

"Contact patch size VS Traction"

Question

Asked by: Mark S.

As an engineer, I know that friction does not depend upon surface area. As a car nut, I know that wider tires have better traction. How do you explain this contradiction?

Answer

This is a good question and one which is commonly asked by students when friction is discussed. It is true that wider tires **commonly** have better traction.

- **The main reason why this is so, does not relate to contact patch, however, but to composition.**
- **Soft compound tires are required to be wider in order for the side-wall to support the weight of the car.**
- **Softer tires have a larger coefficient of friction, therefore better traction.**
- **A narrow, soft tire would not be strong enough,** nor would it last very long. Wear in a tire is related to contact patch.

Harder compound tires wear much longer, and can be narrower. They do, however have a lower coefficient of friction, therefore less traction. Among tires of the same type and composition, here is no appreciable difference in 'traction' with different widths. Wider tires, assuming all other factors are equal, commonly have stiffer side-walls and experience less roll. This gives better cornering performance.

Answered by: **Daryl Garner, M.S., Physics teacher,** Lawton, OK

Friction is proportional to the normal force on the asphalt acting upon the car tires. This force is simply equal to the weight which is distributed to each tire when the car is on level ground. Force can be stated as Pressure X Area. **For a wide tire, the area is large but the force per unit area is small and vice versa. The force of friction is therefore the same whether the tire is wide or not.**

Answered by: **Stephen Scholla, B.A., Physics Teacher,** Vienna, Virginia

However, asphalt is not a uniform surface. Even with steamrollers to flatten the asphalt, the surface is still somewhat irregular, especially over the width of a tire. Drag racers can therefore increase the probability or likelihood of making contact with the road by using a wider tire. In addition a secondary benefit is that the wider tire increased the support base and makes it hard to turn the car over in a turn or in a mishap.

Answered by: Stephen Scholla, B.A., Physics Teacher, Vienna, Virginia