

ASSIGNMENT - 2

KISHORE-S

② Consider a car with following specifications
That is parked on level road. Find the load
on the front and rear axles. $m = 1765 \text{ kg}$,
 $l = 2.84 \text{ m}$, $a_1 = 1.22 \text{ m}$, $a_2 = 1.62 \text{ m}$.

Sol.

$$F_{z1} = \frac{l}{2} mg \frac{a_2}{l}$$

Front wheel $\rightarrow$

$$= \frac{1}{2} \times 1765 \times 9.81 \times \frac{1.62}{2.84}$$

$$= 4938.3 \text{ N}$$

$$F_{z2} = \frac{l}{2} mg \frac{a_1}{l}$$

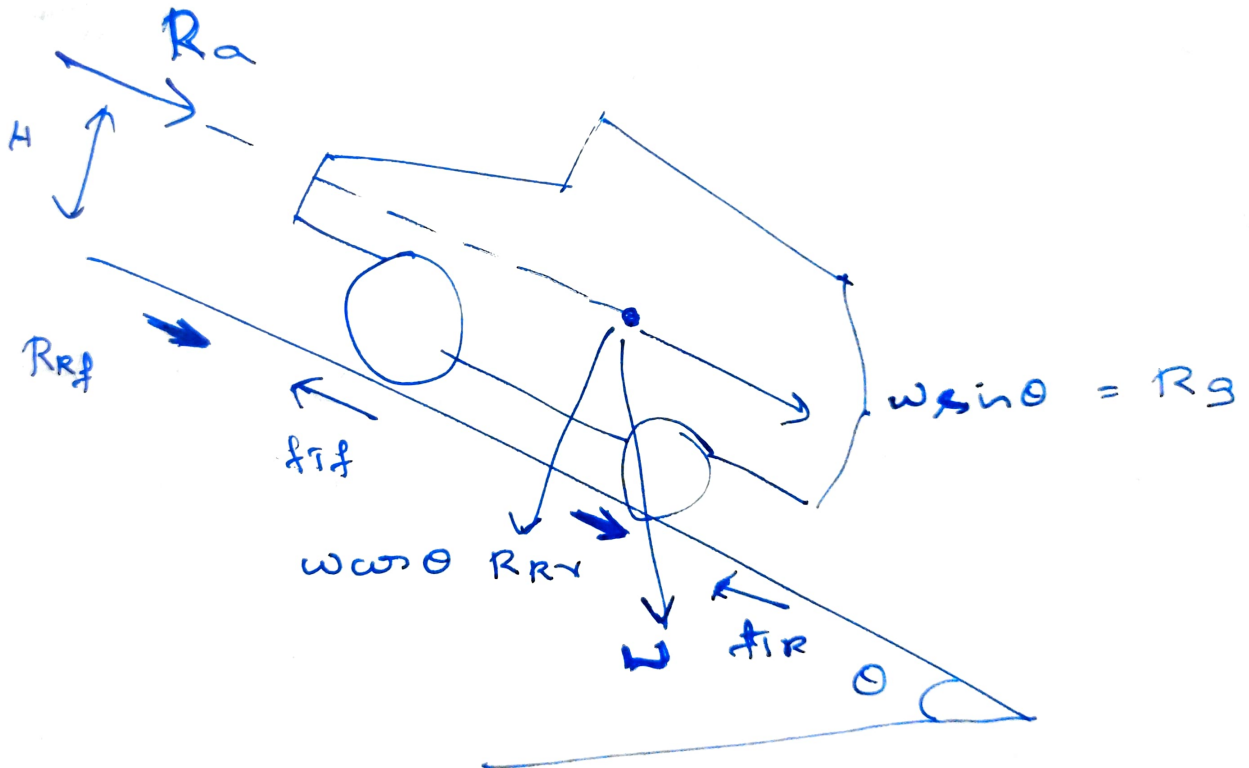
Rear wheel $\rightarrow$

$$= \frac{1}{2} \times 1765 \times 9.81 \times \frac{1.22}{2.84}$$

$$= 3718.99 \text{ N}$$

Powertrain Calculation:

H - height of c.g



• Traction force (F_T)

$$F_T = F_{Tf} + F_{Tr} \quad [\text{This for 4WD}]$$

For front wheel drive,

$$F_T = F_{Tf}$$

For rear wheel drive,

$$F_T = F_{Tr}$$

Thus,

↗ resistive forces

$$F_T - (R_a + R_g + R_R) = m \times a$$

✓

Supports the motion

$$\therefore F_T = m a + R_a + R_R + R_g$$

① Gradeability expression:-

$$P = 100 [F_z / 9.81 \times G_z - F_r]$$

$P \rightarrow$ Gradeability in %

$G_z \rightarrow$ Overall combined mass in kg

$F_r \rightarrow$ Coefficient of rolling resistance

For 4 wheeler drive, coefficient of Rolling resistance

is 10-8.

Tyre Specification :

Layers :

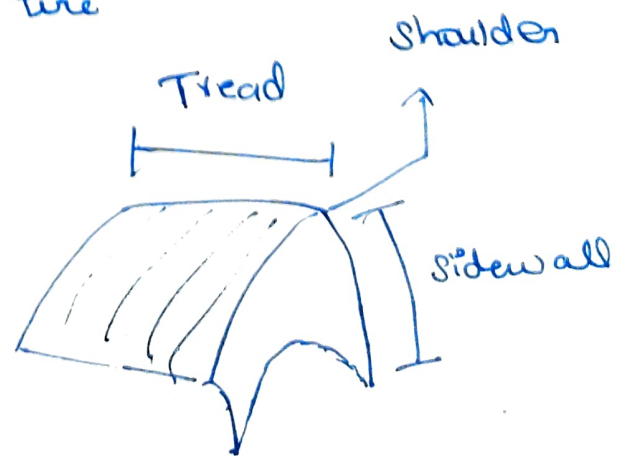
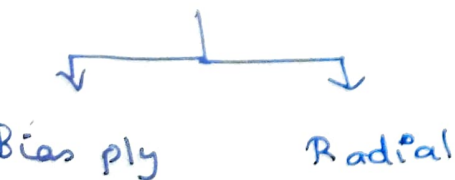
- Tread
- Nylon cap
- Steel belt
- Belt wedge
- Steel belt
- Shoulder insert
- Bead filter
- Bead
- Abrasion gum strip

• Bead - Spring wire .

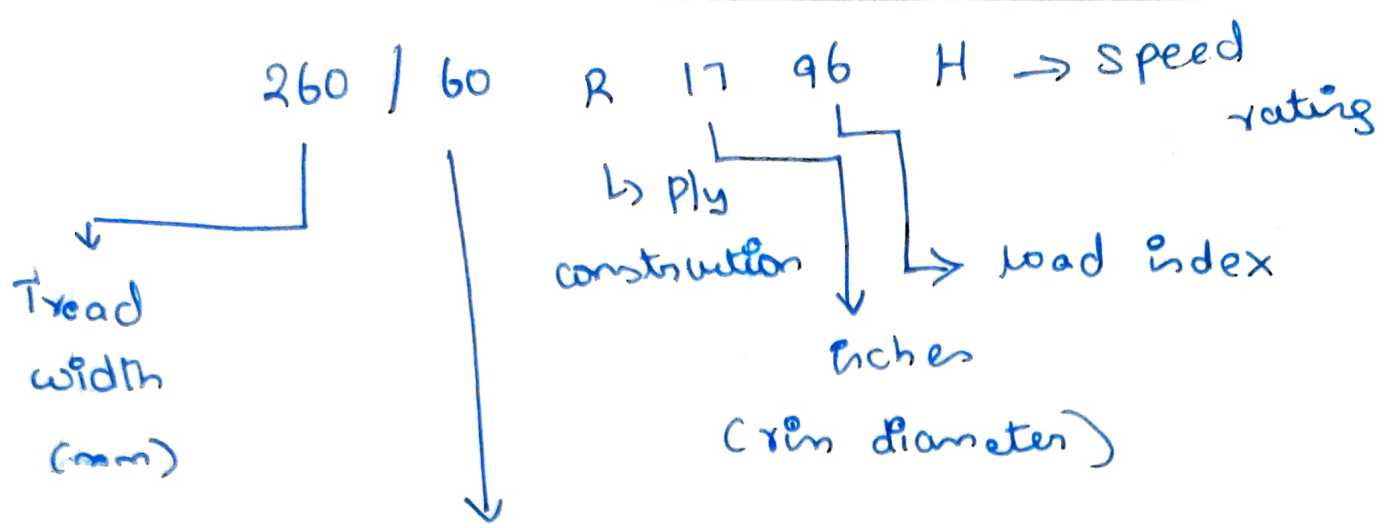
Diameter of bead < diameter of Rim

• Bead holds the tire to the rim or outer edge of wheel

• Body Ply - strength to tire



Shoulder - weakest point



$$\text{side wall ratio} = \frac{\text{sidewall height}}{\text{Tread}} \times 100$$

R - Radial Tyres

B - No symbols

Under static condition,

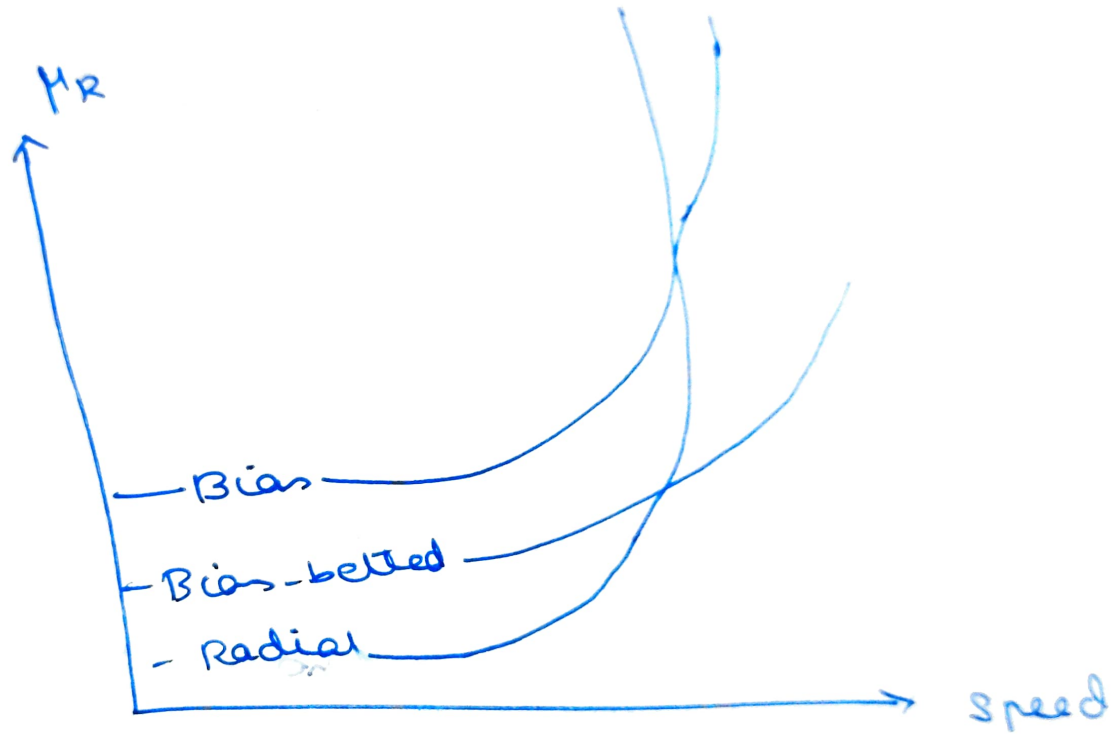
$$710 \times 4 = 2840 \text{ kg (till this wheel can bear)}$$

Under dynamic condition :-

$$\begin{aligned}
 710 \times 9.81 &= 6965.1 \text{ N} \\
 &= 6.965 \text{ kN}
 \end{aligned}$$

individual forces should be below 6.95 kN.

Tyre construction :



- Radial will have less HR compared to Bias
- After division, Radial will have high HR.