The improvement is across the board, with even Japan registering more than 1% growth. The US, 2.6%, and the EU, 2.2%, pick up the pace, and China, India and Russia are all expected to outperform. The bottom of the recent economic slowdown was 2001, and the recovery to more 'normal' world economic growth, which began in late 2001, continued in 2002, and is achieved in 2003.

There are some points of concern: how long can China grow at this rate without hitting bottlenecks and igniting inflation? Inflationary pressures worldwide are low and deflation rears its head from time to time, particularly in Japan, which seems to be suffering the world's longest hangover from its asset price bubble. Recovery in the world economy depends heavily on the US; its twin deficits are cause for concern, but interest rates are low and the dollar is declining in an orderly manner.

Steel demand

Economic growth is a major factor in steel consumption, although one that varies with the degree of industrialisation in an economy and its structure. Apparent consumption of finished steel products grew from 772 Mt in 2001 to 802 Mt in 2002, an increase of 3.9%. Like last year, however, the aggregate world figure is not a good indication of what is happening in all steel-consuming regions. If the steel consumption figure for China is extracted from the world total, steel consumption in the rest of the world rose from 602 Mt in 2001 to 607 Mt in 2002, a derisory increase of 0.08%. Most regions in the world were, at best, flat.

Asia accounted for 49.3% of world steel consumption in 2002, up from 47.2% in 2001. China is the main driver in this region, and its steel consumption rose from 170 Mt in 2001 to 195 Mt in 2002, an increase of 14.7%. Steel consumption in South Korea grew from 38 Mt in 2001 to 42 Mt in 2002, an increase of 10.5%, and in India from 27 Mt in 2001 to 30 Mt in 2002, an increase of 11.1%. By contrast, steel consumption in Japan fell from 73 Mt in 2001 to 70 Mt in 2002, a decrease of 4.1%.

There is some doubt about whether China can continue its rapid growth in steel consumption. The mild deflation currently existing in China could indicate an incipient oversupply problem – then again, it could equally well be economics–of–scale efficiencies being transferred to the consumer. Economists just find it difficult to accept that 7-9% GDP growth and double-digit steel consumption growth can continue indefinitely. A slowdown in China would have significant knock-on effects in other parts of the world, eg Japan and the US.

Steel Consumption in the EU-15 was 139 Mt in 2002, the same as 2001, approximately 17% of the world total. The flat steel consumption figure is indicative of the 1.1% growth in economic activity in 2002. The big five european steel consumers in 2002 were Germany 36 Mt, Italy 29 Mt, France 17 Mt, Spain 19 Mt and the UK 13 Mt. The only mildly surprising item is that Spain is, and has been for some years, a bigger steel consumer than the UK.

Steel consumption in the CIS and Other Europe was essentially flat. Russia is the biggest consumer in this region with 23 Mt in 2002, the same as 2001. Turkey, the second biggest steel consumer in this group, suffered a severe 4.7% decline in GDP in 1999 and a disastrous 7.4% decline in 2001, resulting in a decline in steel consumption from 13 Mt in 2000, to 11 Mt in 2001 and to 10 Mt in 2002.

North American steel consumption was 131 Mt in 2002, 16% of the world total and down from the 134 Mt recorded in 2001. The US was down about 4% in 2002 compared to 2001, but this is sharply below the 120 Mt recorded in 2000.
Steel consumption in South America was an estimated 27 Mt in 2002, approximately 3.4% of the world total. Brazil is by far the biggest steel consumer in this region, with an estimated consumption of 16 Mt in 2002.

Steel consumption in Africa/Middle East increased from 34 Mt in 2001 to 36 Mt in 2002, an increase of 5.9%. The biggest consumers are Iran with 7 Mt, Saudi Arabia 5 Mt and South Africa 5 Mt. This regional grouping is growing rapidly in steel consumption terms, but the numbers are still relatively small.

Oceania (Australia and New Zealand) consumed 8 Mt of finished steel products in 2002, up from 7 Mt in 2001.

Iron and steel production
World blast furnace iron production in 2002 was 609 Mt, up 5.4% from the 578 Mt produced in 2001. At the risk of sounding like a broken record, the increase in output can be largely accounted for by China, which produced 171 Mt in 2002, up 16.3% from the 147 Mt recorded in 2001. China alone accounts for 28% of blast furnace iron production and Asia for more than half the world's output. The second biggest producer in the world is Japan with 81 Mt in 2002, and the other major producers in the region are South Korea with 27 Mt, India with 24 Mt and Taiwan with 10 Mt. All the major producers in Asia increased their outputs over 2001.

Blast furnace iron production in the EU was 90 Mt in 2002, down 0.5% from 2001. Germany was the biggest producer with 29 Mt, up 0.8%, and the UK dropped 13.3% to 9 Mt. The biggest percentage decline was in Portugal, where blast furnace iron production ceased altogether. Blast furnace iron production was essentially flat in Other Europe, but the CIS produced 77 Mt, up 2.6% over 2001. There was a decline of 3.5% in North America, where production in both the US and Mexico fell. South America produced 33 Mt of blast furnace iron in 2002, where Brazil produced nearly 30 Mt of this, up 8.2% over 2001.

Crude steel production closely follows blast furnace iron production, and output in 2002, 902 Mt, was up 6.1% from that achieved in 2001. China was the biggest producer, with 182 Mt in 2002, over 20% of the world's total. Japan's production was up 4.7% at 108 Mt; South Korea produced 45 Mt, up 3.5%; India produced 29 Mt, up 5.6%; and Taiwan produced 18 Mt, up 5.6%. Asia as a whole produced 393 Mt in 2002, up 11.2% over 2001, and 43.5% of the world's total.

The EU produced 159 Mt of crude steel, 19.6% of world output, essentially no increase over 2001. Germany was the biggest producer, with 45 Mt, followed by Italy 26 Mt, France 20 Mt, Spain 16 Mt and the UK 12 Mt. The UK was 13.9% down over production in 2001. Ireland suffered the ignominy of a 100% drop in steel production!

Other Europe increased its steel production in 2002 to 48 Mt, up 4.6% over 2001. Turkey, notably, increased its output to 16 Mt, up 9.9%, and Romania produced 6 Mt, up 12.2%. Production in the CIS was essentially flat at 100 Mt, of which Russia produced 60%.

Steel production in North America was 124 Mt in 2002, up 3.2% over 2001; the US increased its output by 2.4% to 92 Mt. Meanwhile, in South America, steel production was 41 Mt in 2002, up 9.3% from 2001. Brazil produced 73% of this total, increasing its output by 10.8% to 30 Mt.

Crude steel production increased marginally in Africa/Middle East and Oceania.

Technology

Comparing world blast furnace iron and crude steel production gives a ratio, which has changed only slowly with time, eg 0.696 in 1994, 0.684 in 1997, 0.682 in 2001 and 0.676 in 2002. In other words, there is a very slow trend evident in using less blast furnace iron per unit of crude steel produced. However, there is a wide variation in this ratio by country and region: the ratio in the US has declined from 0.542 in 1994 to 0.436 in 2002. Interestingly, while crude steel production in the US rose by 2.4% in 2002, blast furnace iron production declined by 4.5%. The US is using more scrap per unit of steel production than it has in the past and, in fact, more of the iron units in its steel production comes from secondary sources than from primary (from iron ore). By contrast, the ratio in China is 0.940 in 2002, which means that practically all of its iron units in steel production are primary units.

The reason for this regional variability is the much greater availability and use of steel scrap in the older steel-consuming regions, where a scrap bank has been built up. Thus, the US and parts of Western Europe tend to have high scrap inputs in their steel production. Some limited amounts of scrap steel can be charged to the blast furnace, but the predominant method of using scrap is in the electric arc furnace (EAF). This is essentially a steel-melting process rather than a steel-making process (a fine point), and it is fairly obvious that the costs per unit of production would tend to be lower in a scrap-based EAF production system. To produce EAF steel requires a reliable source of steel scrap, either domestic supply or imports, at a competitive price, and a reliable source of electricity at reasonable rates. Scrap-based EAF plants are the essential infrastructure of the mini-mill concept, where a plant produces a limited number of steel products, destined for a local market, using non-union labour. The concept has been very successful, encompassing flexibility, low minimum economic scale and a modular plant structure. The drawback has been the limited product range, particularly the inability to produce high-quality cold-rolled sheet. However, advances in technology, such as thin-strip casting, have allowed them to compete with the integrated blast furnace/basic oxygen furnace (BF/BOF) production system over a much wider range of products.

Integrated BF/BOF plants have a larger minimum economic scale than scrap-based EAF plants, and therefore capital costs per annual tonne tend to be higher. The integrated plants also require ancillary plants, such as coke ovens and sinter plants, and these can cause environmental and cost problems as they age because of leakages and maintenance. These types of problems have surfaced in North America and Western Europe and resulted in the closure of some integrated plants. Developing countries, such as China, South Korea and Brazil, have fast-growing domestic consumer markets and they need large increments of new capacity, for which the BF/BOF plants are ideally suited.

One of the problems faced by scrap-based EAF plants has been the quality of the steel scrap supplied. As EAF steel plants moved to a higher-quality range of products, deleterious elements in the scrap were affecting the quality of the steel products. So, apart from a reliable source of scrap supply, quality was now becoming an issue. This was an impetus for a new type of ironmaking process, and the direct reduction (DR) process was born. Iron ore lump or pellets travel down a shaft and are reduced by a counter-current of reducing gases (hydrogen and carbon monoxide). These gases are produced from the cracking of natural gas (methane) over a metal catalyst, and the product is separated in a solid form; it has the generic name of sponge iron, and the iron content is usually better than 95%. This can then be charged to an EAF, either alone or with steel scrap, and it effectively dilutes the deleterious elements in scrap. Obviously, the iron ore used must contain the minimum amount possible of deleterious elements, since these report to the sponge iron.

DR processes can be gas or coal-based, but the former dominates the market. In 1970, world direct reduced iron (DRI) production was 0.79 Mt, and it had reached 43.78 Mt by 2000. It dropped to 40.51 Mt in 2001, primarily due to natural gas shortages in Mexico, and 2002 production has been impacted by the political situation in Venezuela. DR processes are linked to EAFs and have the advantage of modular plant architecture, low minimum economic scale and environmentally friendlier plants. The disadvantages include the need for very high-quality iron ore with low gangue constituents and a cheap and reliable source of natural gas. This latter requirement is why most DR plants are located in the Middle East, Mexico, Venezuela, Trinidad and Tobago and Russia, where there are ample supplies of cheap gas, often where it would be flared if not used. India is an exception and produces about 6 Mt of DRI per year, most of it from coal-based processes. The sponge iron can be traded but generally requires pacification first. Most sponge iron that is traded is in the form of hot briquetted iron (HBI), because without pacification, the sponge iron can by pyrophoric.

The two main routes for producing steel are the integrated BOF or the scrap/DRI-based EAFs. Over 60% of steel production in 2002 came via the BOF, and 34% from the EAF, but there was a wide variation between countries and regions. There are other methods for producing steel, such as the open hearth furnace (OH), but these furnaces have been largely phased out because of low productivity and cost. There are still some of these

furnaces operating in the CIS and China, an indication that some of the steel capacity in these regions is old and inefficient.

Another measure of modernity and efficiency in a steel plant is the degree of continuous casting (CC) used. Some ingot casting for special sizes and shapes is to be expected, but at least 95% of steel production in a modern plant should be continuously cast. Again, the CIS fares poorly, as do the European countries in the former Eastern Bloc. Asia had over 13% of its steel production ingot cast in 2000, but this had dropped to 6.4% in 2002. India still had 34.7% of its steel production ingot-cast but this is expected to drop sharply over the next few years.

Market dynamics

The most notable event in the world steel market in 2002 was the imposition of tariffs by the US on a wide variety of steel product imports and the knock-on effects from that action. Steel demand softened in the second half of 2001, resulting in an excess of supply and downward pressure on steel prices. At this point, even the most efficient producers were struggling to make profits and several producers in the US were forced to choose bankruptcy in order to protect themselves from their creditors. The US decided to impose tariffs in order to give the domestic steel industry some respite and time to restructure itself, although politics undoubtedly played a role in this action.

The threat of tariffs was enough to push steel prices higher and they rebounded strongly, more strongly in the US than elsewhere. Several countries threatened to impose tariffs on US exports as a form of retaliation, but as 2002 progressed the temperature dropped and cooler heads prevailed on both sides of the tariff question. Exemptions for certain steel imports were sought and several hundred exemptions were granted and more will be forthcoming.

The real problems, of course, are too much steel production capacity, unit costs that decline when production increases – thereby providing an incentive to increase production – lack of market leadership, and the steel cycle that appeared to hit bottom around the end of 2001. There has been a lot of discussion about pruning obsolete capacity, but this is a slow, ongoing process, which can have very painful repercussions for employment in small steel towns. If market forces are allowed to work, marginal steel producers will eventually cease production. But this will only happen if governments do not provide subsidies to keep the marginal producers operating, although it is accepted that governments can help with the social and environmental costs associated with the elimination of steel capacity.

The decline of the US dollar against the euro and the yen during 2002 has also had an ameliorative effect. The strength of the US dollar was one of the underlying problems with the flow of steel imports into the US, and with strong US prices – over US$400/t for hot-rolled coil – it was still worthwhile for steel exporters to ship to the US and pay the tariffs. The relatively weaker dollar will ease that situation.

There is little market leadership in the steel industry because no single steel company has even got a 5% share of the world market. There was considerable consolidation in the steel market in 2002: Arcelor in Europe, which combined the assets of Usinor, Arbed and Aceralia, became the world's biggest steel producer, but still with less than 5% of the market. The Corus Group attempted a merger/acquisition of CSN, Brazil's biggest steel producer, but the proposed marriage collapsed at the church door. Ostensibly, the driving force was the potential supply of 'cheap' iron ore from CSN's Casa de Pedra mine, but the availability of slabs from the Brazilian steel producer's 'hot end' would have been more than a bonus.

Many famous steel-industry names in the US, including LTV, Bethlehem and National, have declared bankruptcy and entered the limbo of Chapter 11. This gives these companies time to restructure their financial obligations while continuing to operate. This has led to much criticism that Chapter 11 is a form of rehabilitation that unfairly penalises healthy steel companies and keeps the inefficient operating. Some companies are recidivists and have used Chapter 11 more than once, surely proving that they are not viable and that the industry would be better off if they ceased operating. Outside investors hover like vultures over companies in trouble, looking to pick up assets at relatively cheap prices.

A group of investors under the rubric of the International Steel Group (ISG) bought LTV as an operating concern, negotiated new contracts with the steel unions, and LTV was reborn. ISG then pursued the more expensive Bethlehem, which would make it the single biggest steel producer in the US. The keys to this successful strategy are new deals with the United Steel Workers of America (USW) and being able to hand-off the burden of health care and pension costs to the government.

The former biggest steel producer in the US, United States Steel, has not been idle: it bought the Kosice steelworks in Slovakia, is currently pursuing Poland's Polskie Huty Stali (PHS), competing with Arcelor, and is in the hunt, along with AK Steel, for National Steel in the US.

Consolidation of steel companies is expected to continue, and in North America it is possible that Weirton will link up with Wheeling Pittsburgh. In Europe, Arcelor is likely to close some of its integrated plants inland. The Asian model of consolidation is a little different and plays to the Asian strengths of harmony and avoidance of confrontation. In Japan, there is an alliance between Kawasaki Steel and NKK, and others between Nippon Steel, Kobe Steel and Sumitomo Metals.

Meanwhile, on a regional basis, there is an 'understanding' among Nippon, Nisshin (Japan), Posco (South Korea) and Baosteel Steel Shanghai. The bigger picture is a regional steel community involving the major producers in Northeast Asia. Ispat (LNM), of course, was one of the first multinational steel producers (not counting intra-EU companies), and it will be interesting to see which model works best in the future.

Consolidations, *per se*, do not change the problem of excess steel capacity, although steel capacity does not necessarily translate directly into steel supply. When demand is soft, some of these plants will operate at sub-optimal capacity, or some capacity will be closed. If not, consolidation will not bear fruit. There is no correlation between steel company size and profitability, although this does not apply to individual plants. A large integrated plant, with modern facilities and a deep-water port, operating at optimum capacity, should be lower-cost, *ceteris paribus*, than a smaller, integrated plant inland.

Trade in steel products now runs at about 280 Mt/y, about 37% of production, compared to 140 Mt, 24% of production, in 1980. Steel trade increased substantially in the early 1990s, possibly because of the collapse of the Soviet Union and the rapid growth in China's steel consumption. Up until the time the Soviet Union collapsed, its steel production (the biggest in the world in 1988 at 163 Mt) was in line with its steel consumption, and net trade was tiny by comparison. After the collapse, steel consumption fell sharply, as did steel production, but by nowhere near as much. By 2002, there was a 60 Mt gap in crude steel terms, and this was steel that had to find a market outside the former Soviet Union. The two great sinks for exported steel products are the US and China. In 2002, the US had a 26 Mt shortfall and China 40 Mt. Thus, when the US cries foul and sticks tariffs on steel imports, foreign producers everywhere worry about falling steel prices elsewhere. If the growth in China's steel consumption were to fall or even pause, exporters of steel to China, particularly Japan, would have to tighten their belts.

Other major differences between production and consumption, in crude steel terms, in 2002 occurred in Other Europe, which is a net steel exporter to the tune of about 9 Mt, and Africa/Middle East, which is a net importer of about 14 Mt. An interesting use of statistics was made at the height of the brouhaha over the US imposing tariffs on some steel imports: the EU claimed that it was a bigger steel importer than the US, which it was, if all intraregional trade is counted. In 2002, the EU was a net exporter of steel.

Most steel-producing countries are both exporters and importers of steel, because of over or under capacity in certain steel products. Steel trade allows the market to clear and allows competitive advantages to occur in certain product specialties.

One of the more interesting points to emerge from the imposition of tariffs by the US on steel imports was the exclusion of steel slabs (semi-finished steel) from duties. The steel industry in the US is the biggest importer of steel slabs and these imports complement their own 'hot end.' The integrated steel sector in the US is getting older, leakier and more expensive to maintain. Ancillary plants, such as coke ovens, are the main culprits and the older ones are running foul of environmental legislation. This problem is overcome by importing coke, using pulverised coal injection (PCI) in the blast furnaces, and switching steelmaking to scrap-based EAFs. About 7 Mt of steel slabs are imported, reheated, rerolled and converted into finished steel products. In effect, the 'hot end' is beginning, almost imperceptibly, to move offshore, and steel suppliers such as Russia and Brazil are happy to oblige. Brazil's

Companhia Siderúrgica de Tubarão (CST) has been built specifically to produce and export steel slabs. It has recently been de-bottlenecked and has a capacity of 5 Mt/y and plans to expand to 7.5 Mt/y by 2006. Shareholders in CST include Arcelor, CVRD and Kawasaki Steel.

In the attempted merger/acquisition of CSN by the Corus Group, a supply of 'cheap' iron ore was given as the imperative of the transaction. Access to the CSN ‘hot end’ and the importation of semifinished steel for further processing in Europe was almost certainly one of, if not the, factor in the transaction. Granted, two larks do not a summer make (two points don’t make a trend), but trade in steel slabs is likely to increase.

Steel outlook

One of the best indicators of what is happening in the steel industry is what is happening to the price of scrap. Scrap prices in the US rose sharply for the first few months of 2002, from US$65/gross ton in January to just over US$100/ton at the end of April (based on US No.1 heavy melting scrap). The price remained relatively constant for the rest of 2002, but then increased sharply from just under US$100/ton in early January 2003 to reach US$120/ton by mid-March. Prices for HBI and granulated pig iron followed the same pattern. Crude steel production was up over 10% in January over January 2002, and over 8% up in the first two months of 2003 over the same period in 2002. From this point it would appear that steel consumption/production will rise in 2003, based on projected economic growth and scrap prices, but the fog of war can be disorienting. There is likely to be euphoria at the end of the war, but the aftermath is unknown. The peace could be messy, disruptive and confidence-draining.

China’s steel production has grown at an exciting clip in 2001/2002, but caution is beginning to creep in when forecasting steel consumption for 2003. This may be nothing more than the unknown: “How long can they keep this up?” China has such a big impact now on world steel consumption and production that to get China wrong distorts the world forecast.

It looks as if 2003 could be a better year than 2002 in terms of steel consumption/ production, but if it is, it is not likely to be by much. The Iraq war and its aftermath are likely to have a negative impact on confidence, and even an unknown respiratory virus can do that. It is all global now!

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World Economic Indicators – Growth Rates[1] %

Country/Region	2000	2001	2002
European Union 15	3.5	1.6	1.1
Germany	2.9	0.6	0.5
France	4.2	1.8	1.2
UK	3.1	1.9	1.7
CIS[2]	8.4	6.3	4.6
US	3.8	0.3	2.2
Canada	4.5	1.5	3.4
Brazil	4.4	1.5	1.5
China	8.0	7.3	7.5
India	5.4	4.1	5.0
Japan	2.4	(0.3)	(0.5)
World Output	4.7	2.2	2.8
World Trade	**12.6**	**(0.1)**	**2.1**

[1] Real GDP.
[2] Commonwealth of Independent States.
Source: IMF.

Apparent Steel Consumption (Mt of steel products)[3]

Country/Region	2000	2001	2002
European Union 15	144	139	139
Other Europe	36	35	34
CIS[4]	28	32	32
North America[5]	152	134	131
US	*120*	*106*	*102*
South America	26	27	27
Africa/Middle East	33	34	36
Asia	338	364	395
China	*141*	*170*	*195*
Japan	*76*	*73*	*70*
Oceania	7	7	8
World Total	**764**	**772**	**802**
World ex. China	**623**	**602**	**607**

[3] Note that these data are in finished steel product tonnes and are not directly comparable with crude steel data quoted elsewhere.[4] Commonwealth of Independent States.[5] Includes Mexico and Central America. Source: IISI.

World Blast Furnace Iron Production (Mt)

Country/Region	2000	2001	2002
European Union 15	95	90	90
Other Europe	26	25	24
CIS[6]	74	75	77
North America[7]	62	55	53
US	*48*	*42*	*40*
South America	32	31	33
Africa/Middle East	11	11	11
Asia	269	285	314
China	*131*	*147*	*171*
Japan	*81*	*79*	*81*
Oceania	8	7	7
World Total[8]	**577**	**578**	**609**
World ex. China	**446**	**431**	**439**

[6] Commonwealth of Independent States.
[7] Includes Mexico.
[8] Totals may not compute due to rounding.
Source: IISI.

World Crude Steel Production (Mt)

Country/Region	2000	2001	2002
European Union 15	163	158	159
Other Europe	47	46	48
CIS[9]	98	100	100
North America[10]	135	120	124
US	*102*	*90*	*92*
South America	39	37	41
Africa/Middle East	25	27	28
Asia	332	354	393
China	*127*	*151*	*182*
Japan	*106*	*103*	*108*
Oceania	8	8	8
World Total[11]	**848**	**850**	**902**
World ex. China	**721**	**699**	**720**

[9] Commonwealth of Independent States. [10] Includes Mexico and Central America.
[11] Totals may not compute due to rounding.
Source: IISI.

Plant Process Used in 2002: (%)

Country/Region	BOF[1]	EAF[13]	Other[14]	CC[15]	IC[16]
European Union 15	58.9	41.1	—	96.6	2.9
Other Europe	58.8	41.1	0.1	86.3	13.1
CIS[17]	55.7	12.6	31.7	41.4	56.2
North America[18]	47.8	52.2	—	97.5	2.5
US	*49.3*	*50.7*	—	*97.0*	*3.0*
South America	66.2	33.8	—	93.1	6.8
Africa/Middle East	31.8	68.2	—	98.7	1.3
Asia	66.0	27.8	6.1	93.2	6.4
China	*71.9*	*16.0*	*12.1*	*92.5*	*7.0*
Japan	*72.9*	*27.1*	—	*97.8*	*1.9*
Oceania	80.8	19.2	—	99.4	0.6
World	**60.1**	**33.9**	**6.0**	**88.4**	**11.0**

[12] Basic oxygen furnace.
[13] Electric arc furnace.
[14] Usually open hearth furnace.
[15] Continuous casting.
[16] Ingot casting.
[17] Commonwealth of Independent States.
[18] Includes Mexico and Central America.
Source: IISI.