Introduction to Infrastructural Engineering

Introduction to Railway Engineering2

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Wear on rails

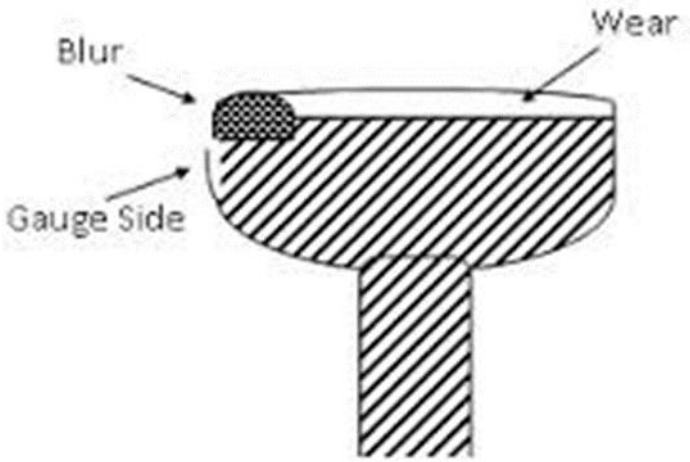
- The moving of number of wheels of train on rail cause wear on rails
- Depending on location wear of rail can be:
  - **Wear of rails on top or head of rail**
  - **Wear of rails at ends of rail**
  - **Wear of rail on the sides of head of rail**

Wear of rails on top or head of rail

- The metal from top of rail flows and forms projections
- These are known as “BURRS”
- Causes:
  - The rails are worn out on top due to abrasion of rolling wheels over them
  - The heavy wheel loads are concentrated on very small areas – results into flow of metal from top
  - Impact of heavy wheel load
  - Grinding action of sand particles between rails and wheels

Wear of rails on top or head of rail

- Causes:
  - The corrosion of metal of rails especially near sea
  - The metal on top of rail burns during starting when the wheels slip or when brakes are applied to the moving trains



Wear of Rail at Top

Wear of rails at end of rails

- Takes place at end of rail
- Much greater than wear at top of rails
- At expansion gap the wheels of the vehicle have to take a jump and during this jump, they impart a blow to the end of rail – causes wear of rail at end
- Wear due to high static pressure combined with impact blows
- End of rail gets battered – causes rough riding in the track, loosens the ballast under joints and disturbs sleeper

Wear of rails on the sides of rail head

- Most destructive type wear
- Occurs when tracks are laid on curves
- Causes:
  - Due to curvature, the pressure due to centrifugal force causes grinding action of wheel flanges on inner side of the head of outer rail
  - The vehicle don't bend to the shape of the curvature while moving over the curve – results into the biting of inner side of head of outer rail by wheel flanges

Allowable limits of wear

- In India, prescribed limit for wear is 5 % of rail weight.
- Allowable wear of 25 % of the section of head is also exceptionally adopted

Methods adopted to reduce wear of rails

- Use of special alloy steel
- Good maintenance of track
- Reduction of expansion gap
- Exchange of inner and outer rails on curves
- Introducing check rails
- Use of lubricating oil
- Head hardened rails

Use of special alloy steel

- At places where wear of rail is considerable special alloy steel rails are used
- Cost is more
- Increases life 2 – 3 times life of ordinary rail
- Recommended for switches & crossings, tracks with steeper gradients etc.

Exchange of inner and outer rails on curves

- On curves sometimes inner and outer rails are interchanged
- Possible where there is heavy wear at top of head of inner rail and heavy wear of the side of head of outer rail
- Thus top wear is exchanged with side wear