Case Study 3

Aluminium Chequered Floor vs Stainless Steel Chequered Floor

Haryana Roadways Engineering Corporation (HREC) is one of the leading corporations in North India running intercity and interstate buses covering around 1.3 million km everyday. HREC has recently completed fabrication of one bus using Stainless Steel chequered material for flooring application at their Gurgaon workshop replacing Aluminium. This bus is now scheduled for launch shortly.

Stainless Steel chequered sheets have clear advantages over aluminium chequered sheets. Due to high strength to weight ratio thinner gauge of chequered sheet could be used so that there is no increase in weight. Since SS chequered sheets have excellent wear and corrosion resistance, hence, in involves negligible or **Zero** maintenance cost over the regulated life of bus body.

The **cost savings** obtained by HREC on conversion of Aluminium chequered sheets into Stainless Steel chequered sheets is Rs 11,756/- per bus.



"SS chequered sheets installed on HREC Bus".



"SS Bus being fabricated at HREC, Gurgaon"





"KSRTC Bus with SS outer panels"



"Inner Panels in SS of KSRTC Bus"

Frequently Asked Question (FAQ)

- Q. How to Install SS chequered sheets?
- **A.** Stainless Steel chequered sheets could be easily installed using HSS drill bits and rivet and bolt mechanism. It does not require any additional equipment or manpower.
- Q. What are the welding consumables to be used for welding of Stainless Steel tubes and sheets with dis-similar metals?
- **A.** Welding procedure : MIG welding Gas mixture : 80% Argon + 20% Co₂ Filler wire: 308L in 0.8 / 1.2 mm diameter

Specification of equipment used at HREC/ MSRTC:

- Standard HSS(Miranda) drill bit used : 5/5.5/6/6.5 mm dia
- Bosch's manual drilling machine used (GBM/GSB Professional series)
- a) Rated power input (below 750 W)
- b) Rated power output (above 350 W)
- c) Maximum torque (39.5/12.5 Nm) d) Rated speed (500 / 1.750 rpm)
- Additionally, standard M6 bolts are used for fixing the SS chequered sheets on the
- floor of the buses(as per ISO 261/262 norms (5/5.5/6/6.5 mm dia).

For further information :

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Karnataka State Road Transport Corporation (KSRTC) operates a fleet of 8348 buses covering 26.43 lakh kms daily. In order to address severe corrosion of body panels, KSRTC had switched over to Stainless Steel from painted mild steel. They have been **successfully** utilising stainless steel for their bus bodies since the last 5 years.

Completed HREC Bus with SS chequered sheets"





Stainless Steel Bus Body

Case **Studies** in India

INTRODUCTION

The use of stainless steel in public transport system has been widely accepted worldwide. Its sterling features provide safety, aesthetics, light weight, fuel efficiency and sustainability. Today stainless steel is increasingly being used in the construction of structural parts as well as side paneling, floor and luggage compartments of medium and long distance buses.

It is an established fact that use of stainless steel in a bus body guarantees better corrosion resistance and reduction in overall weight, offering substantial savings on fuel consumption. Also due to its excellent toughness, stainless steel buses provide superior safety to the passengers in case of accidents and crashes. In the roll over tests of bus frames, stainless steel is considered to be a safe material when properly designed and manufactured.

From the environmental aspect, stainless steel being fully recyclable offers a 'green solution' and hence is the most preferred material for sustainable development for the future.

ADVANTAGES OF STAINLESS STEEL

 Crash Resistance Fire resistance Best in Class Safety High Strength to wt ratio Low tare wt Improved High payload Design High axle load Low Maintenance cost Ease of cleaning Lower No painting required maintenance Superior aesthetics ₹ High paybacks Fuel efficiency _owēr lif Lesser corrosion cycle cost Longer Life onger life



"Fully corroded bus body structure and panels made out of painted mild steel after 3-4 years of operation : Southern India".



Andhra Pradesh State Road Transport **Corporation (APSRTC)** is one of the largest STUs (State Transport Undertakings) in the country, running a fleet of 14,100 buses with 426 bus stations. The Corporation's buses cover 43.03 lakhs km and carry 68.91 lakhs people to their destinations every day. They connect 14,123 villages to all major towns and cities in A.P which constitutes 95% of Road Transport.

In order to address the corrosion related issues. and also to increase the fuel efficiency, APSRTC had fabricated the superstructures and the structural components of their Ultra Deluxe and Telegu Velegu buses with Stainless Steel tubes and sheets. The Ultra Deluxe model in SS has been plying on the Vizag-Srikakulam route since 6th November 2017, traversing 400 kms on a daily basis. The Telegu Velegu bus would be commissioned in March 2018.



"Stainless Steel Ultra Deluxe Bus being fabricated at Amba Coach, Vijayawada".



"Completed Stainless Steel Ultra Deluxe bus""

Fuel Saving : *Fuel savings @ 2.6 litre of diesel for every 1000 kg weight reduction and 100 km of travel

Total Distance travelled per day : 400 km.

Total Distance traversed per month : 12,000 km



"Success achieved with SS Bus"

Weight Reduction: 370 kg for the superstructure vis-à-vis Mild steel.

The increase in fuel efficiency for the SS Ultra Deluxe bus is approx 25-30 points, which translates into a savings on diesel cost of Rs 7,000-7,500 per month at current diesel prices. The payback period is approx 10-11 months.

The estimated Life Cycle cost savings for a Stainless Steel Ultra Deluxe bus is approx Rs 13-14 lakhs over its regulated life of 12 years. This comprises of cost savings of Rs 10-11 lakhs only on account of lower diesel consumption; cost savings of another Rs 2 lakhs due to NIL or negligible maintenance, and the balance on account of increased tyre life and scrap credit for stainless steel.

In addition, there would be significant cost savings due to reduction in downtime, increased tyre life, reduction in repair and maintenance cost, etc



"MSRTC Bus with Complete outer/inner panels & roof in Stainless Steel".



"Stainless Steel chequered sheets installed on MSRTC Bus"

Case Study 2

The Maharashtra State Road Transport Corporation abbreviated as. MSRTC is the state run bus service of Maharashtra. India with 16,500 buses which ferry 7 million passengers daily. It serves routes to towns and cities within Maharashtra and adjoining states.

Recently MSRTC has completed fabrication of a bus in Stainless Steel at their Dapodi Workshop in Pune, wherein they have converted body panels (roof, inner and outer) and floors from galvanized / Aluminium to Stainless Steel. This bus was launched to be operated on the Pune-Solapur route on 20th February'2018.

The total weight savings achieved due to conversion from MS to Stainless Steel for the roof and panels is 233 kg per bus.

Due to the ease of fabrication with Stainless Steel, and the weight savings achieved with SS, MSRTC has decided to convert 10 more buses completely into SS, i.e. with Stainless Steel superstructure, SS panels, SS roof and SS chequered sheets for floor and footsteps.



"Completed MSRTC Bus in Stainless Steel".