

*INCREASING USE OF
STAINLESS STEEL IN ROLLING
STOCK APPLICATIONS*

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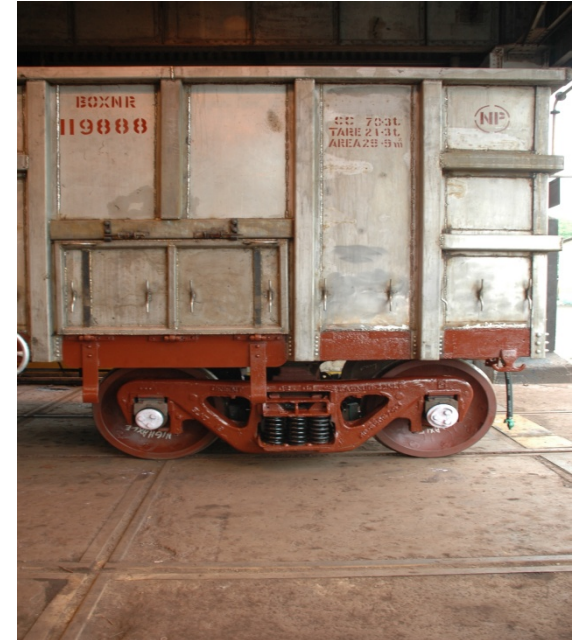
**Addl. Member/Mechl.Engg.
Indian Railways**

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ROLLING STOCK AQUISITION

FREIGHT STOCK

Present Acquisition levels	10,000 wagons per annum
Target - 2008-09 onwards	20,000 Wagons per annum



COACHING STOCK

Present Acquisition levels	Appx 3200 coaches per annum
Target - 2008-09 onwards	4000+ coaches per annum



REQUIREMENTS

Stainless Steel Grade	Annual Quantities Required for Rolling Stock
IRS M-44 (Similar to AISI 409M)	1,70,000t
AISI 409	14,800t
AISI 304	4800t

**Fleet
addition
- 20,000
wagons
per year
w.e.f
2009-10
onwards**

**Fleet
addition -
3000
coaches
per year
w.e.f
2009-10
onwards**

STRUCTURAL MATERIAL

PRESENT STRUCTURAL MATERIALS USED

FREIGHT STOCK

Carbon Steel to IS 2062



COACHING STOCK

Corten Steel to IRS M-41 (for conventional coaches - presently 95% production)

Stainless Steel to Grades AISI 409M and 304 (for new technology LHB type coaches – presently 5% of production levels)



SWITCHOVER ENVISIONED

**Complete switchover to stainless steel for
new acquisition of wagons and coaches**

FREIGHT STOCK

Stainless Steel to IRS M-44 (Similar to AISI 409)

Advantages:

- **Reduction in tare weight -more payload**
- **Less corrosion**
- **Less fuel consumption in empty running**

FREIGHT STOCK

Advantages:

- **Less requirement of loco, crew & path**
- **Extra line capacity available**
- **Less incidences of out of course repair**
- **Reduction in turn around time of wagons due to less detentions**
- **Throughput enhancement**



Use of Stainless steel in Freight stock

TYPE	BOXN (Existing) OPEN TYPE	BOXNHL (New) OPEN TYPE	BCNHL (New) COVERED TYPE
Pay to tare ratio	2.5	3.45	3.4
Payload	58.08t	71t	70.8
Tare weight- 20.60	23.2t	20.6t	20.8
No. of Wagons/ rake	58	58	58 (against 44 at present)



Use of Stainless steel in Freight stock

In Service

BOXNLW wagons

- With IRS M-44 body
- Under operation for the last 9 years
- (Some structural body members with IRS M-44 channels)



Rebuilding

BOXNR wagons

- Conventional Carbon steel wagons being rebuilt with IRS M-44 body
- Use of CRF sections
- 5000 wagons being taken up in 2008-09 for rebuilding
- Policy decision that all further rebuilding to this design

QUANTITY / COST PROJECTIONS

FREIGHT STOCK

BOXNHL wagon (representative example)

Tare weight	20.60 tons
Stainless steel used / wagon	8.5 tons
Cost per ton of IRS M-44	Rs.96,000/-

Translates to **Rs. 1632 crores/**
annum

SWITCHOVER ENVISIONED COACHING STOCK

Complete switchover to stainless steel for new acquisition coaches

Stainless Steel

to AISI 409M and 304

to AISI 301LN (for the unpainted variety)

Advantages:

- Reduction in tare weight -more payload
- Less corrosion
- Vastly improved aesthetics
- Lower life cycle costs
- Further weight reduction - appx 0.5 tonnes -for design with 301LN grade



Use of Stainless steel in Coaching stock

EMUs

Interior furnishings of AC/DC EMUs for Mumbai area, under manufacture at ICF

Roof Panels - AISI 202 grade

- ❑ Seat frames, Hand holds, Grab poles etc. – AISI 304
- ❑ Trough Floor – AISI 304

Approximately 2.5 t / coach

Conventional Mainline Coaches

- ❑ Trough Floor – AISI 304

Approximately 1.3 t / coach



QUANTITY / COST PROJECTIONS COACHING STOCK

LHB Coach (representative example)

Stainless steel used /coach

AISI 304 1.6 tons

AISI 409 4.94 tons

Cost per ton of

AISI 304 Rs.2,70,000 /ton

AISI 409 Rs.1,07,000/ton

Translates to

**Rs. 288 crores/
annum**



ISSUES

COACHES:

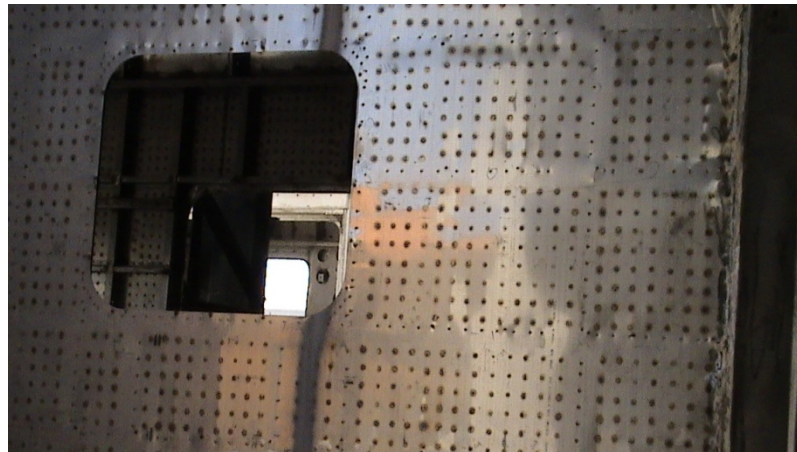
Skin tensioning by spot heating process is a structural strength requirement



- Oxidation marks removal done on 409 grade by Garnet blasting which is time consuming
- Other processes tried, but not very successful:
 - Passivation
 - Buffing

ISSUES

Skin tensioning Marks requiring removal by a suitable process:



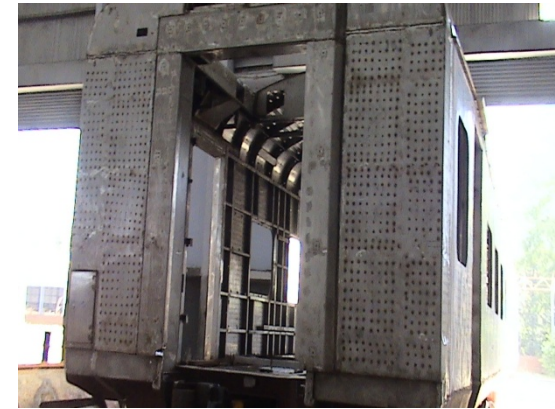
ISSUES

Requirement:

Reduction in surface treatment / painting time

➤ Possibilities:

- Use of Rolled Finish Sheets**
- Any alternate process that Industry could suggest**



Paintless Coaches

- **Surface treatment for 301LN grade, post skin tensioning**
- **Proposed to be used for paintless coaches**
- **Solution required**

THANK

YOU