

ICF BOGIE



Vestibule type AC Pantry car

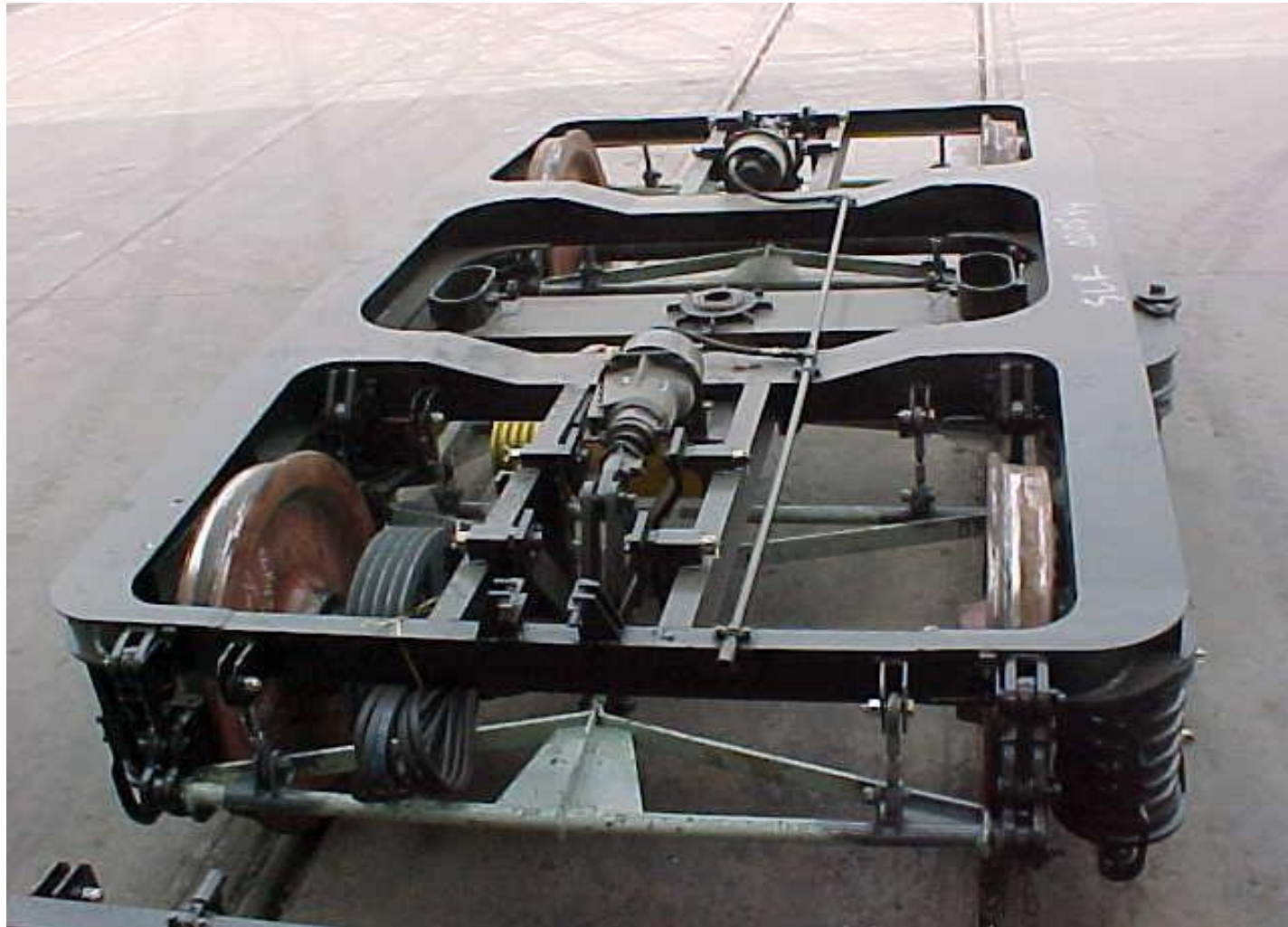
Construction of coaching stock

- Shell or the skeleton part**
- Furnishing or the provisions of amenities**
- Bogie (Trolley), the running gear**

Running of passenger Coaches with safety

**Speed and Comfort mainly depends
on the bogie on which the coach is
placed.**

Bogie



BOGIE (TROLLEY)

What ?

Why?

Bogie - What?

- **It is an independent unit used under a long vehicle.**
- **It is usually mounted on two pairs of wheels.**
(In exceptional cases, such as special purpose stocks or high capacity vehicles of well Wagons or crocodile trucks, inspection carriages etc the bogie may be mounted on three or more pairs of Wheels)

Bogie - What?

- **Normally two bogies are used under a Vehicle.**
- **Each bogie carries half the load of the vehicle body and it's loading.**
- **Each bogie is provided with a pivot on its central transom or bolster for engagement with its male counterpart provided underneath the vehicle under frame.**

Bogie - What?

- **The bogie trucks can swivel about these pivots with ease and without restraining the vehicle body while negotiating a curved track.**

Bogie - Why?

- **Limitation of maximum rigid wheel base of a vehicle**
- **Limitation of maximum axle load prescribed for track**
- **Full utilisation of track loading density**

Requirement of Bogie

- **Sturdy construction to withstand vertical, longitudinal and lateral shocks**
- **Satisfactory damping devices**
- **Suitable suspension gear**

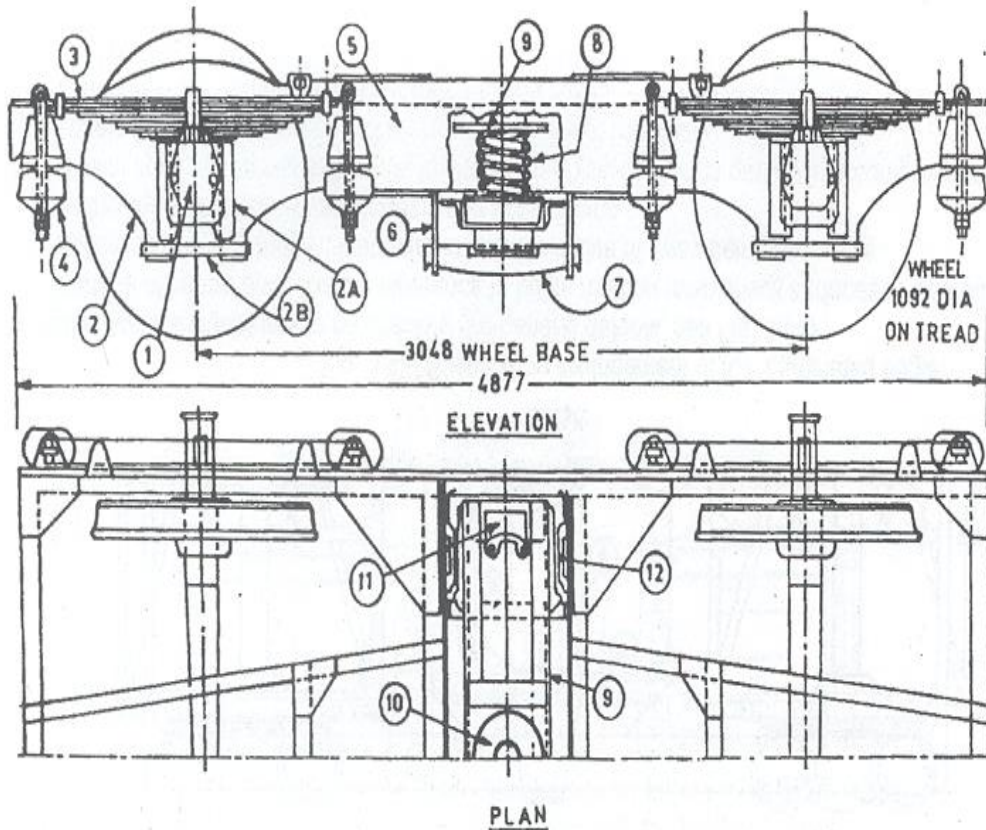
Requirement of Bogie

- **Sturdy running gears to give trouble free service**
- **Easy negotiability on curved track without restraining body structure**

Version of Coaching Bogie

- **IRS Bogie**
- **SCHLIEREN Bogie (ICF Laminated Bogie)**
- **MAN-HAL Bogie (BEML Bogie)**
- **ICF All Coiled Bogie**
- **IR-20 Bogie**
- **Fiat Bogie (Similar to IR-20 Bogie)**

IRS Bogie



1. Plain bearing axle box.
2. Axle guard.
- 2A. Horn cheek.
- 2B. Bridle bar
3. Primary springs (laminated).
4. Auxiliary rubber block (or spring).
5. Bogie frame (rivetted).
6. Swing links.
7. Spring plank.
8. Secondary springs (helical)
9. Bolster.
10. Centre pivot.
11. Side bearers.
12. Check guides (connected to bogie frame).

Suspension arrangement of IRS (B. G.) bogie.

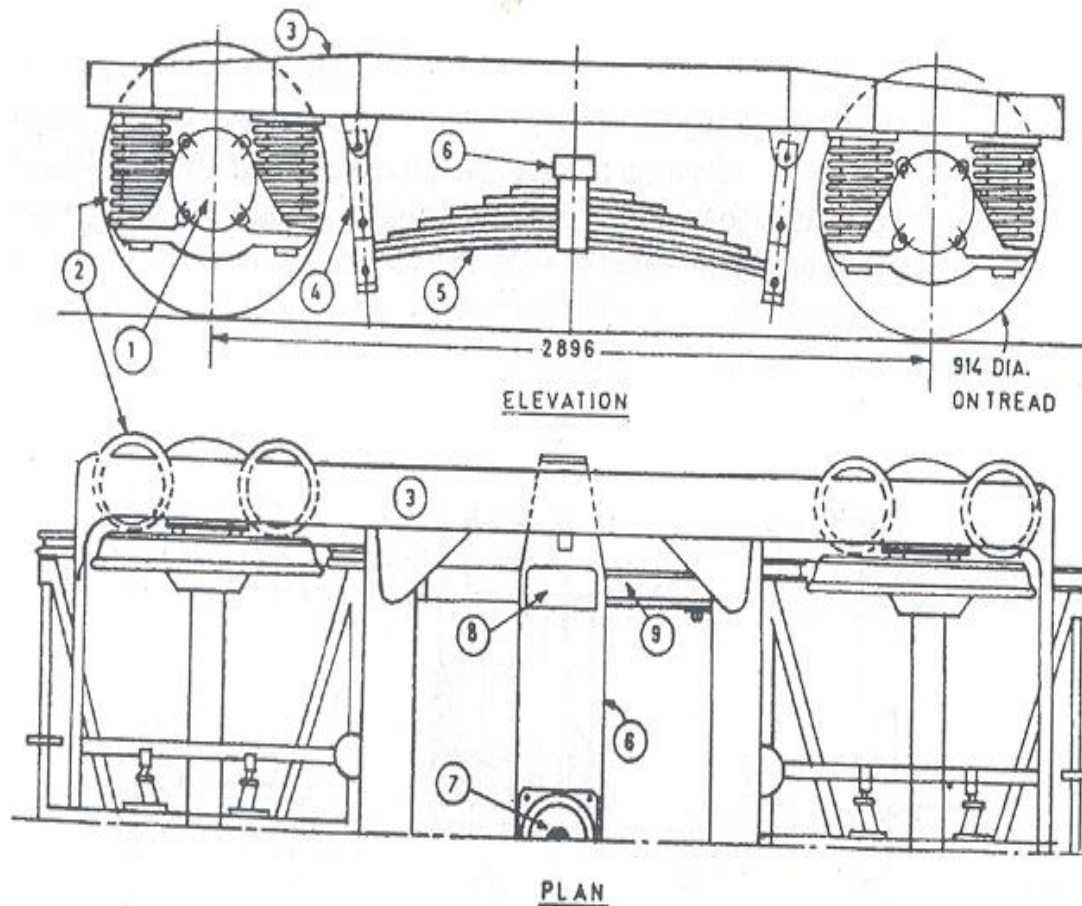
IRS Bogie

Developed / Built by: British Make

Introduction to Railway : Since 1930 – 31

**Status: Productions abolished and use
discontinued on Mail / express service.**

SCHLIEREN Bogie (ICF Laminated Bogie)



1. Wing type roller bearing axle box.
2. Primary springs (helical), with dash-pot inside.
3. Bogie frame.
4. Swing links.
5. Secondary springs (laminated).
6. Bolster.
7. Centre pivot.
8. Side bearers.
9. Anchor links.

Suspension arrangement of ICF Laminated bogie.

SCHLIEREN Bogie (ICF Laminated Bogie)

Developed / Built by:

**M/S Swiss Car and
Elevator manufacturing corporation Ltd,
Schlieren, Zurich**

Introduction to Railway : Since 1951

**Status: Productions abolished and use
discontinued on Mail / express service.**

MAN-HAL Bogie (BEML Bogie)

Developed / Built by:

M/S HAL Bangalore

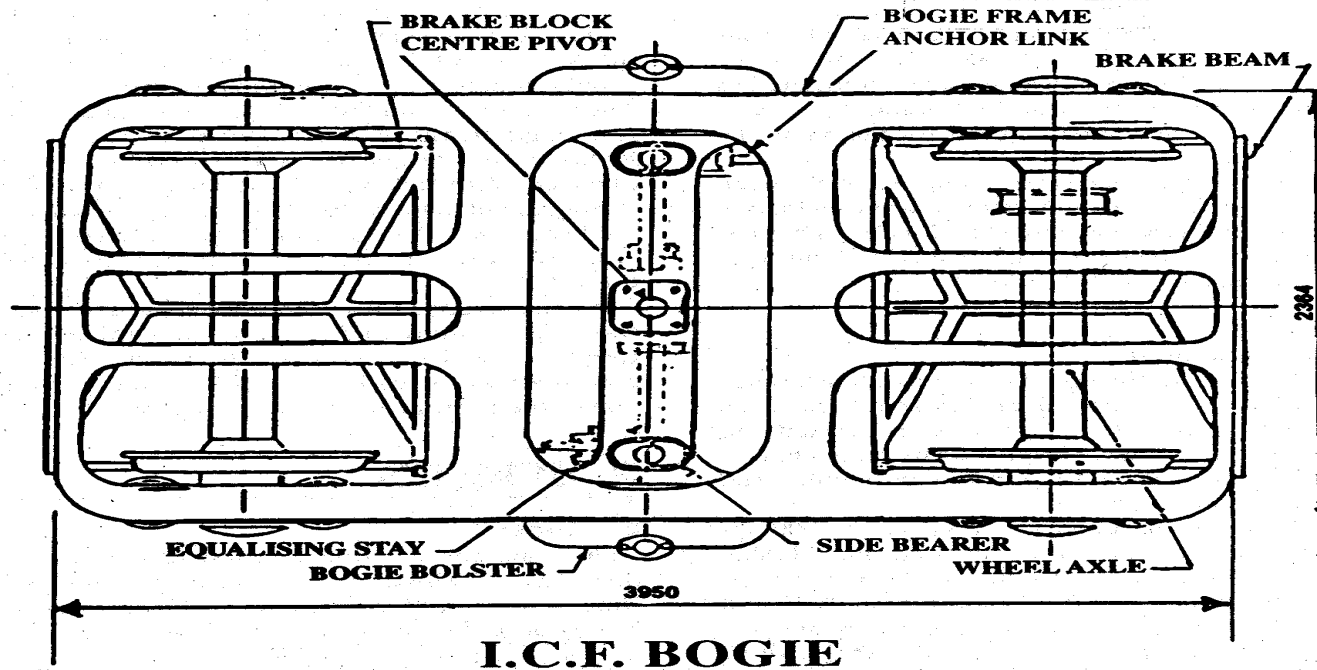
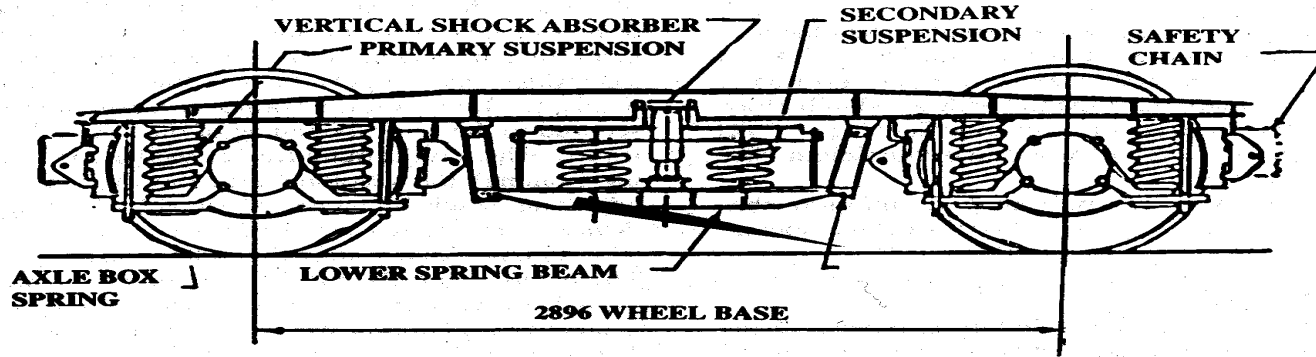
in collaboration with

M/S MAN Nurnberg (West Germany)

Introduction to Railway : Since 1958-59

**Status: Productions abolished and use
discontinued on Mail / express service
having speed more than 105 KMPH.**

ICF All Coiled Bogie



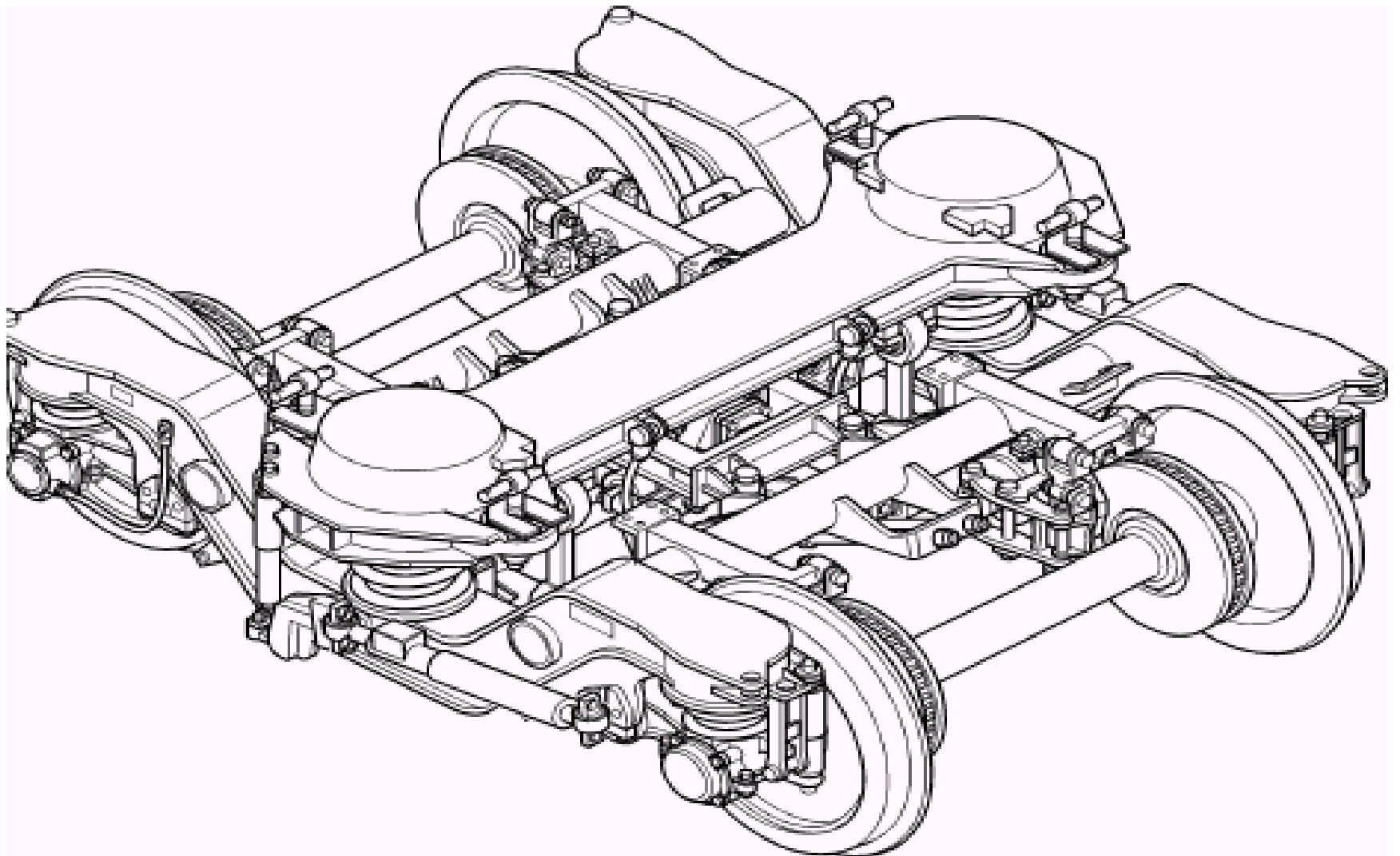
ICF All Coiled Bogie

Developed / Built by: ICF & RCF

Introduction to Railway : Since 1965

Status: Productions continue by ICF & RCF.

Fiats Bogie (Similar to IR-20 Bogie)



IR-20 Bogie

Developed / Built by: RCF

Introduction to Railway : Since 1998

Status: Used in few coaches and production abolished due to introduction of FIAT bogie.

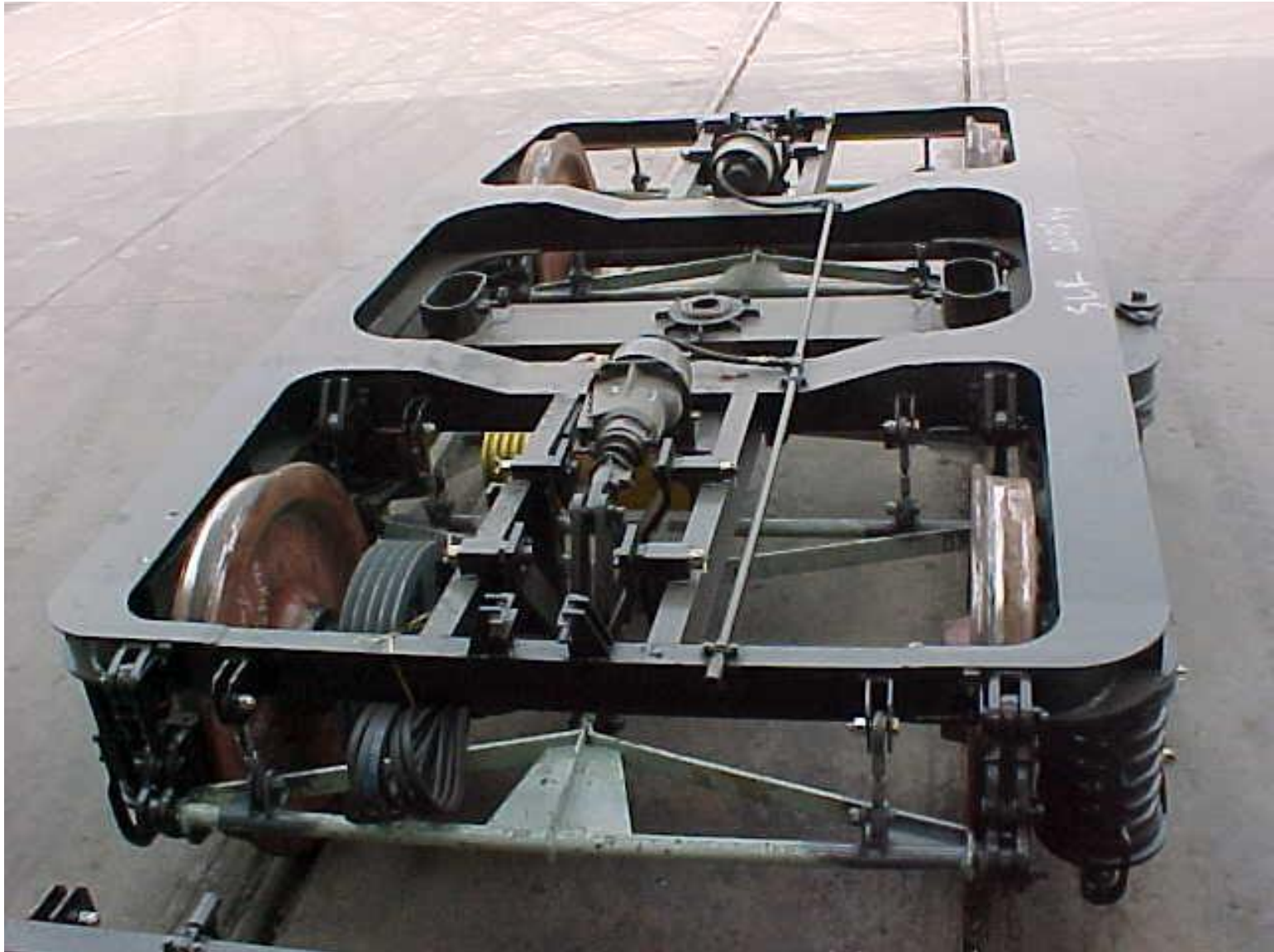
FIAT Bogie

**Developed / Built by: 24 Coaches imported from
Switzerland in 2000- 01.**

Introduction to Railway : Since 2001

Status: Productions started in RCF.

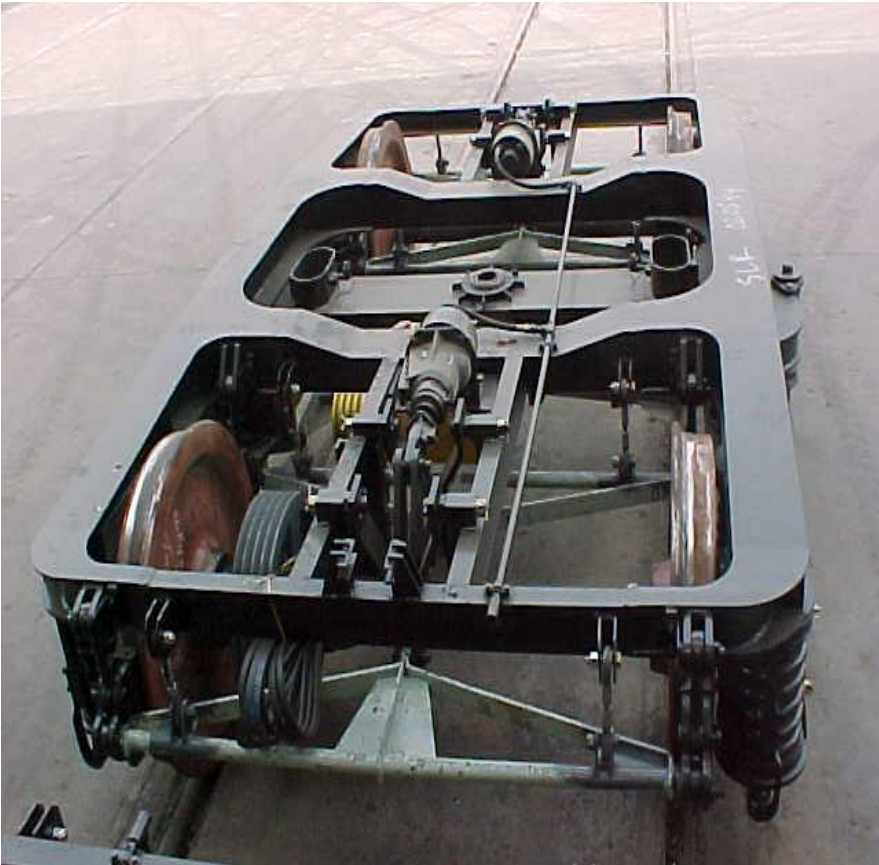
ICF BOGIE (Top View)



ICF BOGIE (Side View)

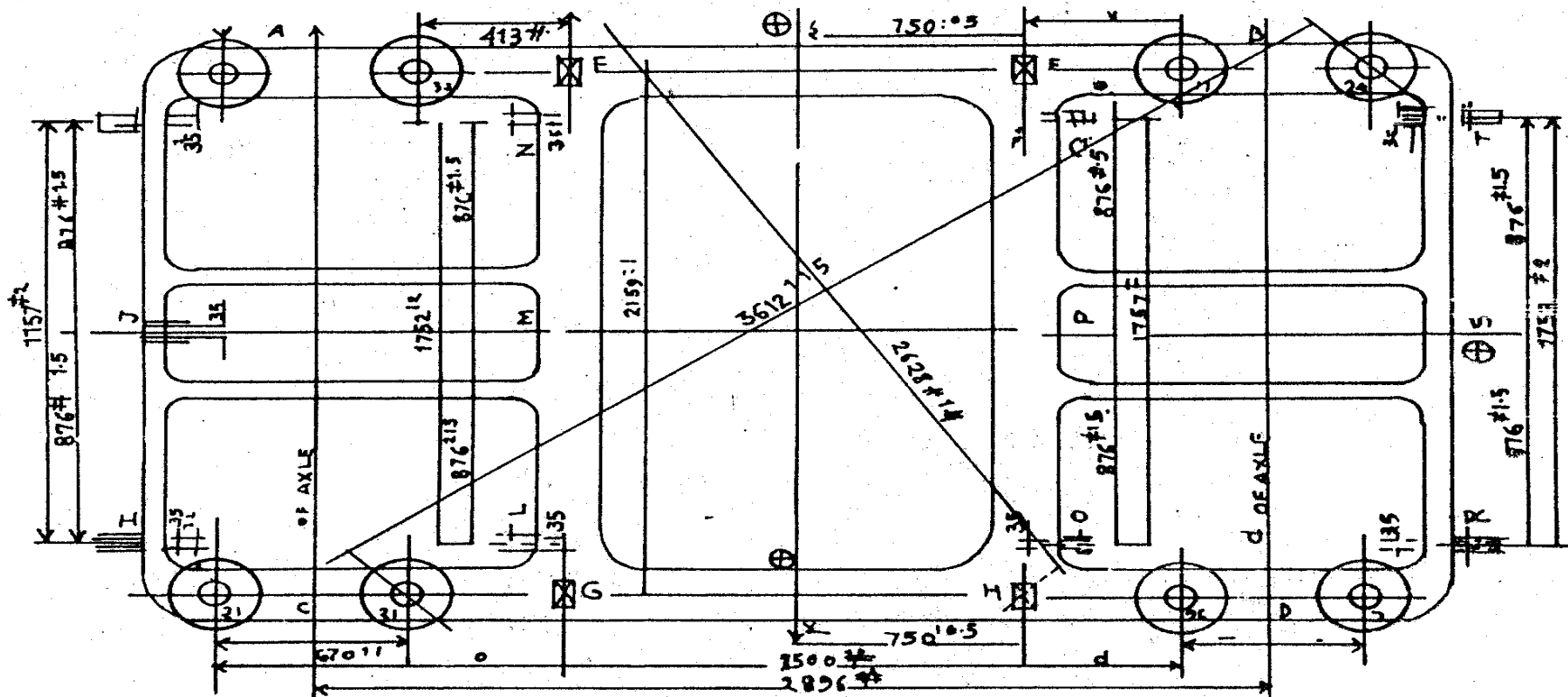


Bogie Frame



Bogie Frame

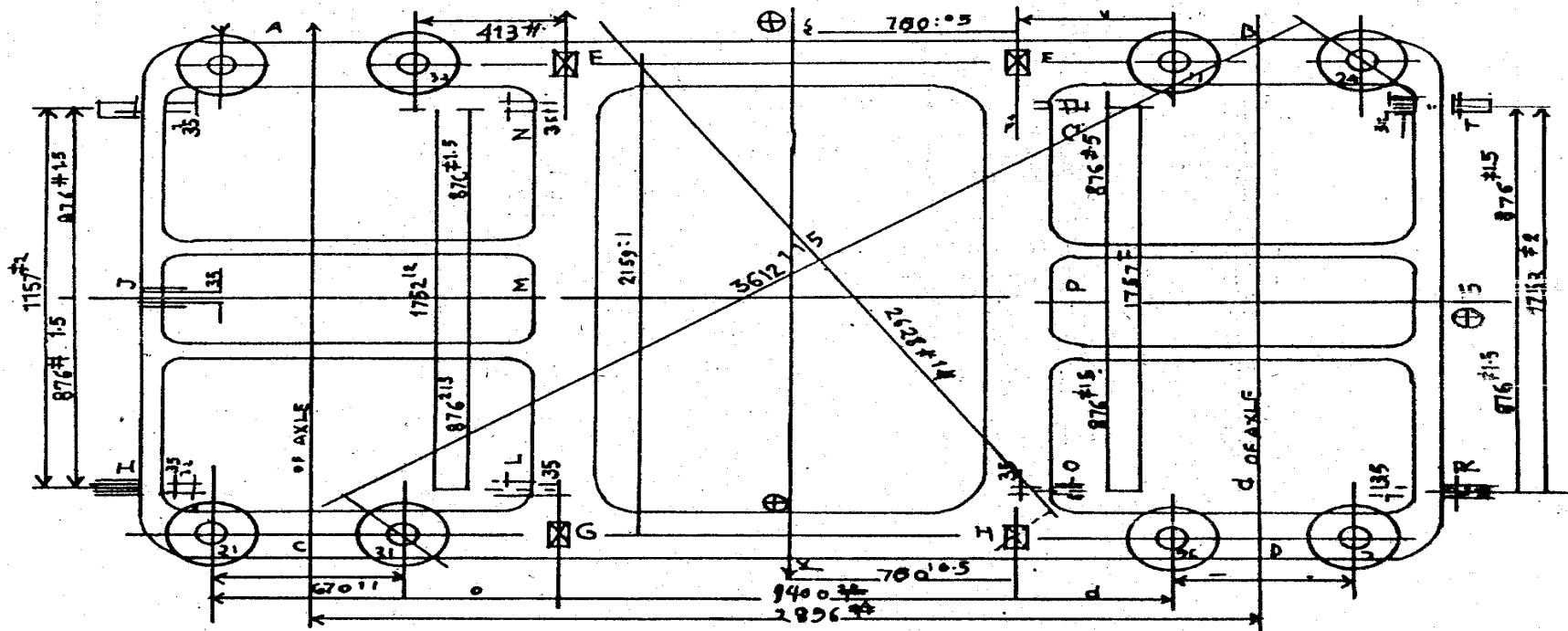




DIMENSIONAL CHECK REPORT

FOR AC- AND POWER CAR BOGIE FRAME

1. SOLEBAR & HEAD STOCK CENTRES OF BOGIE FRAME WILL BE PERMANENTLY PUNCH MARKED IN CONSPICUOUS MANNER.
2. REPRESENTS LOCATION OF AXLE GUIDES.
3. REPRESENTS LOCATION OF BOLSTER SPRINGS SUSPENSION BRACKET.
4. BOLSTER SPRING SUSPENSION BRACKET PIN HOLES E, F, G, H, SHALL BE LOCATED AT 750 + 0.5 mm FROM THE TRANSVERSE CENTRE LINE PUNCH MARKS ON SOLEBAR & CHECK IF.
5. WELDING JOINT SHALL NOT COME UNDER THE AXLE GUIDE.

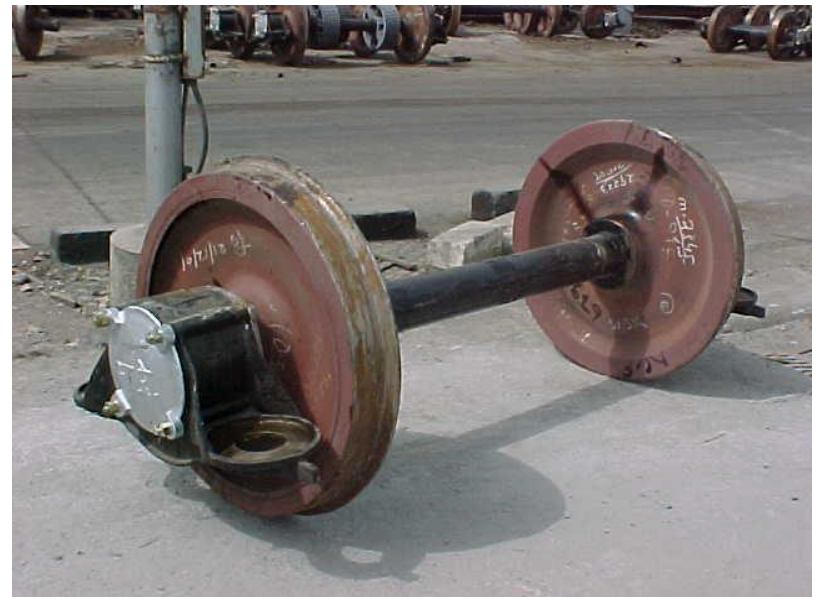


DIMENSIONAL CHECK REPORT

FOR NON AC BOGIE FRAME

1. SOLEBAR & HEAD STOCK CENTRE OF BOGIE FRAME WILL BE PERMANENTLY PUNCH MARKED IN CONSPICUOUS MANNER.
2. REPRESENTS LOCATION OF AXLE GUIDES.
3. REPRESENTS LOCATION OF BOLSTER SPRINGS SUSPENSION BRACKET.
4. BOLSTER SPRING SUSPENSION BRACKET PIN HOLES E,F,G,H, SHALL BE LOCATED AT $700 + 0.5$ mm FROM THE TRANSVERSE CENTRE LINE PUNCH MARKS ON SOLEBAR & CHECK IF:
5. WELDING JOINT SHALL NOT COME UNDER THE AXLE GUIDE.
6. NO INACCURACY IN ALIGNMENT OF HOLES IN THE BRACKETS WILL BE PERMITTED.

Wheel & Axle



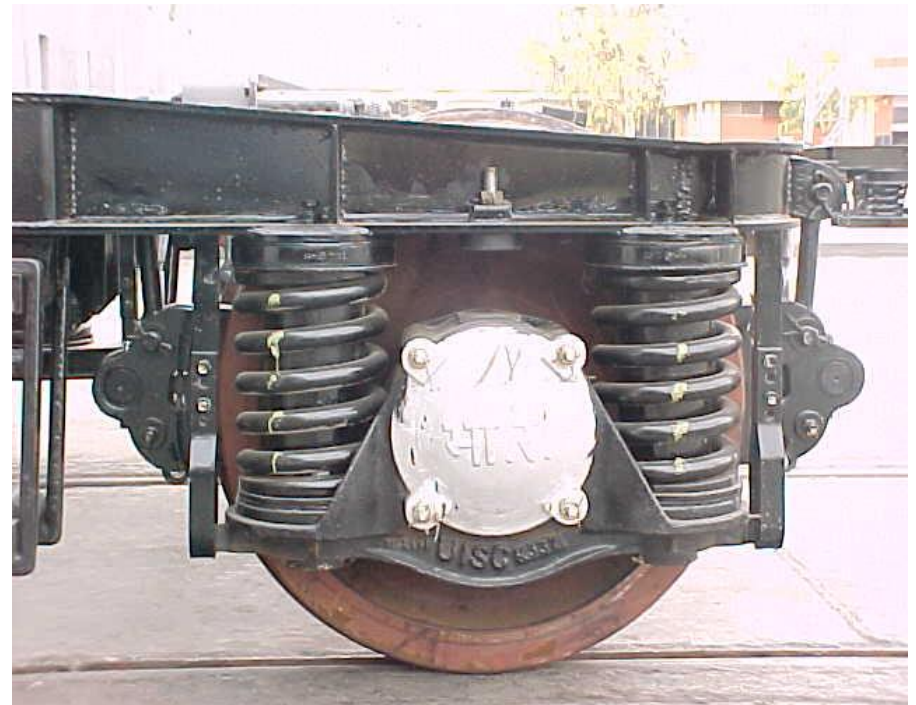
Axle Box Housing



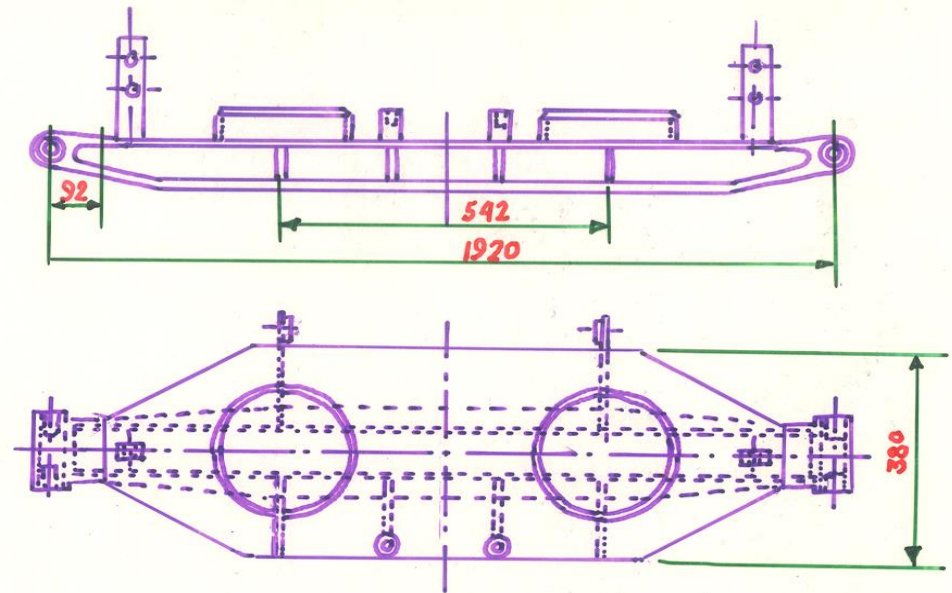
Roller Bearing



Axle Box Spring

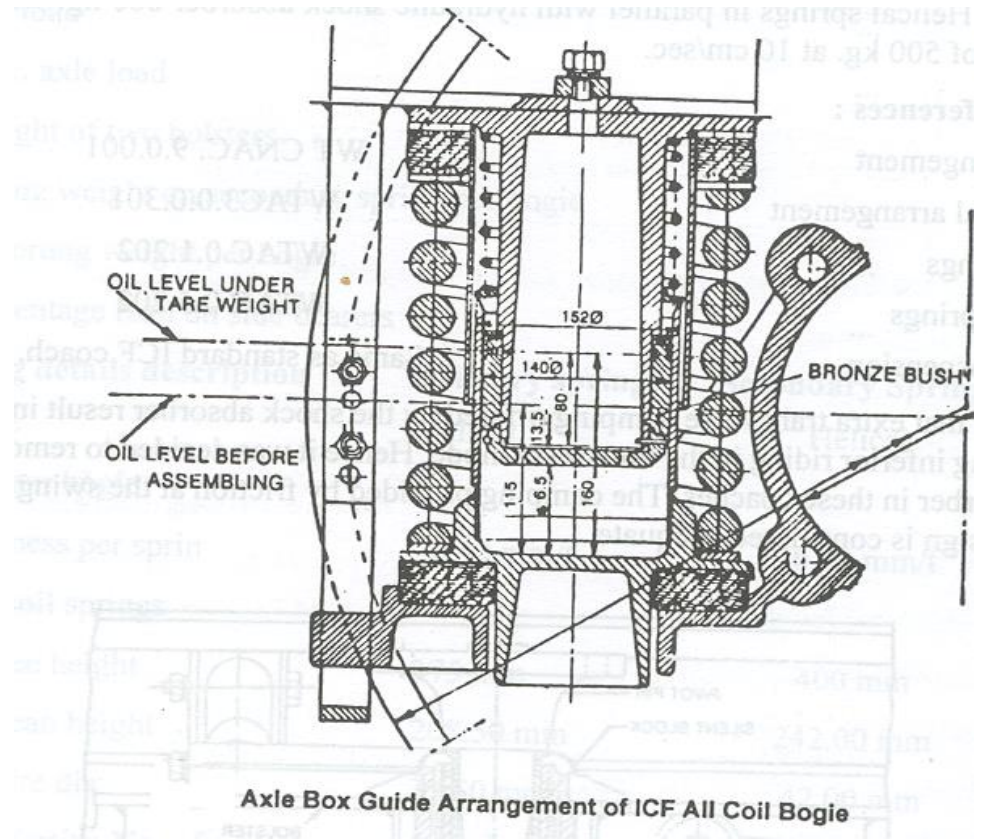
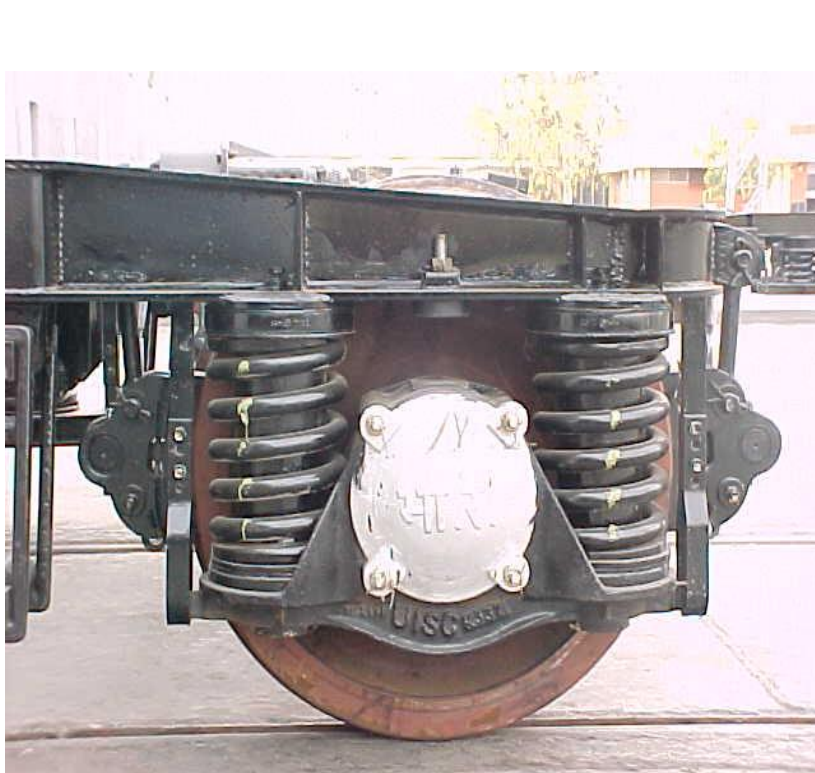


Lower Spring Beam / Seat



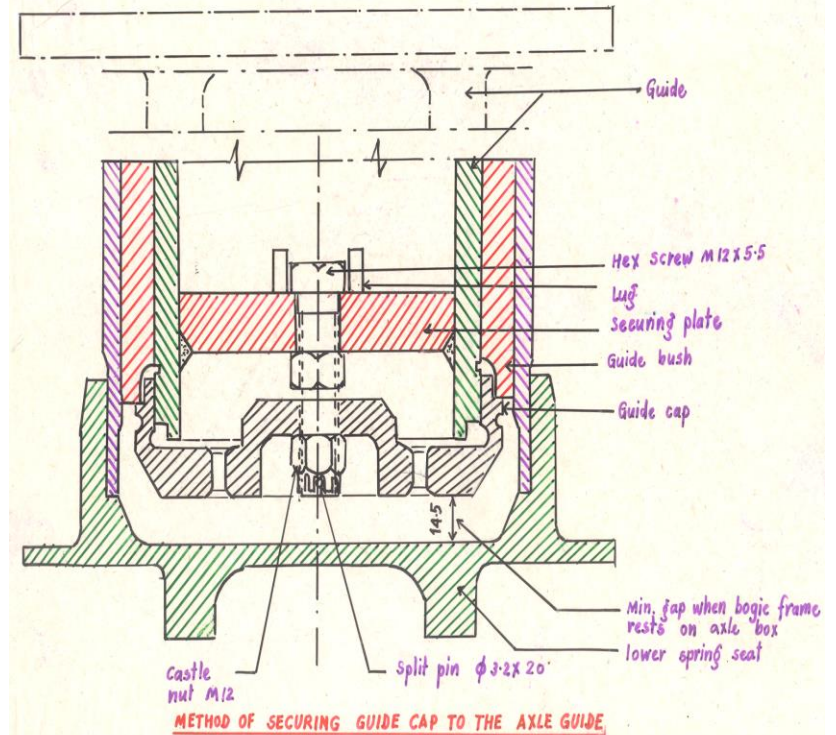
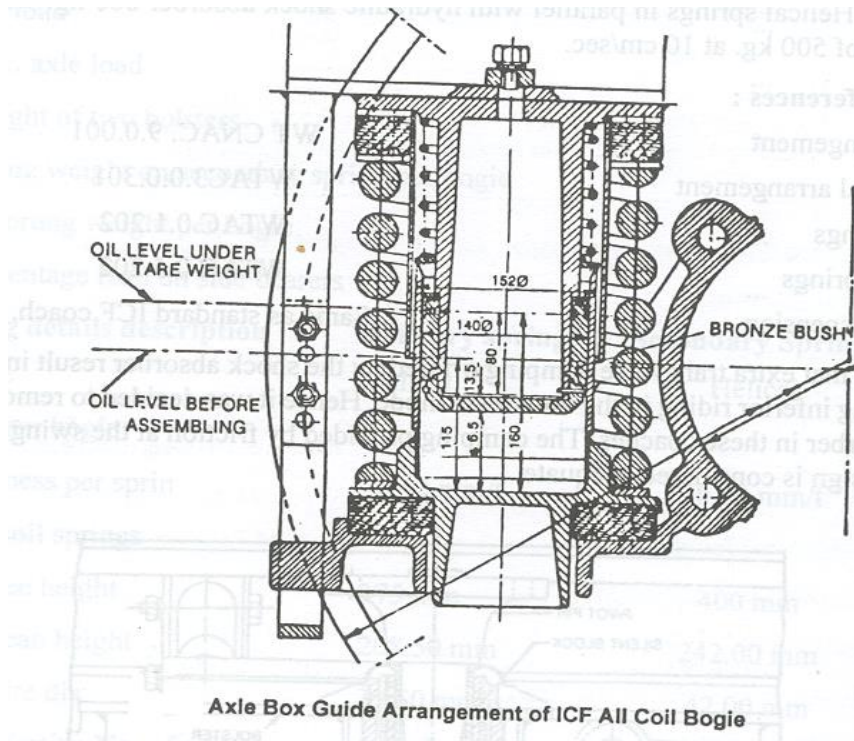
LOWER SPRING BEAM

Dashpots and Axle Guide Assemblies

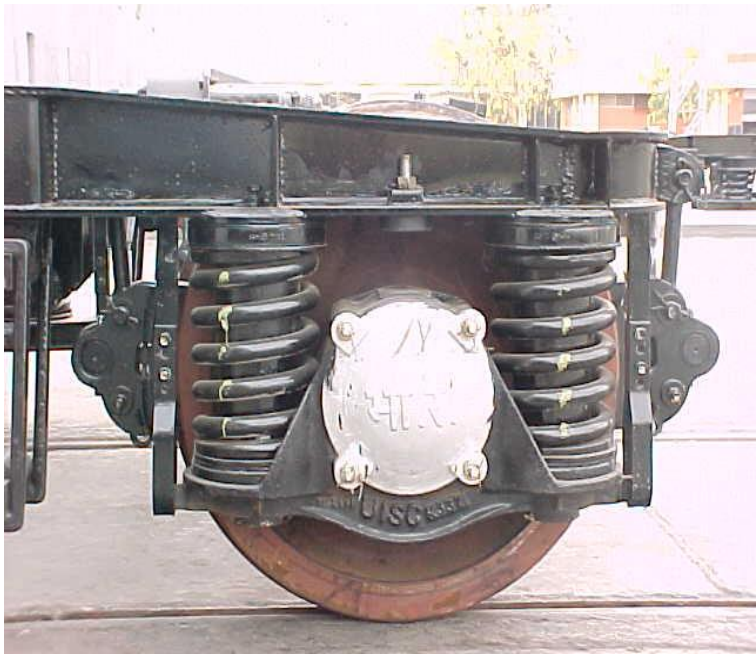


Axle Box Guide Arrangement of ICF All Coil Bogie

Dashpots and Axle Guide Assemblies



Dashpots and Axle Guide Assemblies



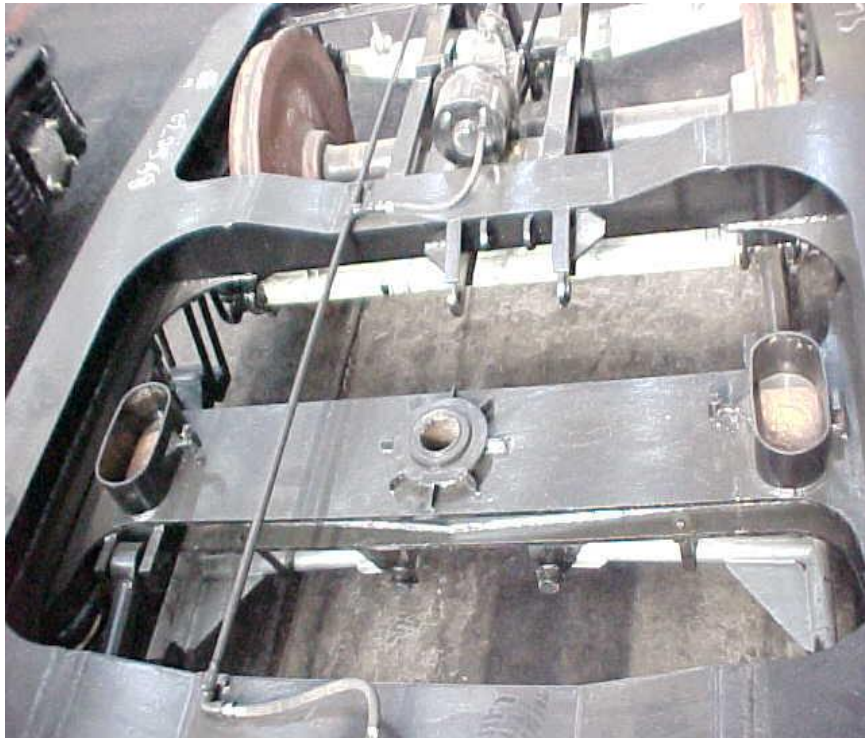
Bolster Springs



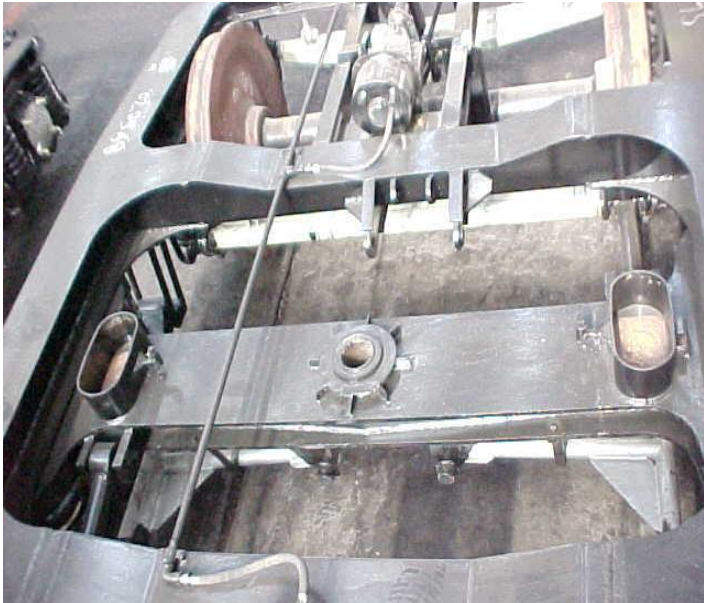
Shock absorbers



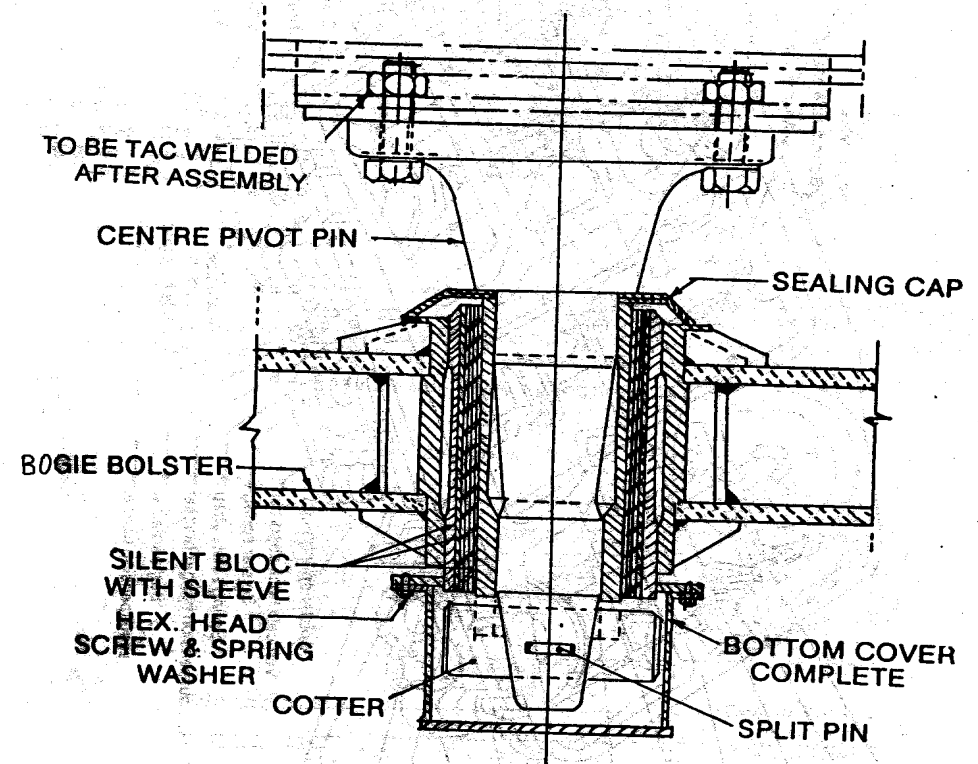
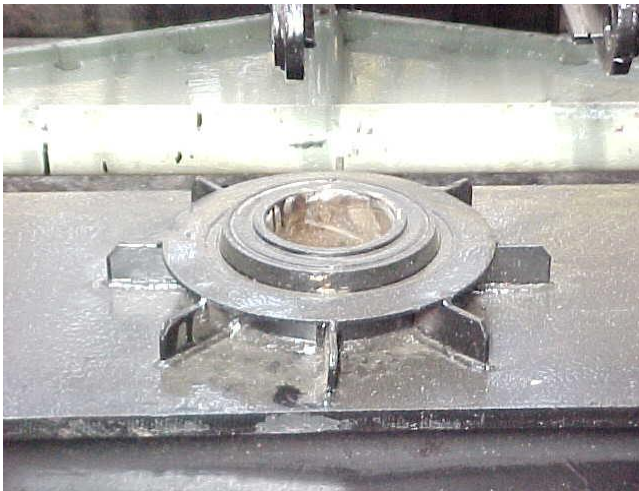
Equalising stays



Centre Pivot



Centre Pivot

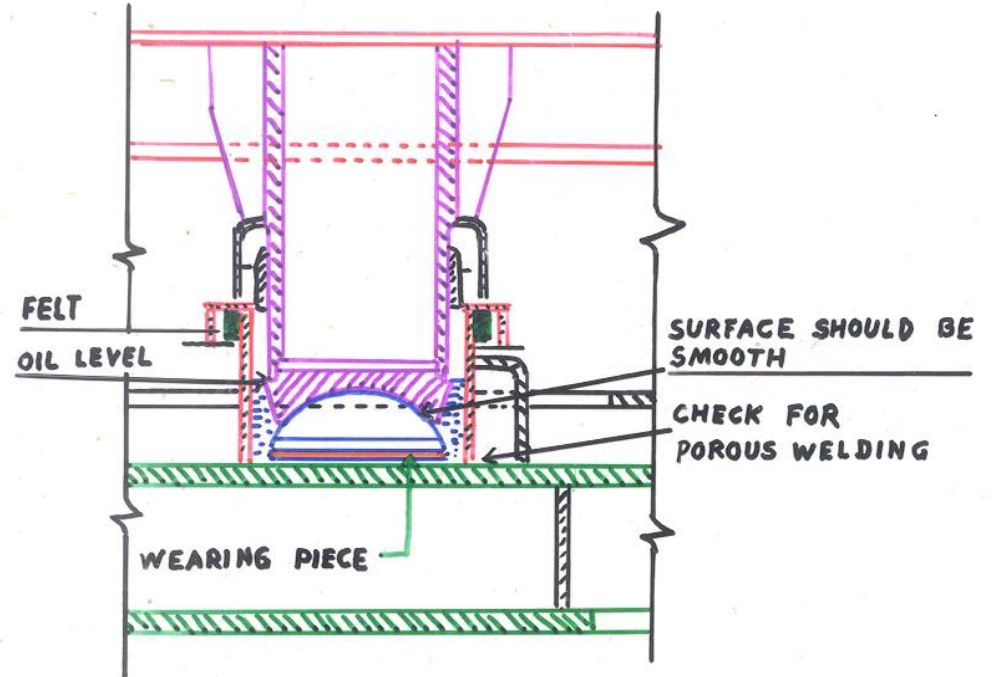


Centre Pivot Arrangement (ICF Bogie)

Side Bearers

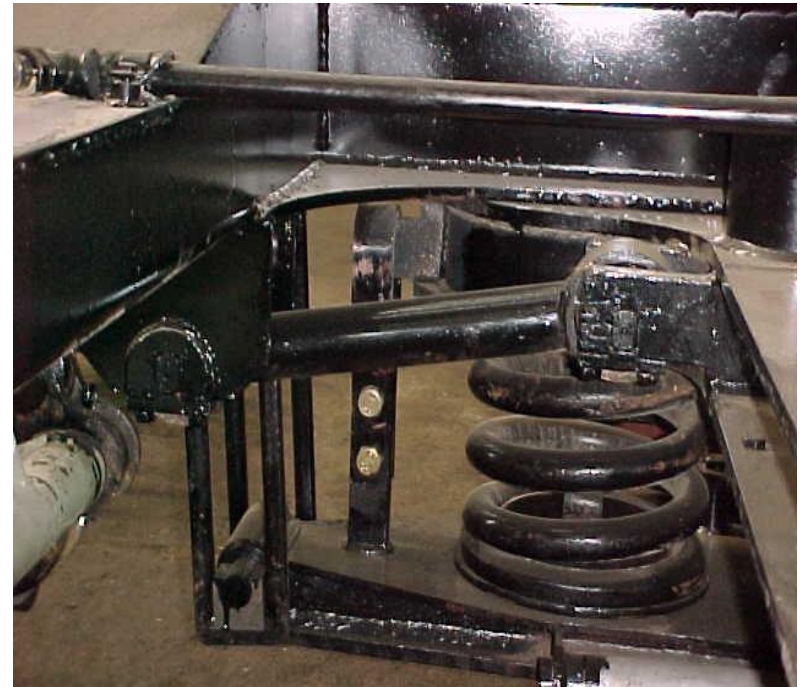
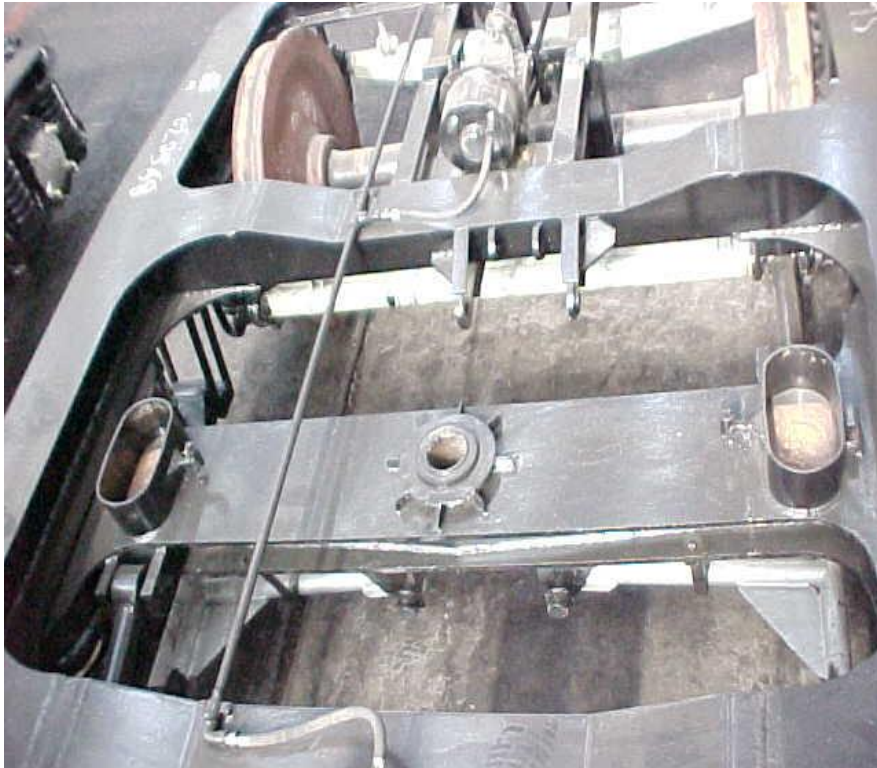


Side Bearers

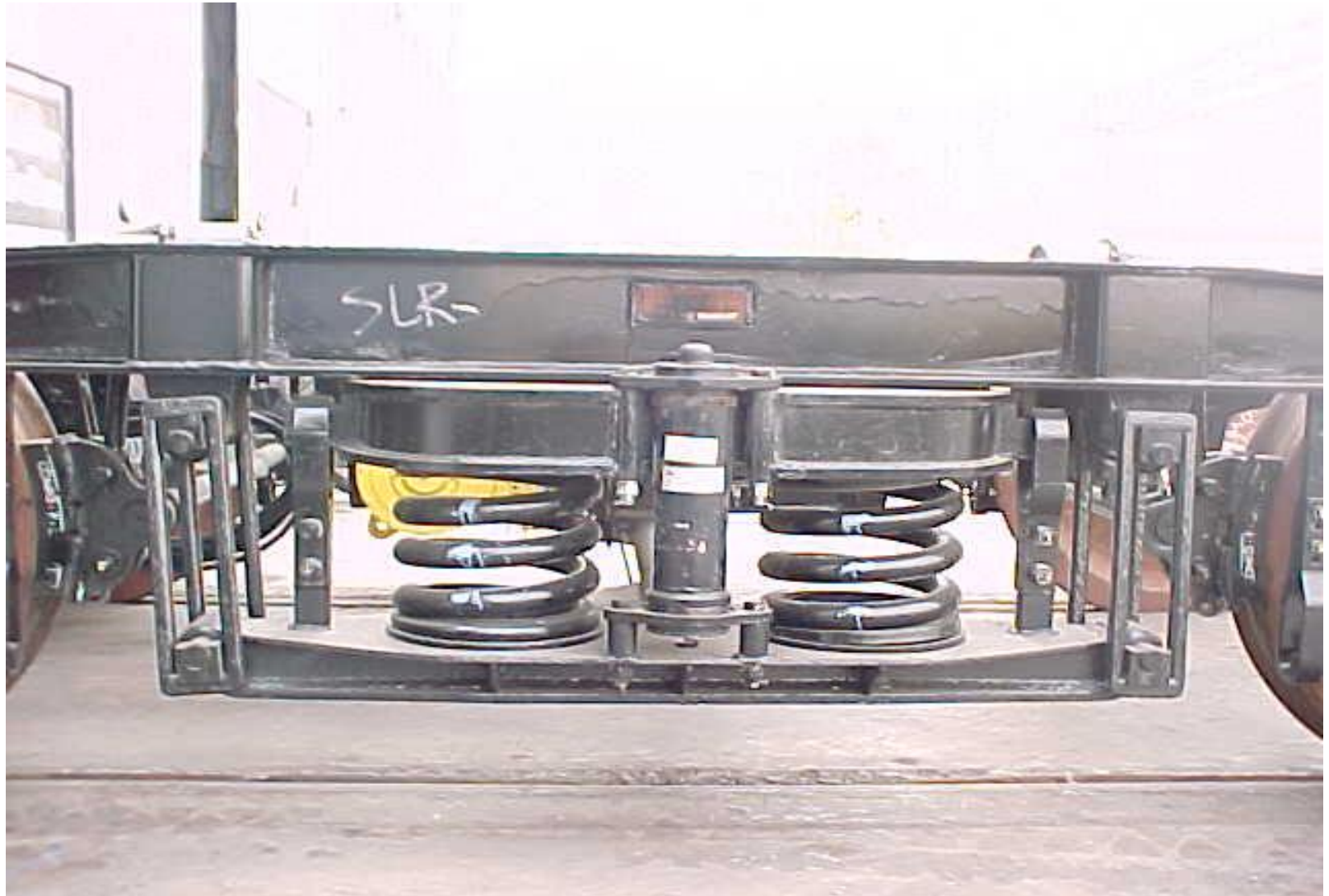


- Bronze wearing piece need renewal when height is less than 42 mm
- Hard ground plate should be renewed when the wear exceeds 1.5 mm.

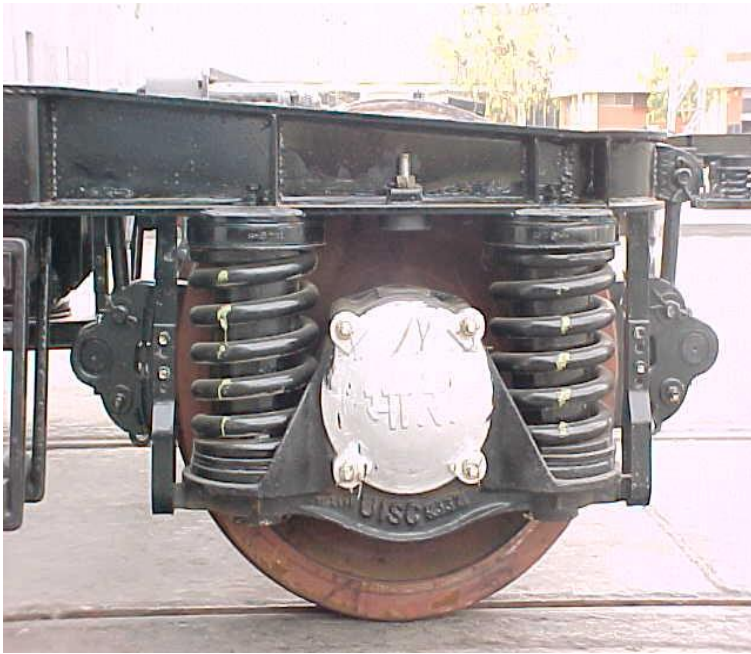
Anchor Links



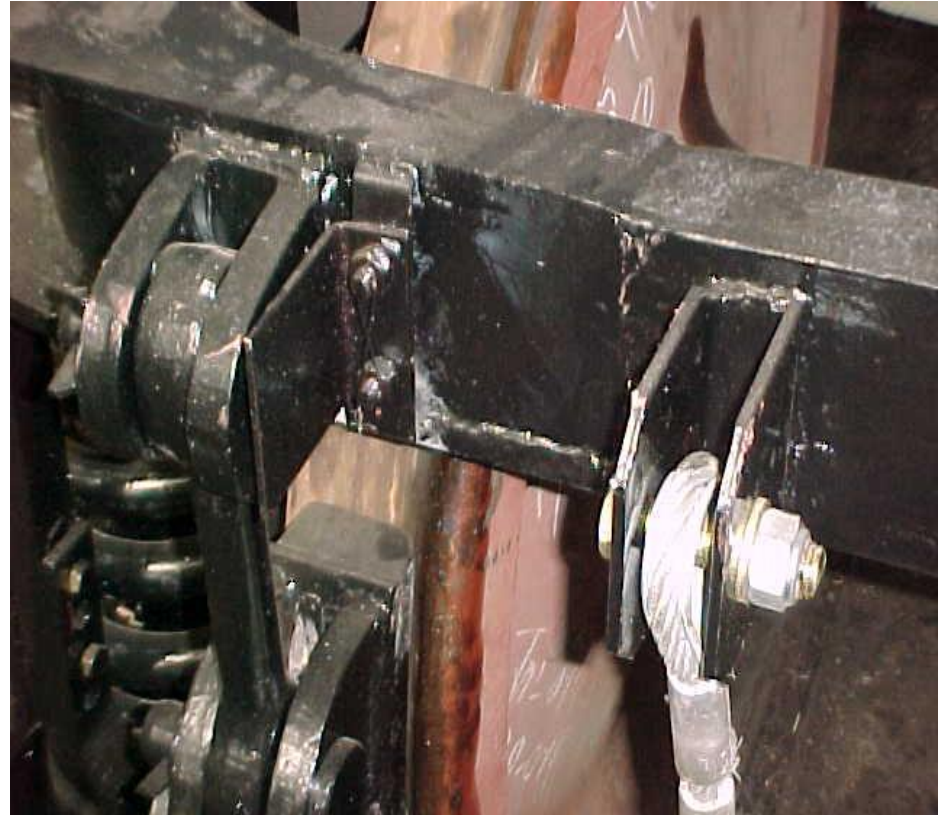
Hanger and Hanger Blocks



Axle Box safety Strap

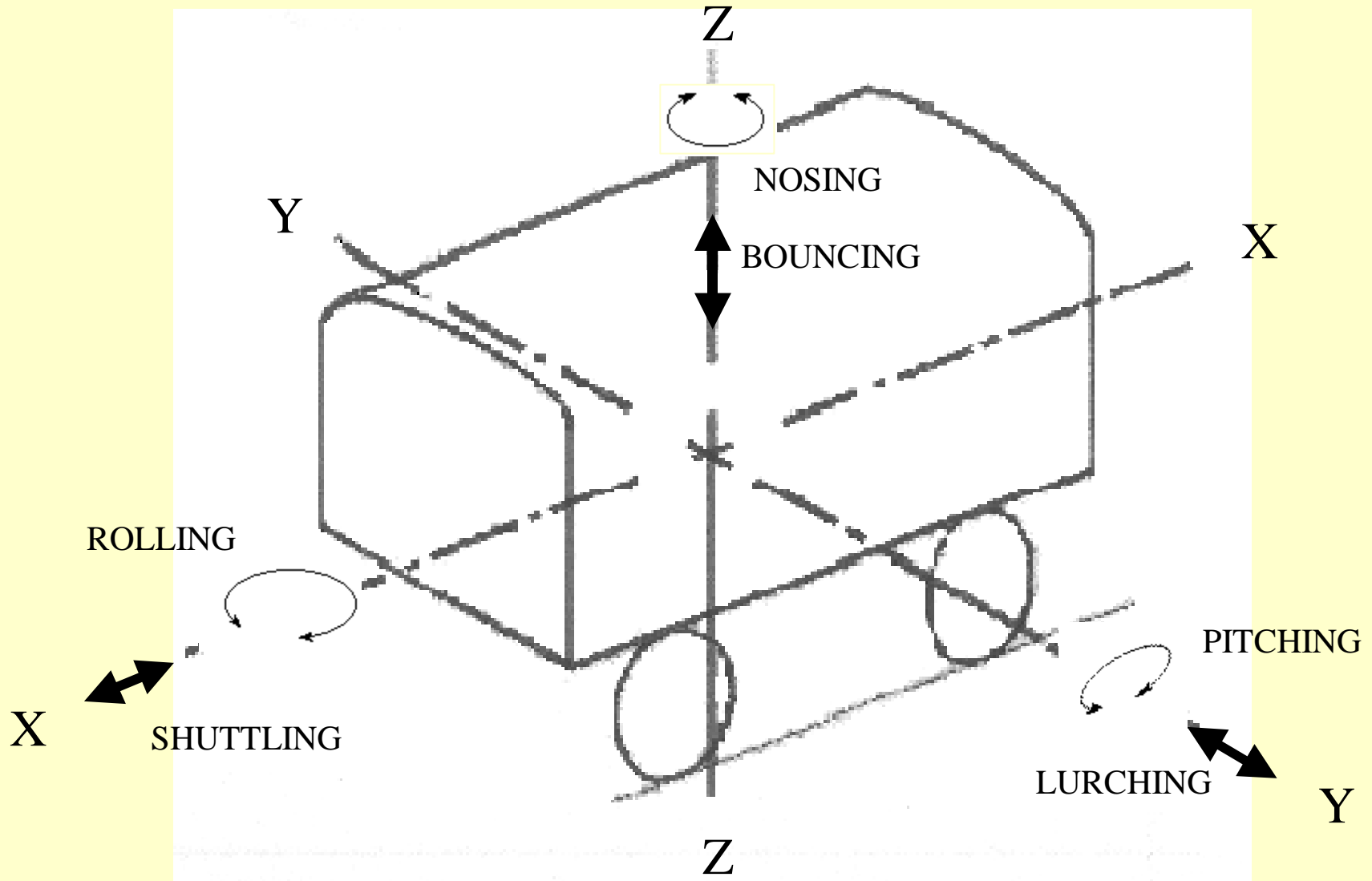


Hanger Pin Safety Stopper



Oscillation modes of vehicles

There are six modes of oscillations:



Limitations of ICF bogie Design

- **Longitudinal and transverse flexibilities of the axle guidance cannot be optimised independently as generally required for high-speed bogies.**
- **There are vertical space constraints to accommodate desirably softer secondary suspension springs and the consequent dynamic movements of the bogie bolster and coach body, as also to increase the length of the swing hangers.**

Limitations of ICF bogie Design

- **Friction damping in the transverse suspension is neither amenable to optimisation nor the same can be controlled during service.**
- **Headstocks increase the yaw inertia of the bogie frame and thereby influence the tendency for hunting.**
- **A large wheelbase, as that of ICF bogie, affects curvability and there by increases wheel flange wear.**

Failure

Any part or assembly is considered to have failed when any of three conditions takes place-

- ▶▶ When it becomes completely inoperable.**
- ▶▶ When it is still operable but no longer able to perform its intended functions satisfactorily.**
- ▶▶ When serious deterioration has been made it unreliable and unsafe for continued use.**

Fundamental source of failure

- **Deficiencies in design**
- **Deficiencies in selection of material**
- **Imperfection of material**
- **Deficiencies in processing**
- **Errors in assembly**
- **Improper service condition**
- **Improper maintenance**

Brake Shoe head

- **In order to fit the brake block snugly in the brake head to avoid any movement between them.**
- **To avoid excessive wear at the ends of the brake head.**

Brake shoe key

- **In order to fit the brake block snugly in the brake head to avoid any movement between them.**

Safety wire rope

- **The old arrangement of safety straps is reported to be falling in service due to ballast hitting.**
- **To improve the safety of brake beam falling on the track safety wire rope introduced.**

Brake block hanger

- **To avoid brake block climbing over the wheel in case of fully worn out wheels.**

Standardization of equalizing stay

- **The old equalizing stay had a pin dia of 25 mm. The longer pin is found to be bending in service resulting in removal difficulties.**
- **In the standardized equalizing stay the dia of pin has been increased to 31 mm.**

Pin for brake lever hanger

- **To avoid slipping of nylon bush in the lever hanger a washer is welded.**
- **Castle nut with split pin introduced.**

Improved brake beam

- **The old brake beam does not cater to the load requirement of air braked coaches and it also bends under extra loads.**

Single piece brake block hanger

- **Single piece design will avoid misalignment of brake block with respect to wheel tread.**

Revised side buffer casing

- **To avoid cracks developing from the bolt holes in the U/frame headstock.**
- **Horizontal pitch for bolt holes has been increased from 254 mm to 349 mm.**
- **Vertical pitch for bolt holes has been increased from 127 mm to 170 mm.**

Provision of locking arrangement for guide cap

- **To avoid falling of guide cap due to breakage of spring clip.**

Rubber stopper axle box crown bolt

- **To prevent the breakage of axle box crown hexagonal bolt assembly in service.**
- **The hexagonal head bolt is prevented from hitting directly. Instead the rubber stopper will be hitting the crown.**

Weld joint of bogie side frame with head stock

- **The side frame head stock joint below guide in the old design was undesirable as the joint leads to misalignment of guides.**
- **Shifted to headstock beyond brake hanger brackets.**

Slack adjuster articulation

- **To provide freedom of rotation in horizontal plane an additional pin joint has been provided.**
- **Freedom of rotation in vertical plane is also ensured at the floating lever end.**
- **This arrangement is expected to minimize the incidence of slack adjuster spring breakages.**