

The Indian Railways:

A Mighty Market for Stainless Steel

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The Indian Railways is the largest railway system in the world under a single ownership. The Indian Railways is drawing up an ambitious Rs 1 lakh crores (Rs. 1,000 billion) modernization plan spread over the next five years. This amount will be spent on modernization of railway signaling, track and rolling stock so that modern services could be provided to passengers in their coaches and platforms and freight customers at low prices by bringing down the unit cost.

A good amount of this money (Rs. 1,000 billion) would go into modernizing the passenger coaches and freight wagons with stainless steel providing aesthetic, safe, comfortable and fast moving coaches for passengers. The passengers would also have and sleek looking railway stations furnished like airports and malls with food courts, shopping areas and internet facilities. The railways attract more and more passengers to travel and also save substantially on their maintenance and energy expenses because of lighter, stronger and safer stainless steel coaches and furnishings at the railway platforms. A similar trend is for freight wagons, a good number of which will be in stainless steel for ferrying coal, ore, fertilizers, cement, food grains etc. and tankers for oil, crude, milk etc.

In short, in the years to come, the use of stainless steel in rail transportation is going to increase significantly in the largest railway system in the world. In this article, we will confine ourselves only to Rolling Stock (i.e. passenger coaches and wagons). This article will not deal with elements like passenger interface areas in the railway stations and platforms where stainless steel is again witnessing increasing use.

New Rail Coach Factories to be set up in Rai Bareilly and Palghat

The Indian Railways are planning two new rail coach factories. One at Rai Bareilly in Uttar Pradesh and the other at Palghat District in Kerala for manufacturing all-stainless steel coaches. The present coach factories at Kapurthala in the Punjab and in Chennai, are designed to manufacture painted coaches.

The main stipulations for the process technology for these two new factories to come up are that (1) there should be no painting of the external surfaces; (2) No surface preparation of any kind (mechanical or chemical) to be done at factory premises; (3) Be amenable to high volume production by minimizing arc welding. What these stipulations mean is that these coaches will be made of austenitic stainless steel (301L) which is the worldwide standard material for passenger rail coaches. Spot welding would be used extensively, as is the practice elsewhere in the world.

The Indian Railways has a fleet of about 30,000 passenger coaches in service. But most of these coaches, being of carbon steel (corten), demand excessive amount of

maintenance. Also, they do not last very long. The Railways are looking for coaches that would last 35-years in tip top condition and with minimal maintenance during service life. The 35-year service design is in order to be able to incorporate new technologies.

Grade 301/LN stainless with suitable surface finish in the steel mills would be the ideal material. The principal benefit of 301/LN is their ability to work-harden, resulting in light weight design. Secondly, they are ideally suited for resistance spot welding. These new stainless steel coaches would eliminate most coach- related problems of the Indian Railways.

The Rai Bareilly factory should be in production mode in 2010. During the first year, it is scheduled to produce 1,200 coaches. The second year onwards, it will produce 2,400 coaches per annum. The facility in Palghat is expected to be ready by 2012. When ready, it is expected to manufacture 600 coaches per annum initially, expandable to 1,000 coaches p.a.



Stainless steel structural members (Photo courtesy ICF)



Future Perfect (A Swedish stainless rail coach under fabrication)

Mail/Express trains also to have Stainless Steel Coaches

LHB coaches with stainless steel shells of 409M are currently being produced at Rail Coach Factory (RCF), Kapurthala. Being a stainless steel of only 12% chromium, their corrosion resistance needs to be reinforced with paint system. These are being provided for Rajdhani and Shatabdi coaches at present. Soon, these will also be provided for Mail and Express trains also. These coaches are more comfortable and have a carrying capacity of 10-16% more than the existing corten steel coaches. These coaches have a longer life and require less maintenance. To increase the supply of these stainless steel coaches, by 2009-2010 onwards only stainless steel coaches will be manufactured at RCF and at ICF (Integral Coach Factory, Chennai).



*Delhi-Mumbai Rajdhani Express
Painted 409M Stainless Steel coaches fabricated with LBH Design (Germany)
at the Rail Coach Factory, Kapurthala.*

Railway Board's test order on BEML for Stainless EMUs

Bharat Earth Movers Ltd. (BEML) which assembled and supplied hundreds of Delhi Metro Coaches which are of un-painted austenitic stainless steel shell and furnishings, has proposed to the Indian Railways on using its (unpainted) all-stainless steel electric multiple units (EMUs or local trains used in Mumbai, Kolkata, Delhi and Chennai) has also found favour with the Railway Board, which is placing a developmental or test order for six rakes.

It estimated the total requirement of 3,000 cars with a business potential of Rs 5,000 crore in the coming years. The Railways operates a substantial EMU fleet in several metros. The present carbon steel painted EMUs tend to corrode severely, especially in marine environments like Mumbai, Kolkata and Chennai. These EMUs have to be repaired and painted almost every year. Stainless steel will not only make these coaches lighter and stronger, but also minimize maintenance and last for a long time.

MRVC Coaches Use 2.5 Tonnes of Stainless Steel for Internal Furnishing

Mumbai Rail Vikas Corporation (MRVC) will buy about 1,500 coaches from Integral Coach Factory (ICF), Chennai. The interiors of these coaches are made of stainless steel, but the shell is made of corten steel. About 2.5 tonnes of stainless steel is being used per coach. Stainless steel has been used for roof paneling, seat frames, handholds, luggage racks, fans, partitions, doorway grab poles, protective wire screen and rainwater gutter.





(Photos courtesy: Integral Coach Factory (ICF), Chennai)

New Design Stainless Wagons of High Capacity

The newly designed stainless steel BCN (C for covered) wagon has a lower tare weight. Due to the shorter length of these wagons, instead of 40 wagons, the BCN wagon train will now accommodate 58 wagons, like BOXN (O for open) wagon trains. Thus, the payload of the BCN trains will increase by 78% from 2300 tons to 4100 tons. Similarly the payload of open wagon trains will increase by 22%, to 4100 tons. This has been achieved this by reducing the tare weight and increasing the width and height of the wagons.

To realize the full potential of the newly designed high capacity wagons, in 2008-09, **5000** open wagons will be upgraded (rehabilitated) to stainless steel body thereby reducing their tare weight by about two tons. Additional **9,000** new wagons of various designs will be manufactured in FY 2008-09. i.e., a **total of about 14,000 stainless steel wagons this year**. These orders have been placed on private companies, public sector units and railway-owned wagon workshops by the Railway Board.

The Golden Rock Workshop of Southern Railway located near Tiruchy, Tamil Nadu is one of the wagon workshops of the Indian Railways. In FY 2008-09 they have received an order for manufacture of 240 wagons in 409M. Each wagon uses 8.7 tonnes of stainless steel. The Carriage and Wagon Works, Perambur in Chennai which has an order for 360 rehabilitated wagons this year has also made a prototype of a rehabilitated wagon in stainless steel. So have several other workshops which include Jamalpur, Raipur, Modern Industries, Braithwaite etc. Some units are in the stage of completing their orders ahead of time.



Unpainted sides of 409M prototype wagon



Painted sides of the same 409M prototype wagon

(Photos courtesy Golden Rock Wagon Workshop in Tiruchy)

Why such a large order for stainless steel wagons?

Made aware of the great benefits of stainless steel by ISSDA and in particular by Salem Steel Plant, the Indian Railways agreed to manufacture 500 stainless steel wagons (grade 409M). In the year 2000 these wagons were pressed into service in Vishakapatnam to ferry iron ore from the mines to the steel plant. Investigations revealed that none of these wagons ever reported for over eight years for any overhaul at all. As per Railway norms, wagons are to report for periodic overhaul after 3.5 years of service. Asked why none of the stainless wagons ever reported for periodic overhaul, the answer was that **even after eight years of service, the wagons were as good as new, then why send for overhaul?**

This is how 12,000 stainless wagons went into the railway order books for FY 2008-09.

With inputs from ISSDA and its members over the years, the new stainless steel wagon design boldly incorporated thinner sections, thereby reducing the weight further. Another input from ISSDA was “why paint the wagons at all?” After due deliberations, **all costly painting systems and time consuming procedures on wagon painting are being totally eliminated and replaced by a simple primer coating on the exterior or none at all!**

Conclusions

The profusion of stainless steel usage by the railways for mainline coaches for mail and express trains apart from Rajdhani and Shatabdi trains, freight wagons for coal, ore, minerals, cement and food grains, and EMUs is very encouraging for the stainless steel industry. In addition to this, the transportation industry uses stainless steels for modern metro rail system which is fast spreading from Delhi to many other metros and mini metros. A third and important facet in the transportation system is the use of stainless steel in automotive exhausts for cars, motorcycles and scooter. Remember, India produces more than 1.3 million cars and 7 million two wheelers per annum.

In short, the transportation industry in general and the Indian Railways in particular, are becoming a very important market for stainless steel in India.

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