Centre Buffer Coupler

Introduction

- Coupling facilitates inter connection of rolling stock to form a train.
- Earlier design
  - Draft load through screw coupling arrangement
  - Buffing load through side buffers.

Screw Coupling.

- Limitations
  - Haulage of longer train is not possible in freight
  - Climbing of coaches in collisions and derailment.
  - Shunting Staff at Risk.
  - Higher maintenance staff requirement

Centre Buffer Coupler

- Transmits both draft & buffing load between vehicles and to/ from under-frame
- Absorb high frequency forces during impact
- Dissipates low frequency forces to protect the vehicle from damage.
- Multi functional units
  - Draft+Buffing
  - Automatic FP+BP connections

Advantages of CBC

- Safe for shunting staff & reduces time required.
  - Automatic coupling type
  - Quick detachment possible.
- Less staff for uncoupling
- Coach only - Anti-climbing feature is to prevent damage to life & property during accident.
- Prevention of un- coupling in the event of derailment / accident

Types of CBC adopted in IR

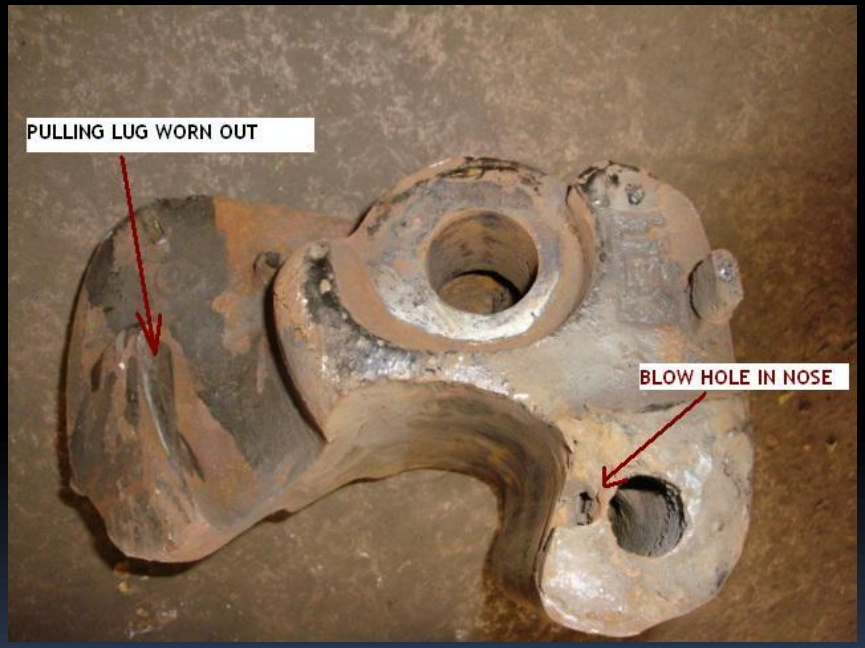
- AAR E/F type used in wagon.
- AAR(H) type Tight lock used in LHB coach.
  - Supplied by M/S Faiveley & M/S Escorts
- Dellner Coupler used in LHB coaches
- Rigid Type- Shacku coupler used in EMU.
- Slackless drawbar – BLC wagons
- Transition coupling
- Hook type – MG/ NG stock

Main Components of CBC

- Coupler body,Knuckle,Lock
- Knuckle thrower
- Lock lifter assly
- Yoke,Yoke pin,Yoke pin support
- Striker casting
- Draft Gear
- Uncoupling device
- Back stop.

Coupler for Wagon

Knuckle



Knuckle

- Fitted with coupler head.
- Used to couple two coupler heads of two coaches/wagons
- NO repair work.
- Always replace by NEW one.

Lock

- Fitted with coupler head.
- After assly of two coaches, it locks the both coupler heads

Lock Lifter Assly

- Fitted with coupler head.
- Used to lift the lock during uncoupling.
- Toggle,Lock lift lever connector,Lock lift lever hook.

Striker Casting

Knuckle Thrower

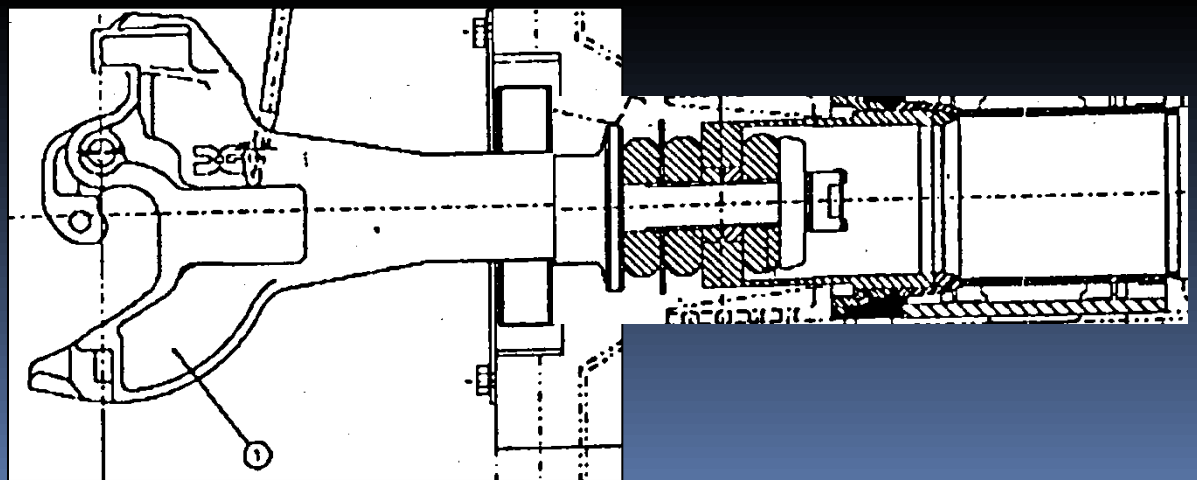
CBC used in LHB Coach

- AAR(H) type tight lock coupler
  - Couple-ability with E type coupler.
  - Anti-climbing feature in built.
- ASF-Key Stone made Draft Gear which was earlier fitted in coach is obsolete now.
- At present,supplied by M/S Faiveley & M/S Escorts
- Dellner Coupler from M/S Dellner, Sweden

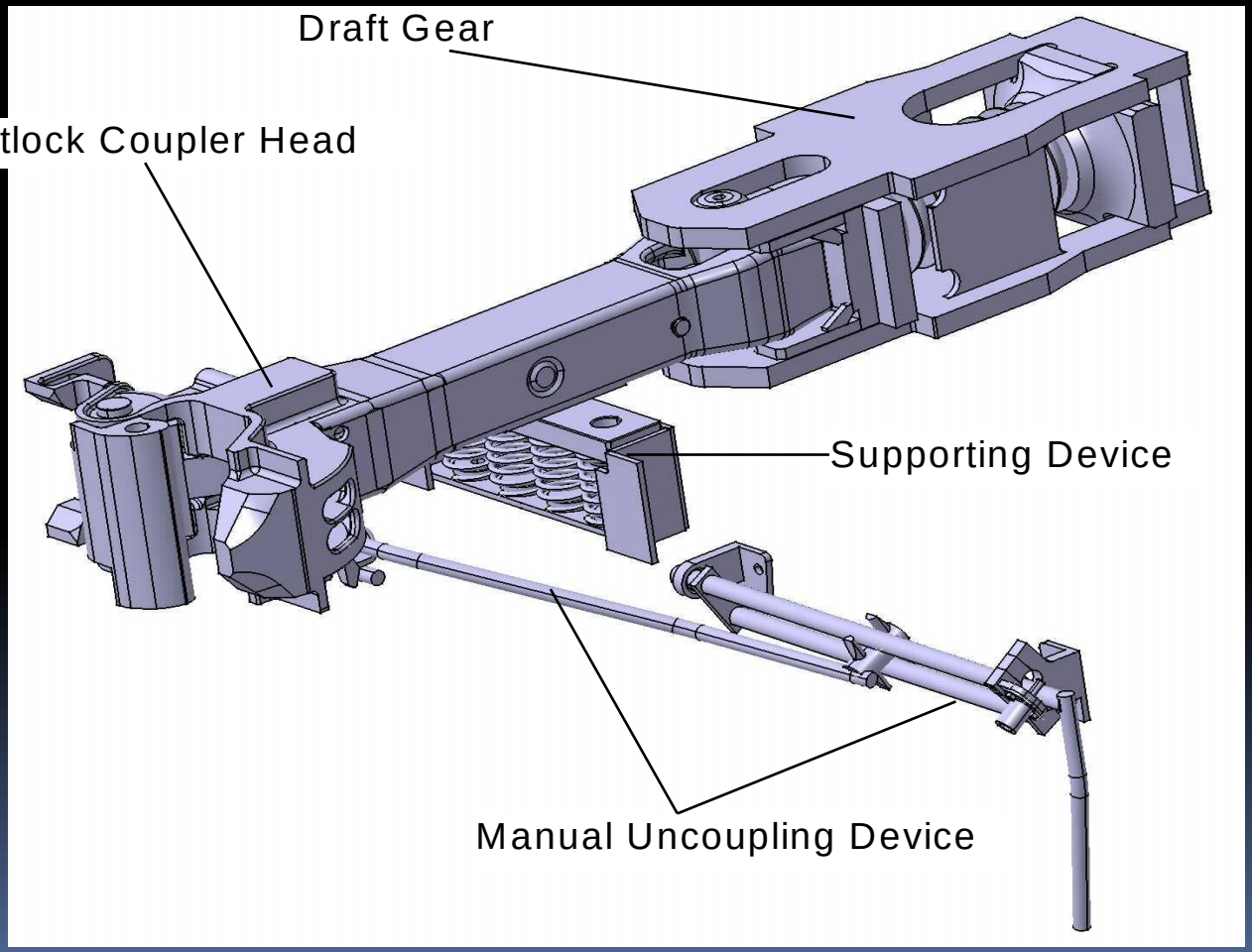
Dellner Coupler Photo

Dellner Coupler

- Single piece coupler
  - No connection between draft gear & coupler shank.
  - No any horizontal pivoting movement.
  - No slack generation due to draft gear action.
  - Tight tolerances-minimum slack 2 mm between heads.

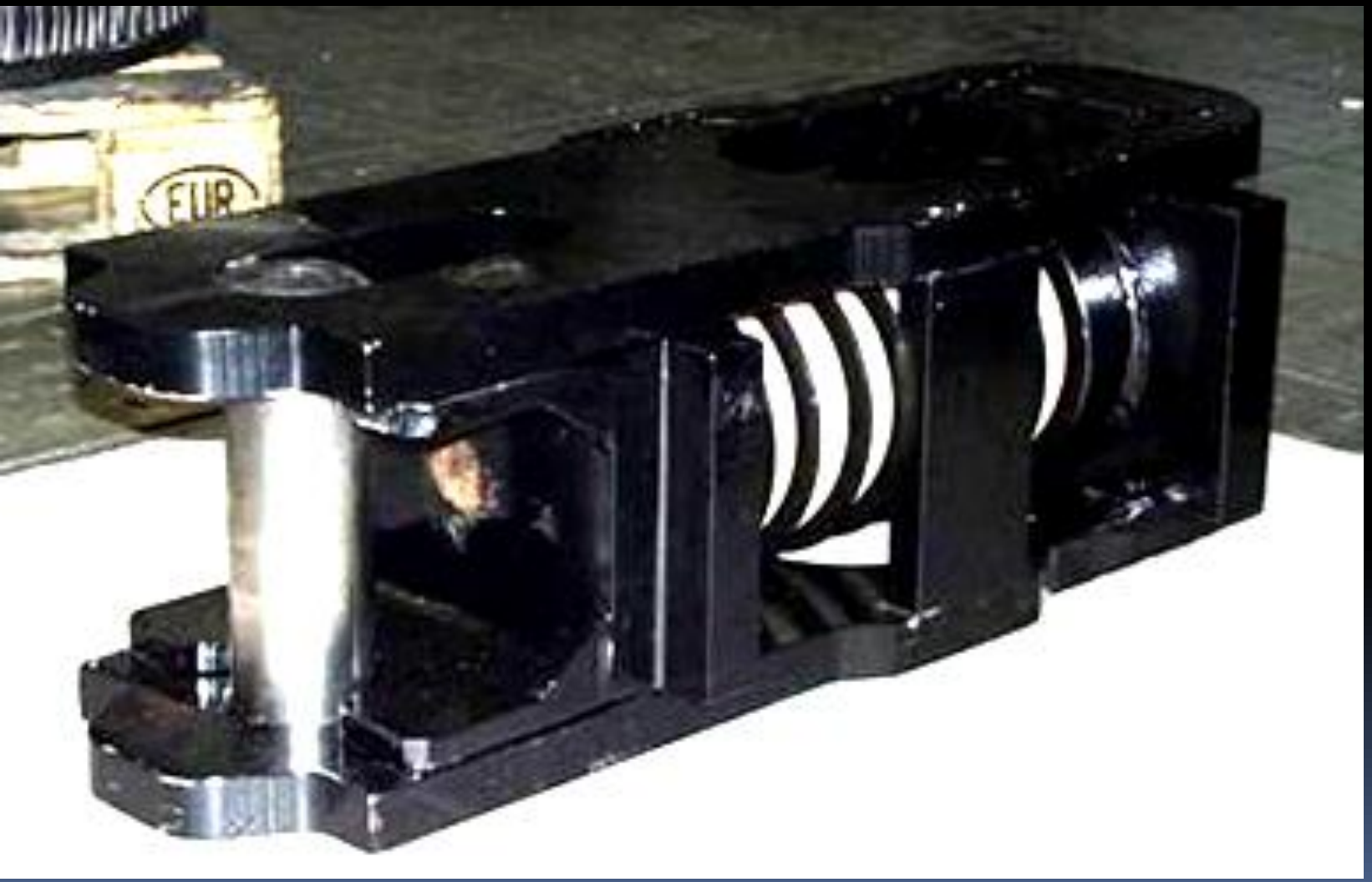


AAR(H) Type Tight Lock CBC



Aikon Draft Gear

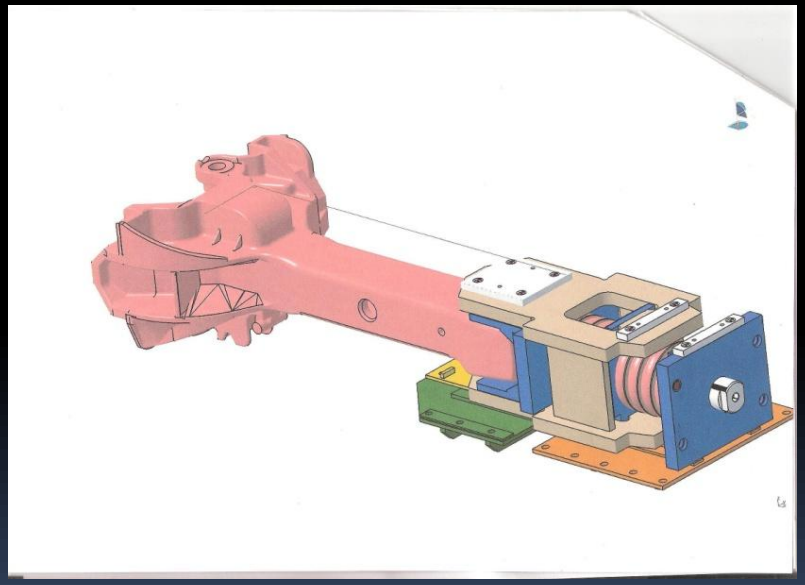
Faiveley Draft Gear



Faiveley Double acting Draft Gear

H-Type tight lock coupler head

Duoble Acting Draft Gear



Maintenance of Draft Gear

Monthly	Check for loose bolts, external damage.
Quarterly	Repeat above checks. Check draft gear seating in the pocket. Examine condition of buff plate. Apply grease if necessary.
Annually	Repeat above checks.
6 – 8 years	Repeat above checks. Check pre-load value. Replace spring column if necessary.

Problems noticed during POH & Solution

- POH of CBC/ Month in LLH-34 Nos.
- DG Rubber Pads damaged,36%
  - Replace
- Longitudinal jerk due to excess pre-load
  - Reduced pre load from 50 KN to 30 KN
- Yoke hole oblonged,18%
  - Replace
- Housing cracked,9%
  - Replace

Coupler Heads

Faivley made

Escourt made

Problems Noticed & Solution

- Coupler body cracked,9%
  - Replace.
- Knuckle worn out,65%
  - Replace
- Yoke Hole worn out,40%
  - Replace

Maintenance of Coupler Head

Monthly	Check tell tale of couplers. Visual check for external damage, condition of wear plate on shank. Replace wear plate if necessary.
Quarterly	Repeat above checks. Coat bare steel areas of coupler head body and knuckle with Molykote D321R (or equivalent) dry spray. **CAUTION: Do not spray on the knuckle locking surface and internal parts like lock etc.**
Annually	Repeat above checks. Check gap between coupler head and knuckle with Jaw gap gauge (NO-GO). If wear out is not acceptable replace knuckle etc., as advised in the maintenance manual. Check by profile gauge (GO). Conduct anti-creep check.
6 – 8 years	Repeat above checks. Overhaul coupler head. Check parts for wear out. Replace if necessary.

Supporting Device

Supporting Device

Problems Noticed & Solution

- Function: To absorb vertical vibration.
- Spring box worn out causes spring height increased,55%
  - Replace
- 100% Nut Bolts worn out causes vertical jerking,hence replaced all nuts & bolts.
- Springs damaged& free hight short,70%
  - Replace

Maintenance of Supporting Device

Monthly	Visual check for external damage. Check height 187.5 mm both sides near the bolts. Tighten the M16 nut to set specified height. Apply grease on wear plate. Check condition of wear plate. Replace wear plate if necessary.
Quarterly	Repeat above checks.
Annually	Repeat above checks.
6 – 8 years	Repeat above checks. Check compression spring for loss of pre-load. Replace if necessary.

Operating Handle

Problems Noticed & Solution

- Operated from both sides in coach & wagon.
- Bolts worn out/corroded,100%
  - Replace
- Bracket corroded,100%
  - If excess, then replace
- Bolts to be tightened with specific torque value.
- Check groove in bore of the bracket

Maintenance of Operating Handle

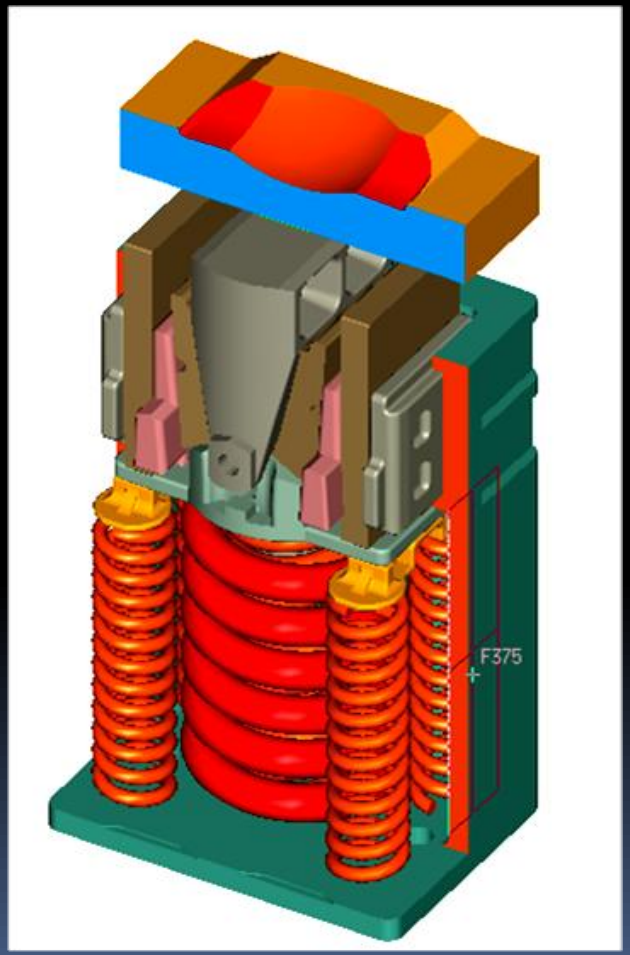
Monthly	Visual check for external damage, loose bolts etc. Apply grease on the slide and slide rods.
Quarterly	Repeat above checks.
Annually	Repeat above checks. Check wear on slide, slide rods and bearings. Replace if wear is excessive.
6 – 8 years	Repeat above checks.

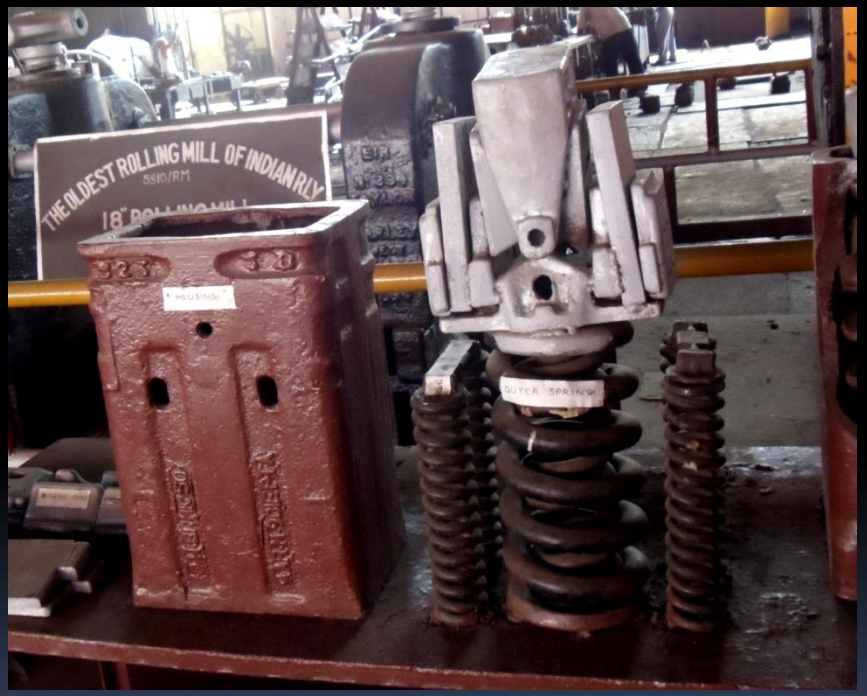
CBC used in Freight Stock

- AAR E/F Type coupler is used in wagons.
- HT Draft Gears are used-MK-50 & RF-361
- Supplied by M/S Jupiter & Alloy Steel India Ltd(JASIL)
- M/S Tex Meco
- M/S FAS
- Draft Gear to be fitted with yoke

High Capacity Draft Gears

MK-50 Draft Gear





MK-50 & RF-361 Draft Gear

RF-361

MK-50

Design Features of Draft Gears

Particulars	MK-50	RF-361
Weight	170 Kg	138 Kg
Capacity	5385 Kgm	5725 Kgm
Travel	81.5 mm	67.8 mm
Reaction force	269 T	232 T
Performance efficiency	23.7 %	36.6 %
Energy absorption	86 %	79.6 %

Draft Gears of BoxN HL

Couplers of BoxN HL

Location of Crack in Coupler

MK-50 Draft Gear Failure & Solution

- Housing cracked,9%
  - Replace
- Spring damage/ broken/bent,100%
  - Replace
- Yoke hole worn out,55%
  - Replace
- Yoke body cracked,15%
  - Replace

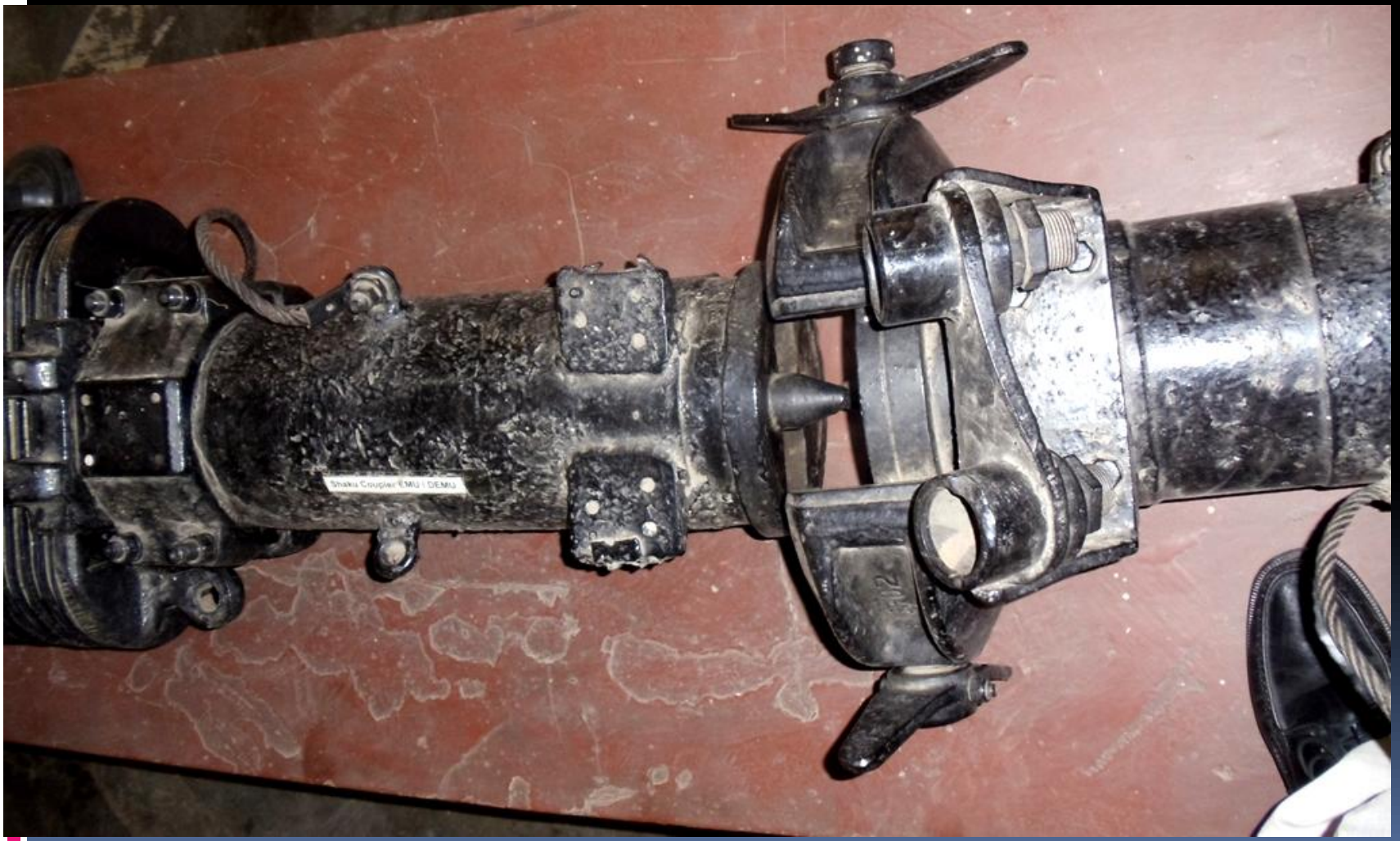
RF-361 Draft Gear Failure & Solution

- Housing cracked,10%
  - Replace
- Rubber pad damage,65%
  - Replace
- Rubber pad thickness less than 54 mm,20%
  - Replace
- 30° shoe broken/ worn out,15%
  - Replace

CBC used in EMU

- Shacku wedge lock coupler is used in EMU
- Rubber pad damaged,65%
  - Replace
- Yoke hole bush worn out/elongated,100%
  - Replace
- Coupler body damaged,36%
  - Replace
- Housing cracked,15%
  - Replace

Shacku Coupler

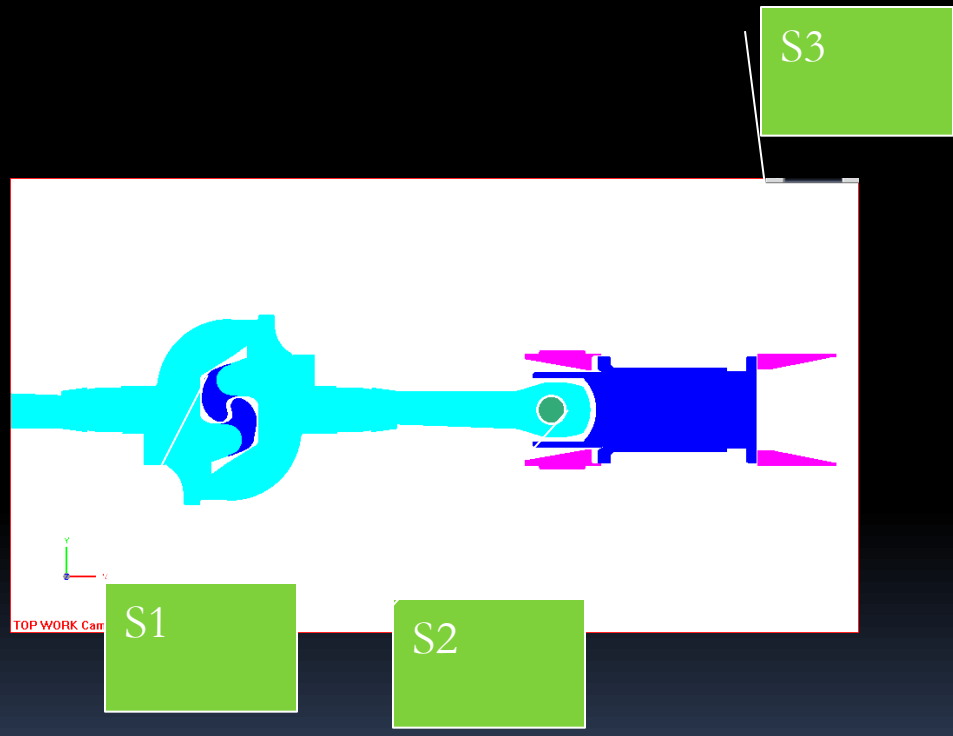


Reasons for the Jerks

- Slack between coupler heads
- Slack in the coupler & draft gear connection due to wear
- Successive movement will produce jerk
- High response time of the draft gear
- Loss of preload due to wear of friction springs

Total Possible Slack

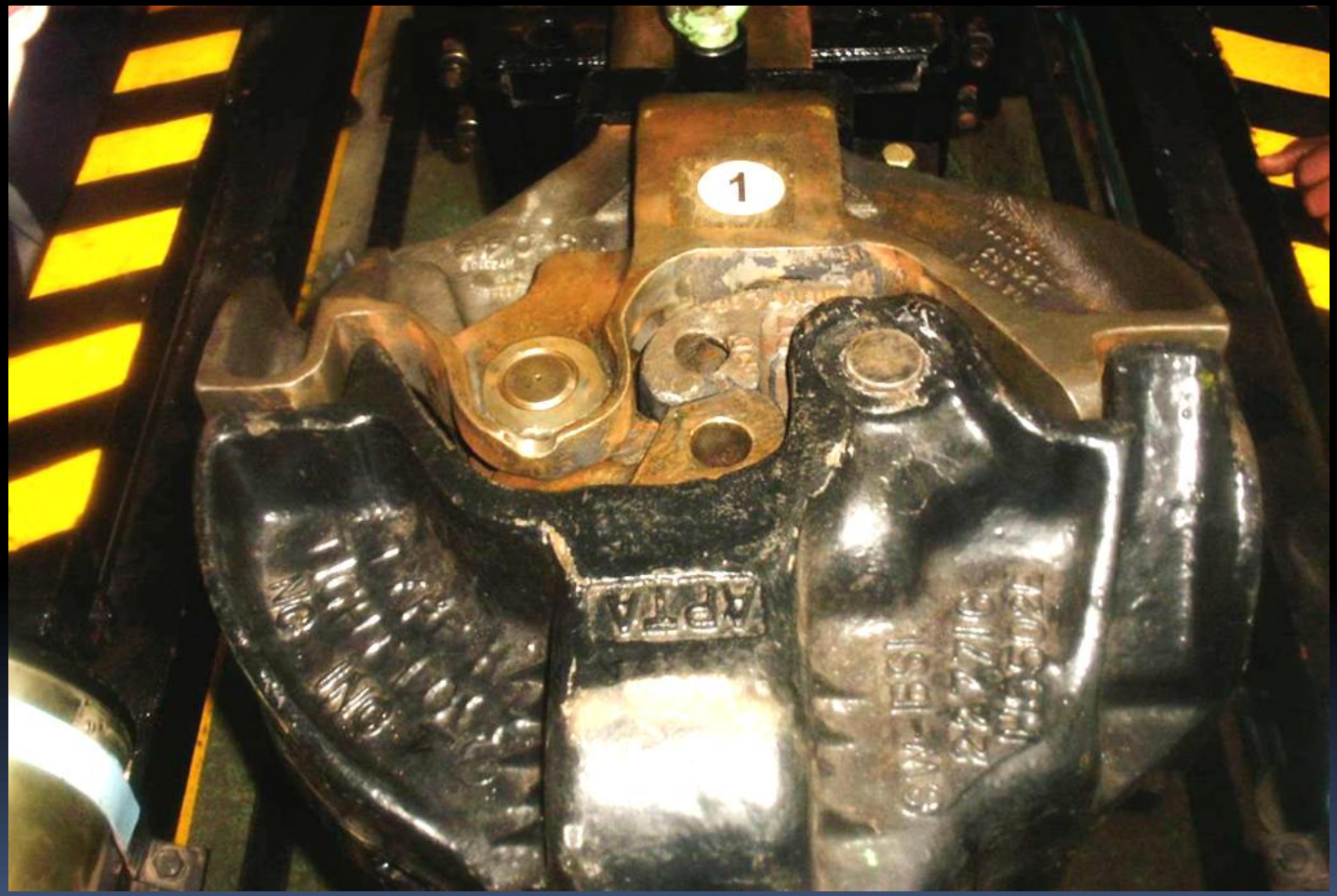
- S1-Between coupler knuckles
- S2-In the coupler and draft gear connection
- S3-Due to draft gear action



Measures Adopted

- AAR(H) type tight lock coupler is used in LHB to minimise slack
- Reduced Pre-Load up to 30 KN.
- Use Dellner Coupler
- Check yoke hole, if oblong found replace it
- Check rubber pad of draft gear
- During POH, preload setting to be done

AAR(H) type coupler in coupled condition



Factors affecting the performance of CBC

- **Stroke: longer stroke will generate lower pressure .**
- **Low end-pressure results in low vaule of deceleration during impact.**
- **Initial pre compression**
  - **A smooth operation is achieved by giving an initial compression which minimise low intensity buffing & draft load**

Continued

- **Amount of recoil: The value of recoil should be as low as possible in order to avoid high reaction force**
- **. The % of recoil varies widely with different materials.**
  - **Very high in helical spring**
  - **Very low with friction & hyd gears**

Restrictor

- To prevent un coupling of loco & power car

THANK YOU