

Stainless Steel in Rail Transportation

The Scenario in India

Ramesh R. Gopal Executive Director – Indian Stainless Steel Development Association www.stainlessindia.org

The Indian Railways are probably the single largest railway system in the world, carrying one million tones of freight and 14 million passengers every day. They have about 220,000 wagons and 40,000 passenger coaches. From the point of view of market development for stainless steel, it is therefore, a very attractive target. The Nickel Institute, the Indian Stainless Steel Development Association (ISSDA) and its members have been actively pursuing the Indian Railways for well over a decade and the results are beginning to show.

Initially, caution was displayed in specifying stainless steel by the railways because of its higher initial cost. One of the early items for experimentation was in-laying the toilets with stainless steel. Then the trough floors were changed on a selective basis. Later, both the in-lays and trough floors for all new coaches were standardized in type 304. Now they are trying entire module of toilets with type 304 stainless. Pantry car interiors for long distance coaches are also going in for 304. The hydraulic braking system in carbon steel is being switched to 304 for all suburban and main line coaches in production. In addition, some suburban systems are changing all interior furnishing to stainless steel (see images of Mumbai and Hyderabad interiors below).



Hydraulic braking system in stainless steel type 304 with double ferrule type fittings

While all these measured steps were in progress, in 1996 the Railway Minister announced that they were going in for new technology from Germany to produce all-stainless steel passenger coaches. Now read on. . .

Railway Long Distance Passenger Cars

The Indian Railways have two large units for production of passenger coaches: the Rail Coach Factory (RCF) in the Punjab and the Integral Coach Factory (ICF) in Chennai. Each of them produces over 1,000 coaches per annum at present and there are plans to increase their capacities.

The all-stainless steel LHB designs from Germany greatly reduce the weight of the coaches, to the tune of 40% and lead to enormous savings in fuel and to a great extent in maintenance. Having assessed the performance and benefits of LHB coach design, the Indian Railways have now decided to phase out all corten steel coach production and switch to all-stainless steel coach production at both the units (ICF and RCF).

The original LHB design largely used 3Cr12 variants for the shell using type 304 only for select items like the trough floor, the roof and other small items. The balance, including the side and end-walls were in 3Cr12 variants. Being ferritic, the exteriors of the side and end walls had to be painted. Realizing that repeated painting every few years involved both incurring repetitive cost and also non-availability of coaches, the railways are now in the process of making prototypes which will use type 301L for most exposed parts, including the side and end walls. The benefit of this design is the elimination of painting. The pristine silvery look of the new design would elevate the image of rail travel in the eyes of the traveling public and help compete with low-cost airlines which target the top end of the rail travelers.

Over a period of about eight years, this decision of the railways to go all out for stainless steel coaches would add about 13,000 TPA of stainless steels for the shells



Above Pantry car;
Right: Modular toilet





LHB stainless steel coach shell



Painted LHB using 3Cr12 variant for side and end-walls alone. The interior furnishing and other fixtures would be mean additional use of stainless steel by the railway coach sector.

Railways – Metro Coaches

The Delhi Metro-type transport system, using all-stainless steel (301LN) coaches, is being spread to connect most parts of Delhi and the domestic and international airports and important parts of the extended National Capital Region. The roaring success of the Delhi Metro is now waiting to be replicated in Bangalore and many other cities which are lined up for this revolutionary change in city transport. Many African and Asian countries have also approached DMRC to replicate it in their cities.

For Delhi alone, about 124 all stainless steel coaches have been procured and an order for 300 more coaches is in the pipeline. Each coach weighs about 10 tonnes. When the system comes up in other cities also,

Delhi metro coach – going places



the total stainless steel uptake not only for the coaches, but also the platforms, would be significant. In cities like Mumbai, Hyderabad and Chennai, the sub-urban train coaches already use stainless steel for internal furnishings. (See picture above).



Prince Charles taking a ride in Delhi Metro. To his left wearing glasses is E. Sreedharan, the architect of Delhi Metro



Above: Interiors of Hyderabad suburban coach; Left: Interiors of Mumbai Local Train

Railway Wagons

The Indian Railways have had a fleet of 300 stainless steel coal wagons under trial for about five years. It was found that not only the wagons were much lighter (not needing corrosion allowance in their design) but also the amount of maintenance required or down-time for these coal wagons was surprisingly very low compared to corten steel wagons in the same service. It was also realized that by increasing the axle loads, the wagons can give a much better payload to tare weight ratio of 4:1 (compared to 2.5:1 for corten steel wagons). This will greatly offset the higher initial cost of stainless steel wagons. They can move more freight per rake, save on fuel, and also expect very little down time loss and expense for maintenance. The Indian Railways expect to earn additional Euros 600 million or more per annum when this switch is effected.

Keeping this in view, the railway budget for 2006-07 paved the way for introduction of light-weight, corrosion-free stainless steel (and aluminium) coal and ore wagons in place of corten steel wagons. The grade of stainless steel specified is a variant of 3Cr12.

As per the new policy, there will be **no new orders for corten steel wagons for hauling coal and ores.**

This is an excellent example of doing Life Cycle Costing Analysis and realizing that though the initial cost of stainless steel wagon is higher, much better profits are to be made by specifying stainless steel!



A stainless steel coal wagon

The early successes in the railway sector mentioned above and the promise of a huge build-up in this sector paves the way for us to easily succeed in the road transport sector, particularly buses and certain types of trucks.