

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

Design and Analysis of Drum Brake

Manoj Kumar¹, Jesu Mangthan¹, Muthu Kumar¹, Mari Muthu Thanumalaya Perumal²

U.G student, Department of Mechanical Engineering, Francis Xavier Engineering College,
Vanarpettai, Tirunelveli, Tamil Nadu, India

Associate Professor, Department of Mechanical Engineering, Francis Xavier Engineering
College, Vannarpettai, Tirunelveli, Tamil Nadu, India

ABSTRACT: A drum brake is a brake that uses friction caused by a set of shoes or pads that press against a rotating drum-shaped part called a brake drum. A drum brake is a brake that uses friction caused by a set of shoes or pads that press against a rotating drum-shaped part called a brake drum. The energy absorbed by brakes is dissipated in the form of heat. This heat is dissipated in the surrounding atmosphere to stop the vehicle.

KEYWORDS; Brake Drum, Automobile, Mechanical Properties.

I. INTRODUCTION

Brakes function to slow and stop the rotation of the wheel. To stop the wheel, braking pads are forced mechanically against the rotor or disc on both surfaces. They are compulsory for the safe operation of all vehicles. In short, brakes transform the kinetic energy of the car into heat energy, thus slowing its speed. Brake fade is the reduction in stopping power that can occur after repeated or sustained application of brakes, especially in high load or high speed conditions. Brake fade can be a factor in any vehicle that utilizes a friction braking system including automobiles, trucks, motorcycles, airplanes, and even bicycles. Brake fade is caused by a build-up of heat in the braking surfaces and the subsequent changes and reactions in the brake system components and can be experienced with both drum brakes and disk brakes. Loss of stopping power, or fade, can be caused by friction fade, mechanical fade, or fluid fade. Brake fade can be significantly reduced by appropriate equipment and materials design and Selection, as well as good cooling. It is more prevalent in drum brakes due to their configuration. Disc brakes are much more resistant to brake fade because the heat can be vented away from the rotor and pads more easily, and became a standard feature in front brakes for most vehicles.

II. LITERATURE SURVEY

Allan Michael Lang;

In his research concluded that no simple relationship exists between the natural frequencies of the brake components and the squeal frequency and during squeal both the drum and shoes hold complex modes, which can be best visualized as the superposition of pairs of similar normal modes phase shifted both spatially and in time relative to each other.

Ramesha.D.K

In his thesis concluded that the maximum temperature obtained for aluminum alloy brake drum is less as compared to the cast iron brake drum for a truck. Also, concluded that thermal deformation is less for aluminum alloy brake drum than the cast iron brake drum. As his study states that the weight of Aluminum is lesser than the Cast iron, it is better to use the Aluminum material in the construction of brake drum.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

Muhammad najib bin abdulhamid

He conducted the experimental analysis on drum brake and FEA analysis and concluded that improved material performs better.

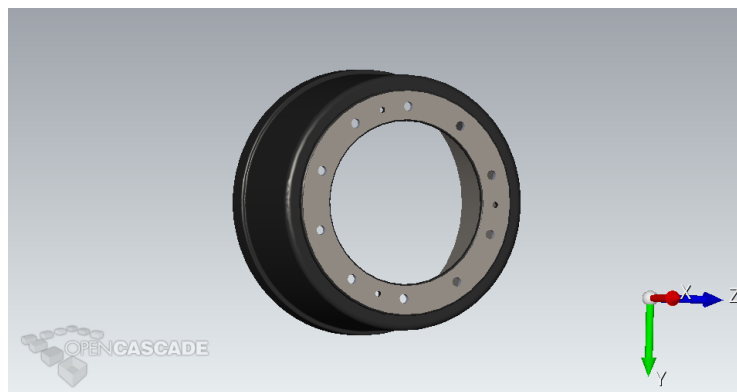
Kang and Cho

He investigated thermal deformation and stress analysis of brakes by finite element method for ventilated disk and solid disk. By comparing the result of maximum temperature in the braking process, the ventilated disk showed a lower temperature than the solid disk. The effect of temperature increase and decrease, depending on the vent area generated in the flange part of the disk. Analysis of design parameter effects on vibration modes of a motorcycle drum brake and brake shoe using the finite element method were also carried out

III. OBJECTIVES

- Slightly Lower frequency of maintenance due to better corrosion resistance compared to disks.
- Less expensive to produce
- Built in self energizing effect requires less input force such as pneumatic pressure.

IV. SOLID WORKS DIAGRAM



International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

V. RESULTS COMPARISION

MATERIALS	CAST IRON	SS	ALUMINIUM
DEFORMATION (MM)	0.304	0.473	0.0799
STRAIN (mm/mm)	0.00095	0.00147	0.00025
STRESS (MPa)	103.92	282.37	79.64
HEAT FLUX (W/mm ²)	0.2838	0.0824	0.8189

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

VI. CONCLUSION

In order to improve the braking efficiency and provide greater stability to the vehicle, an investigation is carried out into the usage of materials. The analysis results showed that, temperature field and stress field in the process of braking phase were fully coupled. Static structural analysis is carried out by coupling the thermal solution to the structural analysis. All the values obtained from the analysis are less than their allowable values. Hence the brake drum design is safe, based on the strength and rigidity criteria. Comparing the different results obtained from analysis, it is concluded that **Aluminium** is the best material for the present application. From the results of the analysis, it is concluded Aluminium is the best material for brake drum.

REFERENCES

- [1]. Anup Kumar and R. saharish. Structural and Thermal Analysis of Brake Drum. Middle East Journal of Scientific Research Vol20. (8). IDOSI Publication. Pp 1012-1016. . 2014.
- [2]. Brake Drum. Available at en.wikipedia.org/wiki/Drum_brake. Cited March 2015.