Wheels of Tiger
Cub 63-2

By Hannah and Eric
Why can’t motorcycles stand up on their own?

Because they’re too tired
Evolution
Physics of the wheel

- The top half of the spokes are in tension when the wheel is moving. To avoid warping the metal, the bottom spokes will become less tense (in other words, compress) when the top spokes are tense.
- In order for the wheel to rotate, torque must be applied—which is a force that causes an object to move around an axis.
- Geometry of the wheel--almost every wheel has clusters of four spokes, even though nipples are evenly distributed around the rim. Most wheels have 36 spokes, but for the British, there are 40 spokes because of differential forces between the rim and the hub when accelerating stopping.
Calculations

- Torque is the twisting force produced by the engine which gets split up between the wheels.
- Multiple sets of plates in a clutch means multiple torques at which the clutch will slip.

**Torque calculation**

3000rpm = fly wheel speed  
420rpm = rear wheel speed  
100 foot pounds = torque required to move rear wheel

\[
\frac{420}{3000} = \frac{x}{100}
\]

\[x = 14 \text{ foot pounds (to move flywheel/ get flywheel to slip--a unit of torque equal to the force of 1 lb acting perpendicularly to an axis of rotation at a distance of 1 foot.)}\]

**What if our wheel had single spoke - what would the diameter need to be?**

150 lbs = weight of bike  
150 lbs = weight of rider (child)  
300 lbs = total downward force; 150 lbs on each wheel  
75,000psi = breaking point of steel  
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\frac{75,000}{150} = \frac{1}{A} = .002 \text{ inches minimum diameter. This can be altered when supplementing with safety mechanisms, ext.} 
\]
Young’s Modulus

Young’s modulus is useful in determining materials properties. There is a relationship between stress and strain: At a certain point, the material will break (this point occurs after the working strength limit is reached.). Thus, it is important that each of the materials, particularly the spokes, on the wheels have been carefully chosen.
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