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Types of Rails

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Definition of Rails

A rail is a steel bar extending horizontally between supports which is used as a track for rail road, cars or other vehicles.

RAILS



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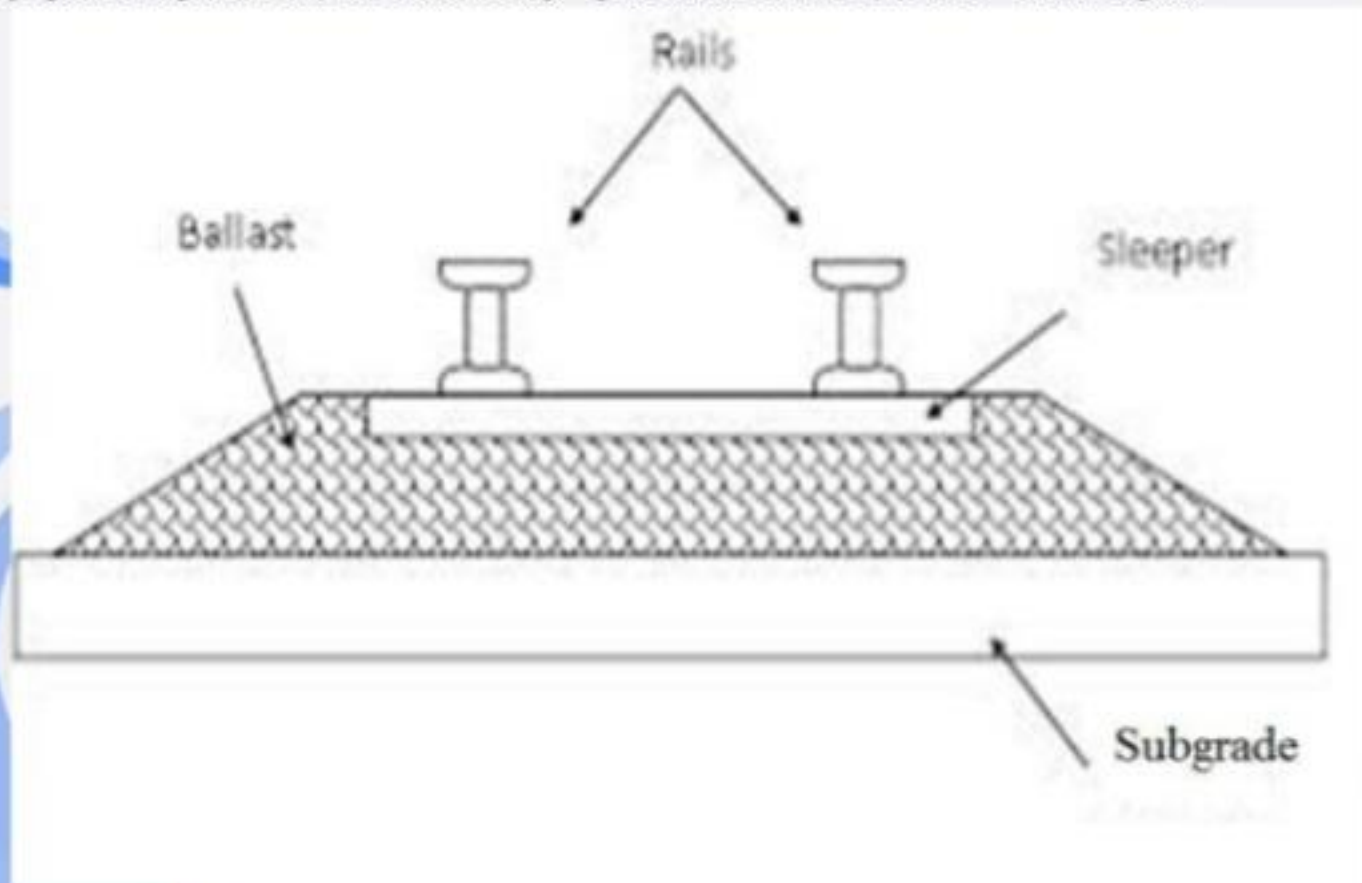


RAILS

- Can be considered as steel girders for the purpose of carrying loads
- Made up of high carbon steel to withstand wear and tear
- Flat footed rails are mostly used in railway track

RAILWAY TRACK

- COMPONENT PARTS OF A RAILWAY TRACK



TYPES OF RAIL SECTIONS

- **Double headed rails**
- **Bull headed rails**
- **Flat footed rails**



Double Headed
Rail



Bull Headed
Rail

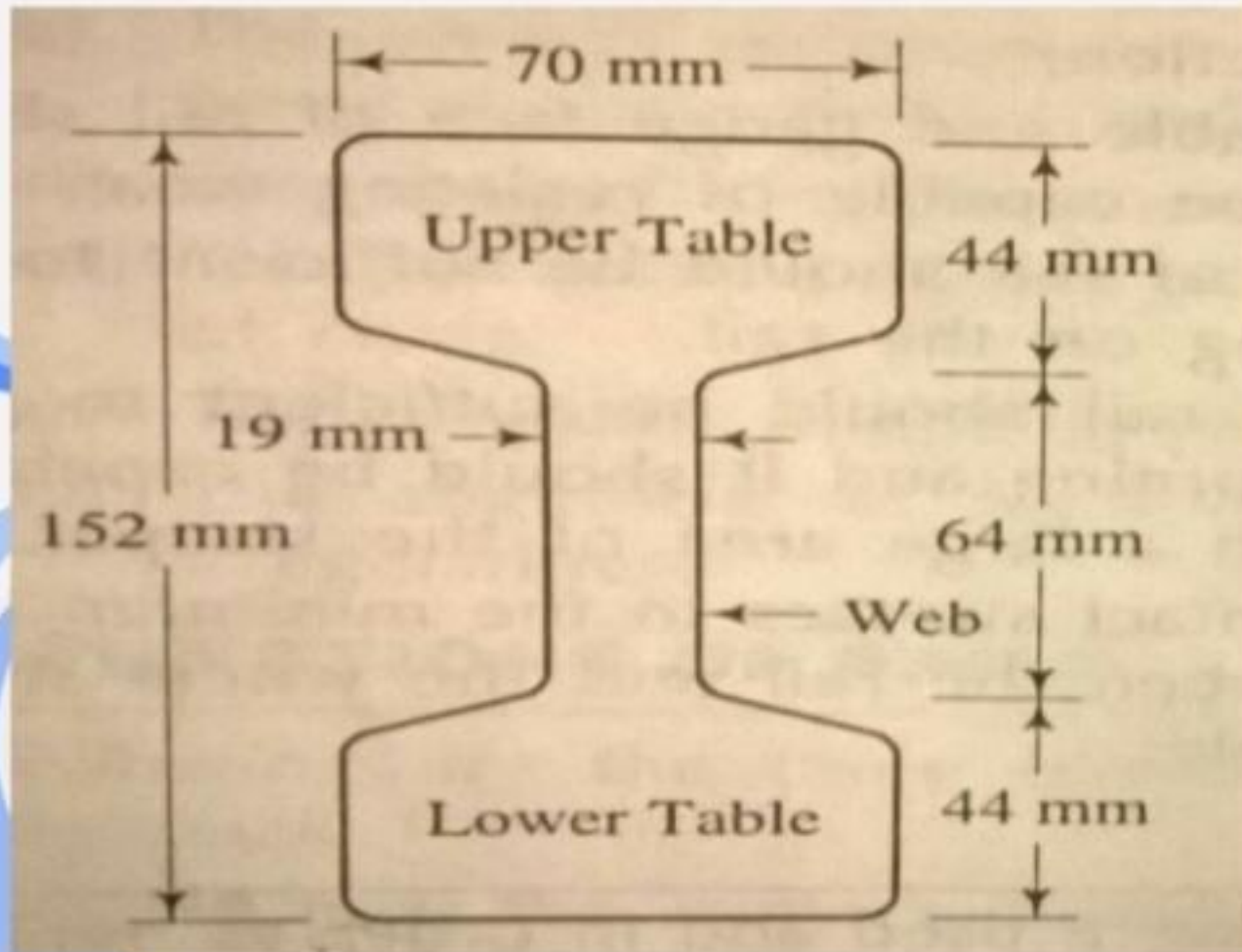


Flat Footed
Rail

DOUBLE HEADED RAILS

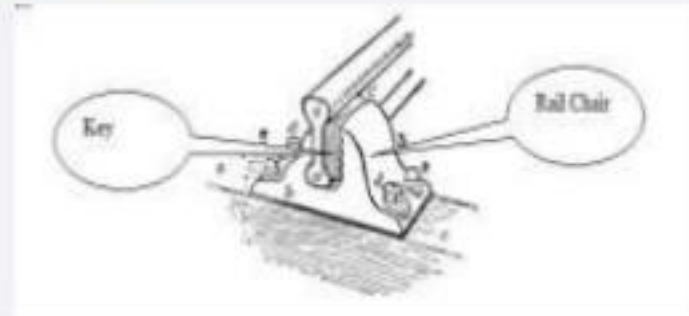
- First stage of development of rails
- 3 parts:
 - Upper table
 - Web
 - Lower table
- Similar to dumb bell section
- Both upper and lower tables are identical
- When upper table was worn out, the rail can be reversed thus lower table can be brought into use
- Practically out of use
- Made of wrought iron
- Length varying from 610 cm to 732 cm

DOUBLE HEADED RAIL

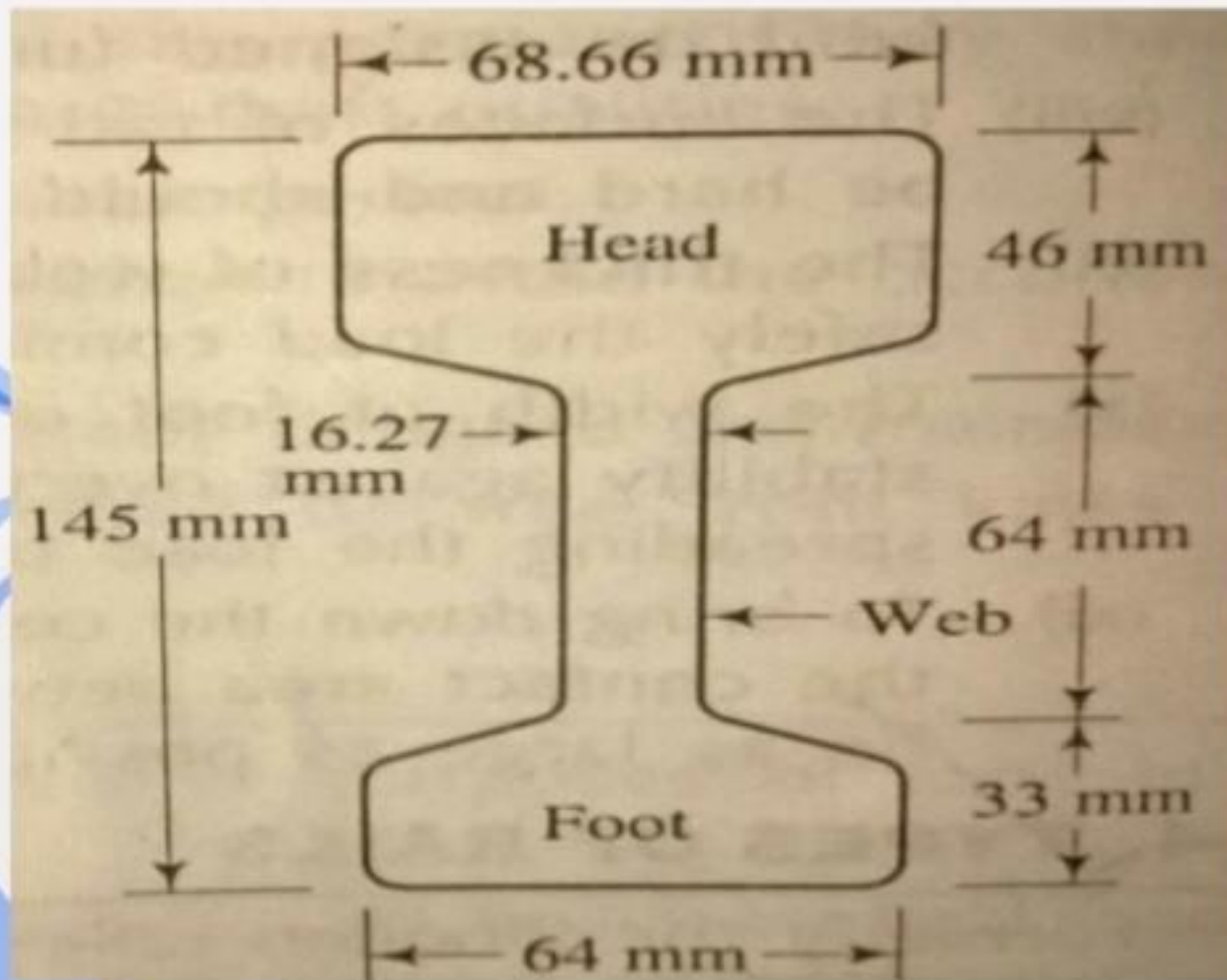


BULL HEADED RAIL

- Made up of steel
- Head is larger than foot
- Foot is designed only to hold the wooden keys with which rails are secured to chairs
- Extensively used in England
- Weight of standard rail or British rail is 47 kg/m of length for main lines and 42 kg/m length on branch lines
- Length of rail usually 18.29 m



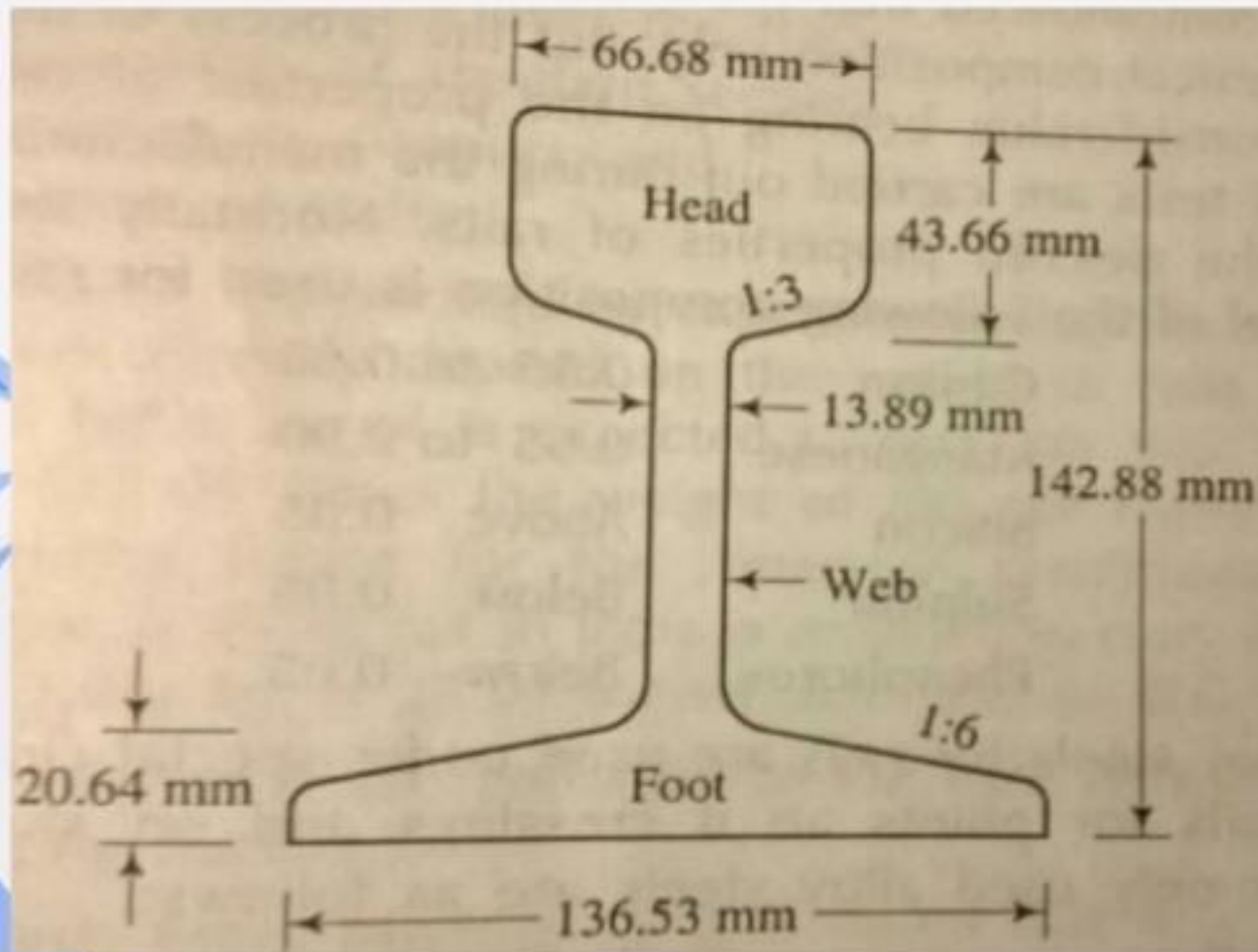
BULL HEADED RAIL



FLAT FOOTED RAIL

- Foot is spread out to form a base
- Invented by Charles Vignoles in 1836 and hence also known as “Vignoles Rails”
- 90 % of railway track is made up of flat footed rails

FLAT FOOTED RAIL



Advantages of flat footed rails

- Chairs
 - No chairs are required
 - Foot of rail directly spiked to sleepers
- Stiffness
 - Vertically and laterally stiffer than BHR of equal weight especially on curves
- Kinks
 - Less liable to develop kinks and maintains regular top surface than BHR
- Cost
 - Cheaper than BHR
- Load distribution
 - Distributes loads over large area
 - Results great track stability, longer life of rails and sleepers, reduced maintenance cost, less rail failures and few interruptions to traffic

WEAR ON RAILS

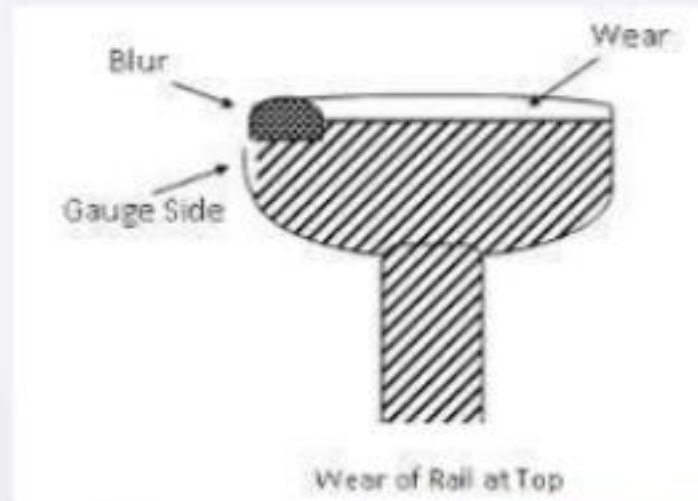
- The moving of number of wheels of train on rail cause wear on rails
- Depending on location wear of rail can be:
 - **Wear of rails on top or head of rail**
 - **Wear of rails at ends of rail**
 - **Wear of rail on the sides of head of rail**

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

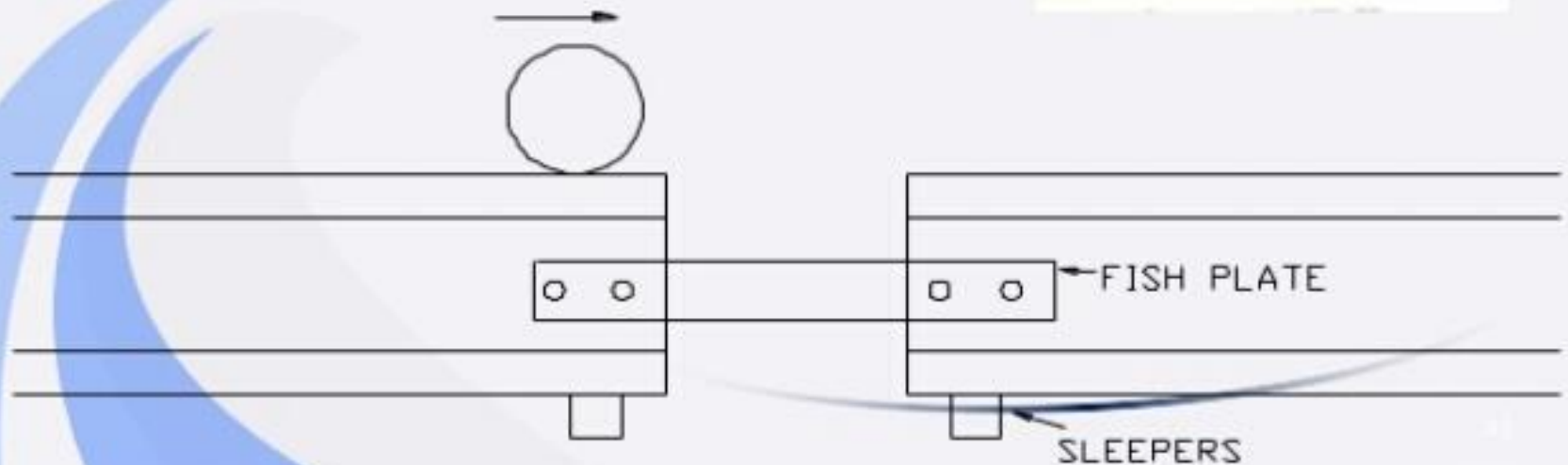
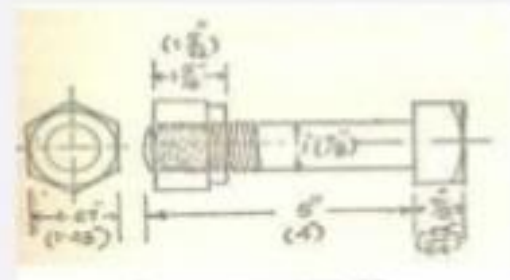


Wear of rails at end of rails

- 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 at end of rails

- Causes:
 - Loose fish plates & fish bolts
 - Heavy loads & large joint openings
 - Difference in rail levels at joints
 - Small wheels
 - Bad condition of vehicle springs
 - Poor maintenance of track

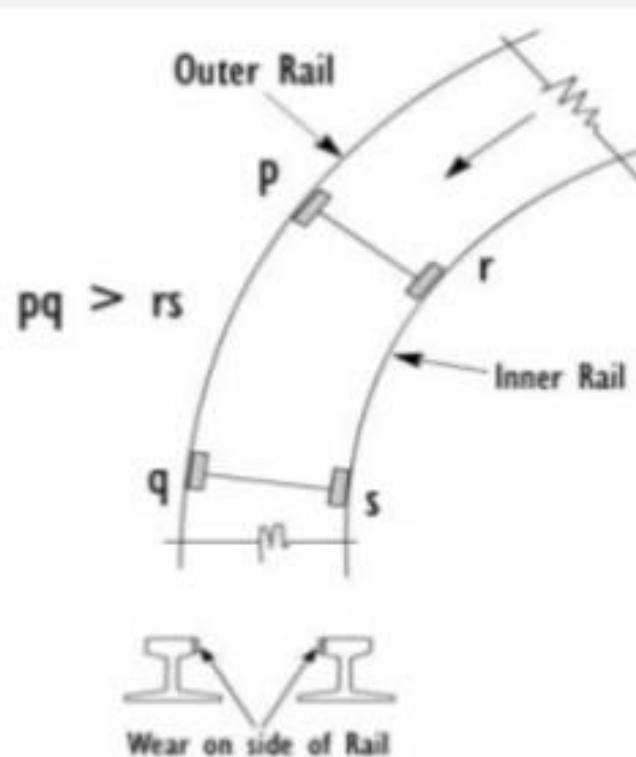


Wear of rails on the sides of rail head

- 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

Wear of rails on the sides of rail head

- Causes:
 - The wear on inner side of head of inner rail is due to slipping action of wheel on curves



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

Conclusion

Rails has many security features enabled by default

- SQL quoting
- HTML sanitization
- CSRF protection

The setup can be tricky to get right

Rails is by no means a “web app security silver bullet” but adding security is easy and not a pain like in many other frameworks

THANK YOU