

Indian Stainless Steel Industry in global perspective

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Introduction

Stainless Steel is a value added product. It does not deteriorate during the life of the product. It is corrosion resistant and has high tensile strength with excellent fatigue properties. Stainless steel saves cost in the long run though the initial cost is high. It has ease of fabrication quality cent percent recyclable and is environment friendly, stainless steel is a material for hygienic condition and has a great aesthetic appeal.

Stainless steel contains a minimum of 10.5 per cent of chromium. Its classification depend on its content and the quantity of chromium along with other metals like nickel, molybdenum etc. that has been used while producing it. The attributes of the alloy that makes it stainless are mentioned below :

- Excellent corrosion resistance – does require coatings
- Strength increase with cold work

- Excellent elongation / formability
- Available in wide range of surface finishes
- Readily clad on carbon steel
- Excellent fatigue resistance
- Easy to clean – hygienic
- 100 per cent recyclable
- Good energy absorbing characteristics
- High tensile strength
- Low thermal conductivity
- Easily formed and welded with conventional equipment
- Good high temperature resistance and strength

- Tough at cryogenic temperature

Global scenario

The first use of stainless steel was made in 1913, in which year the product was invented, in making cutlery items. Since then it found application as an important engineering product for food processing sector. Later, gradually it penetrated into textile industry where many precision components were made of stainless steel.

In the building sector, stainless steel was introduced in 1930 for cladding the top portion of the Chrysler Building in New York, U.S.A. The stainless steel cladded top portion remains in very good shape even today, after 75 years of its first use.

Global production of stainless steel

Global production of stainless steel in 1913 was only a few tones. In reached 2.5 Mt in 1963. Its production crossed the 10 Mt mark in 1986. In



1995, the global production was about 16.2 Mt.

The global production of stainless steel between 1995 and 2004 are furnished in Table – 1

Table – 1. Global production of stainless steel : 1995 to 2004 ('000tonnes)

Year	Production	YoY Growth (%)
1995	16,248	-
1996	16,162	(-) 0.53
1997	17,395	7.62
1998	17,185	(-) 1.21
1999	17,872	4.00
2000	19,300	7.99
2001	19,185	(-) 0.60
2002	20,679	7.79
2003	22,840	10.45
2004	24,564	7.55

Data Source : IISI & ISSF

In the fourth quarter of 2004 a production of 6.4 Mt boosted overall global levels, with a 9.3 per cent growth over the corresponding period of 2003.

Asia was the largest stainless steel producing areas in the world and in 2004, total Asian output grew by about 12 percent to 11.9 percent on its 2003 figures. South Korea and India with production growths of 18 and 11 percent respectively also showed strong production increases.

Western Europe / Africa is the second largest stainless steel producing area. The output in this region reached 9.4 Mt in 2004 over 9.0 Mt in 2003 recording a growth of 4.1 percent.

Growth in Americas was 3.4 percent in 2004 at 2.93 Mt which rose by 3.63 percent over 2.83 Mt in 2003.

Trends in 2005

The International Stainless Steel Forum (ISSF) has announced that global stainless steel production in Q1 of 2005 was 6.5 Mt recording a growth of 7.4 per cent over Q1 of 2004. Production in Western Europe / Africa region rose by 2.6 percent at 2.43 Mt in Q1 of 2005 over Q1 of 2004. Production of Central and Eastern Europe as well as in the Americas dropped by 21.1 and 1.1 percent respectively in the above comparative periods.

Production in Asia, however, rose by a high of 14.2 percent at about 3.3 Mt in Q1 of 2005 over the same period of 2004.

ISSF expects the global stainless steel production to grow by 5 percent to 25.8 Mt in 2005.

MEPS study

In a recent study published by MEPS of U.K. a forecast has been made that global stainless steel production in 2005 would be 25.3 Mt. Most of the growth will occur in the developing nations of the world. Production in the industrialized countries is stagnating.

China remains a power house for stainless demand. New capacities are being installed rapidly to meet expanding requirements. However, the government has recognized that current output increases are not sustainable.

EU production is expected to increase marginally in 2005 to 8.9 Mt. Currently, the steam has gone out of

the market due to poor economic activity in the region and a slowdown of export potential.

Japanese demand is reasonable – particularly from the automotive segment. However, as in EU, exports are more difficult to find and output cuts have been put in place.

The US market suffers from high levels of imports. The mills find it difficult to compete in many product categories. Production in 2005 will be similar to that of 2004.

South Korean stainless steel making should level off at about 2.4 Mt per year after Posco's considerable investment in the past two years. Taiwanese supply should also settle down at around 1.6 Mt in the medium term. The mills in both these countries have indicated production curbs in the third quarter of 2005.

China, South Africa and India are countries exhibiting continuous growth tendencies. Brazil is also likely to contribute more over the next few years.

There are increasing fears that China will become a net exporter of cold rolled coil in the short term and have surplus of stainless steelmaking before the end of the decade.

Indian scenario

The Indian stainless steel industry has come a long way in the last 15 years or so to reach an estimate of production of 1.50 Mt in 2004-05 to be among the top 15 global producers. India has also emerged as a net exporter of stainless steel products as well as fabricated and value-added components and kitchenware. The

stainless steel producers of the country and ISSDA are optimistic about the future of stainless steel in India both in terms of growth in domestic application as well as a hub for downstream value chain.

The per capita consumption of stainless steel in India is about 1Kg as compared to 12 Kg in South Korea in Taiwan and 2.5 Kg in Malaysia. Globally, it is about 4 Kg.

The end-use of stainless steel is still dominated by kitchenware. New applications in the area of building and construction as well as the transport sector are showing positive growth trends. Availability of stainless Steel for building and construction along with up-gradation of fabrication skills has resulted in extensive use in stainless steel in airports, hotels and corporate houses are expected in future at a much faster pace.

India is producing all popular grades of stainless steel based on end use viz. 200,300 and 400 series as per AISI specifications. However, due to the high cost of nickel and its non-availability in India, the 200 series with nickel containing 1 to 4 percent have been developed in the nineties. India has emerged as the largest producer of the 200 series in the world. A large part of export of stainless steel from India belong to the 200 series.

However, The Indian stainless steel industry is capable of meeting all the critical requirements for the nuclear power industry and other process industries by supplying higher grades containing nickel and molybdenum. The 400 series is extensively used for coinage by the automobile

industry.

The capacity for stainless steel production in India is far in excess of current domestic demand resulting in export of largest 40 percent of the production. China has emerged as the single largest net importer of stainless steel with its demand of 4 Mtpy and current production level being below 2 Mtpy. The other important market for the Indian stainless industry is South East Asia, Vietnam has taken up stainless steel fabrication in big way followed by Thailand, Malaysia, Indonesia and Singapore.

India has a huge unorganized sector which accounts for about 5 to 6 lakh tones per year in the form of low nickel stainless steel popularly known as PATTA. Alongside, the country has organized sector having producers like Jindal Stainless, Salem Steel Plant, Alloy Steel Plant and some other upcoming producers. The organized sector primarily caters to the upper end of the quality requirement in the Indian stainless steel market.

Major producers of stainless steel in India

(a) Jindal Stainless Ltd. (JSL)

Jindal Stainless Ltd. an ISO:9002 and ISO-14001 certified company is the flagship company of the Jindal group. The company started with hot rolling of plain carbon and high carbon steel in 1970. Looking ahead at the untapped potential for stainless steel in the country, the company started production of stainless steel by setting up the first A.O.D. converter in the country at Hisar. Since then the company has gone a long way in expansion and growth of the plant and

achieved a turnover of Rs. 3411 crore in 2004-2005.

Jindal Stainless Ltd. is the largest integrated producer of stainless steel in India that single handedly caters to about 45 percent of the total stainless steel demand in the country.

The company exports more than 40 percent of its production to countries like China, Middle-East, Europe and the U.S. etc. The export growth is driven by in house development of low Nickel 'J' series stainless steel. The popularity of these 'J' series grade is growing fast and have the ability to replace higher nickel grades mainly 304, for variety of applications in utensils, household appliances, furniture, decorative trims, railings etc. The company has also a strong presence in certain overseas markets for its thin cold rolled strips and coils for a variety of scientific and industrial usage.

The export turnover of JSL in 2004-05 was about Rs.1087 crore.

Ferro Chrome Plant

JSL's ferro -chrome plant is situated at Kothavasala in the Vizianagram district of Andhra Pradesh. The installed capacity is 40,000 tpy of high carbon ferro - chrome. Besides supplying to the domestic market, the company also exports ferro-chrome to various developed countries.

The company has also embarked on a major expansion of its production capacity by setting up a 1.6 Mtpy capacity stainless steel plant at Kalinganagar in the Jaipur district of Orissa. The present investment of Rs. 950 crore is for the 250,000 tpy ferro alloys capacity which includes

150,000 tpy of high carbon ferrochrome and balance for ferro manganese and silico manganese. The stainless steel plant will come up with backward integration of the ferroalloys complex and thermal power plant of 250 MW coal-based captive power plant.

Hisar Plant (Haryana)

JSL's Hisar plant is a fully integrated stainless steel plant. The production capacity has been expanded to 500,000 tpy. An exclusive complex for manufacturing stainless steel for razor and surgical blades have been created and a coin blanking line has also been installed.

The company has planned to invest Rs. 450 crore for expanding the capacity of the Hisar plant to 600,000 tpy of melting, 7500,000 tpy of hot rolling and 250,000 tpy of cold rolling. JSL has also entered into a technology tie-up with NISSIN steel of Japan which will lead to transfer and upgradation in operation technology for improving quality, production and yield at the Hisar plant.

JSL has also acquired a running 50,000 tpy capacity stainless steel plant from PT Maspion Stainless of Indonesia at an investment of about US\$ 35 million. After acquiring the plant, the company plans to double its capacity by adding one more Z-mill and other finishing equipment.

(b) Salem Steel Plant (SSP)

SAIL's Salem Steel Plant has a capacity to produce 186,200 tpy of hot-rolled carbon / stainless flat products and 70,000 tpy cold-rolled stainless sheets/coils. SSP's Blanking

Line's capacity is 4,000 tpy of ferrite grade coin blanks or 3,600 tpy of utility blanks. One rupee, 50 paise and 25 paise coins are minted from SSP blanks supplied to the Government Mints. SSP is a ISO 9000:2000 and ISO 14001 certified plant. It has gone beyond its designed capacity in producing thinner gauges and supplies value-added 0.13 mm thick stainless steel. The plant has developed new applications of its products viz. LPG tanks for automobiles, stainless steel tubes etc.

Salem Stainless products are well accepted in the domestic and international markets. Industrial segments using 'Salem Stainless' include high tech areas like atomic power station, heavy engineering, chemicals and fertilizers, railways, automobile, construction, dairy and food processing, bulk solid handling, power, architectural, furniture etc.

Salem stainless was long ago for the retractable roof of the Melbourne Tennis Stadium in Australia. Salem stainless weighing about 400 tonnes was used in the worlds tallest twin towers, the petronas tower at kuala Lumpur in Malaysia. Salem Stainless also been used in Canada and the U.S.

In India, about 350 tonnes of Salem Stainless Steel has been used in the Parliament library in Delhi. The 40 ft by 70 ft signage at the Ramoji Film City, at Hyderabad used 60 tonnes of 304 grade salem stainless steel has also been used in the 'Tree' at Priyadarshini Park in Mumbai and 'Garuda' at the TCI headquarters at Gurgaon.

About 70 tonnes of Salem

Stainless in the corrugated form has been used for the 10,000 sq. metre dome-shaped roof of Koparkhairane railway station at Navi Mumbai. Similar projects are underway at the Turbhe and Aairoli railway stations.

SSP has planned to raise its production by 40 percent to 2.11 lakh tonnes in 2005-06 from 1.50 lakh tonnes achieved in 2004-05.

Alloy Steel Plant (ASP)

SAIL's Alloys Steel Plant at Durgapur in West Bengal is a pioneer in stainless steel making in India. ASP was designed for capacity stainless steel grades like austenitic, ferritic and martenistic. ASP has the capacity to produce slabs, blooms, bars, plates and gorged items over 400 grades in a wide range of size totaling 1.78 lakh tpy of saleable steel. Among the value-added items produced by ASP are CRM rolls, concast rollers, crane wheels, springs, hammer, grate bars, hot saw blades, shear blade, bright bars, stainless liner plates etc.

The entire ASP plant is certified to ISO 9001:2000 standards. Through research, ASP has developed many new grades of austenitic, ferritic and martenistic stainless steels.

Other producers

(i) Mukand Ltd.

Mukand was the first company in India to install the furnace, cooling bed and a fully automatic wire rod mill with C.C. machine. It is an ISO - 9002 company and produces about 40,000 tpy stainless steel products to various AISI specifications in 300 and 400 series.

(ii) Shah Alloys Ltd.

The company is a leading stainless steel producer of the country. It produces both long and flat stainless steel products. Its production is carried out by induction furnace route with AOD converter. Shah Alloys has installed a 180 mm wide caster and a HR Coil Mill with a width of 2000 mm for production of 180 mm coils. It is an ISO : 9002 certified company.

(iii) Viraj Group

Viraj produces all types of stainless steel grades in austenitic, ferritic, martensitic and duplex variety. It has a modern meltshop, C. C. machine and rolling mill. The plant is equipped with two A. O. D. Converters, ladle refining furnace with calcium cored wire injection system. Its plant is ISO : 9002 certified and the group's turnover is about US \$ 120 million. Viraj is a 100 percent export oriented unit.

(iv) ISI Bars Ltd

The company is a fully integrated producer of stainless steel having continuous casting and secondary refining facilities. Its annual production including conversion of ball bearing etc. is about 60,000 tonnes.

(v) Mahindra Ugine Steel Co. Ltd. (MUSCO)

It is one of the early producers of stainless steel in India. Its plant has secondary refining technology and CC. facilities. It produces about 8,000 tpy high quality stainless steel products.

(vi) Panchmahal Steel

It has a two strand CC machine

with modern secondary refining facilities having a 40 tonnes ladle furnace. It is producing about 20,000 tpy of stainless steel products.

(vii) Ambica Steels Ltd.

Located at Sahibabad, the company manufactures billets, ingots, round bars and flat bars encompassing various types of forged and rolled products of stainless and alloy steel. The company's manufacturing facilities include 20 tonne induction furnaces



and 30 tonne AOD converters.

Some other companies like FACOR, VISL, Kalyani Steels etc. are also producing stainless steel.

Exports

India exported about Rs. 1100 crore worth of stainless steel in 2004-05 mostly the kitchenware items. Kitchenware exports to various countries in percentage terms is furnished below :

Country / Region	Share (%)
Middle East	35
U. S. A.	25
Africa	15

Europe	10
Latin America	10
Far East & Japan	5

Consumption Pattern of Stainless Steel in Western World and India

The end – use wire consumption of stainless steel in the Western countries vis-avis India are presented below :

Kitchenware sector is the bread and butter item of the stainless steel business in India. Even in 1993, the share of kitchenware in India's total domestic consumption was 85 percent. But due to the sustained efforts of the Indian Stainless Steel Development Association (ISSDA), the consumption of the other sectors have improved in the last decade resulting in a decline in the share catering equipment in the total consumption of stainless steel in the country.

Ten applications of stainless steel in ABC and ART sectors

New application areas in architecture, building and construction (ABC) and automobile, railways & transportation (ART) sectors are showing positive growth in the consumption of stainless steel (S.S) in India.

(i) ABC Sector

Since the late eighties, S. S. has been used in southern cities like Chennai, Bangalore and Hyderabad in Construction of staircase, handrails, pillar cladding etc. This trend is fast picking up in Mumbai, Delhi and other cities. Some new applications in the

ABC sector have already been mentioned under Salem Steel Plant. Other recent applications of S. S. are found in cladding of the 19 meter high OBELISK (stambh) at Gomti Nagar in Lucknow, ING Visya Bank in Bangalore, value pillars at the Bajaj corporate head quarters in Pune, R&D center of JSL at Hissar, Reliance Classic at Hyderabad, Rolling Shutters at Nashik and Shatar in Maharashtra, new bus stand at Delhi etc. Many shopping malls, big hotels, banks, corporate office buildings and other modern high – rise buildings are showing interest to use S. S. in their construction.

The first ever S. S. pipeline was used in matter in Tamil Nadu S. S. when used in buildings for internal plumbing lines helps prevention of dust collection, rust or other foreign bodies and ensures flow of clean hygienic water throughout its lifetime. Use of S. S. sinks and basin is fast increasing.

Use of S. S. domestic LPG cylinders holds good promise. The 50 percent weight saving is of a major benefit for the LPG consumers in hilly terrains and border areas

(ii) ART Sector

(a) Automobiles – Catalytic converters made of S. S. with its corrosion resistant property and ability to withstand high temperature is the preferred material for auto exhaust system due to environmental reasons. Each of such units use about 6 to 12 kgs of S. S. depending on the model and make. India produced over 9.60 lakh units of passenger cars in 2004-05 which ensures a good share of S. S., in the ever growing auto market. The country produced over 6.5 million

units of two wheelers in 2004-05. Prominent Indian motor cycle manufacturers are using S. S. fasteners in the critical locations leading to higher consumption of these steels.

The use of S. S. LPG cylinders in cars is gaining momentum. With a market share of 10 percent in new cars, the S. S. consumption in this segment may reach a substantial level. India is also emerging as a major supplier of auto components made of S. S. for automobiles produced in other countries.

(b) Railways

At present all S. S. long distance coaches consuming 11 tonnes per unit are being produced at the Railway coach factory (RCT) at Kapurathala. The integrated coach Factory (ICF) at Perambur near Chennai have also started the same. Currently RC and ICF together roll out about 2000 all S S coaches annually.

Each of the Delhi Metro coaches use 12 tonnes of S. S. The Mumbai Rail Vikas Corporation (MVRC) will also use similar coaches for the Navi Mumbai routes. ICF has already executed a trial order of an all S. S. coach cell for Malaysia.

A modified version of AISI 409 grade with ferrite-martenistic structure has been developed by the Alloy Steel Plant, Durgapur, for coal wagons catering wet abrasion and corrosion resistance. More than 1000 such coal wagons are now being used by the Indian Railways.

Role of ISSDA

The Indian Stainless Steel

Development Association (ISSDA) was founded in 1989. Since then, with the help of the Nickel Development Institute (NiDi) and maintaining close co-operation with the stainless steel development Associations (SSDA) in other countries, ISSDA could identify the products and end use segments for diversifying and increasing the use of S. S. in India.

As a result of focused and persistent efforts of ISSDA aimed at the material specifiers, engineers architects, fabricators and other decision makers, S. S. has penetrated into many new application areas. ISSDA is holding regular workshops to further propagate the use of S. S. in India. In 1989, when ISSDA was founded, the kitchen / utensil segment accounted for over 90 percent of the total consumption of S. S. in India which has now come down to about 71 per cent with corresponding growth in consumption by other sectors.

Conclusion

S. S. is a very small but significant member of the steel family. The notion of high initial cost is gradually giving way to the life cycle cost analysis approach. While the industry is doing its best to widen the scope of diversified applications and usage of S. S. favourable government policies will help the industry in a big way.

The Indian stainless steel industry is growing fast and its future is bright.

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