

The image shows the interior of a train coach with a curved, ribbed stainless steel roof and walls. The floor is made of dark, textured metal grating. On the left side, there are rows of seats with purple upholstery. On the right side, there are glass-enclosed compartments, possibly for a cafe or luggage. The perspective is looking down the length of the coach towards a bright opening at the far end.

Stainless Steel Coaches

at

Rail Coach Factory, Kapurthala

.... Nov'2014



Historic Brief About RCF



SET UP IN 1985 ON SAND-DUNES





RCF - BIRD's EYE VIEW





RESIDENTIAL COMPLEX

- ❑ Area - 800 Acres
- ❑ Accommodation –approx.3750 Units
- ❑ Population – Approx 20,000
- ❑ Shopping Complex
- ❑ 7 Schools
- ❑ 70 bed Hospital,
- ❑ Post Office, Banks, ATMs, etc.





Important Certifications Awarded



IMPORTANT CERTIFICATIONS AWARDED

☐ ISO 9001 Certification

- ☐ First on IR in 1995

☐ ISO 14001 Certification

- ☐ First in India for Workshop and Township in 1999

☐ Integrated Management System (IMS)

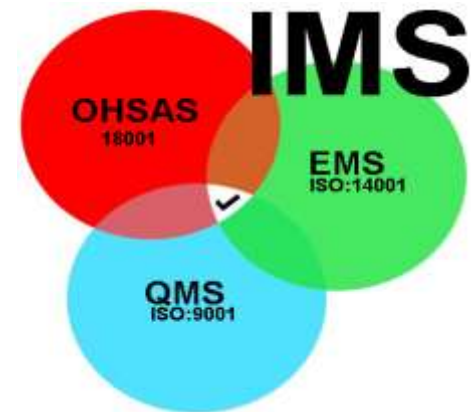
- ☐ Obtained certification for Integrated Management System covering ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 in 2009

☐ '5S' Certification

- ☐ First on IR to obtain the certification in July 2008

☐ NABL accreditation

- ☐ For Spectro Lab and Metrology Lab in Dec 2008 and Feb 2009 respectively.





ENVIRONMENT MANAGEMENT AWARDS



- ☐ Golden Peacock award for Eco-Innovation-2006
- ☐ Golden Peacock award for Environment Management 2008
- ☐ Golden Peacock award for Environment Management 2009
- ☐ Greentech Environment Excellence Gold Award - 2008
- ☐ Greentech Environment Excellence Gold Award – 2009
- ☐ Golden Peacock award for Environment Management 2011
- ☐ Greentech Environment Management Award : 2012
- ☐ Greentech Environment Management Award : 2013
- ☐ Golden Peacock award for Environment Management 2014



Trends in Coach Manufacturing on IR



Coach Designs being manufactured on IR:

❑ Two broad designs

- ❑ Conventional ICF type-Corten Steel

- ❑ LHB Stainless Steel design

Each design type has variants like:

AC-I, II, III, Chair Cars,

Non AC Sleeper etc.

Major chunk of IR fleet is of ICF type Coaches





Coach Designs –LHB type coaches

- ❑ LHB-RCF design
(Stainless Steel body coaches)
- ❑ Transfer of technology from LHB-Germany in 1995
 - ❑ Modified to suit Indian conditions
- ❑ Substantial cost reduction achieved
- ❑ 1st coach produced in the year 2002
- ❑ 2600 coaches produced so far





Coach Designs –Paintless coaches

- ❑ Material grade
AISI -301 LN
- ❑ Wider sheets
2 Meter





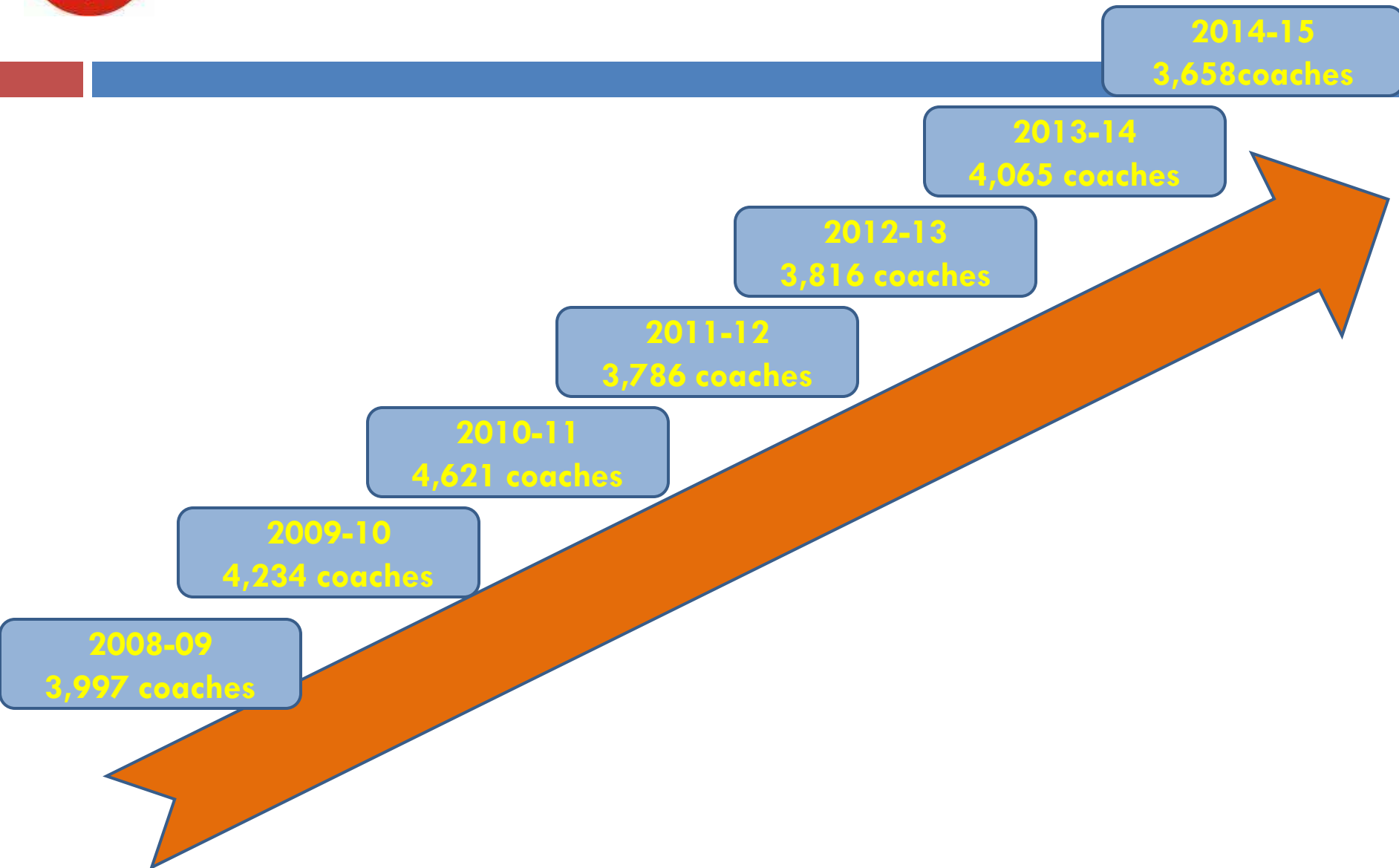
Overview – Product Range

- ❑ AC and Non-AC coaches
- ❑ Self propelled coaches
- ❑ Parcel Vans, Postal Vans, Refrigerated Vans
- ❑ Special purpose coaches





Overview –IR demand for Coaches



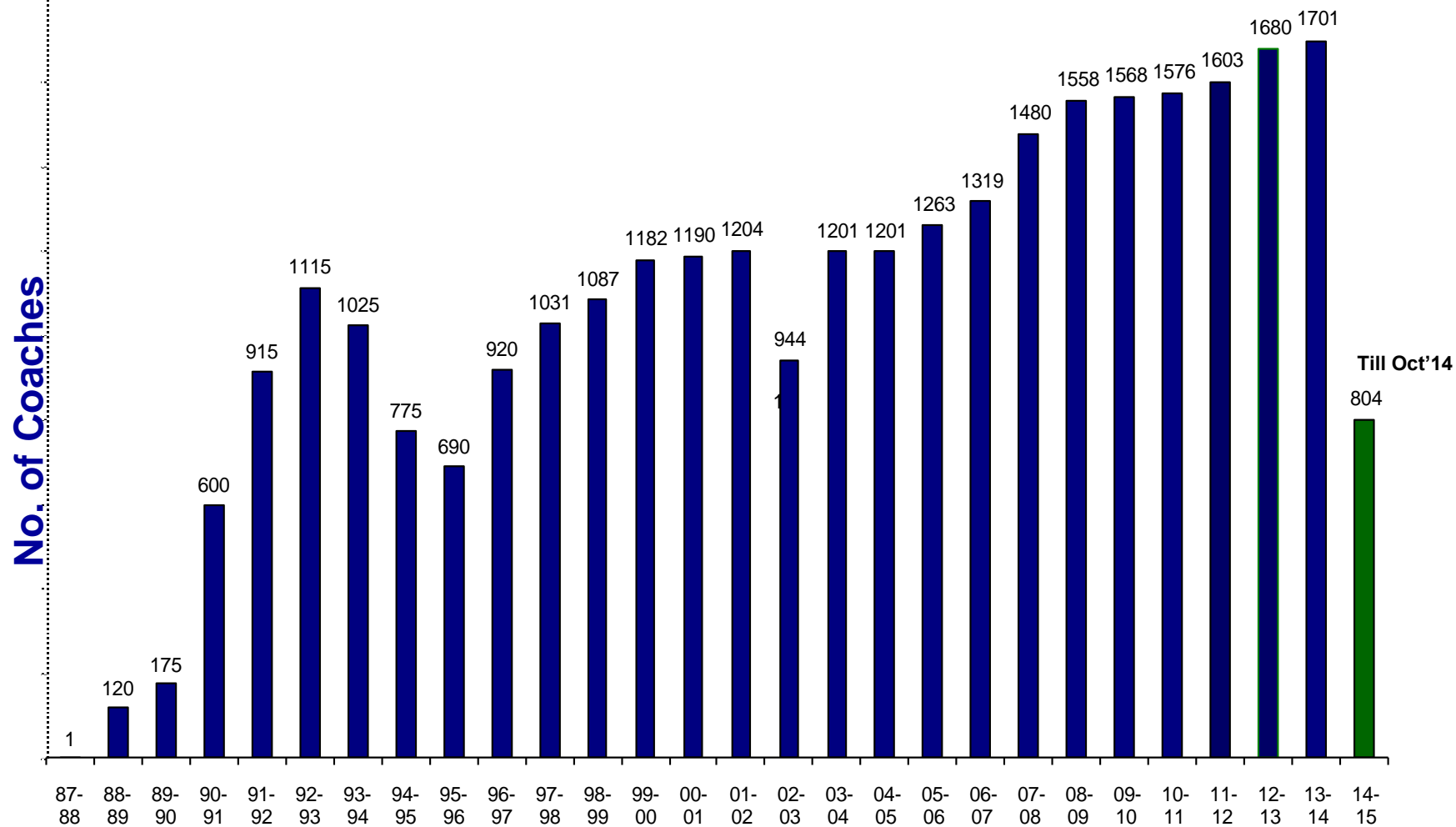


Overview – New coach production units

- ❑ RCF- Rae Bareli (1000 LHB coaches/Annum)
- ❑ Palghat-Kerala, (Cap- 800 coaches/Annum)
- ❑ Sankrail-Bengal (Cap-400 DEMU/Annum)
- ❑ Kanchrapara-Bengal (Cap-500 EMU/Annum)
- ❑ Sonapat Haryana
- ❑ Bhilwada-Rajasthan



Overview –RCF production of coaches

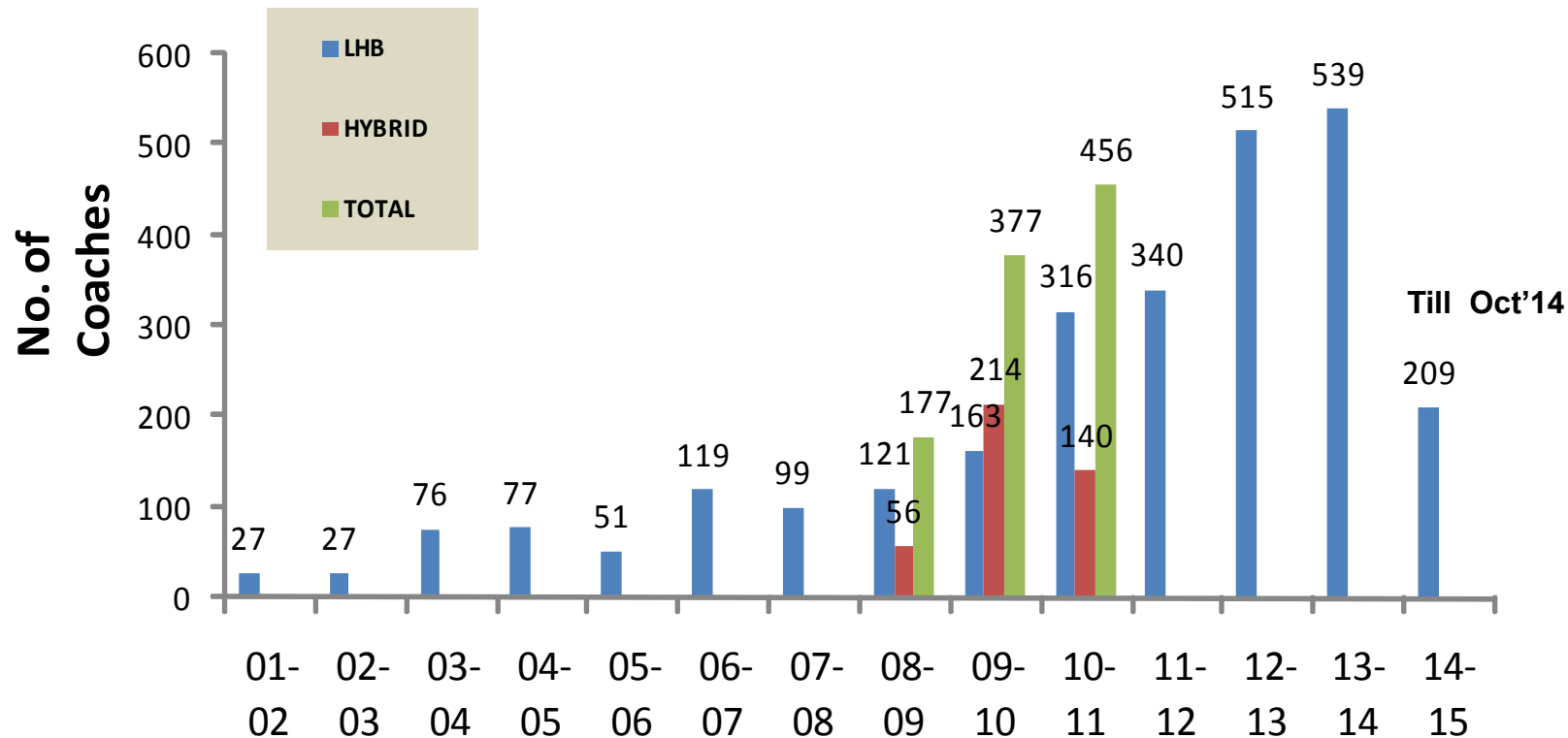


TOTAL NO OF COACHES PRODUCED TILL OCT'14 - 29826



Overview –Shift in production pattern

Stainless steel coaches (RCF)



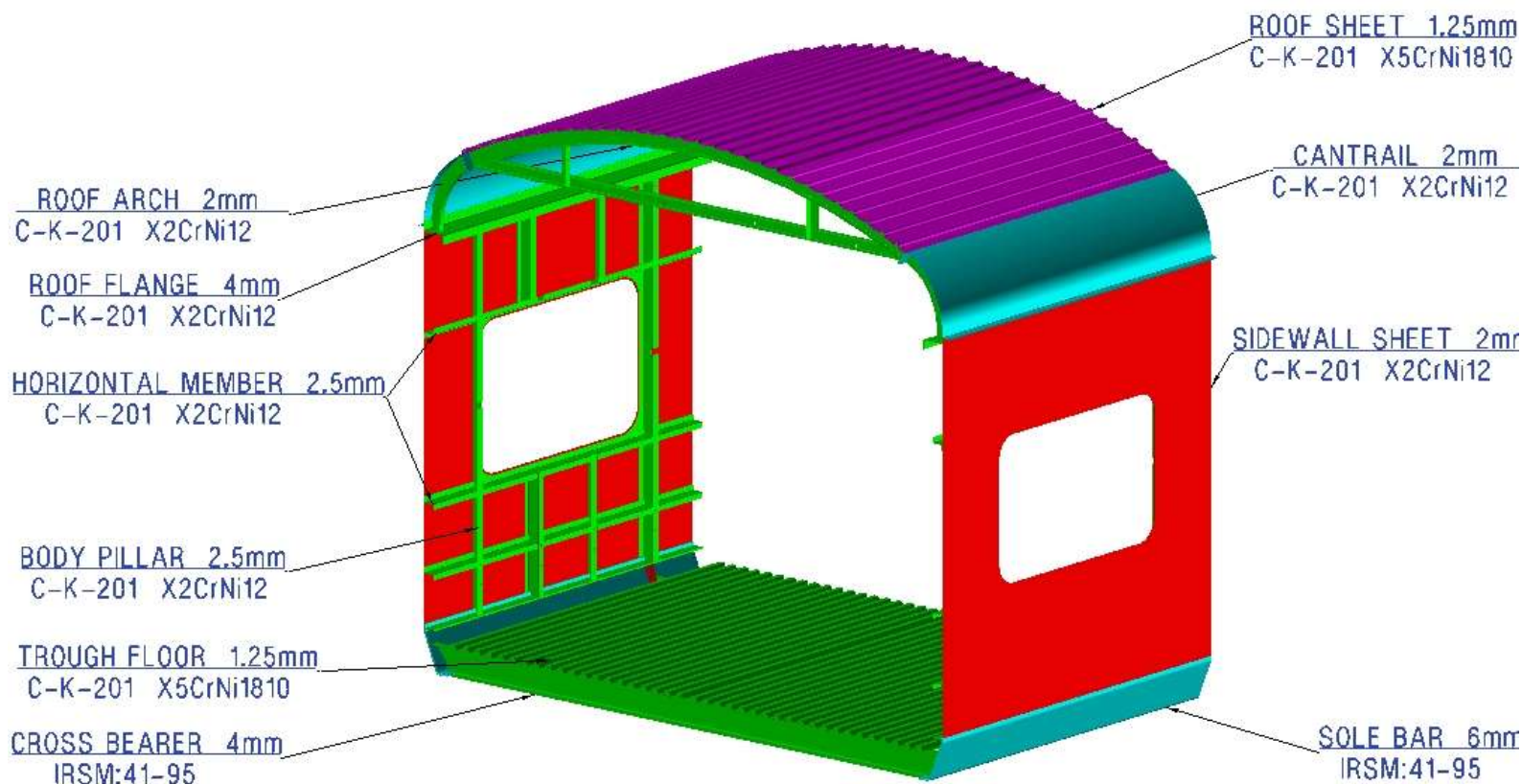


Overview – Steel grades in LHB

Austenitic SS-304 -Corrugated roof and trough floor

Ferritic SS-409M -Other parts sidewall, roof, endwall

Corten -Underframe except trough floor





Properties of Steels

Steel Grade	Yield Stress N/mm ²	UTS N/mm ²
IRS M-41 / Corten Steel C < 0.10 Cr 0.35 - 0.60 Ni 0.20 - 0.47 Cu 0.30 - 0.60 Si 0.28 - 0.72 Mn 0.25 - 0.45 S 0.03 max P 0.075 - 0.14	300-340	440-480
X2 CrNi12 Ferritic Steel (409M) C ≤ 0.03 Cr 10.5-12.5, Ni 0.3 - 1.0 Si 1.0% max. Mn 0.5-1.5 S 0.03 max. P 0.04 max.	320	450-650
X5 CrNi 18 10 Austenitic Steel (304) C ≤ 0.07 Cr 17 – 19 Ni 8.5 – 10.5 Mn 2.0 max. Si 1.0 max. S 0.03 max. P 0.045 max.	235	550-750



Overview –Steel Requirement

- ❑ Indian Railways - One of Largest user
- ❑ Passenger coaches - More than 50,000
- ❑ RCF 2014-15 plan - Over 1600 coaches
- ❑ IR Plan 2014-15 - Over 4000 coaches
- ❑ RCF Steel Req. - 21000 tonnes (MS/Corten/SS)

Austenitic (304) 3840T

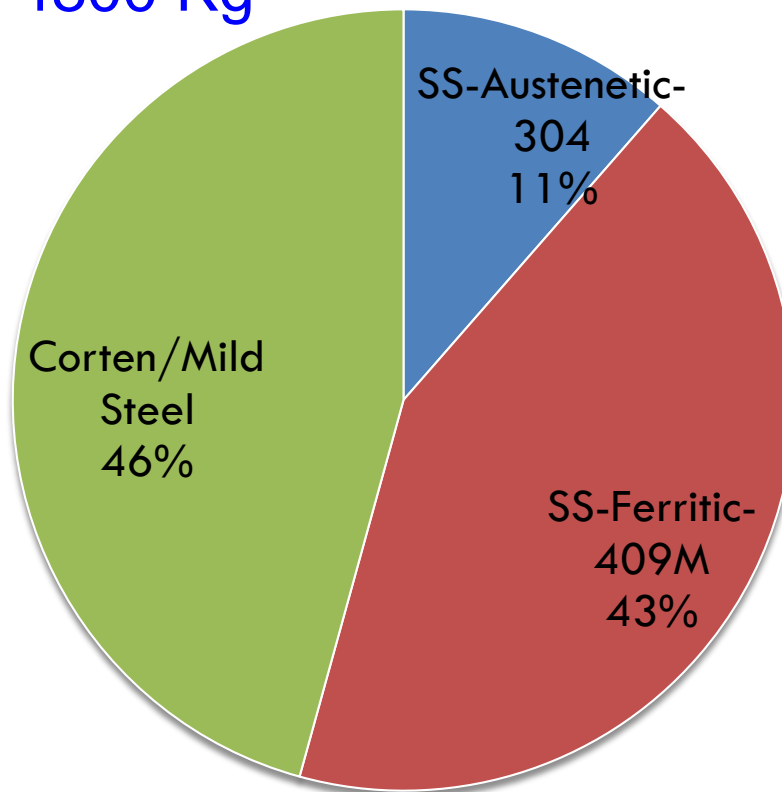
Ferritic (409M) 2700T

Corten/MS 13680T



Overview – Share of various steels in one LHB coach

Austenitic (304) 1200 Kg
Ferritic (409M) 4500 Kg
Corten/MS 4800 Kg

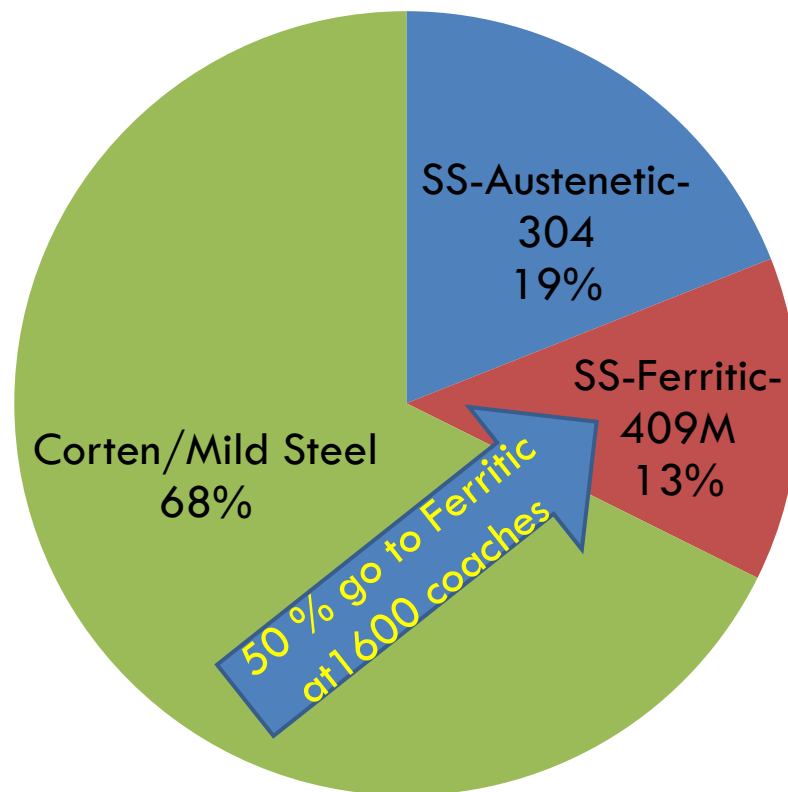




Overview – Share of various steels in during 2014-15 (at RCF)

1600 Coaches (600-LHB; 1000-ICF Type)

Austenitic (304) 3840T
Ferritic (409M) 2700T
Corten/MS 13680T





Glimpse of Stainless steel Items



Stainless Steel Items Outsourced

□ Under-slung water tanks

□ Material : SS 316 Ti

□ Weight : 315 Kgs



□ Bio-digester tanks

□ Material : SS 316L

□ Weight : 100 Kgs X 4





Stainless Steel Items Outsourced

❑ Under-slung fuel tanks

❑ Material : SS 304

❑ Weight : 550 Kgs



❑ Door frame

❑ Material : SS 409M

❑ Weight : 115 Kgs X 4





Stainless Steel Items -Outsourced

❑ End Wall Assembly

❑ Material : SS 409M

❑ Weight : 400 Kgs X 2





Stainless Steel Items -Outsourced

- ❑ Modular Lavatory
- ❑ Material : SS 304





Stainless Steel Items-Outsourced

❑ Roof Car lines

❑ Material : SS 409 M

❑ Weight : 270 Kgs per coach



❑ Water Tank Ceiling Construction

❑ Material : SS 409 M

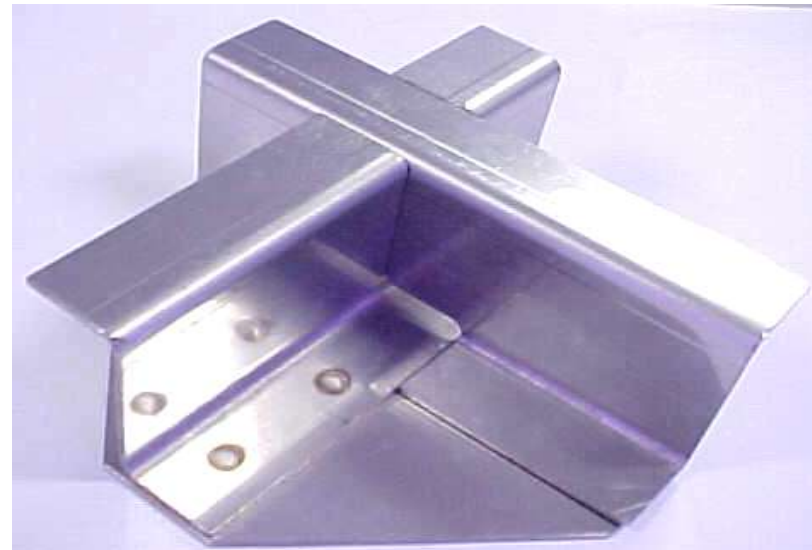
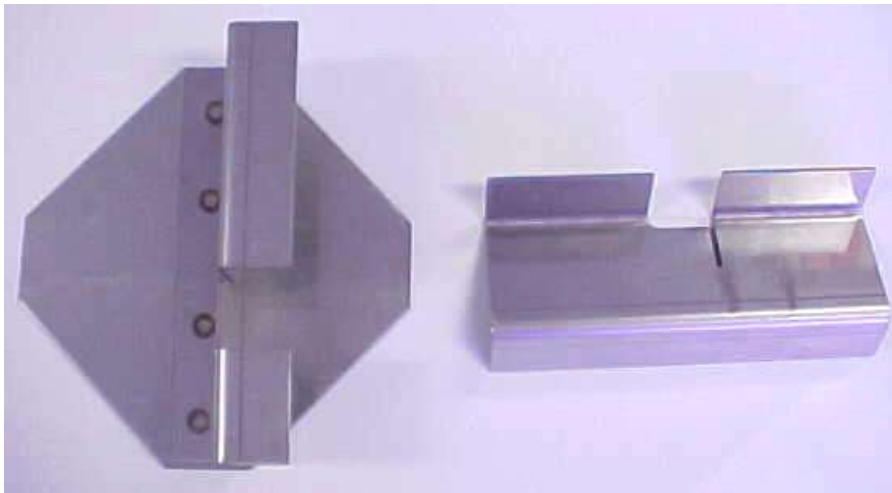
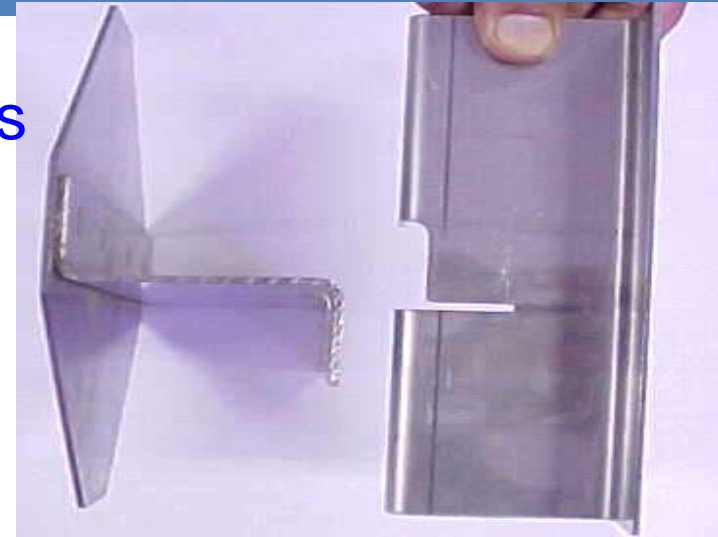
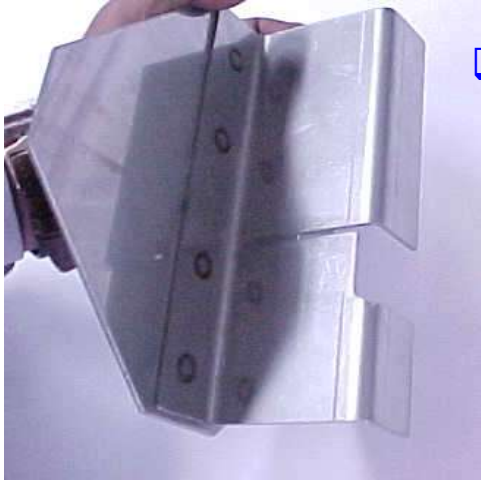
❑ Weight : 225 Kgs X2 per coach





Stainless steel items –outsourced

❑ Sidewall members





Assistance in Development

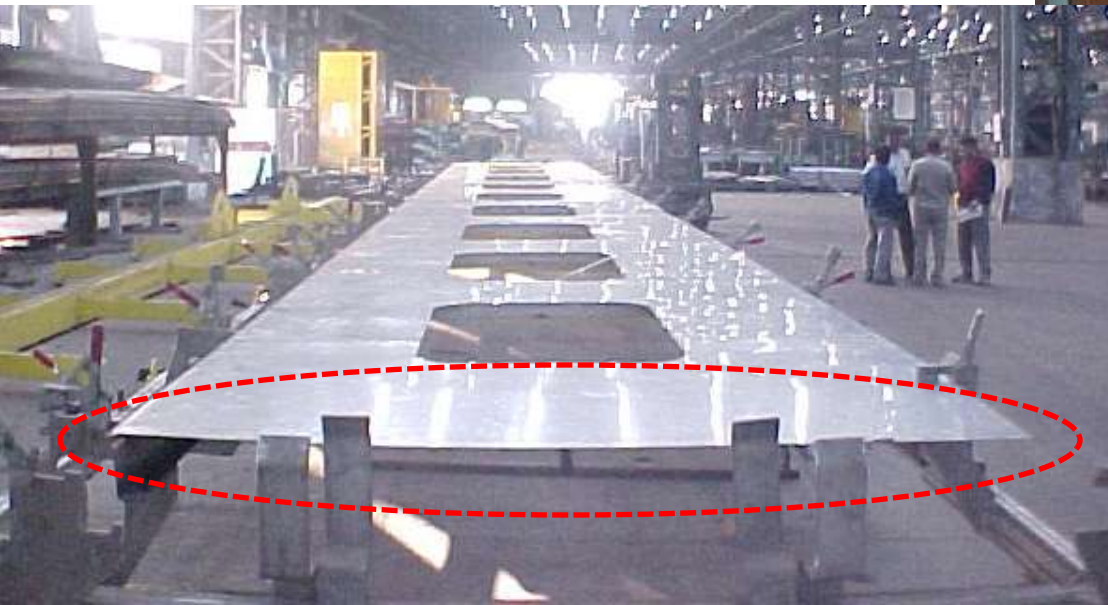


Assistance in Development

– 2 Meter wide sheets/coils

❑ 2-meter wide sheets /coils.

❑ Reduce welding –
improve aesthetics





Assistance in Development

– if 2 Meter wide sheets/coils used in Sidewall (Saving in welding)

Sidewall Sheet size (LHB coach)	No of weld joints	Welding Length
Existing sidewall sheet <ul style="list-style-type: none">Width -1250mmLength -2100mm	18	28 meters
Proposed with: <ul style="list-style-type: none">Width -2000 mmLength - 6000 mm	03	22 meters Saving in welding
Proposed with: <ul style="list-style-type: none">Width -2000 mmLength - 9000 mm	01	26 meters Saving in welding
Proposed with: <ul style="list-style-type: none">Width -2000 mmLength – running length coil	No weld joint	28 meters Saving in welding



Assistance in Development

- AISI 301LN in 2 meter wide

- ❑ Stainless steel sheet for paintless coaches
- ❑ 2M wide sheets/coils
- ❑ 301LN –Dull Finish Similar to Metro coaches





Assistance in Development

- CRF sections

☐ Cold Rolled sections in stainless steel

- ☐ Carline
- ☐ Roof Arch
- ☐ Corrugated Trough floor
- ☐ Corrugated Roof sheet
- ☐ Reduce welding and post manufacturing





Assistance in Development

- Low cost SS for decorative interiors (< Ni)

- ❑ Development of low cost Stainless steel grades for decorative interior items
- ❑ Handhold, light luggage racks, bottle holder, coat hooks





Assistance in Development

-Joint Design & Development

- ☐ Joint development for “Touch and feel items”
 - ☐ Dust Bins
 - ☐ Washbasins
 - ☐ Mirror holders
 - ☐ Bottle holders
 - ☐ Light luggage racks
 - ☐ Door handles
 - ☐ Ladder



Assistance in Development

-Pigmented SS sheets and Chequered SS Sheet

- ☐ Pigmented SS sheets for paneling of MEMU coaches
- ☐ SS chequered sheets in door ways



Thank you