BRAKING AND DRIVING TORQUE

BRAKING TORQUE

Brake torque is a way to measure the pressure exerted on the brake shoes and/or the rotors when slowing down or stopping the rotation of the wheels. A vehicle needs brake torque to come to a stop. When you apply your brakes, the brake calipers press the pads against the brake rotors. This stops or slows down the rotors. When that happens, the axle and wheels stop or slow down accordingly. The amount of force used to slow the rotors is called brake torque.

If your vehicle doesn't have enough brake torque, it cannot stop as well as it could. If your vehicle has too much brake torque, it has too much stopping power. Ironically, the vehicle doesn't stop as well as it should, either.

The factors that determine the brake torque are:

- The effective radius (the distance between the brake caliper/brake pad assembly and the hub center)
- The size of the brake pads
- The force exerted by the caliper

There needs to be a good balance between all three factors to optimize the vehicle's braking power. If the caliper/brake pad assembly is too big for the rotor, the brake torque is too high. In that case, the tires will want to lock up, and the brakes will be grabby. This causes the tires to start skidding instead of effectively rolling to a stop. If the caliper/brake pad assembly is too small for the rotor, the brake torque is too low. In that case, the brake pads can't stop the rotor from turning or will take a long time to stop the rotor. This greatly increases the vehicle's stopping distance, which is quite dangerous.

It is possible to measure brake torque directly. Engineers do this when they are designing brake systems. They take several factors into account such as:

- Speed of the vehicle
- Tire pressure
- Throttle response
- Steering angle
- Steering system

Engineers use the following formula to calculate brake torque, :

Brake torque = (the force exerted by the caliper) * (the effective radius of the system)

This formula determines the maximum braking force that can be exerted by a single wheel.

DRIVING TORQUE

Driving torque refers to the torque generated by the engine or power source in a vehicle or machinery to propel or drive the system in motion. It is the rotational force produced by the engine or motor that is transferred to the wheels or mechanical components to move the vehicle forward or perform work in the case of machinery.

In an automotive context, the driving torque is produced by the engine when you step on the accelerator pedal. The engine's pistons, powered by the combustion of fuel and air, generate torque which is transmitted to the transmission system and eventually to the vehicle's wheels. The magnitude of the driving torque is a critical factor in determining the vehicle's acceleration and ability to overcome resistance and move.

The concept of driving torque is essential in various mechanical systems, not just in vehicles. It can apply to any scenario where a rotating source, such as an electric motor, an internal combustion engine, or a turbine, generates torque to drive a mechanical load or perform a specific task.

Under ideal conditions, the formula for drive torque would be:

$$M = F \times r.$$

Here r is the length of a lever which is attached to the axis of rotation and at whose end the force F acts perpendicularly.