

Automotive Braking Systems History

In a little over a hundred years since the automobile took hold of people's imagination, technologies designed to make them accelerate faster and reach higher speeds have evolved with a fury the likes of which we can only see in the aeronautics industry. Still, despite chargers, turbochargers, twin turbochargers or NOX, there are limits which cannot be surpassed by a land based vehicle in terms of speed, be it because of technological limitations or the laws of physics.

Not the same can be said about the rather unseen part of the automotive evolution: brakes. The only limitations imposed to them are in connection with the human body's ability to withstand rapid decelerations. Otherwise, it would be a lot easier stopping a car than making it go insanely fast.

Whether they come in the form of drum brakes, as was the case in the dawn of the automobile, or as discs, the brakes have been the horsepower's companion throughout the decades, each pulling the evolution of the car in different directions.

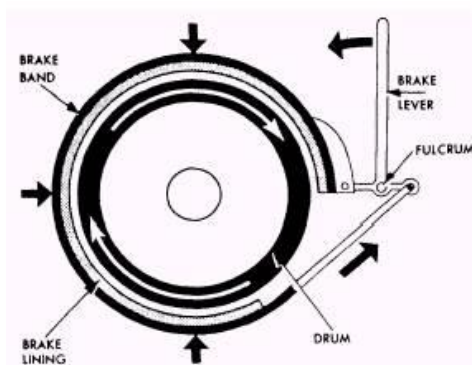
There are several types of brakes, but our goal here is not to present their features. We will only take you through a slow, slow journey to the beginning of the braking systems. As for who came up with the idea of a braking system, no individual person can be credited for it. As the saying goes, what goes up, must come down, or to paraphrase it, what goes fast, must stop. It was only obvious that whoever made a moving object, devised a stopping system as well. So it's rather a matter of who brought what to the idea, than who actually invented it.

Wooden Block

The early braking systems to be used in vehicles with steel rimmed wheels consisted of nothing more than a block of wood and a lever system. When he wanted to stop, the driver had to pull the lever located next to him and make the wooden block bear against the wheel.

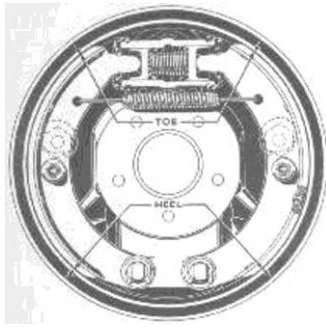
The method proved effective in both horse drawn or steam powered vehicles. It started becoming obsolete towards the end of the 1890s, when the Michelin brothers began replacing steel rimmed wheels with the rubber tire. The wood block method, needless to say, was useless in conjunction with rubber.

Band brake



This is a very simple type of brake using the principle that a band is wrapped part round a rotating drum. Tension can be applied to the band using a lever. The restraining torque results from the difference in tension between the two ends of the belt.

Drum Brakes



The drum based braking system can be considered the forefather of the modern day brake. A forefather who is still alive, as drum brakes are still in use today.

The man largely credited with the development of the modern day drum brake is French manufacturer Louis Renault, in 1902. Still, crude concepts of the drum existed before that. Wilhelm Maybach had used a similar, yet simpler design a year earlier. Even prior to that, in 1899, Gottlieb Daimler came up with the idea to wrap a cable around a drum and anchor it to the vehicles chassis. The forward motion of the car tightened the cable, making it easier for the driver to pull the lever and get the wood block to do its work. What Daimler came up with is called servo assistance and is still in use today, with the required enhancements, obviously.

These types of braking systems were all external, a feature which soon turned into a problem. Dust, heat and even water rendered them less effective. It was time for the internal expanding shoe brake. By placing the shoes inside the drum brake, dust and water were kept out, allowing the braking process to remain effective.

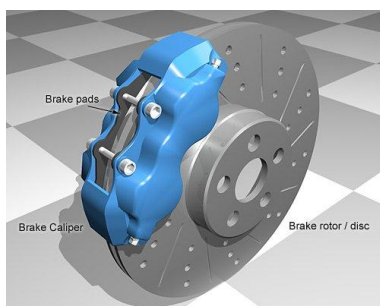
Hydraulic Power



The end of the mechanically-activated brakes came in 1918, when Malcolm Loughead, one of the founders of what later was to become Lockheed Aircraft Corporation, came up with the idea. Loughead put together a four-wheel hydraulic-brake system for cars. This system used fluids to transfer the force on the pressed pedal to the pistons and then to the brake shoes.

The four-wheel hydraulic system was first used on the 1918 Duesenberg and quickly caught on, mostly thanks to the fact that it made braking much easier than in a mechanical system. By late 1920s, this system was fitted on most high-priced vehicles and soon after it expanded to most of the automotive world.

The Disc



As the vehicles spilled out the assembly plants, they started becoming both faster and heavier. Hydraulic drum based brakes were effective, but they had a tendency to ineffectively distribute heat. This feature made room for the creation of the disc braking system.

Even if it came to be, basically, at around the same time with the drum brake system, the disc had to go a long way before getting a place in the spotlight. First patented in 1902 by William Lanchester, the disc became popular in the 1950s.

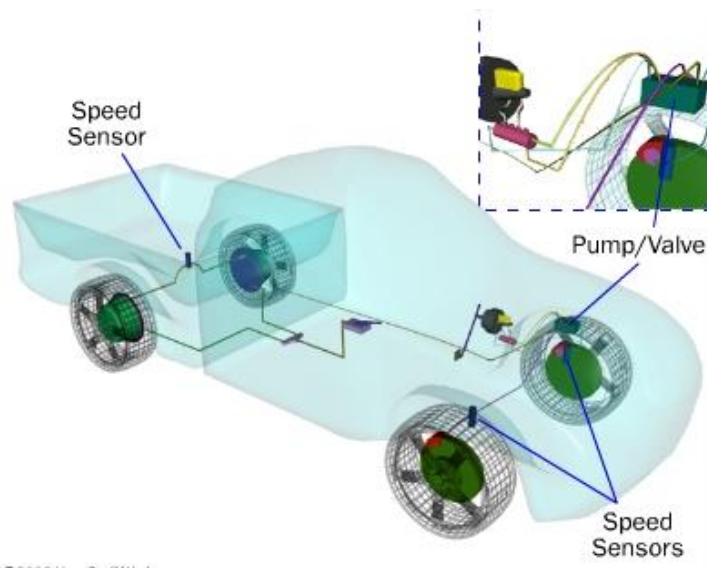
Using the disc brake in conjunction with Loughhead hydraulics, Chrysler became the first manufacturer to implement the system on its vehicles (Imperial). In Europe, the system was adopted by Jaguar (C-Type) and Citroen (DS).

Still, the system was dropped for a few years in the US, as it still required some significant effort from the driver to operate it. It was only in 1964 when it made its final comeback, featured on the Studebaker Avanti. This time it succeeded.

Power Braking System

The difference was made by the development of the power braking system. By assisting the movement of the piston in the master cylinder, the driver no longer had to apply as much pressure to get the car to stop effectively.

Anti-lock Braking Systems



The theory behind anti-lock brakes is simple. A skidding wheel (where the tire contact patch is sliding relative to the road) has less traction than a non-skidding wheel. If you have been stuck on ice, you know that if your wheels are spinning you have no traction. This is because the contact patch is sliding relative to the ice (see Brakes: How Friction Works for more). By keeping the wheels from skidding while you slow down, anti-lock brakes benefit you in two ways: You'll stop faster, and you'll be able to steer while you stop.

Hand Brake

A car's handbrake is the lever to a completely mechanical braking system, which will bypass the primary hydraulic system if it fails. When the handbrake is applied, the brake cable passes through an intermediate lever, to increase the force of your pull; this force is then split evenly between your brakes by an equaliser.