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### “A REVIEW ON WEIGHT OPTIMIZATION OF AUTOMOBILE WHEEL RIM USING FINITE ELEMENT METHOD”

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### ABSTRACT

*In this paper, the survey about different papers which depends on dissected with the limited component strategy and test works, utilizing the distinctive stacking test. Day by day the competition is increasing with new innovations and ideas in automobile sectors. With these innovations, a new path is created in the product development. In this development there is a large scope in modifying the existing materials or replacing old products by new and advanced material products. Automotive organizations are paying their major interest in the weight reduction of components because the weight of the vehicle is the most important factor to be considered as it affects the fuel economy. This weight can be reduced by introducing new materials with better properties and manufacturing process with optimization of design. The dynamic analysis are concentrated so as to discover the zones with higher pressure focus and fatigue life expectation are concentrated so as improve the life cycle of wheel and also to suggest the better design solution. The motivation behind the vehicle wheel edge supplier's a firm base on which to fit the tire. Its measurements, shape ought to be reasonable to sufficiently suit the specific tire required for the vehicle. In this examination a feel worn out on vehicle wheel edge having a place with the combination wheel classification is thought of. The advancement of the vehicle business has emphatically impacted the structure, the material determination and the assembling procedures of the wheels. The wheels loading manner is a complex one; further improvement and efficient wheel design will be possible only if their loading will be better understood.*

**Key Words:** Dynamic Analysis, Fatigue, Finite Element method, Wheel Rim

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### I. INTRODUCTION

Wheel rim is an inseparable part of an automobile mounted on the axle hub of a vehicle. Its main functions are to rotate over the axle of a automobile so as to use power from engine to propel automobile, provide support for braking system over its body, dissipate heat generated in the body of wheel rim to surrounding environment, support whole body weight as well as withstand against impact load due to pot holes and road irregularities with constant load of rider body as well as constant tyre pressure. Wheels have a vital importance for the safety of the vehicle and special care is needed in order to ensure their stability. The advancement of the wheel has strongly influenced the design, material selection and the manufacturing process. They are loaded in a complex manner and further improvement in the wheel design will be possible only if their loading will be better implicit. In order to achieve an optimum design of the wheel, the accurate knowledge of the loading, the mechanical properties and allowable stresses of the material is required.



**Fig.1 Wheel Rim**

### **1.1 TYPES OF WHEEL (MATERIAL)**

Steel and light alloy are the foremost materials used in a wheel rim however some composite materials together with glass-fibre are being used for special wheels.

#### **A. Wire spoke Wheel**

Wire spoke wheel is an essential where the exterior edge part of the wheel rim and the axle mounting part are linked by numerous wires called spokes. Today's automobiles with their high horse power have made this type of wheel manufacture obsolete. This type of wheel is still used on classic vehicles.

#### **B. Steel Disc Wheel**

This is a rim which practices the steel made rim and the wheel into one by joining (welding), and it is used mainly for passenger vehicles especially original equipment tires.

#### **C. Light Alloy wheel**

These wheels are based on the use of light metals, such as aluminium and magnesium has come to be popular in the market. This wheel rapidly become standard for original equipment vehicle in Europe in 1960's and for the replacement tire in United States in 1970's. The advantages of each light alloy wheel are explained as below.

#### **D. Aluminium Alloy Wheel**

Aluminium is a metal with features of excellent lightness, thermal conductivity, physical characteristics of casting, low heat, machine processing and reutilizing, etc. This metal main advantage is decreased weight, high precision and design choices of the wheel.

#### **E. Magnesium alloy Wheel**

Magnesium is about 30% lighter than aluminium and also admirable as for size stability and impact resistance. However its use is mainly restricted to racing, which needs the features of weightlessness and high strength. It is expensive when compared with aluminium

#### **F. Titanium alloy wheel**

Titanium is an admirable metal for corrosion resistance and strength about 2.5 times compared with aluminium, but it is inferior due to machine processing, designing and more cost. It is still in developed stage.

#### **G. Composite material wheel**

The composite material wheel is different from the light alloy wheel, and it is developed mainly for low weight. However this wheel has inadequate consistency against heat and for best strength.

**1.2 WHEEL RIM SPECIFICATIONS**

Sr. No.	Parameters	Dimensions
1	Rim Nomenclature	5.5Jx15 ET38
2	Flange Shape	J
3	Rim Diameter	15 inch
4	Rim Width	5.5 inch
5	Offset	35
6	Pitch Circle Diameter	100 mm
7	Hub Diameter	48 mm
8	Number Of Bolt Holes	4 nos.
9	Number of Spokes	12 nos.

**II. LITERATURE REVIEW**

**Xin Jiang et al [2019]** Designing lightweight and comfortable automotive vehicles is a primary aim of the industry. Lightweight wheel designs can have a negative effect on the dynamic impact performance of the wheel; therefore, striking a balance between these two factors is a key objective in the design of automotive vehicles. Magnesium alloy wheels were investigated as magnesium alloy has damping performance advantages over some metal materials. Damping test methods were designed to establish the damping performance parameters of the magnesium alloy material. A finite element analysis model of magnesium alloy wheels was established with certain boundary conditions and constraints. The applicability of the model was verified by free modal evaluation of the wheel. Dynamic impact simulation analysis of the designed wheels was carried out, and the dynamic speed responses of magnesium alloy wheels under the impact of a dynamic load on the road surface were obtained. Comparison of the dynamic impact performance of magnesium and aluminum alloy wheels with the same structure showed that the magnesium alloy wheel achieved the target weight reduction of 32.3%; however, the dynamic impact performance was reduced. In order to realize the lightweight design, the dynamic impact performance of the magnesium alloy wheel should not be inferior to that of the aluminum alloy wheel; therefore, the design of the magnesium alloy wheel structure was optimized. The structural design optimization of the magnesium alloy wheel was carried out by defining the structural parameters of the wheel and using the acceleration and shock response of the wheel as the outputs. The optimization of weight reduction and dynamic impact performance of magnesium alloy wheels was achieved. Consequently, the designed magnesium alloy wheel was shown to have improved ride comfort while satisfying wheel structural performance standards and providing lightweight design.[1]

**Sahil Bandral et. al [ 2018]** The wheel edge is one of the most basic parts of the vehicle. Subsequently, various tests must be performed on it so that, it could meet the wellbeing prerequisite. Be that as it may, physical testing and the investigation of the wheels during their advancement is exorbitant and tedious. Along these lines, limited component examination (FEA) has created as a significant apparatus for their investigation. In this paper, we considered the reproduction of 90-degree sway test for a cast aluminum wheel utilizing 3-D unequivocal limited component examination. Displaying of four distinctive wheel edge models having the diverse number of spokes alongside striker had been finished utilizing CATIA P3V5-6R2017 programming and investigation was finished utilizing ANSYS15.0. The investigation results are introduced as an element of time and the most extreme estimation of identical Von Mises weight on the wheel edge is determined for each model.[2]

**Chaitanya Sureddi et. al. [2018]** step by step the opposition is expanding with new advancements and thoughts in car divisions. With these advancements, another way is made in the item improvement. In this improvement there is a huge extension in adjusting the current materials or supplanting old items by new and propelled material items. Car associations are paying their significant enthusiasm for the weight decrease of parts in light of the fact that the heaviness of the vehicle is the most significant factor to be considered as it influences the efficiency. This weight can be diminished by presenting new materials with better properties and assembling process with enhancement of

structure.. By this we can accomplish more eco-friendliness in vehicles because of decreased loads. Limiting the weight in the wheel is more successful than limiting the weight in different segments in light of its rotational snapshot of dormancy impact during its movement and furthermore the tire take the general vehicle load and gives padding impact. This undertaking is with the structure of aluminum combination wheel for the vehicle application by paying exceptional reference to streamlining of the mass of wheel by utilizing current chances and patterns. By decreasing the weight we can accomplish the goal the lessening of unsprung mass, by which the inactivity burdens and generally weight are diminished with progress of execution and efficiency. There is enormous extension for diminishing the mass of aluminum wheel by changing or supplanting the materials with composites to build the direction of stresses and to diminish its mass and volume. For this accomplishment the composite materials are acquainted with lessen the heaviness of the segments. From the limited component figurings it is discovered that the mass of the wheel edge can be diminished to half from the current composite wheels. The examination additionally shows that after the advancement the anxieties produced from the wheel edge will be beneath the yield pressure. This gave another methodology in the field of improvement of traveler vehicle wheel edge. In this undertaking we will incorporate the displaying by utilizing CATIA V5 R20 and investigation by utilizing ANSYS15.0.[3]

**Kalpesh R.Salunkhe, Prof.Shailesh S.Pimpale et. al. [2017]** Wheel is a fundamental mechanical term of the vehicular suspension framework that underpins the static and dynamic burdens experienced during vehicle activity. Since vehicles convey substantial heaps of inhabitants just as self-weight, the combination wheel edge ought to be sufficiently able to withstand this heap. Along these lines, their plan ought to be done carefully. While structuring such primary sort of car part dealing with assurance and cost are significant concerns so client can utilize it securely. Significant five specialized contemplations while demonstrating any new amalgam wheel edge are styling, tasteful, mass, manufacturability and ability. While dissecting pressure and dislodging appropriation in vehicle wheels exposed to expand weight and spiral burden .basic endeavors have been taken to find the Finite Element Techniques. Composite wheel edge has been planned utilizing Creo programming, after that static basic investigation is finished with various materials, burden and limit conditions utilizing ANSYS Software. Finally the consequences of all out twisting and identical burdens are gotten for various wheel edge materials and contrasted and one another. In this way, as well as can be expected be chosen for assembling of the wheel rim.[4]

**Stasys Steišūnasa,et. al. [2017]**, This paper depicts the investigation of the vertical elements of the traveler vehicle movement thinking about the vertical powers of wheel/rail cooperation. The point of this examination is the evaluation of the perfection of traveler vehicle running while one wheel is with a level. The scientific models of wheel level effect on the rail and whole traveler vehicle dynamic models are characterized. So as to assess perfection of rail vehicle development by PC recreation implies the product bundle Simpack was utilized. For this situation, the wheel-level was displayed thinking about the deviation of wheel moving span. On the base of the hypothetical investigation, the vertical increasing velocities of traveler vehicle with wheel level running on the digression track were assessed. The examination of traveler carbody motions was performed, while the vertical damping and firmness of the vehicle essential/auxiliary suspension changed inside the predetermined range. The estimations of quickening signals were estimated and explained. At long last, fundamental ends are given.[5]

**Venkatesh.K\* et. al [2017]** The necessities for improved firmness, unwavering quality, exhaustion life and expanded effectiveness includes difficulties of creating imaginative plan arrangements. The current work predominantly center around the structure of vehicle combination wheel, where the scientific and FEM investigation approach was executed to dissect gauge plan. At first static investigation was performed to get absolute twisting, strain and the pressure of vehicle combination wheel. Three Dimensional model was made utilizing CATIA while it was discretized utilizing ANSYS to perform post preparing examination for acquiring anticipated arrangement. The outcomes were acquired through straight static examination regarding Total disfigurement, Minimum chief pressure, Max Principal weight on 4 arms haggle dynamic investigation (modular investigation) was been done to get various modes with various recurrence for 4 arms wheel.[6]

**A I Fedotov1, V G Zedgenizov1, N I Ovchinnikova et. al. [2017]** The motivation behind the paper is to examine the elements of the slowing down of the wheel under typical burden varieties. The paper utilizes a scientific reproduction strategy as indicated by which the figuring model of an article as a mechanical framework is related with a

progressively proportional schematic structure of the programmed control. Move work apparatus examining basic and specialized attributes of an article just as power aggravations were utilized. It was demonstrated that the examination of dynamic attributes of the wheel exposed to outer power unsettling influences needs to consider abundancy and stage recurrence qualities. Typical burden varieties sway vehicle wheel slowing down exposed to aggravations. The closer slip to the basic point is, the higher the effect is. In the super-basic region, load varieties cause quick wheel blocking.[7]

**Gamachisa Mitiku Tadesse [2017]** The car business is a critical help of the nation's monetary movement. Around 90 percent of vehicles are claimed and worked by singular administrators. A vast larger part of the four wheelers are built by units in semi-sorted out/composed segments spread over the nation. There is significant degree to improve the plan of their items. There are various sorts of wheels bodies accessible, for example, Steel, Aluminum, Magnesium, Titanium, and so forth. In Regular business vehicles steel wheels are commonly utilized. For steel destructive obstruction, warm conductivity, weight, throwing and machining properties are low contrasted with aluminum amalgam. In the plan of car, the businesses are utilizing aluminum combination material so as to get decrease of weight without huge lessening in vehicle quality and dependability. This is because of the way that the decrease of weight of a vehicle straightforwardly impacts its fuel utilization. With this idea of decreasing weight and stress decrease the wheel is demonstrated and examined. In this task, Aluminum compound is contrasted and steel. In this task a parametric model is intended for steel wheel from existing model. The wheel model is demonstrated in CAD bundle CATIA and Static auxiliary, Modal and Fatigue examination are done in FEA bundle ANSYS WORKBENCH for Steel and Aluminum Alloy A356.2 materials. By leading the Finite Element Analysis on the wheel Model the aftereffects of Steel and Aluminum Alloy wheel were presented.[8]

**Rahul K. Jape et. al [2016]** This paper manages the plan of aluminum composite wheel for car application which is completed paying unique reference to streamlining of the mass of the wheel. The Finite Element investigation it shows that the improved mass of the wheel edge could be diminished to around half when contrasted with the current strong circle type Al composite wheel. The FE examination shows that the pressure created in the improved segment is well underneath the genuine yield worry of the Al combination. The Fatigue life estimation by limited component examination, under outspread exhaustion load condition, is completed to break down the pressure dissemination and came about dislodging in the composite wheels. S-N bend of the segment portrays that as far as possible is 90 MPa which is well beneath the yield worry of the material and safe for the application. The FE examination showed that significantly after a weariness pattern of 1020, the harm on the wheel is discovered just 0.2%. [9]

**Gaurav Machave and Pote Susheel Sambhaji [2015]** are portray the utilization of the investigation of weight and burden applied on wheel edge by exploratory strategy creator utilizing Radial Fatigue Test (RFT) and limited component technique utilized for breaking down weights on wheel edge what's more, relocation circulations in wheel edges of vehicle when wheel to the conjoint impact weight and outspread burden on wheel. The normally use thought in the plan of the wheel edge. A possibly practical technique for limited component displaying with the assistance of programming exposed to loads is featured on wheel.[10]

**Turaka.venkateswara Rao and ,Kandula. Deepthi [2014]** are bargains that Rims are extremely basic segments of our vehicle. The wheel is a gadget it has turning movement of subject over a surface where there is a powers following up on the outside of article. There are such a large number of kinds of wheels are made by human from the old age. In any case, presently present day world there are two sorts of wheels are utilized. Each vehicle was structured with different kinds amalgam wheels these are more agreeable than spokes wheels. In the undertaking creator planned the wheel edge with the current measurements by utilizing of demonstrating programming. There are the 3D models are made by programming for this task first is genuine is utilized in quite a while, second model is altered model of which is utilized in most recent vehicle and the last model have alteration of most recent wheel edge. The three models of wheel edges are utilized for examination. The creator has picked various sorts materials which are Al compound, Zn composite, and Mg combination and Steel amalgam. The outcomes were contrasted and all materials and we locate the best material was proposed to the industries.[11]

**S.Ganesh and Dr.P.Periyasamy [2014]** are talk about that Design is reproduced by examining the model of wheel edge by changing the structure model of wheel edge styles to be a lot of solid and adjusted. Its material ought to have with enduring and erosion opposition. Combination wheels are which are produced using of aluminum compound or



magnesium composite metals and furthermore produced using blend of both amalgam. Compound wheels edge are commonly not quite the same as steel wheel edges. It have lighter in weight, and it improves the treatment of the vehicle. Compound wheels will lessen the undesirable load of a vehicle think about standard steel wheels. The advantage of decreased weight is increasingly precise taking care of and lessening in fuel utilization by the vehicle. Composite is a decent conductor of warmth, it improve heat dispersal from the slowing down condition, diminishing the danger of brake disappointment under in driving conditions. At present vehicle wheel edges are made of Aluminum Alloys. In the task, creator is contrast Aluminum compound and other Alloy. In this venture a model is structured with the assistance software.[12]

**Ch. P. V. Ravi Kumar [2014]** are talk about that wheel edge load tests are required for planning of wheel edge and assembling of wheel edges is a lot of prerequisites of tests. The effect loads execution of a wheel edge is the serious issue. Numerical technique usage of effect load test is important to abbreviate the plan time, and improving execution of haggles diminishing the expense. This task has chooses the "Topology Optimization of Aluminum Alloy wheel edge" utilizing investigation. From the bombed estimation of plastic strain for Aluminum Alloy Wheel edge is 4.0%, splits will checked whether the Plastic Strain estimation of composite is more prominent than 4%. This examination will show the plastic strain esteem is instigated during sway load testing. Topology Optimization technique has conveyed by expanding the thickness of the wheel edge at the plastic strain esteem show is beneath 4%. The principle focus of the undertaking is to make a Finite component model Hexa and Penta components utilizing Hypermesh with, materials, burdens and Boundary conditions are applied on model. Effect load examination is conveyed by the utilizing LS-Dyna programming, it show the plastic strains of model during sway test. Topology Optimization is changing the thickness of the wheel edge of the Aluminum Alloy Wheel have the estimation of plastic strain is under 4.0%.[13]

**J. Janardhan and V. Ravi Kumar [2014]** are bargains that significance of wheel in the car. The vehicle can be towed without the any motor yet it is unimaginable without the wheels, the wheel edges and the tire need to endure all vehicle loads, additionally give the directing control. The fundamental necessities of vehicle wheel are; it ought to be sufficiently able to all presentation and capacities. It must be adjusted both condition statically and powerfully. It likewise ought to be light weight and lessen the undesirable weight is least. The Wheel edges have finished three kinds of burden assessments before going into creation of wheel edge, they have acting weakness test, Radial exhaustion test and Impact load test. In the task, it had done outspread weakness investigation to locate the quantity of cyclic burden when the wheel is getting the chance to fizzle. The 2D model of the wheel edge was made in MDT programming and after that these model of wheel edge was traded to ANSYS, the limited component technique utilized. IGES interpreter is utilizing for where the 3D model of the wheel is made. The wheel edge is coincided utilizing SOLID 45 component in ANSYS.[14]

**V.Karthi and N. Ramanan [2014]** are examine to the plan the engine cycle composite wheel edge utilizing the PRO-E structure programming and Analyzed with the assistance of ANSYS. ANSYS is a device which is utilized for the assessment of frameworks and structures of models. It is utilized to investigate complex structures of model without any problem. There are three strategy utilized in the task which are preprocessing, investigation all heaps and perception. The creator select material was a magnesium combination, aluminum amalgam, titanium composite. The aluminum amalgam is smarter to the steel metal wheel edges in sturdiness and quality. These combination have phenomenal wear opposition, anticorrosion properties and it have longer assistance life as tried by the pressure recurrence dissemination. The investigation is done in programming with the higher burden can be applied on wheel edge. In each vehicle back huggle wheel have the higher burden that can be upheld. The pressure of the examination is show bring about the scope of the yield quality of Aluminum combination. The Displacement of amalgam wheel is at the low worth. This plan is have in the safe condition.[15]

**T. Siva Prasad and T. Krishnaiah [2014]** are talk about to synopsis of vehicle wheel edge gives a base of edge structure on which tire is fitted. Furthermore, measurements of car and state of wheel edge ought to be reasonable for specific tire required for the vehicle. This venture show vehicle wheel edge has a place with the tire. Configuration is generally significant for each industry which impacts the nature of the item. The wheel edge model is making by utilizing demonstrating programming SOLIDEDGE. Utilizing SOLIDEDGE programming the time spent in making 3-

D models and the hazard inset in the structure and assembling procedure of wheel edge can be handily decreased. In the wake of making total model of wheel edge is import to ANSYS for investigation work. ANSYS is the product which is utilized for mimicking and investigation the various powers, pressure load following up on the model and furthermore ascertaining and see the outcomes without any problem. ANSYS static investigation work is continued wheel edge model by considering two sorts various materials like aluminum and produced steel. also, we discover relative exhibitions of wheel edge with assistance of ANSYS programming. Wheel edge is acting to modular examination; this is a piece of dynamic investigation. This paper watch the outcomes static and dynamic examination got manufactured steel is proposed as best material.[16]

**M. Saran Theja and M. Vamsi Krishna [2013]** are examine that by and large wheel spokes are the backings all heap and it comprising of a spiral individual from a wheel edge have joined the center point. The materials are utilizing for causing Wheel to have fantastic light weight, consumption obstruction, warm conductivity, qualities of throwing, low high damping, temperature property, machine preparing and reusing, and so forth. In this task metal principle advantage is decreased load of vehicle, high precision of the wheel edge. This metal is valuable for preservation of vitality since it is conceivable to extremely simple re-cycle. Spokes of wheel edge make gorgeous vehicles however it have required upkeep issue. The capacity of spokes execution is ideal yet it has huge consideration for support and it conveyed huge measure of pressure load. There are for the most part two kinds of cruiser wheel edges are utilized like strong wheel edges and talked type wheel edge. The issue of talked edge is more prominent on the grounds that the spoke are break, wheels have unequal and it break center. And furthermore upset the riding it cause for harm vehicle. By and by, in engine cycles Aluminum composite wheel edge are utilized, presently this is supplanting by new magnesium compound due its preferable mechanical properties over Al-amalgam. A significant focal point of this paper examination of stresses and relocation of the wheel edge distinctive material like aluminum composite and magnesium amalgam. It assume significant job for safe riding. This paper has with the static and weakness load investigation of the wheel edge. An amalgam wheel of Suzuki GS150R vehicle is picked for study. [17]

**Saurabh M Paropate [2013]** is examine that Alloy wheel edges which are produced using an aluminum combination or magnesium compound Metals and furthermore utilized blend of both material. Combination wheels contrast from regular steel wheel edges since it has lighter in weight, which improves the driving and treatment of the vehicle. Amalgam wheels made up of blend of various metal components it lessen the undesirable load of a vehicle like aluminum combination wheels. The advantage of diminished undesirable load of vehicle is increasingly happy with dealing with and decrease in fuel utilization by the vehicle. Compound is a decent conductor of warmth, It improve heat scattering from the Brakes and lessening the danger of brake disappointment condition. Engine cycle wheel edges are made of Aluminum Alloys. Creator looked at between aluminum amalgam and other Alloy metals and composite materials. A parametric model is planned with assistance of programming for Alloy wheel utilized in cruiser from existing model. Wheels have static burden and exhaustion loads. This heap grows overwhelming worries in the wheel edge and in this manner it is important to locate the basic emphasize point and shear worry in the wheel edges. The model must be worked by programming and, loads are applied on wheel edge and arrangements are acquired. It utilize model of bike Bajaj pulsar 150 cc.[18]

**N. Satyanarayana and Ch.Sambaiah [2012]** are talk about the detail of exhaustion Analysis in Aluminum Alloy Wheel edge under outspread burden condition. The piece of this task has static burden and weakness load investigation of aluminum compound wheel. It utilized compound A356.2 for make configuration utilizing FEA. The three dimensional model for examination of the wheel edge was structured utilizing SOLIDEDGE programming. After that these 3-D model was brought into ANSYS. The limited component strategy is utilized for creating the hubs in modular. At that point it created the 10 hub tetrahedron strong component. What's more, the examination was acted in the model in a static condition. We are compelled in all level of opportunity at the PCD and center segment of wheel edge. After that the weight is applied on surface the edge. Presently we discover the absolute twisting of body, worries by utilizing FEA programming. And furthermore we discover the life of wheel edge, and wellbeing element and harms by utilizing S-N bend with the assistance of software.[19]

**S Vikranth Deepak and C Naresh [2012]** are depict Alloy wheels are which are produced using of aluminum combination or magnesium composite metals and furthermore produced using blend of both amalgam. Compound

wheels edge are commonly not the same as steel wheel edges. It have lighter in weight, and it improves the treatment of the vehicle. Amalgam wheels will diminish the undesirable load of a vehicle analyze standard steel wheels. The advantage of diminished weight is increasingly exact dealing with and decreasing in fuel utilization by the vehicle. Composite is a decent conductor of warmth, it improve heat dissemination from the slowing down condition, diminishing the danger of brake disappointment under in driving conditions. At present vehicle wheel edges are made of Aluminum Alloys. In the venture, creator is contrast Aluminum amalgam and other Alloy. In this venture a model is planned with the assistance programming. Structure of wheel is broke down and it taking extreme worries in two distinctive compound materials and various burdens condition. The creator utilized model of Ford Fiesta.[20]

**Liangmo Wang and Yufa Chen - Chenzhi Wang [2011]** have improved the nature of aluminum wheel edge utilizing another technique for assessing the weariness life of aluminum wheel edge. The ABAQUS programming was use in the venture and it assemble the static burden limited component model of aluminum wheel edges for recreating the rotating exhaustion test. The proportional pressure sufficiency of model was determined dependent on the ostensible pressure technique in the product by thinking about the impacts of mean burden, size, weakness score, surface completion and dissipate factors in model. The weakness life of aluminum wheel edges was controlled by utilizing the proportional pressure abundancy and aluminum compound wheel in S-N bend. The outcomes from the aluminum wheel in rotational weakness seat test appear in the standard wheel edge bombed the test and its break producing was around the center jolt opening region of wheel edge that concurred with the reenactment of model. The wheel edge life cycle was improved by count and fulfilled the plan necessity. The outcomes indicated that the proposed technique for coordinating limited component examination and ostensible pressure strategy was a decent and proficient to anticipate the exhaustion life of aluminum wheel rims.[21]

**C.L. Chang and S.H. Yang [2008]** are bargains different objectives to accomplish better execution of wheel edge and quality, the wheel edge plan and assembling process utilize various wheel tests required pivoting test, spiral burden, weariness load test, and effect load test to safeguard that the wheel edge have the wellbeing necessities. These all heap tests is very tedious and it have significant expense. PC recreation of these heap tests on the product effectively can decrease the hour of burden test and cost required to play out a wheel edge structure. Non-straight powerful limited component strategy is utilized to reproduce the SAE wheel sway test on the software.[22]

### III. CONCLUSION

Wide varieties of materials are available in the market which can be used for the wheel rim. Generally used wheel rim materials are Al alloy, Mg alloy, Steel C 1008, Forged Steel. Each material has some advantages over the other. If original equipment manufacturers require excellent aesthetic shape with very good heat dissipation without compromise with its associated costs then light weight material such as Al and Mg alloys can be used for wheel rims. But we will be used our proposed work composite materials wheel which will be analyzed in ANSYS design software.

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