

Development of wire wool based friction material

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Abstract – Automobile disc brakes are a unit safety crucial parts whose performance depends powerfully on contact conditions at the pad to disc interface. Throughout braking each brake pad and disc surfaces worn, touching the helpful lifetime of brake in addition as its behaviour. From literature, it's found that amphibole is wide employed in automobile disk brake pads. However it's found that it's going to cause cancer to soul thanks to its malignant neoplastic disease nature. Thus the aim of this study is to investigate the impact of various material compositions on friction & wear of brake pad. The impact of abradant fiber content variable from four to twelve attempts to barites variable from twenty four to thirty two you choose the damage behaviour of amphibole free brake pad has been investigated. The formulations (S1, S2 and S3) were made by work amphibole with abradant fiber reinforcement, phenoplast & organic compound hydrocarbon Rubber (NBR) as binder. The phenoplast is additionally other as a necessary ingredient to carry all the parts along. NBR could be a smart toughened rubber for the organic binder and encompasses a positive impact to enhance wear. Barites, vermiculite were elite as fillers to boost friction within the formulations. artificial atomic number 6, mineral were used as friction modifier thanks to their smart wear resistant capability. the damage take a look at was performed mistreatment pin on disk machine by variable the slippy speed, applied load and temperatures. Full factorial style of 3 factor- 3 levels and analysis of variance were employed in the study of the damage take a look at. The results shown that wear rate will increase with increasing the slippy speed, load, temperatures. The co-efficient of friction obtained is inside zero.3-0.4 that is inside the counselled commonplace for automobile brake pad. The twelve-tone music fibre content composite gave the higher wear resistance as compared to others. The study of worn surfaces is finished by SEM micrographs that shown that S3 has less secondary tableland as compared to primary tableland. Therefore S3 sample shows higher wear resistance than S1 & S2. The S3 sample has shown higher compatibility in friction and wear with business amphibole brake pad. The results of this study indicate that abradant composite may be effectively used as a replacement to manufacture constraint..

1.INTRODUCTION

A vehicle brake could be a brake accustomed curtails a vehicle by changing its K.E. into heat. The fundamental mechanism, most typically used, typically has six main stages. The foot lever, the brake boost (vacuum servo), the cylinder, the distribution valves and at last the road wheel brakes themselves.

A brake could be a device by suggests that of that artificial resistance is applied to moving machine member, so as to prevent the motion of a machine. within the method of performing arts this perform, the brakes absorb K.E. of the moving member or the mechanical energy given up by objects being lowered by hoists, elevators etc. The energy absorbed by brakes is dissipated within the sort of heat. This heat is dissipated within the close atmosphere to prevent the vehicle; therefore the brakes ought to have following requirements:

- The brakes should be robust enough to prevent the vehicle inside a minimum distance in associate degree emergency
- The driver should have correct management over the vehicle throughout braking and vehicle should not skid
- The brakes should have well antifade characteristics i.e. their effectiveness mustn't decrease with constant prolonged application.
- The brakes ought to have smart antiwear properties.

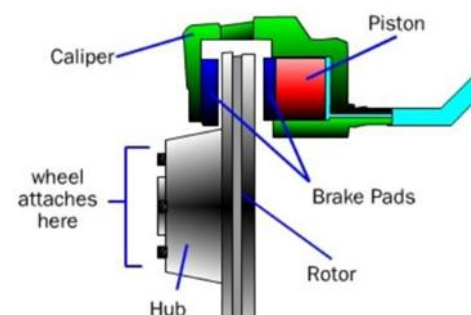


Fig.1.1 Working of Disc Brake

Key Words: SEM, NBR, ABP fibre, Phenoplast,

2. Problem Statement

From the literature review it's found that amphibole, atomic number 51 trisulphide, copper square measure found to be injurious to health of individual. Therefore, it's necessary to exchange these materials employed in constraint with some composite materials. In several papers analysis has been done on ever-changing formulations of the composite materials. totally different natural, organic and bronze fibers composites are tested. The tests square measure conducted on chase kind friction monitor, brake measuring instrument or pin on disc machines. Load, speed, temperature, slippy distance is found to be vital parameters for conducting experiment. Therefore, it's found that terribly less work is finished victimization the abrasive as fiber content and testing the composite for friction and wear of automobile brake pad.

3. OBJECTIVE AND METHODOLOGY

3.1 Objective-

1. to arrange sample of brake pad materials with reinforcement of abrasive.
2. to check tribological properties of abrasive composite (Coefficient of friction & wear rate etc.)
3. To introduce a replacement various for NAO material for brake pad.
4. Experimental verification of hand-picked material at totally different temperatures.
5. to see important parameter poignant wear and constant of friction.
6. Study of worn surfaces of tested samples victimization SEM.
7. Comparative study of developed stuff with business amphibole primarily based brake pad material.

3.2 Methodology-

In general, the most substances in friction materials carries with it fibers, fillers and binder. The binder consists of varied styles of resins like phenolic resin, epoxy, polymer and rubber. The organic compound serves to bind the varied constituent substances within the friction material. Binder will type a matrix at comparatively stable temperature.

3.2.1 Fibers:

Reinforcing fibers square measure wont to offer mechanical strength [5]. Steel wool, additionally referred to as abrasive material or wire sponge, could be a bundle of strands of terribly fine soft steel filaments. it's used as associate degree abrasive in finishing and repair work for sharpening wood or metal objects, cleansing unit kitchen utensil, cleansing windows, and sanding in light-weight painting. abrasive is created from steel (low enough to be about to plain iron). it's

not created by drawing "steel wool wire" through a tapered die, however rather by a method additional like broaching wherever an important steel wire is force through a toothed die that removes a skinny wire shaving. abrasive could be a bronze material that has a superb structural reinforcement property and high thermal stability that square measure so needed to boost the performance of the brake pad.

3.2.2 Binders:

Binder holds parts of a brake pad along. thermoset phenoplast resins square measure unremarkably used, usually with the addition of rubber for improved damping properties. phenolic is invariably used as binder in friction materials thanks to smart combination of mechanical properties like high hardness, compressive strength, moderate thermal resistance, creep resistance and extremely smart wetting capability with most of the ingredient. The high hardness of the phenolic is attributed to the rise within the hardness throughout process. it's clear that from the results higher properties of hardness and compression square measure related to FBP materials possessing higher vol. you look after rosin phenoplast synthetic resin} resin [3].

3.2.3 Frictional Modifiers:

Frictional additives verify the resistance properties of the constraint and comprise a mix of abrasives and lubricants. The literature shows that C powder once used as friction modifier helps in rising the thermal physical phenomenon of the composite brake pad material. It conjointly helps within the dominant the hardness of the brake pad to the specified level. mineral is additionally wide used material as friction modifiers in constraint [5].

3.2.4 Fillers:

Fillers square measure accustomed scale back the price and improve the manufacturability of constraint. totally different minerals like mineral and vermiculite square measure usually used. metallic element salt is another unremarkably used fillers

3.3 Sample Preparation

Sr.No	Ingredients	(Vol.%)		
		S1	S2	S3
1	Wire wool*	4	8	12
2	Synthetic resin	36.5	36.5	36.5
3	NBR rubber	8.5	8.5	8.5
4	Synthetic graphite	10	10	10
5	Zirconium silicate	2	2	2
6	Synthetic barites*	32	28	24
7	Vermiculite	7	7	7

Table 3.3.1 Composition of the sample



Fig. Samples of developed composite after wear



Fig. Samples of commercial ABP material after wear

4. RESULT AND DISCUSSION-

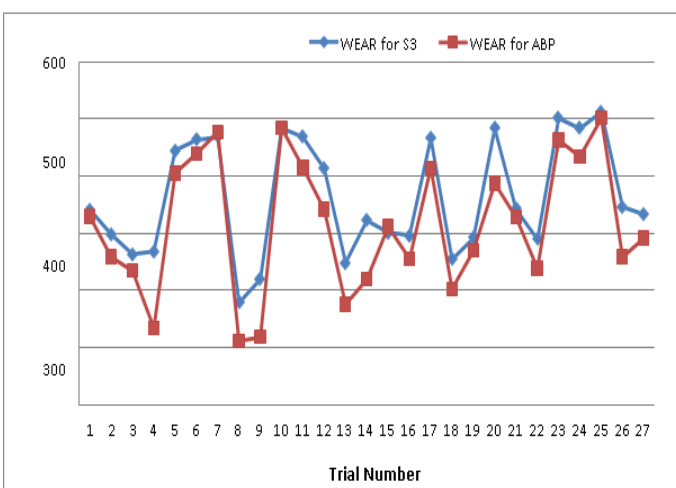


Fig. 4.1 Wear comparison between S3 and ABP

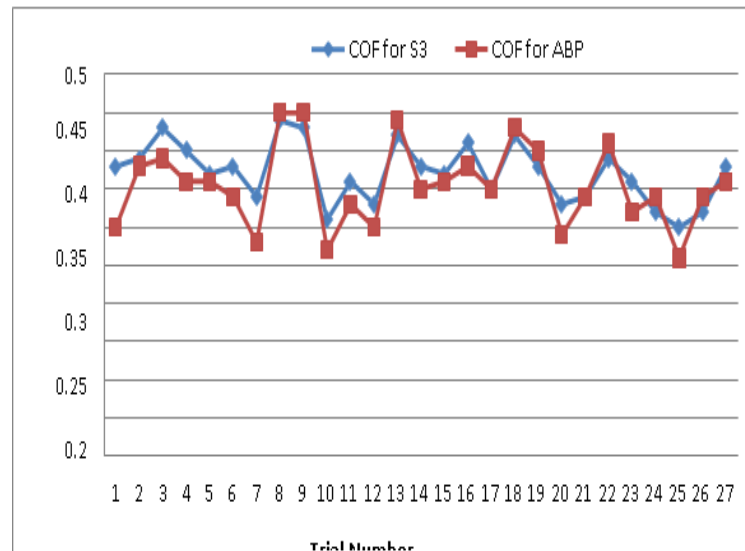


Fig. 4.2 COF comparison between S3 and ABP

3. CONCLUSIONS

- The results shown that wear rate will increase with increasing the slippery speed, load, temperatures.
- The co-efficient of friction obtained is among zero.3-0.4 that is among the counselled customary for automobile brake pad.
- The 12-tone system fibre content composite (S3) given the higher wear resistance as compared to alternative composites S1 and S2.
- The analysis of variance analysis has shown that the variable speed is most vital issue poignant wear followed by load and temperature.
- The variable speed and temperature are found to be most vital parameter poignant constant of friction.
- the damage values for S3 material are found to be nearer to ABP material. COF values for S3 material are found to be higher than that for ABP material.

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