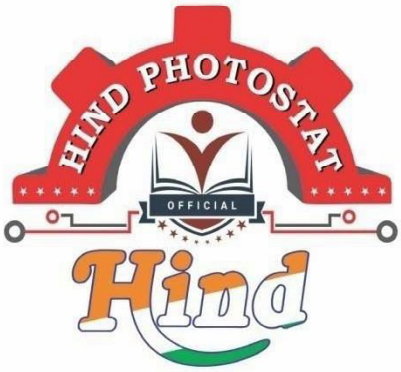

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Railway Engineering
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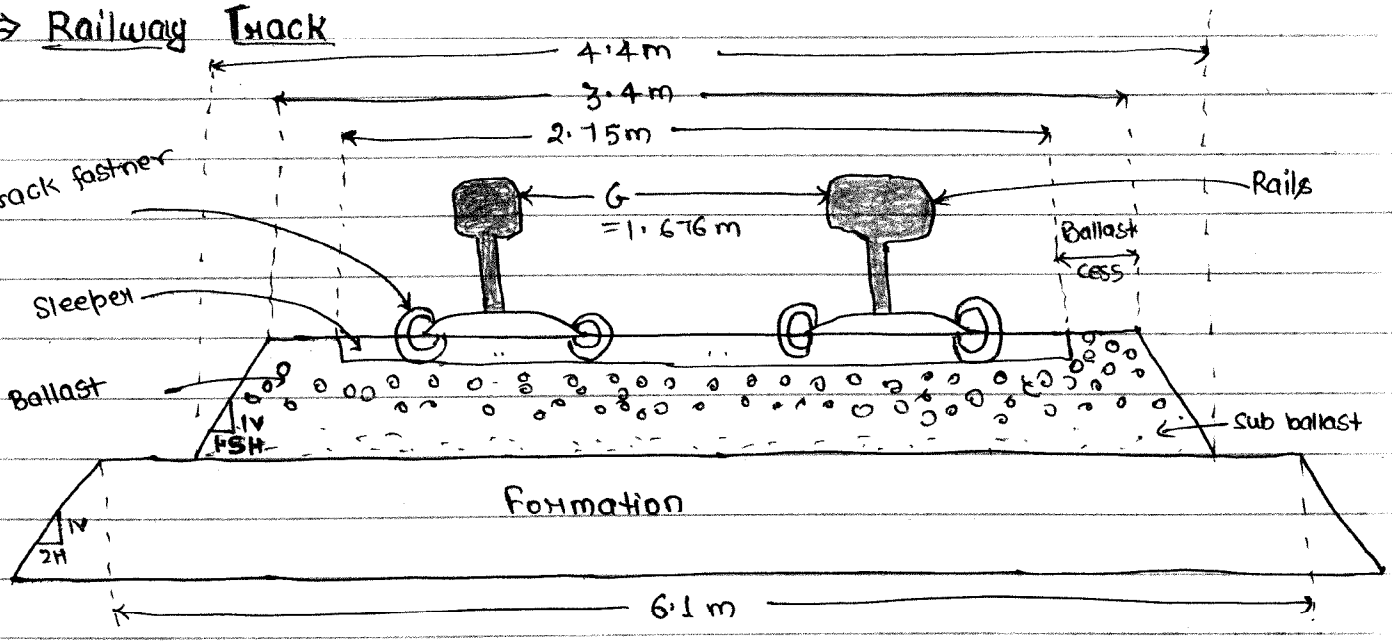
Railway Engineering

Railways are considered to be huge and reliable transportation system all over the world.

⇒ Railway Track



* Rails are provided to allow the movement of train.
* Rails are attached with sleeper by using Track fasters.
* Sleepers are provided to hold the rails in position and to convert the point load into line load which is coming from rails.
* Ballast are provided to hold the sleeper in position and to distribute the load to a larger area.
* Sub ballast is provided of fine grained soil special murrum soil which does not allow percolation of water into subgrade.
* formation or subgrade is fundation for railway track madeup of compacted soil at OMC. (Optimum moisture con.)

* Ballast cess or Ballast soldier is provided to improve lateral stability.

⇒ Survey before Laying Railway Tracks :

1) Traffic Survey

Expected volume count, type of trains, gauge distance, revenue generated from population and industry nearby, route desired.

2) Recc Survey

It is related to rough survey of topography, nearby waterbody, nearby road collectivity, expected stations and their rough location, type of soil, water table depth and material availability near by & map study.

3) Prilimineny Survey

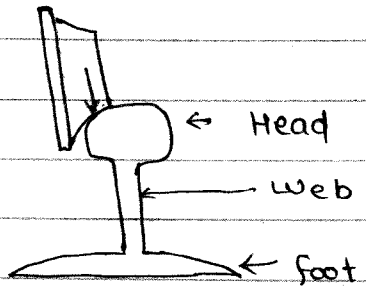
Instrumental analysis of rec survey and expected estimate. ~~of final~~

4) Final location Survey :

Final work details, centreline establishment for straight and curved track, final estimate & DPR.

Chapter 1 : RAILS

* The rails are most strongest portion of the track because it allows the movement of train
* Rails are supposed to be well, leveled, continuous girder.
* As the rails allows, moving load that why they are considere to be gurder.
* The surface of rail head should be smooth (very less friction)
* The rails had made smooth because rails made up of C, Mn, Si, P, S respecively in % order.
* As the contact area blw the rail head and web of wheel is very less so it also reduces the friction.



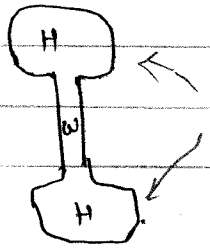
* As contact area blw railhead and web of wheel is very less so rail convert moving load into point load.

⇒ Type of Rails :

(1) Double Headed Rail

foot and head have same thickness.

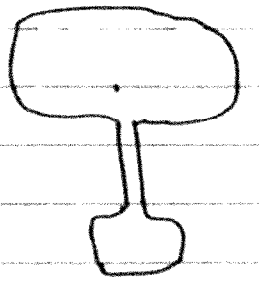
Suppose to be use from both of the side but could not happen because the bottom of foot weared completely after continuous use. (indentation mark)



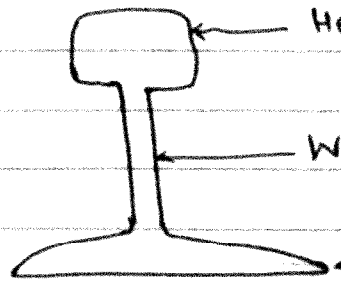
2) Bull Headed Rail

- Head of the rail bigger than foot of the Rail.
- It can not resist the overturning of the rail.

3) .



3) Flat footed Rail:

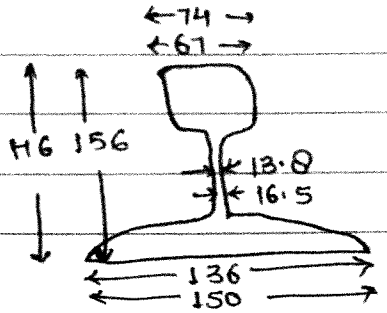


There are two Section of flat footed Rail Available.

i.e. (i) 52 kg/m &

(ii) 60 kg/m

* Whatever the rail section is manufactured the distribution of material should be equally distributed so that the C.G. of rail section lies in approximately in centre.



- For 52 kg/m
- For 60 kg/m

(All dimensions are in mm)

	Speed	UTS (Ultimate tensile strength)	GMT (Gross million tonn per year per km)	CIS Area
52 kg/m	130 kmph	710 MPa	20-25	6615 mm^2
60 kg/m	160 kmph	880 MPa	735	7686 mm^2

NOTE: Identification of Rail

IRS - 52 - 710 - SAIL - XI - 17 - OB

- 710 → UTS
- SAIL → manufacturer
- XI - 17 → Date of manufa.
- OB → method of manufacturing.

Method of Manufacturing:

(i) Basic Bessemer

(ii) Open breathe

(iii) Duplex process

→ Tup test and falling weight test is performed on rail before use.

→ Rail tounge :- Used to hold Rail.

→ Jim Crow - Used to bend Rail.

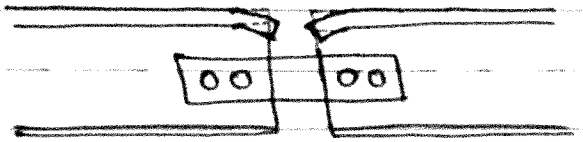
→ Visex Miex - Used to check level surface.

⇒ Defects in Rail :

(1) Corrugation in Rail (Roaring Rails)

- The minute depression on the rail surface due to application of brake or during the start or due to abnormal load known as corrugation.
- It induces high roaring sound.
- The corrugated rails should be replaced as soon as possible because these minute depressions are spreading in nature.

2) Hogging in Rails



- Due to loose joints and continuous impact of wheel, the ends of rail section may get bent known as hogging in rails.

3) Kinking of Rails :

Due to loose packing of the ballast and loose joints, miss allignment of the rail can take place at the joints known as kinking of the rails.

4) Buckling of Rail :

- Due to very tight fish bolt and due to insufficient gap at the joint, when temp. increases rail will not get enough space for expantion so results in Buckling of the rails in lateral direction.
- Buckling of Rails Results in widening of the gauge.

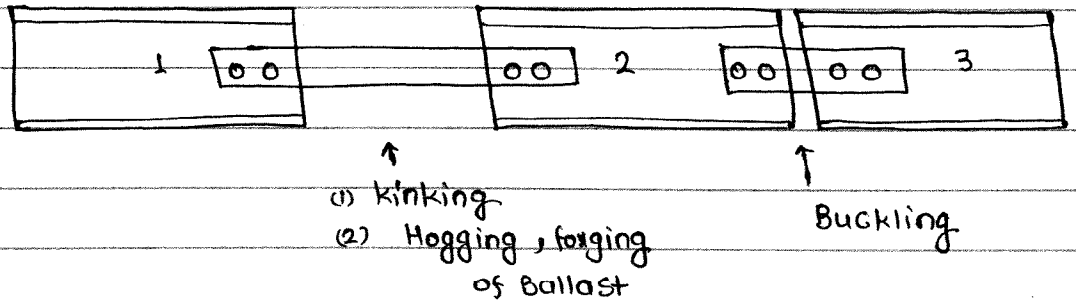
(5)* Creeping in Rails

- The longitudinal movement of rail w.r.t. sleeper in the direction of traffic due to loose joints is known as Creep.
- It can be identified by closing of joints from one side and opening of joints from another side.
- Opening of joint may cause hogging and kinking and closing of joint may cause buckling of the rails.

As the creep is a dangerous localized phenomenon.

So, it should be checked atleast within three month with the help of creep indicator.

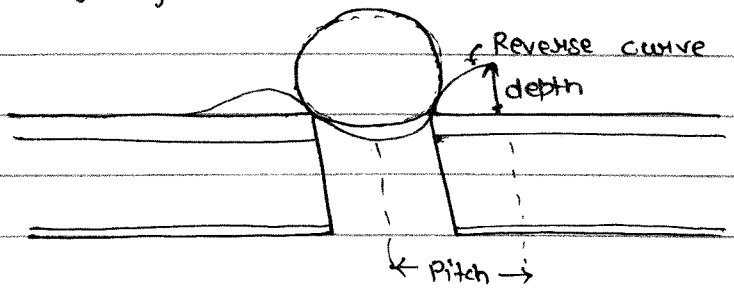
- Maximum creep is 150mm permissible or we can say 6 continuous rails should not get subjected to creep.
- In single lane traffic, chances of creep is less.
- Sometimes if creep is not repaired and the train movement is continous then the packing of ballast become so loose and gets accumulated blw the railway track known as forging of ballast.



⇒ Theory of Creep

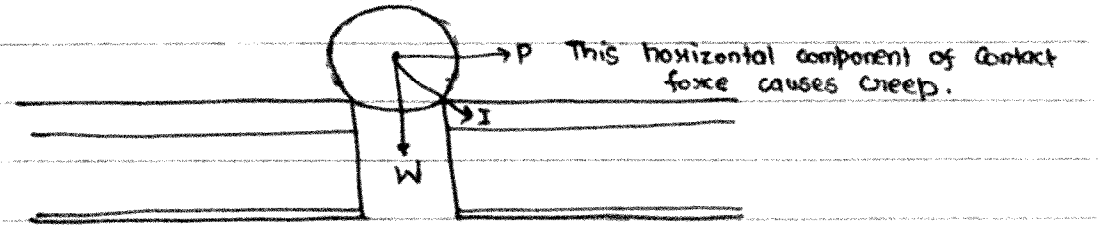
(1) Wave Theory

- As per wave theory when wheel moves on track, it forms a reverse curve as shown in fig. and wheel actually pushes the reverse curve which results into forward movement of rail (or creep).
- The depth of wave depends on stiffness of rail section, Stability of foundation and track modulus.



2) Percutation Theory

As per percolation theory the longitudinal movement of rail occurs due to the impact force exerted by wheels on the joint of rail.



3) Drag Theory

- As per drag theory when locomotives starts moving it creates a backward thrust to move forward.
- Due to the inertia effect the wagons put forward thrust on the same rail
- Now whichever thrust is higher creep will occur in that direction. (generally forward thrust is higher)

Creep can be repaired by fish bolts, pulling back the rail in correct position, provide steel sleepers, providing anchor and anticreeps.

⇒ Wear in Rails

- Due to abnormal heavy load, very high speed of train, due to any of the above mention defect if stress in rails goes beyond the yield stress it results in wear.
- It can occur at head of rail, side of the rail, and at ends of the rail.