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Review Of Design And Development Of Test Rig For Brake Fluid

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ABSTRACT :

The problems caused by brake failure are very severe. It may cause even danger to life.

So in hydraulic system it is essential to test the brake fluid before in use under different conditions. In order to enable this process it is essential to design some device which would be able to predict the failure of the brake. In case of hydraulic braking system the brake failure takes place due to failure of the hydraulic oil present in the brake system if the hydraulic fluid fails, it results to the failure of the brake simultaneously. Design of the device which will fulfil these requirements should be done. Different types of hydraulic fluids can be tested by the use of this equipment. It is useful for many of the hydraulic fluid manufacturing companies. Many manufacturers require periodic fluid changes to ensure reliability and safety. Once installed, moisture diffuses into the fluid through brake hoses and rubber seals and eventually, the fluid will have to be replaced when the water content becomes too high. For getting the perfect information about the failure of brake fluid the testing of fluid is essential. The test is performed under different pressure and temperature conditions.

1 Introduction :

Braking system implementation

The stop mechanism is quite possibly the prime wellbeing basic segments of current street vehicles. The slowing mechanism's capacity to carry a vehicle to a safe controlled stop is totally important to keep away from unintended harm to the vehicle and individual injury. Brakes ingest the complete energy of moving mass by assessment of erosion powers. Slowing mechanisms might be constrained by mechanical, pneumatic, or pressure driven methods. The water powered brake is noted for short activation time, reduced plan, little generally speaking size, little mass, low acquirement and support costs. Water driven brake principle segments in corporate expert chamber, wheel chamber, brake shoes and their instruments, brake cushions, brake pedals and brake fluid.

A brake is a mechanical component that forestalls movement. There is a typical concept that brakes squeeze the brake drum and it results to pressure. Brakes uses friction from shoes and drum to convert motor energy heat energy. Shoes push the brake drum to convert dynamic energy to nuclear power through rubbing when we apply brakes. While brakes are basically a component for changing sorts of energy. The fundamental three slowing mechanism determinations are:

- Repeatable deceleration in a controlled way
- Aid to keep up consistent downhill speed
- Keep the vehicle fixed on a level or inclination

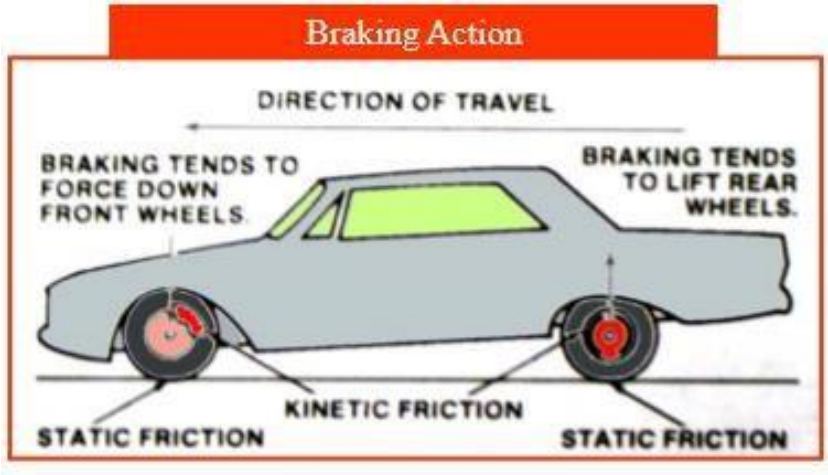


Figure 1.1 Braking Action Factor administering slowing down:

There are four essential variables which decide the framework's slowing down force.

1. Pressure–The measure of erosion delivered between moving surfaces that interact with one another depends to some degree of the press factor placed on the surfaces. By using the pressure force, cushions or shoes are pushed inwards turning rotors or drums fitted on the wheels.
2. Friction coefficient–The COF shows the frictional contact among cushions and rotors auto brakes, and is explicitly adjusted to guarantee ideal proficiency. [RFC 0.25 to 0.55]
3. Frictional surface contact–The measure of air, or zone that is in contact. Greater brakes get the vehicle halted speedier.
4. Heat Dissipation–Brakes produce a lot of warmth. The slowing down capacity is controlled by the weight and speed of the vehicle.

History of Braking System

Passage presented this model in 1908 That car was the main item ever produced and with it the vehicles turned out to be more accessible to the normal. Model T was implicit front of the travelers with a burning motor, four wheels, and back tire drive.

Mercedes Benz dispatched class S 65 AMG during 2013. Created to be the world's generally rich and agreeable vehicle with a 630hp motor, the car can quicken from 0 to 100 km/h in 4.3s, and its maximum velocity is electronically restricted to 250 km/h (due to security reasons). The normal dynamic energy has now been multiple times higher than 105 years prior, bringing tremendous slowing down proficiency necessities. Four circle brakes had supplanted the single band brake. The drivers of the current day expect the vehicle stopping mechanism to function admirably under extraordinary velocities and various conditions.

The requests for brake productivity on games vehicles are a few times higher than those on the Mercedes S class. For example, BMW's Bugatti Veyron Super Sport, answered to be the quickest vehicles available, has a maximum velocity of 429 km/h which brings about a few rate higher greatest dynamic energy than the Mercedes.

1.3 Brake Fluids:

One of the important qualities of brake liquid is boiling point of the liquid. Hydraulic powered frames depend on incompressible liquid to deal with the power. Fluids are by and large incompressible while gases are compressible. On the off chance that the brake liquid bubbles (turns into a gas), it will lose the greater part of its capacity to communicate power. This may mostly or totally incapacitate brakes.

The Importance of Brake Fluids

Brake liquids are principally utilized in the slowing down and grip frameworks of on-and rough terrain vehicles. Run of the mill applications incorporate cars, cruisers and light trucks. With around 253 million vehicles on American streets every day, the stopping mechanism is fundamental for driver security. While vehicle proprietors may change their brake cushions, rotors or drums dependent on a specialist's proposal or their vehicle not halting when it once did, not many individuals supplant the brake liquid. For sure, brake liquid might be a vehicle's most ignored part.

Perusing your vehicle's proprietor manual will give subtleties on certain time sensitive or mileage-based help that ought to be performed, including oil, transmission, coolant and differential liquid changes. In any case, most American manuals offer no rules for when to support the brake liquid. The proposals from liquid makers and different nations commonly range from one to two years for playing out a flush of the slowing mechanism

Classifications and Standard

Brake liquids are arranged into four primary orders by the U.S. Branch of Transportation (DOT): DOT 3, DOT 4, DOT 5 and DOT 5.1. Most liquids fall into the DOT 3, DOT 4 or DOT 5.1 grouping. These liquids are for the most part hygroscopic, which implies they ingest dampness from the air. Spot 5

liquids are not hygroscopic but rather are regularly utilized in vehicles that sit for extensive stretches of time, for example, authority vehicles or military vehicles.

The substance sythesis of the liquids likewise changes with the various characterizations. Spot 3 liquids are glycol ether based.DOT 4 liquids are a combination of glycol ether with borate ester. Dab 5.1 liquids use borate ester with glycol ether mixed in, while DOT 5 liquids are silicone based. The Federal Motor Vehicle Safety Standards (FMVSS) No. 116 characterizes the properties that a brake liquid should must be arranged into one of the DOT groupings. The table

1.1 underneath shows a portion of the limits a liquid should meet to fit inside this order.

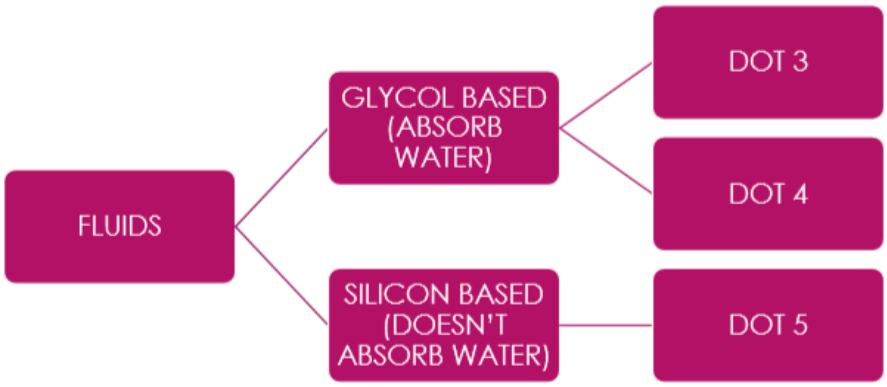
These properties influence how a brake liquid performs. Limit is one of the significant pointers of how the slowing down or grip framework will respond. During slowing down, wheel chambers and brake calipers are exposed to high temperatures because of the grating from the brake cushions coming into contact with the drum or circle. During street course occasions and

track days, it's normal to encounter caliper temperatures of 400 to 500 degrees F. Indeed, even with these higher than ordinary temperatures, the brake liquid actually should perform. A liquid that arrives at its limit will disintegrate inside the line. This makes the liquid become compressible and give insufficient water driven exchange of the slowing down power Boiling point can be broken into two classifications: dry and wet. The dry limit applies to the liquid directly from the compartment. The wet limit is estimated dependent on a 3.7-percent water assimilation.

Another fundamental property of a brake liquid is its thickness. Liquids should meet SAE determinations at less 40 degrees C and 100 degrees C. For the various groupings, the base and greatest consistency reaches will fluctuate.

	DRY BOILING POINT	WET BOILING POINT	VISCOSITY @ -40°C	VISCOSITY @ 100°C	CHEMICAL COMPOSITION
DOT 2	190°C/374°F	140°C/284°F	-	-	Castor Oil/ Alcohol
DOT 3	205°C/401°F	140°C/284°F	Max. 1,500 mm²/s	Min. 1.5 mm²/s	Glycol Ether
DOT 4	230°C/446°F	155°C/311°F	Max. 1,800 mm²/s	Min. 1.5 mm²/s	Glycol Ether/ Borate Ester
DOT 4+, SUPER DOT 4	300°C/572°F	180°C/356°F	Max. 750 mm²/s	Min. 1.5 mm²/s	Glycol Ether/ Borate Ester
DOT 5	260°C/500°F	180°C/356°F	Max. 900 mm²/s	Min. 1.5 mm²/s	Silicone
DOT 5.1	260°C/500°F	180°C/356°F	Max. 900 mm²/s	Min. 1.5 mm²/s	Borate Ester/ Glycol Ether
LHM+	249°C/480°F	249°C/480°F	1,000-1,200 mm²/s	6-6.5 mm²/s	Mineral Oil

Table 1.1 Properties of Brake Fluid



1.6 Types of Brake Fluid Contamination

For what reason would it be advisable for you to change brake liquid if your vehicle's maker doesn't provide guidance for doing as such? Basically, brake liquid is the same than different liquids in your vehicle and ought to be supplanted. It is exposed to pollution from breaking down hoses and lines. At the point when the expert chamber is opened up to review the liquid level, it is presented to dampness defilement.

In the event that the brakes are not appropriately drained, air pollution will stay in the framework. The high temperatures related with slowing down can likewise cook the oil inside the caliper or wheel chamber. This warmth joined with any of the recently referenced toxins can bring about a helpless performing stopping mechanism.

Air

Air pollution inside a stopping mechanism can happen in an assortment of ways. The main source is helpless seeping of the framework. Air may likewise enter the framework because of worn seals and segments. Over the long run, as the cylinders move to and fro, the seals will separate, permitting air into the framework. At the point when worn or broken parts are changed, pockets of air may likewise move into the framework and be hard to cleanse out.
The customary draining strategy for having one individual push down the brake pedal while someone else drains the air in the driver's seat can be tedious and regularly isn't the best for eliminating 100% of the air. Vacuum and pressing factor frameworks offer better choices for eliminating the air.

Moisture

By plan, a brake liquid is planned to ingest dampness. Something else, water particles could spoil the interior segments and harm the stopping mechanism. Obviously, this property includes some significant downfalls. As the brake liquid assimilates dampness, it reduces the liquid's presentation. The high temperatures regular with stopping mechanisms can bring about this dampness disintegrating, which makes the liquid become compressible and gives you that "elastic" feeling.
Not all brake liquids have this property of engrossing dampness. Silicone liquids will just retain such a lot of dampness, leaving the rest to remain in free structure and sink to low spots in the framework. This can prompt consumption.
So whether the tainting is from air, water, temperature or unfamiliar materials, your brake liquid should be changed. I as of late experienced this with my vehicle. While at the quarter-mile drag strip on a bright day, I lost the usefulness of my grip. With a blend of hard dispatches and old liquid in my repository, my grasp pedal fell dead to the floor as I was attempting to change into third gear. Subsequent to giving the vehicle some an ideal opportunity to chill off, I found that my grasp pedal returned to its ordinary immovability.
I looked for an answer for this issue and discovered I was by all account not the only one to encounter this marvel. I set out to address the issue by buying a few parts that didn't permit the stock line to the slave chamber to be presented to such extraordinary warmth. Another improvement was adding a distant bleeder to the framework. With my new equipment and liquid, I'm presently ready to change out the liquid rapidly absent a lot of issue and haven't had a vanishing pedal since.

Testing Brake Fluids

The Federal Motor Vehicle Safety Standards (FMVSS) No. 116 specifies the prerequisites for engine vehicle brake liquids. To be considered for one of the DOT orders, a brake liquid should experience the accompanying tests:

1. Harmony reflux limit (dry limit)
2. Wet harmony reflux limit (tried with 3.7 percent water)
3. Kinematic viscosities
4. pH esteem
5. Brake liquid steadiness (high-temperature and substance security)
6. Consumption
7. Smoothness and appearance at low temperature
8. Held
9. Water resilience (low temperature and at 60 degrees C)
10. Similarity (low temperature and at 60 degrees C)
11. Protection from oxidation
12. Impacts on cups
13. Stroking properties
14. Liquid tone

Relevance/Motivation:

Test rig is a contraption utilized for surveying the presentation of a piece of mechanical or electrical hardware. This framework is intended to assess the grease nature of the brake liquid under unique conditions. The testing is planned according to IS-8654:2001 and SAEJ 1703 oct 88. In this set up the test rig is planned to test the exhibition of the brake liquid in working condition under applied tension and temperature. Brake liquid is stroked under controlled conditions at a raised temperature in a recreated engine vehicle pressure driven slowing mechanism comprising of three slave wheel chambers and an activating expert chamber associated by steel tubing. During the test, temperature, pace of pressing factor rise, greatest pressing factor and pace of stroking are determined and controlled. The framework is inspected occasionally during stroking to guarantee that over the top spillage of liquid isn't happening. A short time later the framework is dismantled. Metal parts and SRB cups are analyzed and reassembled. The brake liquid and any resultant ooze and trash are gathered, analyzed and tried. The principle work to be done in this project is to plan the test rig which is to be utilized for the test work. The test rig comprises of plan of expert chamber, wheel chambers, brake gathering, ace chamber get together, slowing down pressing factor impelling system. In auto designing, the expert chamber is a control gadget that changes over nonhydraulic pressure (usually from a driver's foot) into water powered pressing factor. This gadget controls slave chambers situated at the opposite finish of the water driven framework. The most well-known vehicle employments of expert chambers are in stopping mechanisms. In stopping mechanisms, the worked gadgets are chambers within brake calipers or drum slows down; these chambers might be called wheel chambers or slave chambers, and they push the brake cushions towards a surface that pivots with the wheel until the fixed brake cushions make grinding against that turning surface. A wheel chamber is used in a drum slowing mechanism. It is placed in each haggle placed at the highest point of the wheel, over the shoes. The wheel chambers are mainly associated with the shoes with little fledgling mouth formed

poles. Wheel chamber get together is planned to mount the three chambers in the broiler. The stove is intended to apply temperature. Force pack is intended for impelling the pressure driven gathering. What's more, the absolute circuit is constrained by PLC programming. Numerous makers require occasional liquid changes to guarantee unwavering quality and wellbeing. Once introduced, dampness diffuses into the liquid through brake hoses and elastic seals and at last, the liquid should be supplanted when the water content turns out to be excessively high. For getting the ideal data about the disappointment of brake liquid the testing of liquid is fundamental. The test is performed under various tension and temperature conditions. To test the brake liquid for various pressing factor and temperature the test rig is fundamental to be planned. The issues brought about by brake disappointment are serious. It might cause even risk to life. So in water powered framework it is crucial for test the brake liquid before being used under various conditions. To empower this cycle it is vital for plan some gadget which would have the option to foresee the disappointment of the brake. In the event of pressure driven slowing mechanism the brake disappointment happens because of disappointment of the water powered oil present in the stopping mechanism. In the event that the water driven liquid comes up short, it results to the disappointment of the brake all the while. Plan of the gadget which will satisfy these prerequisites ought to be finished. Various kinds of water driven liquids can be tried by the utilization of this gear. It is valuable for a large number of the pressure driven liquid assembling organizations. Plan of the fundamental parts for the test rig is required. Subsequently this is the essential explanation for choosing this undertaking.

Objective :

Design and Development of Test Rig for Brake Fluid is the main objective of this thesis.
Theoretical, numerical and experimental analysis of Master and Wheel Cylinder will be carried out to find out its Strength under the High pressure and Temperature condition.
The CAD Models will be developed
ANSYS Workbench model will be used to perform the Static and Thermal Analysis on Master Cylinder and Wheel Cylinder.
Experimental Test Rig will be developed to verify various properties of brake fluid and as well as the Master cylinder and Wheel Cylinder will be checked for any leakages.

Outline of Work :

STEP I : Gives the review of literature on design and Development of Test rig for Brake fluid. With motivation from this review this thesis work is carried out and arranged in following manner with different chapters.
STEP II ; Presents theoretical design calculations of wheel cylinder and Master cylinder under Pressure and subjected to High Temperature.
STEP III : Focuses on the CAD Modeling of Master Cylinder and Wheel Cylinder.
STEP IV : Presents Numerical Analysis of Master and Wheel Cylinders under the Static and Thermal Condition.Ansys Workbench software will be used for Study.
STEP V : Presents experimental analysis of Master Cylinder and Wheel Cylinders for Strength. General Arrangement of Test rig will presented in this chapter. Also Test rig will be tested for Brake fluid testing. General Arrangement of Test rig will presented in this chapter.
Chapter VI : Presents results and discussions.
Chapter VII gives outcomes of research work and future work that can be extended in a continuation.

Literature Review :

Introduction :

Braking system is one of the most important parts of our vehicle required to have a better control on vehicle and to stop it within a safe stopping distance. Master cylinder is a control device that converts
Non- hydraulic pressure (commonly from a drivers foot) into hydraulic pressure. This is used for stopping vehicle.
Brakes are most significant security parts in the vehicles. For the most part the entirety of the vehicles have their own wellbeing gadgets to stop their vehicle. Brakes work is to take back and stop the wheel. In order to stop the wheel, slowing down of the cushions are constrained with precision against the rotor plate on the surfaces. They are compulsory for the entirety of the advanced vehicles and the protected activity of vehicles. So, brakes change the motor energy of the vehicle into heat energy, subsequently easing back its speed.
Water powered brakes utilize an extraordinary fluid called brake liquid. Brake liquid is utilized to apply brake strain to cushions or shoes. Most autos have a pressure driven slowing mechanism. The fundamental pieces of this framework are a chamber called an expert chamber. The expert chamber is situated close to the brake pedal. At any rate one wheel chamber is situated at each wheel. Cylinders called brake lines associate the expert chamber to the wheel chambers. The chambers and brake lines are loaded up with brake liquid.
Inside the expert chamber is a cylinder. This cylinder can slide to and fro. In a straightforward pressure driven framework, the brake pedal controls this cylinder by methods for a pole or some other mechanical connection. At the point when the driver pushes on the pedal the cylinder inside the expert chamber applies tension on the liquid… and slides forward a short distance. The liquid sends this pressing factor through the brake lines. This pressing factor powers cylinders in the wheel chambers to push ahead. As the wheel chambers move ahead they apply brake strain to cushions or shoes. The wheel chambers are mounted in either circle brakes or drum brakes.
By thinking about every above certainty, this point attempts to cover writing which manages Design and Development of Test Rig for testing the Brake liquid.

Rahul Singh et al.[1], examined Design of new sort of expert chamber to maintain a strategic distance from the unwanted seeping in the circle stopping mechanism, they planned another kind of expert chamber containing air vessel, to limit or dispense with the unfortunate draining and some different issues identified with slowing mechanism of vehicle, and strategy for locking of every one of the four wheels all the while. Slowing mechanism is perhaps the main pieces of our vehicle needed to have a superior control on vehicle and to stop it inside a protected halting distance. Expert chamber is a control gadget that changes over non-water powered pressing
factor (normally from a driver's foot) into water driven pressing factor. This is utilized, for halting vehicle. They planned another sort of expert chamber containing air vessel, to limit or take out unwanted draining and some different issues, and another technique for locking of each of the four wheels all the while.

Fabio Burlon [2], distributed a paper on Energy Efficiency of Combined Ovens, he distributed a paper to centers around proficient broilers, which devour a lot of energy. They need to fulfill excellent guidelines, high versatility and dependability however they actually don't have overall perceived principles for energy order. The examination has featured an inconceivable correlation among the outcomes and an ensuing troublesome assessment of the energy proficiency of the stove. The ensuing advance of the work introduced in this paper is the distinguishing proof and the improvement of a nitty gritty strategy for examining the energy proficiency of the broiler. The consequence of the strategy is then a guide in the recognizable proof of improved plan specialized arrangements. A portion of these are at last applied, indicating momentous outcomes in the general energy effectiveness of the broiler.

David Amienyoa et al.[3], Studied on Sustainable assembling of customer apparatuses: Reducing life cycle ecological effects and expenses of homegrown stove. This examination has considered life cycle ecological and financial effects of regular and novel profoundly productive stoves. The GWP of the previous reaches from 812–1478 kg CO2 eq. also, of the last between 576–738 kg CO2 eq. over the lifetime of 19 years. Along these lines, HEO broilers can possibly set aside to 30% of energy and somewhere in the range of 9% and 61% of the GWP, contingent upon the suppositions for the cleaning alternatives for the ordinary stove just as on the measure of power utilized per cycle by HEO. A large portion of the GWP for both broiler types is created during the utilization stage, with the power contributing 53%–97% to the aggregate. The crude materials contribute around 1%–2%, while the production of the stove hole represents under 1% of the all out effect. The other natural effects are decreased by 24%–62%.

Robert Bosch GmbH [4] concentrated on Braking framework ace chamber gasket. This innovation identifies with a gasket for an expert chamber. As indicated by this patent, it is given in a notch around the cylinder, and contains a center associated with three considerably annular and concentric lips. The center draws in a side of the score that has a surface furnished with an internal edge followed by a fringe plate, through which at any rate one channel broadens, and bolsters an external crown. An association territory is framed by a break in the crown and deformable by methods for the pressing factor inside the gasket for re-making the progression of the crown and of the snugness, basically along a line, while encouraging the waste of the slowing mechanism without pressure through the channel and the association region.

Yuan Mao Huang et al.[5], Published a paper On Pressure Distributions of Drum Brakes. The reason for this investigation is to examine the impact of the viable lift at the activation end on the contact power, impacts of the Young's modulus of versatility for metal shoes, the points of the circular segment lengths of metal shoes and coating plates, separately, the main area of the covering plates, the thickness of the coating plate, the grinding coefficient, the Young's modulus
of flexibility for coating plates, and the area of the impelling power of the drum brake on the pressing factor disseminations. A two-dimensional model of the drum brake is created by utilizing the BEM, and autonomous and more affordable programming is produced for the PC to diminish the expense for planning drum brakes. By choosing legitimate estimations of these boundaries, a drum brake can be intended to have a more uniform pressing factor dissemination and a more drawn out life.

B.Sandhya Rani et al.[6], Published a paper on Design and Analysis of Plastic Brake Master Cylinder for Automobiles .In this article the idea and investigation of plastic and aluminum ace chamber are performed. The plastic expert chamber is more points of interest for Automobiles. The accompanying ends were made.

CengizYegin et al.[7], Published a diary named, Journal of Petroleum Science and Engineering. In water powered cracking, the plan of the breaking liquids is a pivotal advance in improving the viability of hydrocarbon recuperation. Thus, we depict a supramolecular scattering with exceptionally flexible, reversible thickness conduct, empowering command over the portability, settling, and testimony of proppants. The supramolecular scattering was acquired by complexation of an amino amide and maleic corrosive in a fluid arrangement. The rheological properties of the created cracking liquid including this supramolecular arrangement and proppant (silica sand) were described by recurrence clear and tixotropy tests, and settling examines.

Masood M et al. [8], distributed paper on Braking System of Go-Kart. This report records the interaction and philosophy to create an ease go-kart which is agreeable, defenseless, strong and complete altogether angles by displaying it with CAD programming The achievability of the go- kart configuration was inspected through FMEA, Cost report. The group centers around an in fact sound vehicle which is upheld by a significant plan and great assembling rehearses. The report clarifies approach, reasons, choosing measures and anticipated working of the vehicle boundaries. The procedural method of clarification is utilized for various pieces of the vehicle, what begins from approach with the assistance of well established realities, at that point the plan and figuring strategy has been clarified. The most ideal way realized had been use to go on to the end-product, everything being equal.

KhaingWai et al. [9], distributed paper named, Design of Wheel Cylinder and Average Temperature Rise of Brake Drum for Rear Drum Brake of Hydraulic Brake System. Paper shows Design of wheel chamber measurement used in front circle brake and back drum brake has a major job in water driven stopping mechanism of Hilux. Now a days, water driven brakes are generally utilized in vehicle as they are easy to work, than the mechanical brakes and air powered brakes.

Bhau Kashinath Kumbhar et al. [10], played out A Comparative Study on Automotive Brake Testing Standards. Paper manages Performance testing of car brakes.

2.1 Summary

From the writing overview it very well may be seen that the slowing mechanism has been subject of interest for some specialists. The exploration began from creating hypotheses identified with general conduct of brakes and is currently moving towards upgrading different stopping mechanism boundaries as indicated by applications. Rahul Singh considered Design of new sort of expert chamber to dodge the unfortunate seeping in the plate stopping mechanism. Fabio Burlon distributed a paper on Energy Efficiency of Combined Ovens, he distributed a paper to centers around proficient stoves, which burn-through a lot of energy. David Amienyoa Studied on Sustainable assembling of shopper machines: Reducing life cycle natural effects and expenses of homegrown broiler. Yuan Mao Huang Published a paper On Pressure Distributions of Drum Brakes. B.Sandhya Rani Published a paper on Design and Analysis of Plastic Brake Master Cylinder for Automobiles .In this Paper the plan and examination of plastic and aluminum ace chamber are performed. CengizYegin Published a diary named, Journal of Petroleum Science and Engineering. In water powered breaking, the plan of the cracking liquids is a urgent advance in enhancing the adequacy of hydrocarbon recuperation. KhaingWai distributed paper named, Design of Wheel Cylinder and Average Temperature Rise of Brake Drum for Rear Drum Brake of Hydraulic Brake System. BhauKashinathKumbhar played out A Comparative Study on Automotive Brake Testing Standards. Paper manages Performance testing of auto brakes include assurance of halting time, distance and deceleration level. V.Y Gajjar distributed paper named, Design and Analysis of an Automotive Vacuum Suspended Power Brake Using Pro/MECHANICA. Sourabh Dhole distributed paper named, Stress Calculation in Two Wheeler Disk Brake Master Cylinder Aluminum Piston in CAE.

2.2 Formulation of the Problem

There are numerous effects of braking are found in environment. The absence of brake often leads to mechanical failures and costly maintenance of vehicles. The occupational exposure of humans to braking leads to pain, discomfort and reduced efficiency. The Braking can be improved by following various tests on the brakes. In these cases the braking action can be improved. A literature review motivated to find out effect of various braking actions and their effects during description of its behavior.

From this motivation it is proposed to carryout design, development and analysis of test rig for modifications in the vehicles. Since wheel cylinder and master cylinder are main parts of test rig, these parts will be considered. It is also proposed to carryout experimental analysis to validate the theoretical and numerical results.

REFERENCES

1. Brandt, "Noise and Vibration Analysis - Signal Analysis and Experimental Procedures", John Wiley Sons, Inc., First ed., 2011.
2. Carrela A. et.al.,2009, *"Using Nonlinear Springs to Reduce the Whirling of a Rotating Shaft"*, Mechanical Systems and Signal Processing journal, Volume No.23, pp.2228–2235.
3. Dan Russell, *"The Dynamic Vibration Absorber"*, Acoustics and Vibration Animations.
4. G.K.Groover and A.K.Nigam, "Mechanical Vibrations", Edition-2011.
5. Irshad M. Momin, Dr. Ranjit G Todkar, "Design and Development of a Pendulum *Type Dynamic Vibration Absorber for a SDoF Vibrating System Subjected to Base Excitation"*, International Journal of Mechanical Engineering and Technology (IJMET), pp.214-228, September-December 2012.
6. J. S. Bendat, *"Nonlinear System Analysis and Identification from Random Data"*, John Wiley Sons, Inc., First ed., 1990.
7. J. S. Bendat and A. G. Piersol, *"Spectral Analysis of Non-Linear Systems Involving Square-Law Operations"*, Journal of Sound and Vibration, vol. 81, No. 2, pp. 199 - 214, 1982.
8. Jiang W. J., Henshall J. L., "A Novel Finite Element Model for Helical Spring", Finite Elements in Analysis and Design, Vol. 35, pp. 63-377, 2000.
9. Jiri Vondrich, Evzen Thöndel, *"Engineering Design of Machines with Rotating Members"*, 8th LACCEI Latin American and Caribbean Conference for Engineering and Technology (LACCEI'2010) "Innovation and Development for the Americas", June 1-4, 2010, Arequipa, Perú.
10. M.I. Friswell, E.I. Saavedra Flores, Y. Xia, *"Vibration Isolation using Nonlinear Springs"*, Proceedings of ISMA 2012, pp.2333-2342, 2012.

11. Prof. H.D. Desai, Prof. Nikunj Patel, *"Analytical and Experimental Investigation of a Tuned Undamped Dynamic Vibration Absorber in Torsion"*, Proceedings of World Congress on Engineering (WCE2010), vol. II, 2010.
12. Prof.S. H. Sawant, Dr. J. A. Tamboli *"Analysis and Comparison of Vehicle Dynamic System with Nonlinear Parameters Subjected to Actual Random Road Excitations"*, International Journal of Mechanical Engineering and Technology (IJMET), ISSN 0976 –6340(Print), ISSN 0976 – 6359(Online) Volume 3, Issue 2, May-August (2012).
13. Prof. S.H. Sawant, *"Vibrational Analysis of Active and Semi Active Suspension System Subjected to Random Road Excitation with Time Delay and Non-Linear Parameters"*, a Ph.D. thesis submitted to Shivaji University, 2012.
14. Richard G. Budynas and J. Keith Nisbett, *"Shigley'sMechanical Engineering Design"*, 9th Edition, McGraw-Hill series in mechanical engineering, 2011.
15. S. P. Chavan, *"Experimental Verification of Passive Suspension System Subjected to Harmonic Road Excitation with Time Delay and Non-Linear Parameters with Half Car Model"*, a Master thesis submitted to Shivaji University, 2011 – 12.
16. S. S. Rao, *"Mechanical Vibrations"*, 5th Edition, Pearson Education, Inc., 2010.
17. Sanket Modi, Ajeet Patil and S. P. Chavan, *"Study on Helical Compression Spring of Varying Wire Diameter"*, International Conference on Current Trends in Engineering and Management (ICCTEM 2012) pp.237-240, July 2012.
18. Tarsicio Beleândez et.al.,*"Numerical and Experimental Analysis of a Cantilever Beam: a Laboratory Project to Introduce Geometric Nonlinearity in Mechanics of Materials"*,International Journal of Engineering, Vol. 19, No. 6, 2003, pp. 885-892.
19. Yu chengsu, Dr.Yuyilin,*"Modeling, Verification, Optimal Design of Nonlinear Valve Spring"*, a Master thesis submitted to University of Missouri-Columbia, December 2009.
20. Yung-Sheng Hsu, Neil S Ferguson, *"The Experimental Performance of A Nonlinear Dynamic Vibration Absorber"*, Proceedings of IMAC XXXI Conference and Exposition on Structural Dynamics, USA, 2013.
21. Zahra Khazaei Poul, Prof. Mrs.J.G.Nikam,2013 *"Fatigue Analysis of Helical Spring using CATIA V5 and FEA Software"*, International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 10, October – 2013, ISSN: 2278-018, pp 2798-2800.
22. ZuoShuguang,YangXianwu,Wang Jirui,Lee,*"A Finite Element Analysis of the Barrel-Shaped Helical Spring on the Vehicle Rear Suspension"*,ICCDA Vol 2, 2010.

LIST OF PUBLICATIONS

1. Mr.Amit A. Hingane and Prof. Dr. S. H. Sawant, 2013, *"An Overview of Disarray in Undamped Dynamic Vibration Absorber Subjected to Harmonic Excitation with Nonlinear Parameters"*, International Journal of Emerging Science and Engineering (IJESE)ISSN: 2319–6378, Volume-2, Issue-2, pp.: 13-15
2. Mr.Amit A. Hingane and Prof. Dr. S. H. Sawant, 2013, *"Vibrational Analysis of Undamped Dynamic Vibration Absorber subjected to Harmonic Excitation with Nonlinear Parameters"*, Avishkar 2013-14, Shivaji University Post Graduation Research Project Competition (Poster Presentation) held at Shivaji University Kolhapur.
3. Mr.Amit A. Hingane and Prof. Dr. S. H. Sawant, 2014, *"Theoretical and Numerical Analysis of Undamped Dynamic Vibration Absorber"*, International Conference on Eco-Friendly Technologies for Sustainable Growth (ICEFT-14), at MHSS, College of Engineering ,Byculla, Mumbai, ISBN NO:978-93-8335-220-3, pp.: 72-74.
4. Mr.Amit A. Hingane and Prof. Dr. S. H. Sawant, 2014, *"Static Analysis of Helical Compression Spring used in Vibration Absorber with Nonlinear Parameters"*, International Journal for Scientific Research & Development (IJSRD), Vol. 2, Issue 04, 2014, ISSN (online): 2321-0613, pp.: 568-570.
5. Mr.Amit A. Hingane and Prof. Dr. S. H. Sawant, *"Analysis of Quadratic Nonlinear Mass and Cubic Nonlinear Spring Dynamic Vibration Absorber Subjected to Harmonic Excitation"*(In Process).