

# ALL INDIA INDUCTION FURNACES ASSOCIATION



# AIIFA

## INDUCTION FURNACE NEWSLETTER

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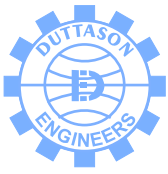
- ☑ Enjoy the wider market exposure and expand your business and customer portfolios
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## UNION BUDGET 2017-18 PROVIDES RENEWED IMPETUS TO MANUFACTURING AND MAKE IN INDIA

**Kamal Aggarwal**  
*Hon. Sec. General, AIIFA*



Union Finance Minister Arun Jaitley arrives at Parliament to present the Union Budget 2017-18, in New Delhi on Wednesday

The 2017 Union Budget, presented by Hon'ble Finance Minister Shri Arun Jaitley on **1<sup>st</sup> February, 2017** was broadly focused on **10** themes — the farming sector, the rural population, the youth, the poor and underprivileged health care, infrastructure, the financial sector for stronger institutions, speedy accountability, public services, prudent fiscal management and tax administration for the honest.

In fact "This budget would tremendously strengthen the economic muscle of the country. It is directionally correct, fiscally prudent and strengthens the governance fabric of the nation. We would like to congratulate the Finance Minister on his vision for the economy which alongside economic growth also ensures economic justice. Growth without inclusion can be a liability for the country."

"I think the biggest take away from this budget is the reform, introduced in the area of political funding. The demonetisation move of the government was an attack on the stock of black money and the measures announced in the budget on electoral funding will help attack the root cause of corruption of India.

In pursuance of its objective to double the income of farmers in five years' time, the government has significantly enhanced the allocations under most of the agro-economy directed schemes and programs including those related to farm credit, crop insurance, soil health, irrigation, market infrastructure, dairy farming etc. "All these efforts including the all-time high annual allocation for the reformed **MNREGA** scheme will not only help to improve the income levels in the rural areas of the country but also help to generate a route of new jobs across vast parts of the

nation. This is a clear boost for generating demand on a large scale"

With the inclusion of the Railway Budget in the main Budget, government has been able to focus on development of the transportation network within the country in an integrated manner. The major plans as outlined by the Finance Minister on infrastructure development will help improve the service quality as well as bring in greater efficiency in the operations of our railways, ports, roads and highways. "Another plus in the infra sector is the extension of infrastructure sector status to the affordable housing segment. Housing sector is a force multiplier with its linkages to almost 200 industries across the economy. AIIFA had strongly advocated for special recognition of this potential and thanks the government for having made this move",

Financial sector being the backbone of the economy also got the needed attention in the Budget. AIIFA welcomes the abolition of Foreign Investment Promotion Board as the institution was becoming increasingly irrelevant with as much as 90 per cent of the FDI inflows coming through the automatic route. This is again a testament of the administrations resolve to have more governance and less government.

"On the banking side while the Finance Minister did allocate Rs. 10,000 crores for capitalising public sector banks, AIIFA feels that this figure will have to be increased during the course of the next fiscal given the actual requirements of the banks and the need to support growth.

"The announcement to reduce the Income Tax rate for MSMEs with an annual turnover of up to Rs. 50 crore is geared towards expanding the tax base in the economy as well as giving a thrust to employment generation. This will benefit scores of small business units in both the manufacturing and services segments. It is a clear encouragement to businesses to move over to the formal economy"

The reduction in the tax rate for individuals in the lowest income tax slab will leave more disposable income in the hands of the people and will enhance consumption demand in the economy which had taken evident hit due to the demonetisation move. "On the face of it, this step may not appear significant, but a 50 per cent reduction in tax liability is a huge positive for the maximum number of tax payers of the country.

## POSSIBLE OUTCOMES OF THE UNION BUDGET 2017-18

**Dr. Susmita Dasgupta**

*Joint Chief Economist, Economic Research Unit, JPC*

The much hyped Union Budget for 2017-18 post demonetization which promised the world for the industry in particular and the economy in general has turned out to be a damper. The industry is disappointed that almost nothing was done by way of easing the import of raw materials such as scrap and coking coal to nil duties or freer imports of intermediate products like hot rolled sheets which continue to attract the Minimum Import Prices, seemingly forever.

However, the encouraging aspects are that the basic customs duties on nickel, an input for the stainless steel is down to nil. The basic customs duties on the HR sheets under 7208 for the manufacture of pipes falling under 7305 and 7306 have been reduced from 12.5% to 10%. The basic customs duties on magnesium oxide coated CRC under 72251990 for the use in the manufacture of CRGO sheets under 72251100 is reduced to 5% from 12.5%. 10% concession is provided on the customs duties on polymer coated MS steel tape for the manufacture of telecommunication grade optical fibre as well as on stainless steel tapes used in optic fibre cables<sup>1</sup>.

Clearly, the classes of manufacturers favoured by the Union Budget are those who manufacture stainless steel through primary processes rather than those who manufacture it out of induction furnaces by melting stainless steel scrap, those who manufacture CRGO and CRNO and those in the business of

manufacture of optic fibers for telecommunication. The stainless steel industry of the large players namely those who manufacture stainless steel for nuclear applications are favoured over those who make stainless steel for the more common uses in domestic or industrial applications. The power sector and the telecommunication sector have been favoured as well.

Mass housing has been awarded the infrastructure status. This is not the same as giving infrastructure status to the real estate sector as a whole. A part of the steel long product manufacturers have lauded the move but one need to be cautious. Housing for the weaker sections may only need the smaller diameter of medium to light steel structural which are overwhelmingly manufactured by the induction furnaces. If the low end housing sector is awarded the status of infrastructure then clearly it will attract the Quality Control Order which will eliminate the bulk of the bars and rods manufacturers, leaving this market to be fulfilled by the integrated large players only. Similarly the increase in outlay in infrastructure which includes power and ports, railways and telecommunication will help the large players that too protected by tariffs.

However, the tax benefits to the SMEs may help improve their margins but the bar on cash transactions beyond Rs 3 lac will throw the steel industry which circulates on cash into a deep crisis.

## 25TH STEEL CONSUMERS COUNCIL MEETING



- **On 21st January, 2017** the first meeting of the National Steel Consumers' Council was held under the Chairmanship of the Union Steel Minister Shri Chaudhary Birender Singh in Mumbai.
- The **function** of the Steel Consumer Council is to **advise Government** on matters relating to supply, availability, quality and the market trends of iron and steel.
- This meeting was attended by representatives of

various ministries, **several industry associations**, producers and consumers of iron & steel Industry, house builders and related industries, industry experts and steel makers including SAIL, RINL and TATA Steel etc.

- This meeting would provide a vibrant platform to discuss the domestic steel industry scenario, the global steel trends, and benefits of using steel and on how to boost the domestic steel consumption. Even though domestic steel consumption is only 60 kg per capita, India has attend third largest steel producer in the world.
- There has been continued thrust from the Ministry of Steel to boost domestic steel consumption by exploring the versatile steel uses.
- Hon. Sec. General of AIIFA, places on records, its fullest support towards Steel Ministry ambitious vision under Make in India initiative, of accelerating Indian steel production and taking country's crude steel production from 110 MT at present to 300 MT by 2025. He said that, the target is made to a reality under your talented and dynamic leadership.
- In view of the difficulties faced by the numerous Induction Furnace units, steel rolling mill units, hot rolling mills, Cold Rolling mill, GPGC Sheets, Colour coated sheets the Industry Association pertaining to these units proposed the following:

#### • **Acceptance of ISI Marked Product**

In light of the notification no. **8(1)/2015-TD (vol-IV) dated 12th May, 2016** against diminishing the anomalies appearing in classification of steel producers it is a matter of great surprising that although more than **7 months** has been passed, but none of the government procurement agencies like RDSO, PWD etc., are agreed to use materials produced from electrical route by secondary producers, even though they are manufacturing their product strictly as per BIS norms.

They are bound to procure materials only from primary producers (BF-BOF route) unless and until the competent authority have to circulate this notification with their own order.

Therefore, it is proposed to look in to this matter and issue a letter in light of the above notification to concerned Ministries/Government procurement agencies to accept ISI marked product only without specifying any route so that the secondary steel

producer could also be capable to supply their materials in these projects.

Further, as much more public money is invested in Government infrastructure project, therefore, we would like to propose that, on behalf of small and medium enterprises, MSTC Ltd may be permitted to create and develop a platform specifically for this sector where finished products bearing relevant BIS standard manufactured by this sector can be sale or purchase as well as also permitted to participate and quote tender in these infrastructure project so that a healthy competition among the vendors will be created. This will in turn to save a lot of public money also.

#### • **To Fix up Minimum Export Price and Minimum Import Price on HR Coil as they are Semi/Intermediate steel product**

As we are aware that non-integrated producers of **Cold Rolled, Galvanised sheet, Colour coated and CRNO/CRGO sheets** with an annual capacity of the more than 6 million tonnes and are spread all over India.

The **value addition** contributed by this industry is in the range of **25% to 70%**, in line with the MIP announced by the Government. Since, Hot Rolled coil is the basic raw material for this industry and constitute around **70%** of the total production cost of Cold Rolled sheets. As such it is important that HR coils is available globally at competitive prices. However the major domestic producers fix up higher prices of HR coil due to the monopolistic situation. As a result, the value addition available for this non-integrated industry **goes down drastically** affecting their **viability**. The demand from manufacturing sector also goes down owing to the import of manufactured products.

Since **85 to 90%** of HR coil is further processed for producing Cold Rolled products, Pipes and Tubes, therefore, it is proposed that, HR coil should be considered as a semi/intermediate steel product and Government should have fixed up minimum export price also along with minimum import price.

In this context, **Moosa Raza committee** formed in **2008** had recommended in their report that for integrated planning and continual monitoring of the steel industry from raw material supplier to the steel producers and consumers, JPC needs to be re-organised and expanded to include more private producers, major association of secondary sector and consumers.

- **Abolition of Basic Custom Duty on import of steel melting scrap**

According to the data published by Ministry of Steel, Government of India (Annual Report-2015-16), India produced nearly **90 million tonnes** of steel through **BF-BOF (42%), DRI-EAF (27%) & Scrap/DRI-EIF (31%) route**. In other words, **38 MT** of steel produced through oxygen route (BF-BOF) and remaining **52 MT** of steel produced through electric route (DRI-EAF & Scrap/DRI-EIF). Out of 52MT, **about 24 million tonnes** was supported by **sponge iron** as feed material. This leaves about **28 million tonnes of steel** to be served by way of **steel scrap**. At **1.1 tonnes** of scrap per tonne of crude steel, one may expect that to produce 28 million tonnes of steel, one would **need 30.8 million tonnes** of scrap. **India imports** about close to **7 million tonnes** of scrap which would leave us with a need to **internally generate over 23 million tonnes** of steel scrap annually.

At this circumstances, the imposition of **2.5% of import duties** on such low value items making its imports unviable. No one countries like USA, Europe, UK, Australia, China, Thailand, Pakistan etc. where such type of duty applicable on import of scrap.

Therefore, it is propose that, to support the indigenous small and medium enterprise steel industry which is dependent up to **60% of their raw material** requirements on imports, this duty should be abolished in order to make them competitive for cheaper imports. This in turn saves a lot of natural resources like iron ore, coal, lime, water and is less polluting in nature.

- **Provision for CENVAT Credit on Stainless Steel Scrap**

As we know that, a lot of units in secondary steel sector comprising of induction furnace units as well as arc furnace units are engaged in manufacturing of stainless steel. These units are producing stainless steel ingots, billets and flat bars by melting stainless steel scrap which is their main input / raw-material. These products – ingots, billets, and flat bars are sold in the market to downstream manufacturing units engaged in manufacturing of stainless steel patta / patti, circles and utensils.

The present Central Excise Duty regime applicable on various manufacturing stages in this entire chain/cycle of conversion / manufacturing starting from Scrap (i.e. Scrap to Ingot/Billet/Flat-Bars to Patta/Patti to Circles/Utensils) is having certain

disparities and anomalies which are adversely affecting the manufacturers of Ingot/Billet/Flat Bars.

Since no Excise is paid at the stage of sale/clearance of such domestic scrap from these units (because of either these units are non-excise or covered under compound excise), therefore, no Excise Invoice is issued, and hence no input CENVAT Credit is available to the induction / arc furnace units which buy such scrap for use as input in the manufacturing of Ingots / Billets / Flat-Bars.

In this context, it is relevant to note that the scrap which goes into the making of Ingot / Billets / Flats have suffered Excise Duty at one or more stages in the above chain / cycle, particularly at the Ingot / Billet / Flat stage at least without any exception. However, when it comes back in the form of scrap to these units after having undergone further processes, no CENVAT Credit is available to them. This tantamount to a kind of double taxation which is contrary to the intent & purpose of the CENVAT provisions.

**Therefore, it is proposed** that a provision for deemed CENVAT Credit on Stainless Steel Scrap procured by these manufacturers of Stainless Steel Ingots / Billets / Flats may kindly be brought about and deemed CENVAT Credit on such scrap be made available to such manufacturers.

- **Power**

As power constitutes more than **60%** of the **cost of conversion** of scrap to Ingots through induction furnace, it is more than important that power is made available at most competitive tariff to our industry but on the other hand the EIF industry is charged one of the highest tariffs in India in almost all the states in the name of **power intensive units**. In reality induction furnace industry is the most stable and **balanced load** and is also the **highest revenue generating** per kilowatt of connected load.

Added to this is that whenever there is power shortage our industry is first to force upon **power regulatory measures** thus restricting production and increasing fixed expenses.

Above all whatever advantage our industry was trying to get through **open access of power** has been **dashed by the power coms** of various states by imposing **cross subsidy** and **surcharges and wheeling and transmission charges** so as to make **open access of power unviable**. Thus we are **forced to use costlier power** from the state utilities.



Therefore, it is proposed that the vision of our Hon'ble Prime Minister i.e. **One Nation, One Grid and One Price** should be promoted and implemented at the earliest so that the user industry can avail the benefit of uniform power rates and compete with China and CIS Countries.

In response, the chairman informed that Ministry of Steel has already started a campaign to boost steel consumption in country through encouraging all concerned ministries to use only India-made steel for

infrastructure and construction projects of the government. Also, he said that the campaign would help in educating people about the numerous sustainability benefits, which are guaranteed to be realized whenever steel is used.

He further stressed that in 2016, India had emerged as the third largest steel producer in the world and central government is taking all steps to make the country world's second largest steel producer.

The meeting ended with a vote of thanks to the Chair

## NOTIFICATION

*Dated: 06th February, 2017*

### **Addition of new sub para 5.03(e)(i) and (ii) and Amendment in sub para 5.10(d)(ii) of Handbook of Procedures 2015-20**

1. S.O. (E): In exercise of powers conferred under Paragraph 2.04 of the Foreign Trade Policy 2015-20, the Director General of Foreign Trade makes the following amendments in para 5.03 and sub para 5.10(d)(ii) of the Handbook of Procedures, 2015-20 with immediate effect. (Changes made are in hold letters)
2. New sub para 5.03(e) is being added after sub para 5.03(b) as under:  
"5.03(c)(i) An application for amendment in the list of import item(s) including addition(s)/ deletion(s), if any, may be filed with RA concerned provided the authorisation is valid for import. The applicant would give justification for seeking such amendments(s) along with fresh nexus certificate from an independent Chartered Engineer.
3. The amended sub para 5.10(d)(ii) shall read as under:

Para 5.10(d)(ii): Proof of having despatched the goods from authorization holder's factory/ premises to the ultimate exporter/ port of export viz, (a) ARE-1 Certificate issued by Central Excise with due authentication by the Customs verifying the exports along with the shipping bill number, date and EPCG authorization number or (b) invoice duly incorporating the relevant EPCG authorization number & date at the time of dispatch in case the unit is not registered with Central Excise.

4. Effect of this Public Notice: A new sub para further specifying the provision for amendment of import/export items under EPCG Scheme is being added. Documents to be submitted in case of third party exports are being further clarified.

**(A.K. Bhalla)**

*Director General of Foreign Trade*

**[Issued from F.No. 18/154/AM-17/PC-V]**

## ALLOY STEELS FOR MANUFACTURING MINING EQUIPMENTS

**Srikumar Chakraborty**

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**Introduction** : The coal mining equipment manufacturing industries provide mine excavation equipment, underground transportation equipment and mineral washing and screening equipment to coal mines. Indian economy is heavily reliant on steel plants, power plants/ energy sector as such, demand for natural resources drives the need for equipments in the industry which has is expanding rapidly in recent years due to very high domestic demand, although India imports large volume of coal. The [primary energy](#) consumption in India is the third biggest after

China and USA with about 5.3% of global share in which consumption pattern comes from Coal 55%, Crude oil 30%, Natural gas 8%, Hydro-electricity 5% and Nuclear energy 1.3%, rest being wind power, biomass electricity and solar power. About 70% of India's electricity generation capacity is from fossil fuel and dependence on energy imports is around 50% of the country's total energy consumption. However, India has become a power surplus country with huge power generation capacity idling for want of electricity demand.

Coal mining equipments are used for extracting the coal, crushing and sizing. During the crushing cycle, gouging or high stress abrasion is present depending on the particle size of feed material. Crushers are differentiated by the degree to which they fragment the starting material with primary and secondary crushers handling coarse materials reducing the particles to finer gradations and work with a certain maximum size of raw material, and often deliver its output to a screening machine for sorting and directs the product for further processing.

- **Manganese Steel in Coal Mining Equipment :**

Manganese steel is widely used in numerous engineering applications such as mining, quarrying, earthmoving, railways and construction industries due to its excellent wear resistance with high strength and ductility. The machining of this type of steel is difficult because of its hardness, low thermal conductivity and strain hardening behavior. Various grades of high manganese steel products are used as components in jaws of crusher for size reduction usually constructed from cast steel and are fitted with replaceable liners, made from Manganese steel, or "Ni-hard" or Ni-Cr alloyed cast iron. In the gyratory crusher, the outer shells are usually constructed from heavy steel casting or welded steel plate and are fitted with reinforced alloyed white cast-iron (Ni-hard) liners. Similar operation is done by roll crusher, cone crusher, impact crusher, hammer crusher, rotary breaker where key variables are open and closed side settings, operating gap, particle nipping angle, resident time for a particle in the crushing chamber and feed size of the particle.

High austenitic manganese or Hadfield steel performs best in gouging abrasion conditions such as in dragline buckets, gyratory rock crushers, roll crushers, jaw crushers and among others, where toughness is a prime requirement. It is an extremely tough alloy and has built up an enviable record as outstanding material for resisting severe service condition combining with abrasion and heavy impact. Moreover, there are standard specifications for austenitic manganese steel comprising a number of grades

- **Contribution of Mini Steel Plants in the Field :**

Indian mini steel plants produce different grades of wear and abrasion resistance steels in their induction furnace for manufacturing mining equipment with the highest attention towards the industry's most stringent standards. The steel making and processing units back up that commitment by standing behind their industrial wear and abrasion resistant steel products providing innovative

resolution for stubborn impact and wear resistant problems offering host of mining-specific application.

The various types of ramming masses used as furnace lining e.g. acid, basic and neutral depending upon the chemical nature slag formation during steel making. Silica masses are acid ones; alumina is neutral mass while magnetite is basic mass. The most commonly used lining material for induction melting is high purity silica ramming mix for advantages like –the dense sintered layer at contact portion with liquid steel is perfectly tight, thermal loss minimum compared to other refractories because of low thermal conductivity with good resistance to change of temperature, short heating time and low cost with satisfactory lining life. It is also used for melting carbon steels with carbon content higher than 0.1% and iron alloys like Ni- harden-resist and chrome iron. But acid lining is not suitable for high manganese steels like Hadfield steel.

- **Alloy Steels for Mining Equipments**

Alloy and various specialty steels are used for manufacturing mining equipments, material handling, heavy transport and lifting equipments in mines. By understanding the needs of the mining equipment manufacturers, mini steel plants produce specialty steels through induction furnace, process the steel by hot working process which are subsequently heat treated for higher performance. The unique competitive edge of mini steel plants in special steels lies in one of the widest product and service portfolios on the market, combined with deep knowledge of steel properties and performance creating the foundation to work with customers to develop products for mines, wear plates, buckets/ containers etc. where hardness, abrasion and wear resistances are the major criteria. Characteristics of popular grades for mining equipments are:

**Carbon-Manganese Steel** - Carbon is the most important and essential element in this steel grade widely used in mining equipments, the product has to be hardened by quenching where the degree of carbon controls the hardness and strength of the material, as well as hardenability. On the other hand, ductility, forgeability and machinability will decrease if the amount of carbon increases, as well as decreasing weldability properties of the steel. Manganese, present in all commercial steels, is considered as the second most important element after carbon in steel having effects similar to those of carbon, and the steel maker uses these two elements in combination and in proportions to obtain a material balancing the desired properties. In hot rolling or forging, manganese is a necessity by its combination with oxygen and sulfur.

At steel making stage, Mn is a mild de-oxidant acting as a cleanser taking the sulphur and oxygen out of the melt into the slag. It increases the hardenability and tensile strength but decreases ductility in products. It combines with sulphur to form globular manganese sulphides (MnS), essential in free cutting steels for good machinability but counters the brittleness from sulphur. Steels usually contain at least 0.30% manganese, however, amounts of up to 1.5% can be found in some carbon steels which tends to increase the rate of carbon penetration during carburizing. However when too high carbon and too high manganese accompany each other, embrittlement effect is observed. For welding purposes, the ratio of manganese to sulphur should be at least 10 to 1. Manganese content of less than 0.30% may promote internal porosity and cracking in the weld bead, cracking can also result if the content is over 0.80%.

Steel with low MnS ratio may contain sulphur in the form of iron Sulphide (FeS), which can cause cracking in the weld. Mn decreases the critical cooling rate during hardening. Mn content in carbon steels is often increased for the purpose of increasing depth of hardening and improving strength and toughness e.g. Carbon-manganese steels containing over 1.2% up to approximately 1.8% manganese are referred to as carbon-manganese steels commonly used for parts of mining equipments. Because of notoriously abrasive and corrosive environment on equipment, hard-wearing steels like above grades with good quality products in a range of resistant properties are so important.

Larger amounts of manganese are present in constructional steels because of its beneficial effect on notch toughness. The improvement in notch toughness results because amounts increase up to about 1.75 percent. Mn acts to refine the ferrite grain size preventing the formation of brittle inter-granular films of carbide. For the potent hardenability effect of manganese, it is utilized in a number of quenched and tempered steels. However, interest is seen in steel making units for increasing the use of much higher amounts of manganese than normally present in steel. Low-carbon steels containing 2.0 to 4.0 percent manganese are air hardening in thicknesses up to 6 inches and such high-manganese steels offer an attractive possibility for developing hot-rolled plate steels with higher yield strengths. The major drawback to high-manganese steels has been their poor toughness. More than 2% Mn in C-Mn steel shows tendency of cracking during rolling or forging

Specification, normally followed by mini steel plants for low/medium/high carbon-manganese steel, as

AISI 1500 series using induction furnace where both S and P are kept below 0.035 and ranges of C & Mn in AISI 1500 series as-

**1518:** 0.15–0.21 1.10–1.40, **1522:** 0.18–0.24 1.10–1.40, **1524:** 0.19–0.25 1.35–1.65, **1525:** 0.23–0.29 0.80–1.10

**1526:** 0.22–0.29 1.10–1.40, **1527:** 0.22–0.29 1.20–1.50, **1536:** 0.30–0.37 1.20–1.50, **1541:** 0.36–0.44 1.35–1.65

**1547:** 0.43–0.51 1.35–1.65, **1548:** 0.44–0.52 1.10–1.40, **1551:** 0.45–0.56 0.85–1.15, **1552:** 0.47–0.55 1.20–1.50

**1561:** 0.55–0.65 0.75–1.05, **1566:** 0.60–0.71 0.85–1.15, **1572:** 0.65–0.76 1.00–1.30.

**Hadfield Manganese Steel** – Hadfield Manganese steel, a high resistance to impact wear caused by rapid cold work hardening grade and extremely hard wearing, contains about 1.2 % C and 12 % Mn. It has wide applications in mining equipments, earth moving, oil & drilling, steel making/ processing, dredging, cement, engineering industries, railway track particularly at crossing where resistance to high metal – to – metal wear and impact loading is required. The high hardness of face layers increases the abrasive wear resistance but because the middle part keeps good toughness supporting high impact stress. The basic condition for the chemical composition of Hadfield's steel is ratio as Mn : C > 10. The upper borderline is usually 14 % Mn but in some cases the same can be increased to 20 % most of all for thick-walled castings for improving the hardenability. Acid lining arc or induction furnaces cannot be used with a high percentage manganese in the charge because of severe attack of the acid refractories by manganese oxides and manganese recovery in the melt is too low. The most common practice of Hadfield steel making is to use 50- 60% of returned manganese steel scrap, and balancing the rest of the charge with low carbon steel scrap. The percentage of carbon and manganese is brought up to specification by addition of ferromanganese and graphite to the charge.

**Hardox** – Another grade is the leading global brand of wear resistance steels designed for maximum payload and longer service life having unique combination of hardness and toughness, high-strength, abrasion for manufacturing widely used components like wear resisting plates, liner plates, hammer blades, tipper bodies etc. in most of the core sectors reducing down-time. The hardness of products is kept in shape without becoming plastically deformed. Its toughness allows the material to cope with jolts, shocks and bangs without damage, and it is

resistant to cracks during manufacturing processes such as pressing. The high yield strength of the material allows for stronger designs at a lighter weight, whilst still remaining one of the most wear resistant steels. Various types in this grade are Hardox 400/ 450/500/550 etc. Further, grades like **Strenx, Raex, Toolox, Armox, Ramor**, the high-strength structural steel product brand, offer the high-strength and strong steels of very high Yield strengths ranging from 600 MPa to 1300 MPa, are made by different producers.

**Ni-Hard** – The other grade is a trade name for Fe-Ni-Cr-C alloys used in mining equipments and are classified as different classes in standard specification for wear/ abrasion resistant and used extensively in applications requiring superior wear resistance like crushing and grinding ores, mixing concrete, pulverizing coal, and rolling metals. Ni Hard alloys contain about 44 volume percent M3C type carbides embedded in an iron matrix. Their solidification begins with formation of pro-eutectic austenite followed by a eutectic reaction of liquid. Upon cooling to room temperature, austenite partially transforms to martensite.

One Ni-Hard alloy contains 4.2 wt. pct. Ni. The second Ni-Hard alloy is similar to first but higher in Cr, Si, and Mo. The third Ni-Hard alloy also, in the same ASTM specification, but contains 3.3 wt. pct. Ni. All the alloys after production are stress relieved which does not change the tensile strength much of the high Ni-Hard alloy and found to be in range of 340-450MPa depending upon the stress relieving temperature used.

• **Operational Conditions in Mines** : During excavation, crushing, sizing of coal, the equipment parts face abrasive and fatigue wear because of compression of the feed material between the fixed and movable wear parts with micro-mechanisms, micro-ploughing, microcutting, microcracking, microfatigue between the cycles when particles of feed material slide against wear parts, abrasion/scratching takes place. Good work hardening effect of high Mn steel protects such problems. The principal design parameters of coal mining equipments is based on production requirements, coal/ore characteristics, operational process, climatic conditions, safety and environment, mine/expansion plans, maintenance requirements

Activities and operations in different coal mines vary for types of coal and equipment. However, principles and prioritization of activities affect the performance. In most cases problems are not metallurgical

because of using right quality steel products in the equipments still operational and mechanical issues affect the productivity.

• **Parts of Mining Equipments** : In heavy machinery application e.g. front shovel bucket for mining machine, mass excavators, wheel dozers, heavy duty bulldozers, wheel loaders, large mining shovels etc. components are produced from steel and alloy plate. In the surface mining industry, many parts are used to manufacture machines and products used to extract coal, nonmetal minerals such as rock and sand, minerals, ore, metals, rock salt, oil shale, stone and gravel. The fabricated parts made from steel and alloy, stainless steel, nickel alloy, aluminum, copper, brass, heat resistant alloys, corrosion resistant alloys, abrasion resistant alloys, non-ferrous steel and chrome carbide overlay plates.

Reputed fabricators, as custom steel fabrication groups in the country, use high quality steel and alloy products with good workmanship manufacture equipment and equipment parts from newer technology of CAD design, plate bending, mechanical engineering, manufacturing of wear resistant components, plate rolling, plate forming, metal forming, cold forming, hot forming, steel plate fabrication, welding, heat treating, plate cutting and plate straightening. Carbon-Manganese steels and other alloys are also, used to manufacture coal mining equipment parts like Bushings, cylinders, pistons, disks, seamless rolled rings, bucket pins, pinion racks, bevel gears, crusher rolls, drive gears, gear blanks etc.

The factors underpin to save on the cost of the materials consumed are the actual mechanisms by which the existing materials become degraded and identified before meaningful substitutions or design changes and the other being the careful consideration of material substitution considering cost-life benefits. However, the most common causes of material failure in general activities are corrosion, fracture, fatigue, wear, and environmentally-assisted cracking. Fatigue failures are not common in mining equipments for product quality and involved process which are mostly in reciprocating or rotating conditions. It has been experienced in mining industries that abrasion, corrosion are more significant than fatigue and fracture for poor quality steel products. The dependence of the impact toughness of high manganese steel on its carbon and manganese content makes it possible to evaluate the effect of their absolute and relative amounts which is decisive for obtaining the maximum level of impact toughness

with equal ratio Mn:C manganese affects impact toughness more than carbon.

**Conclusion** – Heavy machineries are used in mining to explore and develop sites removing and stockpiling overburden, breaking and removing rocks of various hardness and toughness and to process the coal, ore/minerals carrying out reclamation projects after closure of mines. Bulldozers, crushers, drills, explosives and trucks are all necessary for excavation jobs. Indian mini steel plants are in a position to produce most of the steel grades needed for manufacturing mining equipments through acid lining induction furnace and process products

maintaining quality at international level. Only bottleneck being melting of high manganese steel like Hadfield because high Mn % in the charge will attack severely the acid refractories by manganese oxides and manganese recovery in the melt will be too low. The most commonly used lining material for induction furnace melting is high purity silica ramming mass for advantages like the dense sintered layer at contact portion with liquid steel which is perfectly tight, thermal loss minimum compared to other refractories because of low thermal conductivity with good resistance to change of temperature, short heating time and low cost with satisfactory lining life...

## STEEL SECTOR NEWS

### JNPT becomes First Major port to equip Radiological Detection System at all Gates

Navi Mumbai: Jawaharlal Nehru Port Trust (JNPT), India's No.1 Container Port that handles more than 55% of total container traffic of all major ports, had advanced to become the first major port to equip Radiological Detection Systems at all the Port gates – North, Central & South – in order to detect presence of any special nuclear material in the containers passing through roads & rail gates. Installation of such devices in main areas would give an added lease of life to the major importers in the region of Aurangabad, Jalna, Wardha and others who import huge volume of scraps and raw metals to make finished goods.

With this installation, JNPT has successfully complied with the directives of the Govt of India to enable Radioactive Detection System for Port security and has fully equipped itself to handle 100% secure in handling radioactive materials in all kinds of cargo, as per the international safety standards.

A total of 28 Vehicle Monitoring System (VMS) has been installed at various locations, from where import containers are entering, for the purpose of radiological detection in the containers carrying various unshredded scraps and metallic waste. With the help of VMS, containers can detect the presence of

radiological materials through specialized detecting characteristics in the system. In addition to this, JNPT has also installed 2 LIMB monitors for pedestrian traffic. Additionally, the system uses Portable Gazettes and monitors for detecting/ identifying the radioactive source.

Shri Anil Diggikar, Chairman, JNPT, said, "This step towards National security has always been our priority in enabling right technology at right place to establish not only a safe secure ecosystem but also to provide modern services to EXIM trade."

These hi-tech detection devices will provide a passive, non-intrusive means to screen containers and pedestrians for the presence of nuclear and radioactive materials. These equipment alert security personnel by means of audio/ visual alarms locally and remotely. These equipments are connected to centrally located control room to monitor and maintain the history of the events. Electronics Corporation of India Limited (ECIL) has made these equipments and handed over to JNPT for further installation to fulfill Port security and has already trained the CISF persons on this equipment and provided the operating procedures for the same to stabilize this process.

हार्दिक अभिनंदन .....

वंदन ... आभार.

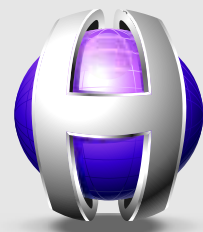


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