Indian Railways

Mulls Using Stainless Steel Coaches

- K. K. Pahuja,
President, (ISSDA)

Indian railways are the largest railway system in the world under a single ownership. It is the lifeline of India carrying over 1000 million tons of freight per year and in excess of 23 million passengers every day. They have about 2, 50,000 wagons and nearly 70,000 passenger coaches.

With such a large network there has been incidence of horrific accidents happening over last few decades resulting in human loss and tragedies. Over the years there always has been a demand for "crashworthy" coaches made with superior material and structural design and has been the focus of discussion after each such accident.

The ideal situation for any vehicle crash is for the passenger to be enclosed in a rigid, safe structure and wear seat belts so that they don't get thrown around violently to suffer serious damage. This is demonstrated by modern automobile cars wherein the passenger compartment is designed as safe, rigid cell and front and rear of the car designed as crumple zones that collapse to absorb impact energy.

It is unlikely that the railway passengers will ever wear seat belts, so the interiors of modern rail coaches are carefully designed to have minimum of hard surfaces or projections that can damage a flying body. Like modern cars ends of the rail coaches are now designed to absorb the impact energy of the collision occurs. This is where stainless steel offers a distinct advantage to carriage designers. Tests show that stainless steels are not only stronger than carbon steel and aluminum, but also absorb about 2.5 times more energy than carbon steel when it is deforms. Consequently it is used all over the world to make strong safe passenger compartments with ends that will absorb large amount of energy when collision occurs thereby minimizing the damage to the occupants inside.

Its superiority was illustrated in Australia way back in 1975 when a B class diesel locomotive drawing carbon steel railcars collided with a stationary suburban train. The stationary train had coaches made in stainless steel. The rear stainless steel coach, which was the first to be hit, ened up sitting on the top of the B class locomotive, which lifted it up and ploughed underneath. No one was killed and passengers escaped with only minor injuries (see pic). Had it been a carbon steel coaches the results could have been damaging and the magnitude of it can be gauged from one the very recent horrific accident of Indore express in Indian railways.

Indian railways has understood the importance of stainless steel for coach manufacturing as far as passenger safety is concerned and for the same reason they introduced the LHB (Linke Hofmann Busch) coaches from Germany in 2000 and are currently being used in Rajdhani, Shatabdi and other premium trains. According to a senior Rail Ministry official "LHB coaches made of stainless steel have more inbuilt safety features, as they can absorb shock and impact of derailment more effectively and as a result do not topple, thus reducing the loss of lives in case of accident." In 2016, the Indian Railways planned to roll out 4,000 LHB coaches in India, and as stated by Mr. P. K. Agarwal (Additional

Member Mechanical, Engg, Railway Board) in his speech at the Rail India Conference 2016, "the Indian Railways will make a complete switch over to LHB coaches by 2018".

The white paper on Indian Railways, drafted by the Ministry of Railways, Govt of India, in Feb 2015, mentions that derailment, collision of trains and fires in rolling stock have contributed to 60% of the accidents occurring in Indian railways over the last 3 years. Thus, it has become imperative that coaches are designed in a manner that shall enable achievement of high speed, coupled with best in class safety.

Besides safety and speed, the other advantages of using stainless steel instead of carbon steel include: the ability to maintain good strength properties in a fire; the opportunity for lighter weight design (reduced energy requirements); competitive life cycle cost due to lower maintenance and operating cost and corrosion resistant.

As the growth in the economy picks up, Indian railways will have a challenging task ahead because of line and terminal capacity constraints in transporting the incremental traffic. While initiatives are afoot to decongest the existing network by introducing high speed trains, passenger safety will assume critical importance in selection of design and material of construction for coach bodies.

All stainless steel coaches can save a lot of human lives and mitigate human sufferings resulting from such accidents. It is time that Indian railways should fast track a complete replacement of steel coaches into stainless steel to ensure safety of its passengers.

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