



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 Issue: XI Month of publication: November 2019

DOI: <http://doi.org/10.22214/ijraset.2019.11134>

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Evolution of Braking System

M. Srihari¹, G. Shai Kumar², K. Naveen Kumar³, M. Mani Koushik⁴, S. Sai Pavan⁵

¹Assistant professor, ^{2,3,4,5}Students, Department of mechanical Guru Nanak Institute of Technology, Ibrahimpatnam, Ranga Reddy
Telangana, India.

Abstract: Mechanical brakes all act by generating resistance forces, as 2 surfaces rub against one another. The stopping power or capacity of a brake depends more on the surface area of frictional surfaces as well as on the actual force applied. The friction and wear encountered by the operating surfaces square measure severe. Thus, the durability of a brake or service life between maintenance depends heavily on the type of material used to line the brake shoe or pads. They use levers or linkages to transmit force from one purpose to a different Most brakes unremarkably use friction between a pair of surfaces smooth on to convert the energy of the moving object into heat, though other methods of energy conversion may be employed

I. INTRODUCTION

Most of the brakes are use friction between 2 surfaces ironed along to convert the energy of the moving object into heat, though other methods of energy conversion may be employed.

For example the Eddy current brakes use magnetic fields to convert kinetic energy into electric current in the brake disc, fin, or rail, which is converted into heat. Still other braking methods even transform kinetic energy into different forms to stop a rotating flywheel.

II. DRUMBRAKE

The hydraulic brakes contain a metal drum that encloses the brake assembly at every wheel. Two curved brake shoes expand outward to slow or stop the drum which rotates parts with the wheel. The term drum brake usually means a brake in which shoes press on the inner surface of the drum. When shoes maintain the skin of the drum, it's sometimes referred to as a clasp brake.

Where the drum is contact between the 2 shoes, similar to a conventional disc brake, it is sometimes called a pinch drum brake, though such brakes are relatively rare.

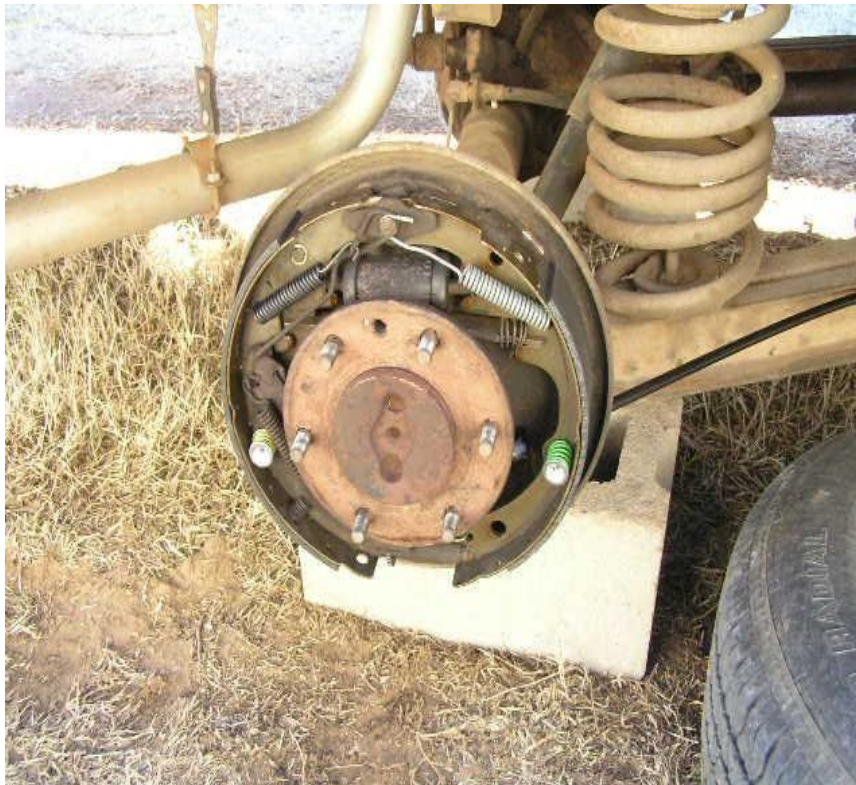


Figure (1)-Drum brake setup

III.DISC BRAKES

Disc brake, the fluid from the hydraulic brake cylinder is forced into a caliper wherever it presses against a piston. The piston successively squeezes 2 restraint against the disc rotor, that is hooked up to wheel, forcing it to slow down or stop.

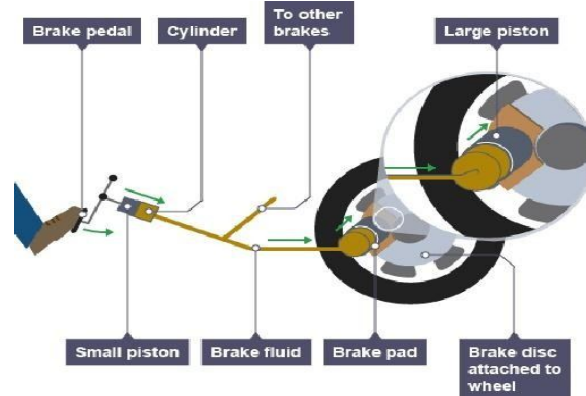


Figure (2)-Disc brake setup

A. Master Cylinder

The master cylinder in a hydraulic braking system is an intermediate component that works as an energy converter as well as a force multiplier. Mechanical energy is converted into hydraulic pressure. The brake force needed before the wheels is on top of that of the real wheels due to the shifting of mass from rear to front wheels throughout braking. This distribution of brake force between rear and front wheels is a function of the master cylinder.



Figure (3) -Master cylinder

B. Brake DISC

A hydraulic brake may well be a sort of brake that uses calipers to press the pairs of pads against a disc or rotor to create friction. This action slows the rotation of a shaft, such as a vehicle axle, either to reduce its rotational speed or to hold it stationary.



Figure(4)-Brake disc

Materials considered for the brake disc

- 1) Carbon ceramics
- 2) Stainless steel 3213
- 3) Grey cast iron GG-204
- 4) Titanium alloys
- 5) Aluminium matrix composite

C. Brake Caliper

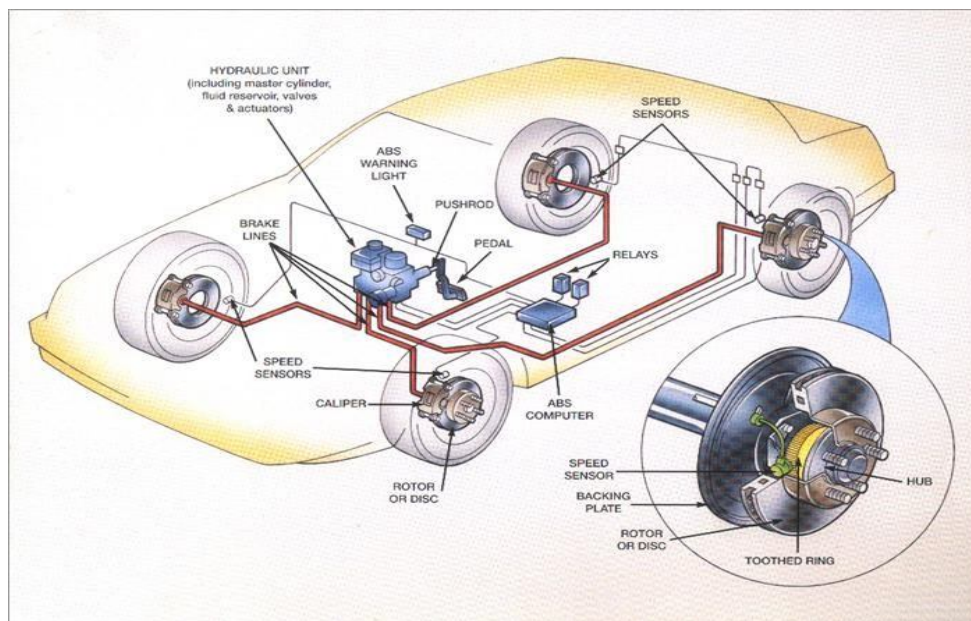
Brake calipers is a part of vehicle's braking system. Brake calipers squeeze the brake pads against the surface of the brake rotor to slow or stop the vehicle. The job of the caliper is to slow the car's wheels by creating friction. The brake caliper fits over the rotor like a clamp. Inside each caliper is a pair of metal plates bonded with friction material - these are called brake pads. The outboard brake pads are on the outside of the rotors (toward the curb) and the inboard brake pads are on the inside



Figure(5)-Brake calliper

IV. ANIT-LOCK BRAKING SYSTEM

An anti-lock braking system is also a security anti-skid braking system used on craft and on towards land vehicles, like cars, motorcycles, trucks, and buses. ABS operated by preventing the wheels from locking up during braking, thereby maintain tractive contact with the road surface.



Figure(6)-Anti locking braking system

A. Components Used In ABS

- 1) Speed sensor
- 2) Valve
- 3) Pump
- 4) Controller
- 5) Reluctor ring

V. CALCULATIONS FOR WORKING OF BRAKES

Caliper and master cylinder which are used from the TVS Apache RTR 180 bike. This is used due to our previous experience with the equipment and also its reliable performance at any given situation.

A. Parameters

γ_b = Rotational moment of inertia = 1 to 1.05

W = weight

g = gravitational constant = 9.81 f_b = Braking force

f_r = Rolling Resistance = 0.0137 v = Initial velocity

f_f = frictional force = μW μ = coefficient of friction = 0.7 N = Newton

Mm = millimeters m/s = meter/seconds Kg = Kilograms

Master Cylinder diameter = 13mm Caliper Piston diameter r = 27mm Pedal Ratio = 5:1

Maximum Force applied = 50kg Force x g

= $50 \times 9.81 = 490.5N$

Moment = Force x Pedal ratio

= $490.5 \times 5 = 2452.5N$

Pressure = Force / Area

= $2452.5 / (\pi/4) \times (13)^2 = 18.47N/mm^2$

Force applied by caliper = Pressure x Area

= $18.47 \times (\pi/4) \times (27)^2 = 10579.127N$

Braking Force = Force applied by caliper x $2 \times \mu$

= $10579.12 \times 0.38 \times 2 = 8040.13N$

VI. CONCLUSIONS

The anti-braking system has gone through a number of changes since its invention all the changes are aimed at improving its performance and safety. The advancement in technology has had a lot of contributions towards the improvement or implementation of the automobile braking system. For instance, the production of the anti-braking systems is a huge step towards improving safety of automobile braking systems. The opposed braking systems are created in such the way that they will sense associate degree avoid associate degree at hand collision with an obstacle with none input from the driving force

VII. ACKNOWLEDGMENT

The mini project entitled "EVOLUTION OF BRAKING SYSTEM" is the sum of total efforts of our batch. It is our duty to bring forward each and every one who is directly or indirectly in relation with our project and without who it would not have gained a structure. We wish to convey our sincere thanks to our internal guide Mr. M. Srihari, Assistant Professor in Mechanical Engineering, for his professional encouragement in starting this project and academic guidance during the course of this project. We wish to convey our sincere thanks to Dr. B. Vijaya Kumar, Head of the Department, Mechanical Engineering, for his professional advice, encouragement in starting this project and academic guidance during the course of this project. We wish to express our candid gratitude to Principal Dr. S. Sreenatha Reddy and management of Guru Nanak Institute of Technology for providing the required facilities to complete our project successfully. We are also grateful to our well-wishers and friends, whose co-operation and some suggestions have helped us in completing the project..

REFERENCES

- [1] Automobile Engineering R.B.Gupta. Brakes, classification and introduction. Page no 9.1-9.6
- [2] Kamaraju Ramakrishna. "Types of Braking system", Page no 190
- [3] <http://www.ignou.ac.in/upload/Unit-6-61.pdf> Calculation of hydraulic forces
- [4] http://teachersites.schoolworld.com/webpages/M_legacy_brakes.pdf
- [5] Joshua Pérez, Fernando Saco, Vicente MI lanes, Antonio Jiménez, Julio CDiaz and Teresa de Pedro, an RFID based (ABS) Vehicle speed controller



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)