

## Design and Analysis of Disk Brake

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### **ABSTRACT**

*The main purpose of read paper and present this paper is that to design a vented type disc brake and analysis the thermal stress and thermal structural analysis of different material and compare with the other material. My main motive to work on this topic is that to work on software and analysis what is actual property be needed and what we include on that particular problem. The long term braking system damage the rotating disc and rotating wheel and we have to maintain it for proper braking on vehicle, especially on railway .primary work find out the problem and got the solution and execute that solution in actual with the help of software.*

*We have to find perfect solution of that problem. That was problem by repeated braking that wheel get damage and block so overcome that issue we have to analysis the situation and developed a solution for Thermal stress and thermal analysis of that brakes. Find out the heat generate and Cooling system that brake. Brake between caliper and disc should be dry otherwise brake did not work properly Therefore, it is very important that the design and analysis should be précised And should have a good quality to sustain in mechanical load, thermal stress, hydraulic load and other stresses.*

*The accuracy of precise should be more otherwise design will not sustained in market or worldwide.*

**Keywords:** *Disc Brake, Thermal analysis, Structural analysis, ANSYS, Caliper.*

### **Introduction:**

The performance of vehicle is growing continuously in today life in growing competition of automation market for better. Every industry wants to grow itself by performing well in market. The racing thing is very well knows the requirement of brakes. Brakes is become very initial things for racing vehicle in market. Brakes is available in various type but disc brake introduce in market than till now market and performance sudden change and safety also reach a good level. The disc brake is a things which provide slowness or stopping the rotation of a device or wheel. A disc brake usually made with help of cast iron or other material which may be composite material have carbon, Kevlar and silica. Disc brakes are connected with the wheel and axel, disc brake is use to stop the rotation of wheel. The forces mechanically, hydraulically, pneumatically or electromagnetically against sides of the disc is produced by friction material like pads. Due to This friction the disc the wheel become slow or stop.

Today we use regenerative braking or friction braking system for braking. That friction brakes produced friction both sides of disc surface with help of pads and it reduce speed of wheel or disc by design configuration disc brake can be mount in drum. The heat transfer rate of solid body is slow. So we use vented type disc brake today life. If the disc in solid body than cooling

rate slow and contact of area is more but heat transfer is very slow. For preventing that condition we use vented type rotor Today industry vented type disc rotor is used for increase heat transfer rate and cooling. The contact area is also increased by vents.

**Requirement:-**

The brakes should be strong enough to stop the vehicle with in a minimum Distance in an emergency when it is required.

The driver should have proper control on vehicle during driving and by which the vehicle did not skid.

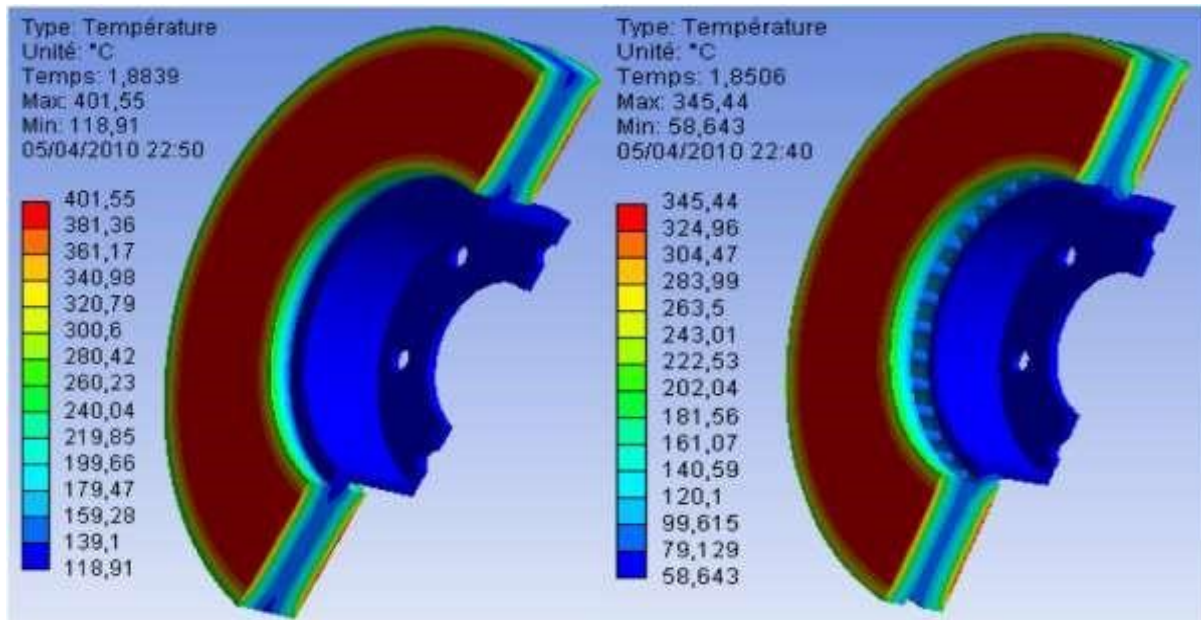
It should have anti wear properties. It is its first priority

**Literature survey:**

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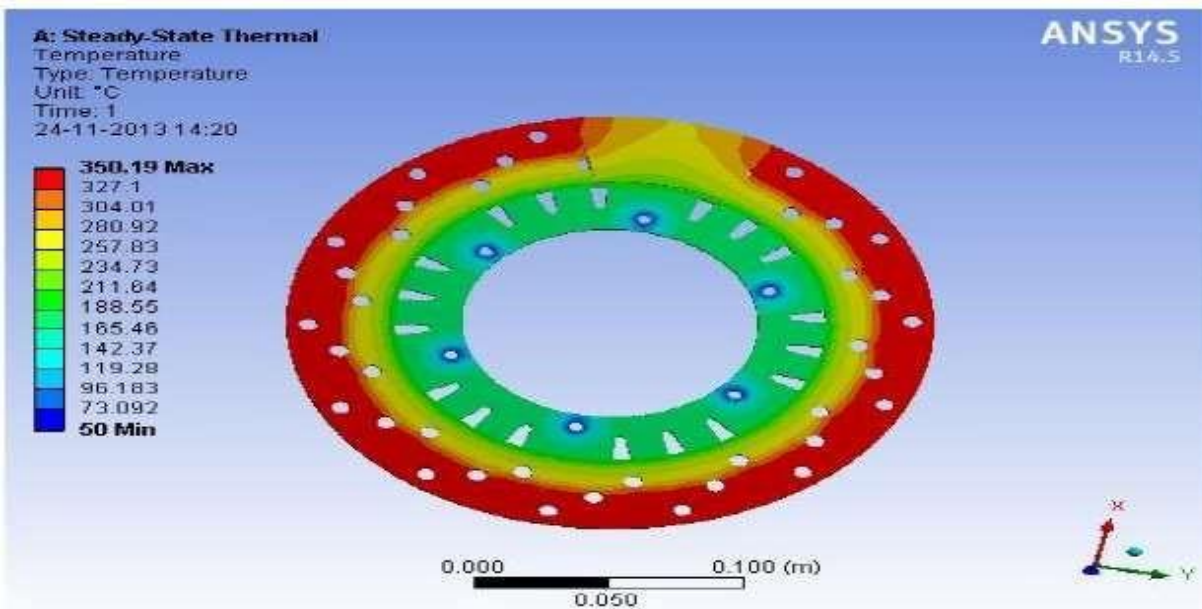
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The disc brake is only a device which do slow or stop the rotation of a wheel and the machine device. We have to care about the thermal structural analysis for repeated braking system. Analysis of rotor disc against design because by that we analyst the actual condition.



**Figure - Temperature distribution of a full and ventilated disc**

CATIA is best designing software which is best for comparison accordingly to material, thermal analysis, thermal structural, forces. Ansys is generally used for FEM (finite element method). Finite element method is a very crucial things or subject where we break object in element than study particular element.



**Figure 2- Temperature distribution**

Without brake the driver as well as passenger feel unsafe for that brake is introduced. Brake is such device that reduce or stop the vehicle distance with the help of calipers and other braking devices. After design we have to analysis the thermal stress and material type and also measurement with help of software. Then also we have to design accordingly design.

## Conclusion

I have been a symmetric carried with the help of ANSYS software and plane 55 and 75. The intensity of stress of solid modal than the vented type disc rotor and the deformed values of the solid modal is lesser than the vented type disc brake. When we compare the results in the consider of materials change than two materials have better results than the AMMS. Finally by this we conclude that vented type disc brake with AMMS material is better than others.

When we compare the thermal results of both vented type and solid type model vented model producing better results compared to solid in the both cases of thermal flux and thermal gradient and two material is lower suitable compared to the AMMS material. So we prepared the AMMS material Braking force due to friction for time duration of 4,5 and 6 seconds when Transient thermal analysis is taken out with the direct time integration technique for the application.

The maximum temperature 239.161°C is obtained on disc brake surfaces with the help of analysis software.

The maximum Von Mises stress is observed to be 517 MPa when Static structural analysis is taken out by joining the thermal solution with the structural analysis and other parameter.

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