Global outlook of Nickel market

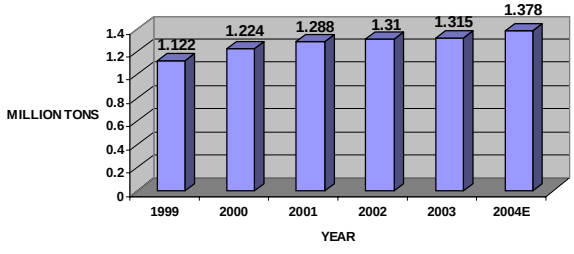
B.V.R.Raja, P.L.Talwar, N.P.Jayaswal
Alloy Steels Plant, Steel Authority of India Ltd.,
Durgapur - 713 208

Nickel was discovered by A.Cronstedt in 1751 in Kupfernickel (niccolite). It exhibits relatively low thermal cum electrical conductivities, high resistance to corrosion & oxidation and excellent strength & toughness at elevated temperatures. Basically, nickel is present in earth's crust as laterites where the principal ore minerals are nickeliferous limonite & garnierite or magmatic sulfide deposits with the ore being pentlandite.

Lateritic ores are processed initially through drying for moisture removal followed by removal of chemically bound water by reduction process which reduces nickel oxide. Here, electric furnace is used to obtain high temperatures to accommodate high magnesia content of the ores and production of ferronickel products. Some laterite smelters add sulfur to the furnace to produce matte for processing. Also, hydrometallurgical processes based on ammonia or sulfuric acid leach are applied to the ore after reduction roasting.

Sulfidic ores are generally processed either by flash smelting or electric smelting where electric smelting requires a roasting step before smelting for reducing sulfur content and volatiles. Earlier, blast or reverberatory furnaces were used for nickel smelting. The common process applied for these ores is flash smelting where the ore is fed to the furnace along with preheated air, oxygen enriched air or pure oxygen and iron & sulfur content are oxidized due to the heat generated by exothermic reaction to smelt the concentrate for production of liquid matte (up to 45% nickel) and slag. However, the furnace matte contains certain amount of iron and sulfur which are oxidized in Pierce – Smith Converter to sulfur dioxide and iron oxide by injecting air or oxygen into the molten bath. Slags are processed in electric furnace before discard to recover nickel. Nickel matte is refined either by fluid bed roasting and chlorine-hydrogen reduction for production of high grade nickel oxides (nickel exceeding 95%), vapor process known as Carbonyl method to produce high purity nickel pellets or Electro-winning process in which nickel is removed from solution in cells equipped with inert anodes where sulfuric acid is used as electrolyte.

FIG.1. GLOBAL MINED NICKEL PRODUCTION

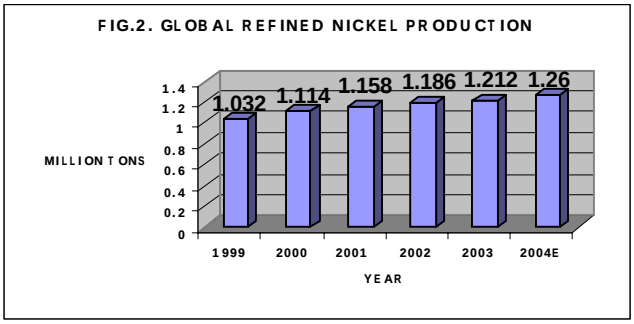


Nickel Production

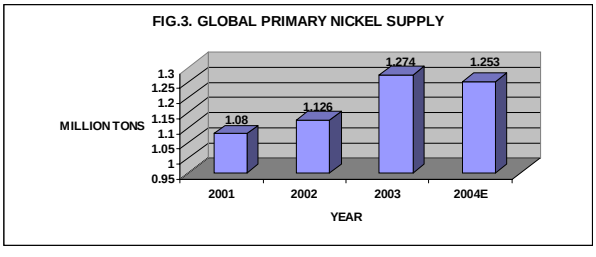
The global nickel mine production was 1.315 million tonnes in 2003 with an average annual growth rate of 4.30% from 1999 onwards. The top 10 nickel mine producers contributed 70% of the total production. The mine production is illustrated in Fig.1.

CIS countries are the largest producers of mined nickel and contribute to about 19.77% of the world production. The largest change in mined nickel production in the world has been from Indonesia where the production rose from a level of 93,000 tonnes in 1999 to a mammoth 145,000 tonnes in 2003. Considerable increase in mined nickel production has also been reported in Australia from 122,000 tonnes in 1999 to 199,000 tonnes in 2003. The production from New Caledonia has been inconsistent varying between 99,000 tonnes to 126,000 tonnes in the aforementioned period. Also, there has been continuous decline in nickel mine production from Canada from 186,000 tonnes in 1999 to 156,000 tonnes in 2003. The mined nickel production is estimated to reach 1.378 million tonnes in 2004.

The refined nickel production in the world was 1.212 million tonnes in 2003 compared to 1.032 million tonnes in 1999 showing an average annual growth rate of 4.36%. This clearly indicates the influence of mined production on the refined nickel output. The top nickel producing countries are Russia, Australia, Canada, Indonesia and Columbia. CIS countries are the largest producers of refined nickel contributing to 21.70% of the world refined nickel output and is about 263,000 tonnes in 2003. Australia has shown a great increase in the refined nickel output from a level of a mere 85,000 tonnes in 1999 to reach 127,000 tonnes in 2003. Refined nickel production during the period 1999 to 2003 is shown in Fig.2.



Refined nickel output in Japan increased from 134,000 tonnes in 1999 to 165,000 tonnes in 2003. However, Canada has shown a decrease in nickel output from 137,000 tonnes in 2001 to 124,000 tonnes in 2003. Global refined nickel output for 2004 is estimated at 1.26 million tonnes.

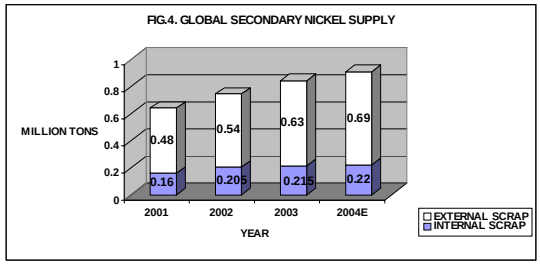


Nickel Availability

Nickel is available in the market either as primary nickel or as secondary nickel in the form of austenitic stainless steel scrap.

Primary Nickel Supply

The primary nickel is the refined nickel produced coupled with stocks. The nickel supplied in the market is illustrated in Fig. 3. Hence, it does not always reflect the refined nickel produced in that year. This is because nickel can be used as loan collateral and then returned to and absorbed in the market based on any changes observed in the nickel market. So, some times one is amazed to see that the primary nickel supply in the market is less than the refined nickel output.

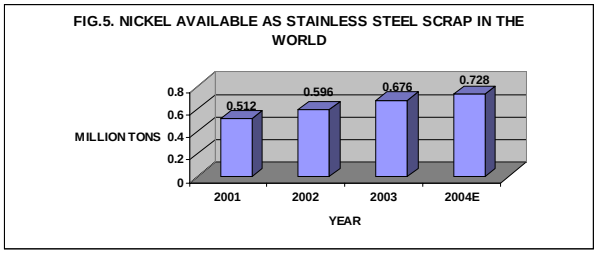


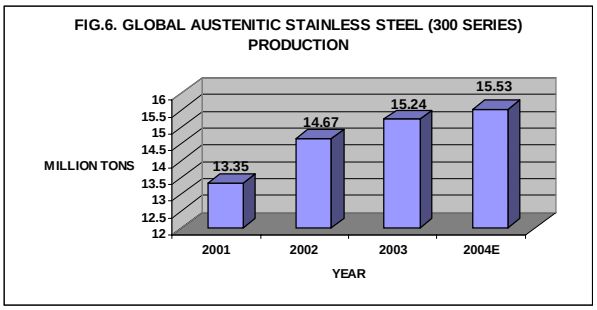
Secondary Nickel Supply

Secondary nickel is basically the nickel bearing scrap which is the obsolete austenitic stainless steel scrap evolved from the demolition of obsolete factories, machinery, equipment and consumer goods. This is the largest source of scrap contribution and is also known as the External Scrap. Another source of nickel is the Internal Scrap which is generated during melting and rolling processes.

Generally, the nickel content in the scrap is about 8%. The amount of nickel bearing scrap availability is shown in Fig.4.

Scrap availability was limited in 2003 due to tighter Russian export restrictions and collapse of industrial/ investment activities in the main generating areas. However, the availability improved during the first half of 2004 due to higher level of economic activity but it did not continue with the same pace for the other half of 2004. Scrap available in terms of pure nickel is shown in Fig. 5.

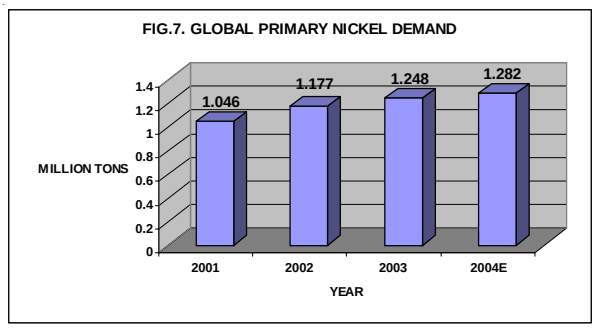




Nickel consumption & demand

Nickel consumption is derived from the production growth of austenitic stainless steel in the world as this segment consumes 68% of the nickel produced. The austenitic stainless steel discussed about is that of the 300 series material which possess a min. of 8% nickel and its production is figuratively explained in Fig. 6.

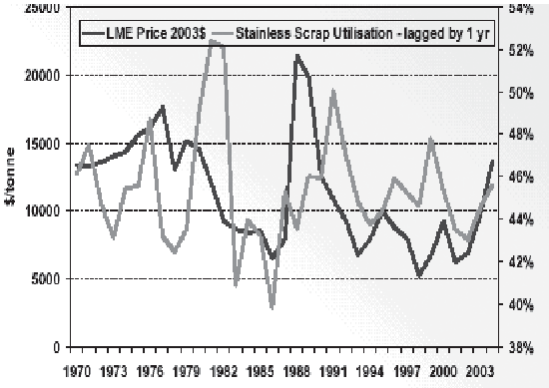
This clearly indicates the increasing demand of nickel for production of austenitic stainless steel. The demand for primary nickel is illustrated in Fig.7.



The primary nickel consumption has increased by 6% in 2003 mainly due to the excellent growth in austenitic stainless steel production, 9.8% growth in primary nickel use in stainless steels coupled with strong demand of nickel from China up by 27% (including stock build). However, the primary nickel consumption is expected to increase by a mere 2.8% due to the weaker growth of primary nickel usage in stainless steel by 4.3% with flat demand for nickel from China due to de-stocking but, the last quarter of 2004 has led to pick up of nickel consumption caused by increased demand from China.

Conclusions

The nickel prices on LME which are as high as $15,950 per ton as on 25th April,2005 are on a decreasing trend. Also, the LME warehouse stocks are falling where a fall of 354 tonnes in 22 days of the April month to touch a level of 6756 tonnes as on 22nd April,2005 clearly provides a message that the nickel producers are pushing hard to maximize their production for



increase of stocks in LME. Along with the above, the price of nickel also depends on the potential production disruptions in nickel refining units world wide. However, it is the growth of low nickel austenitic stainless steels (200 series) which are replacing the 18%Cr-8%Ni steels and the stainless steel scrap availability that could bring a balance in the nickel market for 2005. It is expected that the price fall is expected to take place in the second half of 2005 bringing out a balance in the nickel market.

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