Static Analysis of Alloy Rim

K. Kandasamy[1], T. Amalraj[2] ,J.Anandha babu[3] , K. Arun[4], C. Ganesan[5]
[1, 2, 3, 4, 5] Dept of Mechanical Engineering
[1, 2, 3, 4, 5] Rathinam Technical Campus, Coimbatore, India.

Abstract- *The purpose of the car wheel rim provides firm base on which to fit the tire. Its dimensions, shape should be suitable to adequately accommodate the particular tire required for the vehicle. In this study a tire of car wheel rim belonging to the disc wheel category is considered. The wheel rim is designed by using modelling software SOLIDWORKS. In modelling the time spent in producing the complex 3-D and risk involved in design and manufacturing the process can be easily minimized.so the modelling of the wheel rim is made by using SOLIDWORKS. Later different forces acting on the component and also for calculating and viewing the result.*

I. INTRODUCTION

The recent introduction of alloy wheel for car, which has more complicated design and shape than a regular shape, needs prediction of fatigue life by analytical methods rather than a regular test. Limited research has been carried out on the analysis of wheel disc using finite element analysis .

The fatigue life of aluminium alloy wheels Under radial loads and reported that the predicted fatigue life of wheel is found to be in close agreement with the experimental observations. We have analysed the life by finite element simulation. SOLIDWORKS Software was used for building the static load finite element model. The results of Al1060 alloy wheel bolt hole area which is closely agreed with the prediction by simulation. It was also reported that during the assembly of wheel disc, considerable amount of stress is developed in the component and alters the mean stress value. In the previous study, it is observed that in most of the cases fatigue life estimation and prediction of suitability of alloy for wheel disc is carried out; however no attempt has been made for mass optimization and design of alloy wheel.

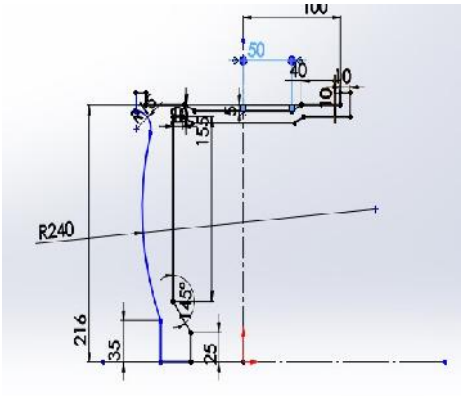
Hence, in the present investigation an attempt has been made to analyse the alloy wheel from a solid disc shape to an improved design which resulted into use of less requirement of mass of material with improved design. The objective of this paper is to design an aluminium alloy wheel by meeting all the design standards. the area between the rim and the hub is considered for optimization. Static analysation has been carried in three cases

II. METHODOLOGY

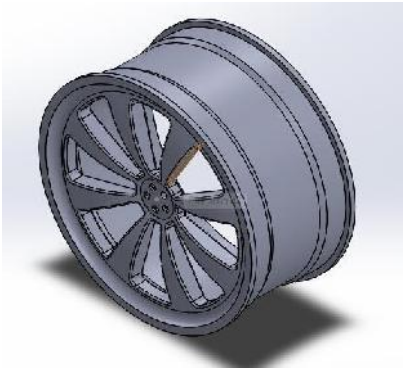
Finding lowest deformation material for Choosing three alloy metals and comparing its deformation ratings , the 3-D alloy rim model developed and analysed by using SOLIDWORKS Software. First select the (material 1) Aluminium1060 and fixed required end , then Applied load 3731.61N respectively .next we create mesh for separating the element and get results for Stress , Displacement , Strain ….

Same as we apply load on A 357 alloy(material 2) and magnesium (material 3) So we get three Deformation result comparing the results which is the material is lowest deformed stress value is the suitable material for making an alloy rim in out of three material

III. MODEL DRAWING

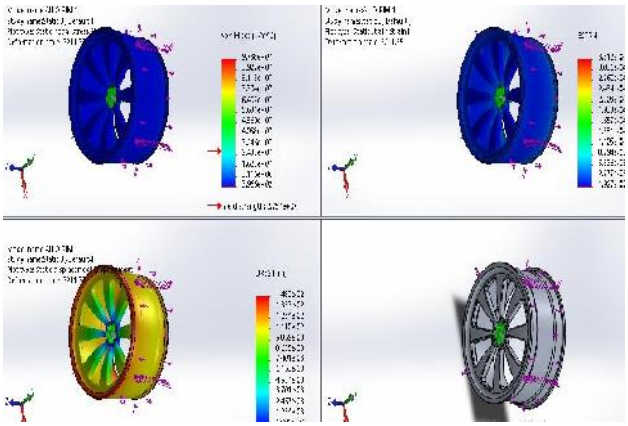


1.2D Sketch of the rim



2.Isometriv view

IV. DEFORMATION OF ALUMINIUM 1060 ALLOY

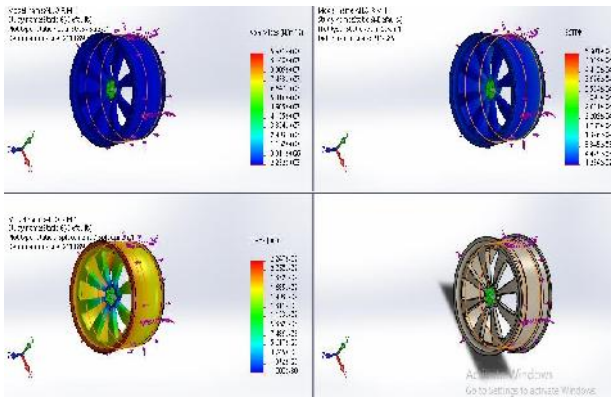


NAME	TYPE	Min	Max
Stress 1	VON :von mises stress	3.966e+02 N/m^2 Node: 25234	9.738e+07 N/m^2 Node: 25624

NAME	TYPE	Min	Max
Displacement1	URES:Resultant displacement	0.000e+00 mm Node: 1	1.480e-02 mm Node: 16631

NAME	TYPE	Min	Max
Strain 1	ESTRN: Equivalent Strain	1.927e-07 Element: 574	3.312e-04 Element: 1724

V. DEFORMATION OF MAGNESIUM ALLOY



NAME	TYPE	Min	Max
Stress3	VON: von Mises Stress	2.232e+03 N/m^2 Node: 23947	9.971e+07 N/m^2 Node: 23591

NAME	TYPE	Min	Max
Displacement3	URES: Resultant Displacement	0.000e+00 mm Node: 1	2.247e-02 mm Node: 12537

NAME	TYPE	Min	Max
Strain3	ESTRN: Equivalent Strain	1.254e-07 Element: 101	5.301e-04 Element: 9442

VI. CONLUSION

At the final analysis and design we determine the good and durable rim from the types of wheel rim. The design and analysis are taken by the software. Also rim was subjected to modal analysis, a part of dynamic analysis was performed and performance was observed. In this they observed the results of static and model analysis, and forged steel was suggested as best material.

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