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Numerical Analysis of Brake Performance in Passenger Cars

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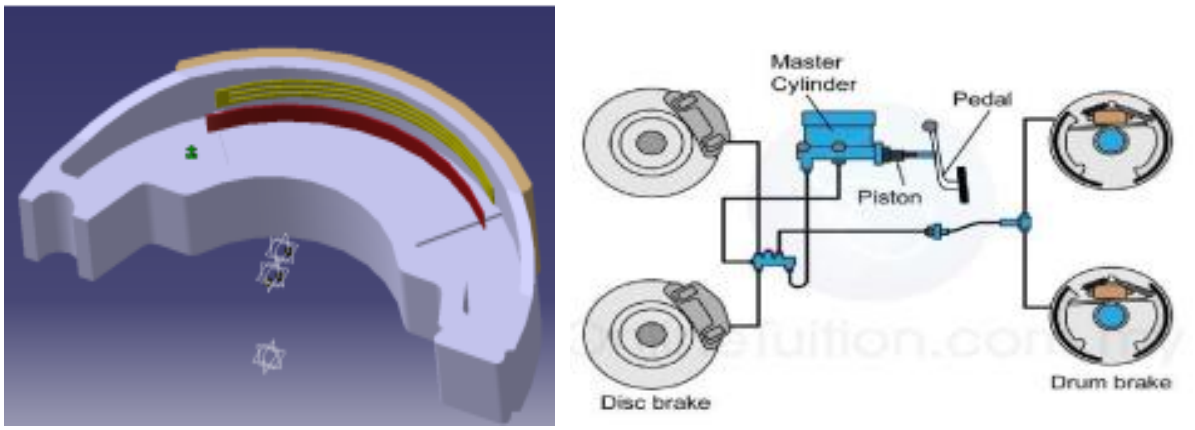
Abstract: Brakes work when two different materials come into contact with the vehicle to reduce braking distance. Due to the irregularities located in the surface mechanism, it contacts with a high contact force and makes an annoying noise called brake squeal. This article examines braking distance based on research based on incorporating a brake isolator into the brake assembly to reduce noise. Different configurations of isolators are used in finite element analysis. The effectiveness of the brake isolator is analyzed using different types of isolators. The finite element model of the brake is developed on a real basis we can determine using the dimensions of the drum brake. Braking distance is used for modal analysis to estimate the modal. Frequencies and mode shapes must be considered. Different friction coefficients, wheel speeds and braking forces are taken into account in the analysis. The braking device is indicated by a positive real and the accompanying slip rate in the basic model of a part of the basic graph the isolator significantly increases the noise of brake noise. This results in increased braking distance.

Keywords: Brake mechanism, hydraulic brake system, pneumatic brake system, brake chamber, brake noise, braking distance.

Introduction

Brake is one of the important components of transport. In the development of the car, brake improvement is aimed at increasing braking power and reliability. However, the refinement of car acoustics and comfort has increased significantly brake noise benefits this aesthetic and environmental concern. Brake noise irritating to users. Many of them believed that it was a symptom of brake noise defective brake and this problem leads them to claim warranty from the company even though the brake worked as before, it produced cars developed. Brake squeal, or brake squeal in general, does not have a clear definition. Thus, there is noise generation and suppression in the design and manufacture of brake parts becomes a prominent focus. Many manufacturers of materials for distance braking pads spend up to 50% of engineering budgets on noise, vibration and stiffness issues. There are several terms for brake noise, such as squeal, shudder, buzzing and screeching. However, the more commonly used terms are rustling. Several approaches are used to estimate the probability of failure in the automotive braking system. Of them based on theoretical approaches, based on experimental and finite element approaches, the system generates sound during movement. In addition, several methods are proposed to stop or reduce the appearance of noise in the brake mechanism. Systematic changes in the braking system, active steering and additional shock absorbers. Of the three methods, adding a damper may be the most effective method. Brake mechanism applied by replacing the material with a higher damping material or adding an insulator. In the brake mechanism part of the pad or sole,

depending on which type of brake is used. Drum brakes produce significantly more noise compared to disc brakes. And on a motorcycle for this study, a brake using a drum brake type is used. The brake is one of the least used technological mechanisms. Important things to consider in car manufacturing. Noise the sound produced by the brakes not only contributes to the speed of the noise, but allows users to not use the vehicle conveniently. They thought it might be the brakes broken and unsafe operation of the vehicle, which will bring them to court and pays attention to the warranty of the company that produced the car. Frictional contact is one of the following are important sources of screeching in braking systems. A combination of two real modes unstable complex due to an increase in the coefficient of general characteristic friction a scenario is created for the appearance of brake system noise. This phenomenon is called modal synthesis can be seen in the review example. Many researchers have done this research has been conducted worldwide based on experimental work in laboratory or industrial braking devices. The car's braking system indicates that the whisper includes a pad mode combined with a disc mode. Even if this phenomenon is known, numerical modal analysis remains and it is possible to rely on calculations that are not sufficiently predictive to improve the design of braking systems.



Picture1. Hydraulic and pneumatic braking system.

A disc brake or disc brake is a device for slowing down or stopping the rotation of a wheel when it is in motion, the mechanism device works. The brake disc is usually made of cast iron, but it is possible in some cases it can be made of composites such as reinforced carbon or ceramic-matrix. It is based on the scheme of the technological system connected to the wheel and axle. Friction material to stop the wheel the shape of the brake pads (mounted on a device called a brake caliper) is mechanically compressed, a hydraulic, pneumatic or electromagnetic system acts against both sides of the disc. Causes of friction will consist of slowing down or stopping the disc and the connected wheel. Brakes (disc and drum) convert motion into heat, but if the brakes get too hot they are less effective because they cannot spread and passes the sufficient heat level. This failure condition is known as brake drop. A brake caliper usually consists of one or two hollow aluminum or chrome-plated steel pistons (called caliper pistons), a heat transfer brake assembly, and a rotor. The system is usually filled with glycol ether-based brake fluid (other fluids can also be used). Passenger vehicles once used drum brakes on all four wheels. Later, disc brakes were used for the front and drum brakes for the rear. However, disc brakes better heat dissipation and more resistance to "putting" and therefore usually safer than drum brakes. Thus, four-wheel disc brakes are becoming more and more popular and replacing them drums on all but the most basic vehicles. However, many two-wheeler designs continue use a drum brake for the rear wheel. In the following description, the terms for and are used simple configuration. In a hydraulic brake system, when the brake pedal is pressed, a thrust force is applied. the piston(s) in the master cylinder causes fluid to flow from the brake fluid reservoir. pressure chamber through the compensation port. This leads to an increase in pressure entire hydraulic system, forcing fluid through hydraulic lines into one or more gauges. Here it acts on one or two caliper pistons that are sealed with one or more seats. The brake caliper pistons then apply force to the brake mechanisms, pushing them against the brakes the rotating rotor and the

friction between the mechanism and the rotor causes a braking torque. is formed and slows down the vehicle. The heat generated by this friction is released through the vents and channeled in the rotor or through a braking system made of special heat-resistant materials such as kevlar or sintered glass. Further release of the brake pedal / lever allows the spring(s) in my master cylinder. Brake mechanism the main brake acts as a retractor to return the lever(s) to position. This action first releases the hydraulics and exerts pressure on the caliper, then the brake on the caliper assembly acts as suction on the brake mechanism and sets it in motion. Brake system mechanism back into its housing, allowing the brake systems to release the rotor. The hydraulic brake system is designed as a closed system: if there is no leakage in the water no brake fluid enters or leaves the system, and no fluid is consumed through use.

Discussion and Results

Air brake systems are commonly used in heavy trucks and buses. The system consists of the following consists of service brakes, parking brakes, control pedal and air storage tank mechanisms. For parking brake, has a disc or drum brake arrangement designed to hold it in the "applied" position pressure is based on mechanics. Air pressure must be generated to release these "gear brake" parking brakes. For mechanisms service brakes to be applied (those used to slow or stop while driving), brake the pedal is pressed and air is directed to the brake under pressure. Camera, causing the brake to apply. Most types of truck air brakes are drum brakes, although there is a growing trend to use disc brakes in this application. the air the compressor draws filtered air from the atmosphere and forces it into high-pressure reservoirs is approximately. Most heavy-duty vehicles have a presence gauge in the driver's view air pressure, often adjusting warning tones or lights for safe vehicle operation parking / emergency brake releases pressurized air in the lines between the compressed air, In the system stores and sets the brakes, allowing the parking brake to operate on the mechanism. Suddenly loss of air pressure immediately results in full mechanism brake pressure. The compressed air brake system is divided into a supply system and a control system. Supply the system compresses, stores and delivers high-pressure air to and from the control system and additional air-operated truck systems (gearbox shift control, clutch pedal air) are implemented. The compressed air first passes through the cooling coil and is sent to the dehumidifier moisture and oily mixtures, as well as a pressure regulator, a safety valve and can be smaller cleaning the reservoir. As an alternative to the air dryer, it can be equipped with a supply system antifreeze device and oil separator. The compressed air is then stored in a reservoir and then distributed to the front and rear through a four-way safety valve brake circuit air reservoir, parking brake reservoir and auxiliary air supply distribution point. The system also includes various check, pressure limiting, drain and safety valves. Air brake systems may include a wiggle flap device installed to alert the driver if the system becomes airborne the pressure drops too low.

Conclusions

The control system is further divided into two service brake circuits: parking brake circuit and trailer brake cycle distance. The brake circuit of this mechanism is divided into front and rear parts. Wheel chains that receive compressed air from separate reservoirs for added safety air leakage condition. Service brakes are performed using a brake pedal air valve and regulates both chains. The parking brake is a type of air spring brake that is applied by spring force in the spring brake cylinder and released by compressed air through the manual control valve. Trailer the brake directly consists of two linear systems: a supply line (marked in red) and a separate control or service line (marked in blue). The supply line receives air from the prime mover park brake air the tank is regulated by the brake relay valve of the reservoir and the control line is regulated by the trailer brake relay valve. Operating signals for the relay are provided by the main drive brake pedal air valve, trailer service brake hand control and the main drive is performed under manual control of the parking brake. The air supply is unlimited, so the braking system will never fail like a hydraulic brake, no fluid is required. Small mechanisms do not cause brake failure. Air line couplings are easier to attach and detach than hydraulic lines; there

is no danger passing air into the hydraulic fluid. Thus, air brake chains of trailers can be attached and easily removed by operators with little training. Air not only serves as a fluid for power transmission, but also stores potential energy. Thus, it can serve to control the applied force. Air brake systems include a storage air tank enough energy to stop the car if the compressor fails. Air brakes are effective even with significant leakage, so an air brake system may be.

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