Design Analysis of Aircraft Wheel Hub Using the Finite Element Method

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ABSTRACT:

The wheel hub is a central part of the wheel axle passes. wheel hub is the main part of the steering wheel and consists of bearings and shaft. Axis is linked to the wheel tug.In this project, design and analyzes the axis of the wheel, while the task of reducing the pressure in the wheel hub due to the concentration of body weight of the aircraft and other amounts in the wheel hub.

For the design of a wheel hub uses CATIA V5. And they were analyzed using ANSYS. While stress analysis, have been found in pressure in specific areas of concentration (screws with the site). the concentration of pressure in three ways is checked and choose one that gives the optimal concentration of the pressure.

Three forms are

1. design modification,

2. materials without modifications in the design,

3. change the material with a modified design. Of these three methods you will discover the optimal pressure changes in concentration.

Introduction:

Although the design is to change tires, and some of the classic models are still among the main destinations. And derived versions with 4 or 5-spoke wheels or those who have crossed wireless race car. The conclusion is that hides behind the shape and function. Is derived from the shape of this account is to provide durability, low weight and stiffness. On the other hand, there is, and the "friendly" wheels to change the "station" with each other. If this is decided by the wheels importance of the technical characteristics are designer and engineer, [4]. Because these types of wheels of their approach to production life is relatively short, cheap and

roads. Unfortunately, to meet the above requirements, it is unable to use the latest technology in this field. Moreover, car manufacturers tend to include a standard tire. Since its invention in the 50s, it has been used for the wheels to improve device performance. As for the materials they are made, and magnesium alloy wheels (the original version produced) or aluminum alloy. magnesium alloy too fragile to be used on the streets. I'm pretty hard to maintain and limited in terms of resistance to adverse environmental factors. For example, in many cases, the brightness of the tendency to oxidize magnesium. In this type of wheels used in race cars to participate in such as the Formula 1 Grand Prix, held in Indianapolis, etc .. to continue the supervision of staff. For normal use of the machines was aluminum alloy wheels and resistant to larger shocks through joint design. We are in different models, each weighing less than hardcopy [2].

Ways to reduce the concentration of pressure

To reduce pressures in the wheel hub is considered three ways. They are:

• modify the design of an existing model

• fundamental change in the existing form

• modify the design and fundamental change in the existing form

Under the design modification, where he always focused on maximum stress as just a private cross-section is a modified design. In the current maximum voltage component it is concentrated in particular in the key hole and the top, adjusting the thickness of the center at the top and change the diameter of the keyhole tension gradually decreases.

In light of a substantial change in the place of the current material is a new material. These mechanical properties of the new material is lower compared to the same mechanical properties of existing materials. With this weight and cost element is reduced.

In the above two methods they are considered while a third way.

By analyzing the above three methods is a method that produces very less stress.

2. Literature review

Among the general efforts to reduce CO2 pollution in the atmosphere and there is also the question whether it was possible to impose taxes on passenger aircraft without emissions, and self-reliance in the field of taxation. A positive side effect is the reduction of ground movement traffic of vehicles, especially tractors, and therefore reduce the risk of accidents. German

center has addressed the issue of space and the Institute of vehicle concepts designed and built a prototype wheel motor Electric bow commercial aircraft Airbus A320. This project is part of a global research project for the integration of fuel cells on airplanes. The document describes the boundary conditions and requirements, design of the electrical machine, the gear, and the test result. [1] The design work on the implementation of the new elements of the space requires the use of techniques of 3D CAD modeling and rapid prototyping, which makes it possible to significantly accelerate the deployment of new solutions. The article presents the possibility of using some techniques to produce a quick search form that are part wheel axle landing prototyping. It has been characterized with respect to technology to implement the model shaft, the device parameters manufacturing, compared with basic technical data - Rapid prototyping additional ways - JS (jet system) and the Army of Liberation of Sudan (print stone stereo), Company (deposit modeling cast) the materials used in the analysis of operations. It was one of the elements of process models in other data processing equipment rapid prototyping. This process involved the following steps: identifying standards model building, and determine the appropriate configuration model in the workspace of the manufacturing equipment, and the liberalization of the support structure, and

verification of subsequent classes through the process simulation building a model, and generate numerical procedures for production manufacturing equipment. It is manufactured dimensional precision models using the coordinate-measuring machine evaluation. Also measure the surface roughness. Studies carried out on the basis of determining the applicability of the different methods of rapid prototyping in the research process and plane manufacturing hub of the wheel. [2] M. are GOVINDARAJU1, M. JAYALAKSHMI1 *, K. Prasad RAO2, Uday scientific article CHAKKINGAL2, K. BALASUBRAMANIAN1 studies on erosion of welded zones friction welded AZ91D magnesium alloy in applications such as lightweight structural materials building cars and space. Friction welding magnesium, magnesium alloy AZ91D alloy AZ91D AZ91D and a welding speed 600 rpm which produced a length of 2 mm burning. Studied erosion of the weld zone using the recording I E- polarization 0.1M ammonium carbonate. It turns out that the welded areas are more resistant than samples from the parents of each corrosion in similar experimental conditions. electronic scanning microscopic images confirm refine the grain of welded areas. For a better understanding, I polarization E- recording they are also pure magnesium alloy and their studies. [3] models or to model important to put the finishing steps of product design touches. It also helps in

conception and design. Before the start of full production model typically manufactured and tested. Manual models by skilled craftsmen, such as old age practice for many centuries. The second phase of the models began in the mid-1970s, when soft prototype 3D curves and surfaces can be modeled to stand out in a virtual environment, simulation and test with the exact material and other goods. No, ended last third and began the direction of models and rapid prototyping (RP) through after the material layer deposition during the 1980s with the explosive growth of the techniques of computer-aided design and manufacturing (CAD / CAM) when almost unequivocal solid models with the information about edges and surfaces can determine the product and production CNC. And it provides the historical development of RP techniques and listed in Table 1. [4] RP process belongs to the generative processes (or added) Unlike Matrouh operations or forming such as turning, milling, grinding, or SEC, etc., that the pattern is formed by removing the material or plastic warp. In all business processes RP, manufactured and part of the deposition layers is contoured in the (x-y) two dimensional plane. The third dimension (z) is single layers are stacked one above the other, but not as a continuous Z format. Therefore, the models are on the face of a very precise on-board Tairh- X Y but have the effect of giving a step in the drawer uniform direction. If the model deposit

very thin layers, that is, smaller the Z stage, the model resembles the original. RP can be divided into two stages, a sports jacket essential information generation and second-generation process model physical layer [5] The finite element method (FAME) is a numerical method for solving differential or integral. It has been applied to a number of physical problems, where the differential equations that govern available. Method is mainly on the assumption of a function definition multi-function underway to resolve and get the job parameters that minimize the error in the solution. This article provides a brief description of the finite element method. The method is illustrated with the aid of drafting the plane stress and plane strain. [6]

CONCLUSION:

The main restriction of this project is to reduce stress. To reduce these pressures are considered three ways. They are,

• modify the design of the existing model (AZ91D materials and hole diameter 7.5MM 39.75)

• fundamental change in the existing model (Az92a-T6, 7075-T6 Al, materials AM60)

• modify the design and fundamental change in the existing model (40.062mm, and 8 mm and 41 062 mm, 7 mm)

Among these methods, the three third method gave the best results. Thus a series of model design modification is D41.062 and materials D7mm model AL-7075-T6 and produces less pressure 109.52Mpa and the Federal Office of Statistics 4.5927 compared with other materials. This material meets the two conditions are less weight and less expensive.

The end result of this project is D41.062 and materials D7mm model AL-7075-T6 give very less stress, and have a good safety factor

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