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DESIGN AND ANALYSIS OF SCISSOR JACK

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Abstract - *Each designing item include taken a toll compelling fabricating and its flexibility in application maintaining its aesthetics as well as relegate benefit life without disappointment keeping those parameters in intellect we centered our purposeful on planning and analyzing the jack show for real service loads for shifting models of car L.M.V. divisions. Car divisions are exceptionally sharp at their productivity and client fulfillment. We too sharp at diminishing the weight of scissor jack at the same time keeping up its quality and benefit life. We made certain alter in manufacturing process in this manner made a unused flexible jack that can be utilized for shifting models of L.M.V automobile segment. Moreover the unused plan that made by Pro-e program can be tried by ANSYS software.*

Key Words: (Size 10 & Bold) Key word1, Key word2, Key word3, etc (Minimum 5 to 8 key words)…

1. INTRODUCTION

Since conventional jack that accessible in market involve bounty of assortment like screw jack. We had chosen the conventional scissor jack for L.M.V. and centers our purposeful to remove perm insect welds as that's the range where chances of disappointment is more. We supplanted weld joints by bolts as well diminished materials by redesigning uncommon brackets and employing special fabricating forms for traditional.

As per the today's situation of cost reduction, we got to find the fetched effective solution for long term benefits. So within the generation framework it is fundamental to redesignthe different items for lessening the taken a toll of the item over the same product. So we havechosen such work out with the scissor jack. The primary good thing about this paper is to decrease theunnecessary taken a toll, decrease the over plan, thedesign will be up to the check. This paper will give modern approach to item plan. Suchas in case of expansive volume, the taken a toll reductionis more and it'll increment the request of product in advertise itself. In case of themanufacturing of the scissor jack we canreduce the fabric of the item by converting the fabricating handle, e.g., Casting into sheet metal, in which the quality of the item stay because it is and the fetched of the fabric will be naturally reduces. Even portion diminishment by get together prepare and no welding joints will grant less diversion and the huge precision.

2. OBJECTIVE

This paper incorporates the scissor jack of automobile L.M.V. vehicle. The objective of this exercise will be

1. To diminish the weight of the jack by changing the manufacturability.

2. To decrease the no. of parts for streamlining the assembly process.

3. Evacuate welding to maintain a strategic distance from distortion.

4. Item ought to withstand the current strength prerequisites.

3. MATERIALS AND METHODS

3.1 Operation

A scissor jack is worked basically by turning a small wrench that's embedded into one conclusion of the scissor jack. This wrench is more often than not "Z" shaped. The conclusion fits into a ring gap mounted on the end of the screw, which is the protest of force on the scissor jack. When this wrench is turned, the screw turns, and this raises the jack. The screw acts like a adapt component. It has teeth (the screw string), which turn and move the two arms, creating work. Fair by turning this screw string, the scissor jack can lift a vehicle that is a few thousand pounds.

3.2 Construction

A scissor jack has four primary pieces of metal and two base closes. The four metal pieces are all associated at the corners with a jolt that allows the corners to swivel. A screw string runs over this gathering and through thecorners. As the screw string is turned, the jack arms travel over across over it and collapse or cometogether, shaping a straight line when closed. Then, moving back the other way, they raiseand come together. When opened, the four metal arms contract together, coming together at the center, raising the jack. When closed, the arms spread back separated and the jack closes or straightens out once more.

3.3 Design and lift

A scissor jack employments a basic hypothesis of gears to get its control. As the screw segment is turned, two closes of the jack move closer together. Because the gears of the screw are pushing up the arms, the sum of constrain being applied is duplicated. It takes an awfully little sum of force to turn the wrench handle, however that action causes the brace arms to slide over and together. As this happens the arms extend upward. The car's gravitational weight isn't sufficient to anticipate the jack from opening or tostop the screw from turning, since it is not applying drive straightforwardly to it. On the off chance that you were to put pressure straightforwardly on the wrench, or incline your weight against the wrench, the individual would not be able to turn it, indeed in spite of the fact that your weight is a small rate of the car's.

4. MODELLING

Design of scissor jack is done with Pro-E andmodel assembly is shown in Figures 1 to 3.

4.1 Design details of Jack

The total height of the screw jack = 276 mm.

• The deformation of the screw jack in y direction = 2.00 mm.

• Permanent set in y direction is = 0.37 mm.

5. DESIGN

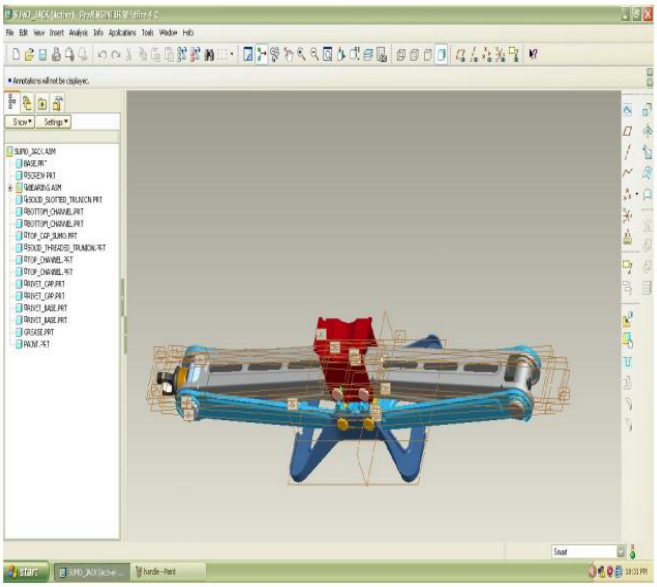

Figure 1 3D Model

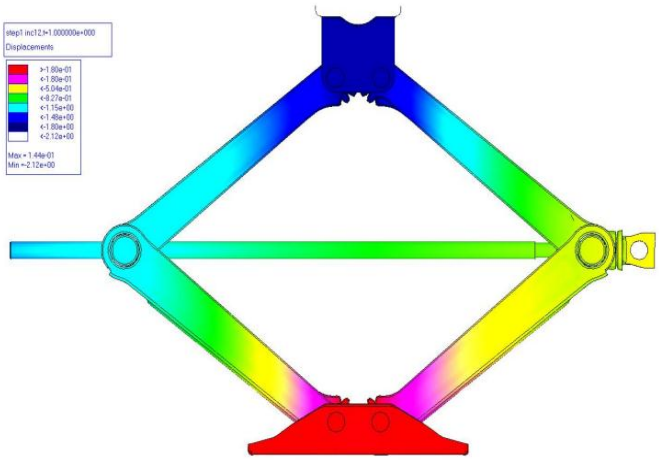

Figure 2 Analysis

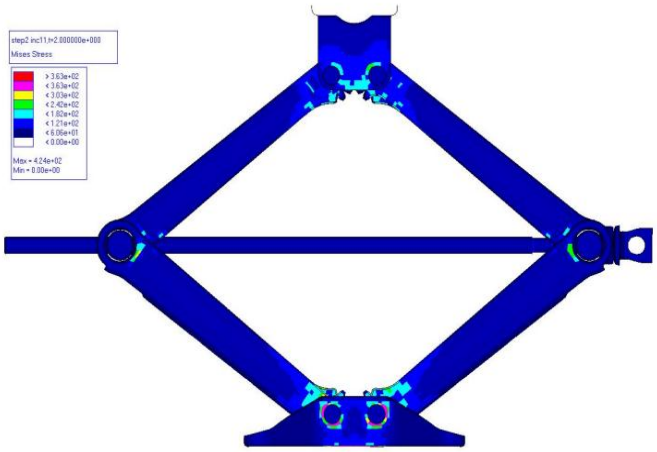

Figure 3 Stress contour

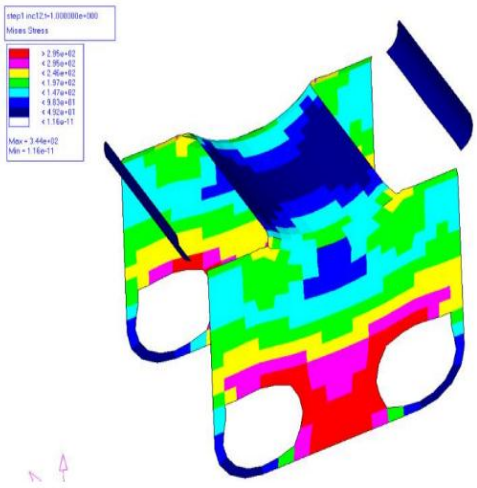

Figure 4 Cap-Von Mises Stress Contour

Table 1: Material Properties			
Material	Tensile Yield Strength	Poisson's Ratio	Modulus of Elasticity
SAE J1392 050YLF	344 Mpa	0.3	200000 Mpa
SAE 1018	410 Mpa	0.3	200000 Mpa

Table-2: Data analysis of scissor jack				
Part Names	Yield Stress (Mpa)	Failure Strain (%)	Load to Yield (Kgs)	Plastic Strain at 2355 Kg Load (%)
Cap	344	20%	2355	0.0174
Base	344	20%	1177	0.28
Base rivet	410	20%	1177	3.28
Cap rivet	410	20%	1577	3.05
Lower arms	344	20%	1177	1.89
Upper arms	344	20%	1577	0.595
Screw	410	20%	2355	0.599

The maximum strain in the Base Rivet = 3.28%.

- The maximum strain in the Cap Rivet = 3.05%.
- Mass of the Jack in Kg = 1.824 Kg.

6. PROJECT BACKGROUD

6.1 Model

Beat channel, foot channel, Base and Cap modeled with shell components and bearing, Trunions, Base Bolt, Cap Bolt and Screw are modeled with Hexa and Penta elements.

6.2 Loading

The point stack of 2,355 kgs applied on the beat surface of the cap (23102 N applied on the best surface of cap by utilizing inflexible) after that emptying (for changeless set investigation) the point stack to 1.47 N.

7. RESULT

Data analysis of scissor jack static loading conditions subjected to point load on upper cap of 2033 kgs is shown in Tables 1 and 2.

8. CONCLUSION

The paper will incorporate a scissor jack of automobile L.M.V. vehicle and other same typeof variations. This proposed plan of scissor jack after its stretch stress stretch push investigation concludes that: Typically a common jack for the variant (satisfying the item requirements). The proposed jack has the decreased weight (by changing the manufacturability). Designing this modern jack decreases the no. of parts for rearranging the get together process. Only bolt joints are actuated.

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