STRUCTURAL AND MODEL ANALYSIS OF DUAL HOOK JOINT

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ABSTRACT

This Project involves in modeling and analysis of a simple DUAL HOOK JOINT. Modeling was done by using advanced design software CREO 1.0{Feature based parametric bi-directional software}. By using the features of this software DUAL HOOK JOINT was modeled. Individual parts of this dual hook joint are designed separately in the part module and assembled in the assembly module.

In the assembly module there are two methods, one is bottom up method and the other is top down method and by using bottom up assembly method the modeling of the dual crane hook was completed.

Finally, analysis was done on the ANSYS 14.5 which works on the prominent FEM technique, because work done on a GUI it was called as FEA. By using this software stress analysis and modal analysis was done for different materials at different loading conditions and the best material will be chosen.

KEY WORDS:

Dual hook Joint, top down method ,Bottom up method

INTRODUCTION

Crane hooks are the components which are generally used to lift the heavy loads in industries and constructional sites. Now a day's excavators having a crane-hook are widely used in construction works site. One reason is that such an excavator is convenient since they can perform the conventional digging tasks as well as the suspension works. Another reason is that there are work sites where the crane trucks

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for suspension work are not available because of the narrowness of the site. In general an excavator has superior maneuverability than a crane truck.

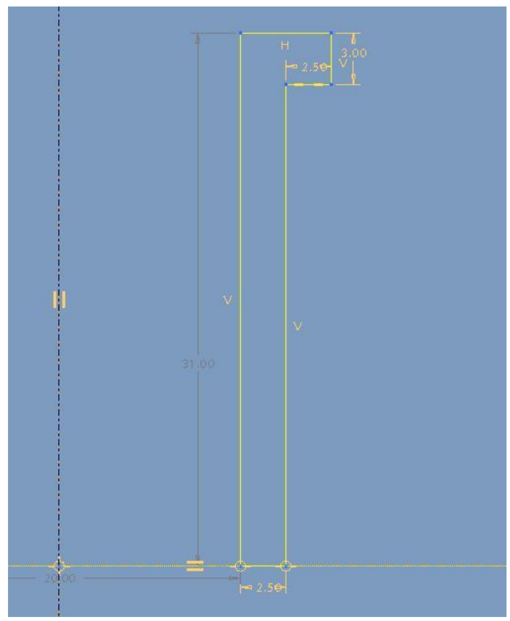
INTRODUCTION TO PRO-E

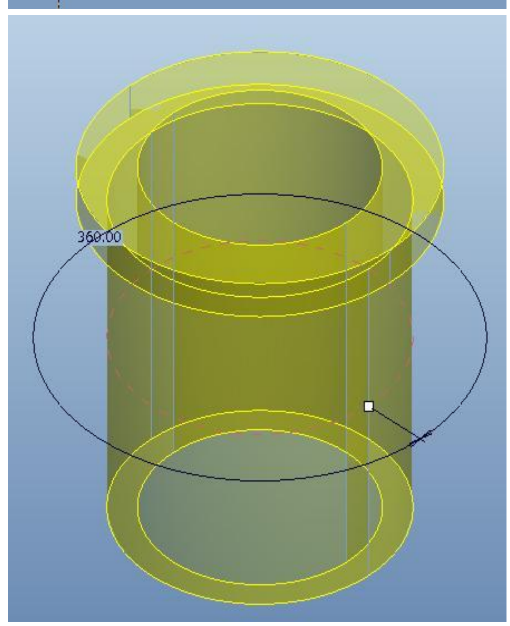
Pro /ENGINEER (Pro/E) is developed by PTC Company. It is a program that is used to create precision three dimensional computer models. The 3-D parts created on Pro /E use a technique known as solid modeling. Other important definition used to classify Pro/E is: feature-based parametric bi-directional associative software.

Pro /E is a fully parametric CAD program This means that the geometry of features (e.g., holes, slots) on a part have to be fully specified in terms of size, shape, orientation, and location. This specification allows the user to write equations (i.e., relations) which describe how features on individual parts or multiple parts should relate to each other. For example, in an engine, if the diameter of the piston is increased or decreased, the corresponding engine block is automatically modified to match the specifications of the new piston. For the student, full parametric means that you must have a strategy before you start modeling of what features you want and how you want to constrain them within the part.

MODELING:

To model the bush,first we have to draw a base sketch,and then revolve it around an axis ,so that the cross section that is drawn in the sketcher will be revolved through a slected axis,and the revolved part will be formed.





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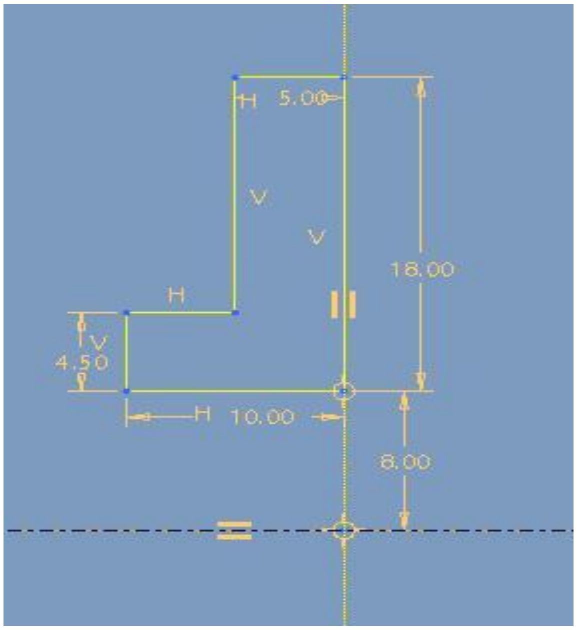

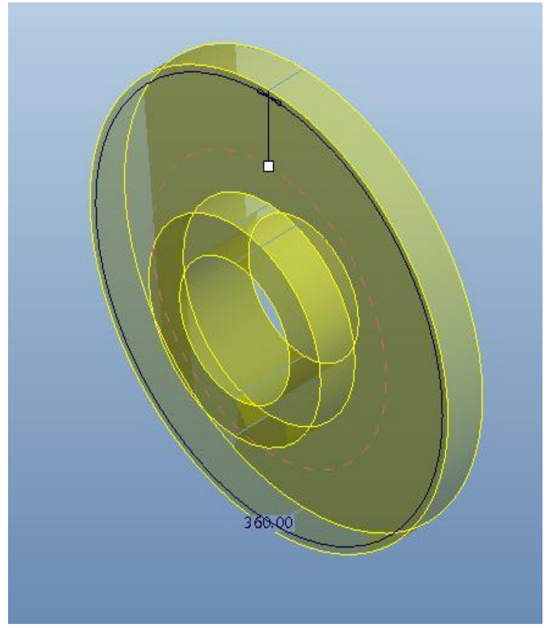

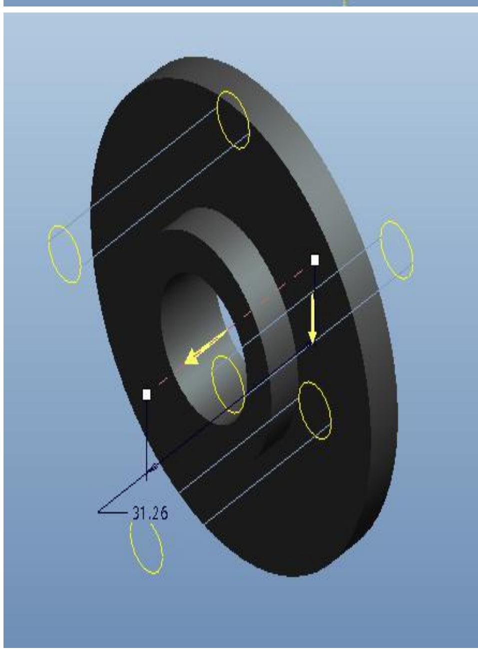

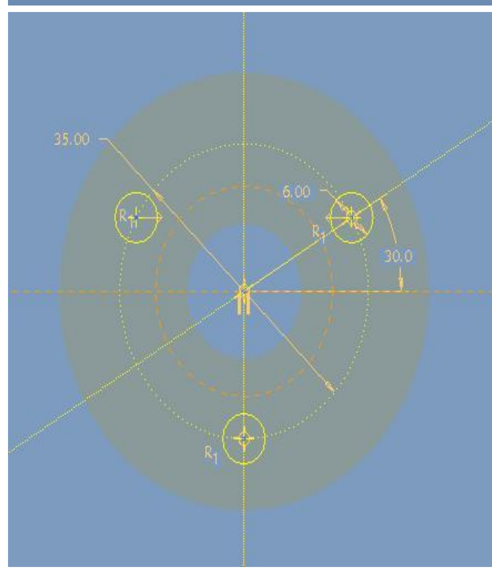

In this part first we draw a sketch of the bottom part of the crane hook,after drawing the sketch,we will extrude it

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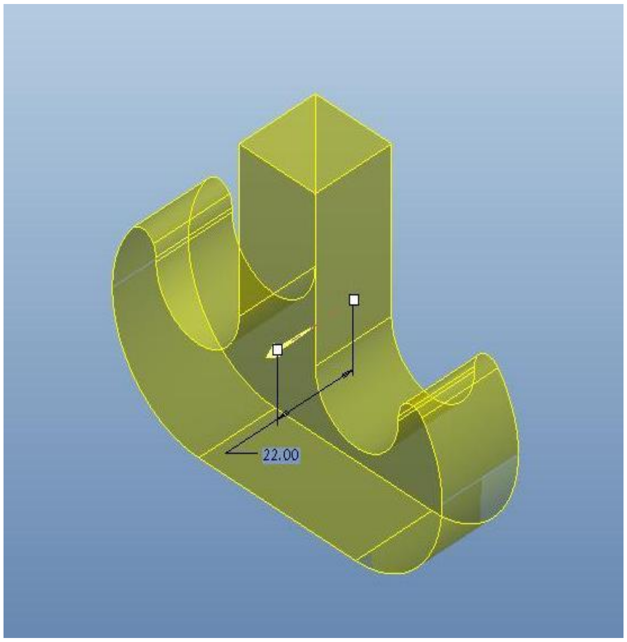

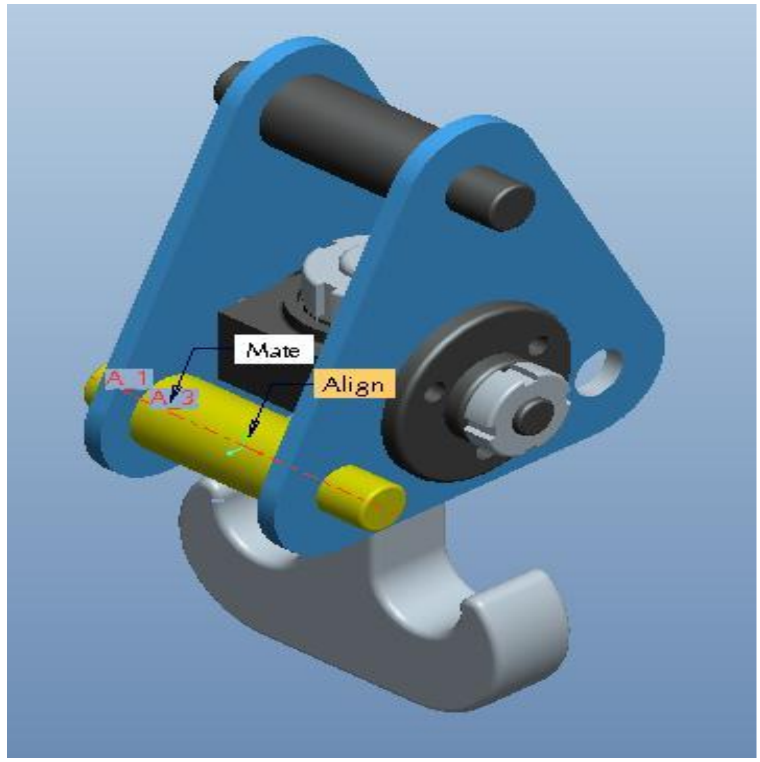

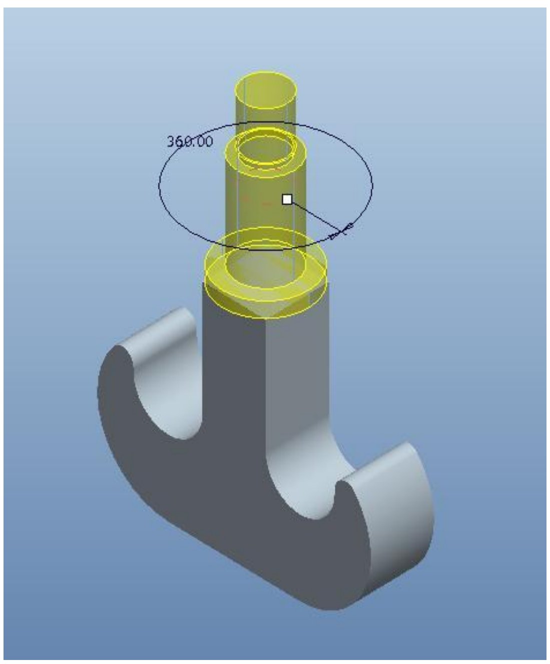

Assembling plate spacer1 by using mate and align constraints

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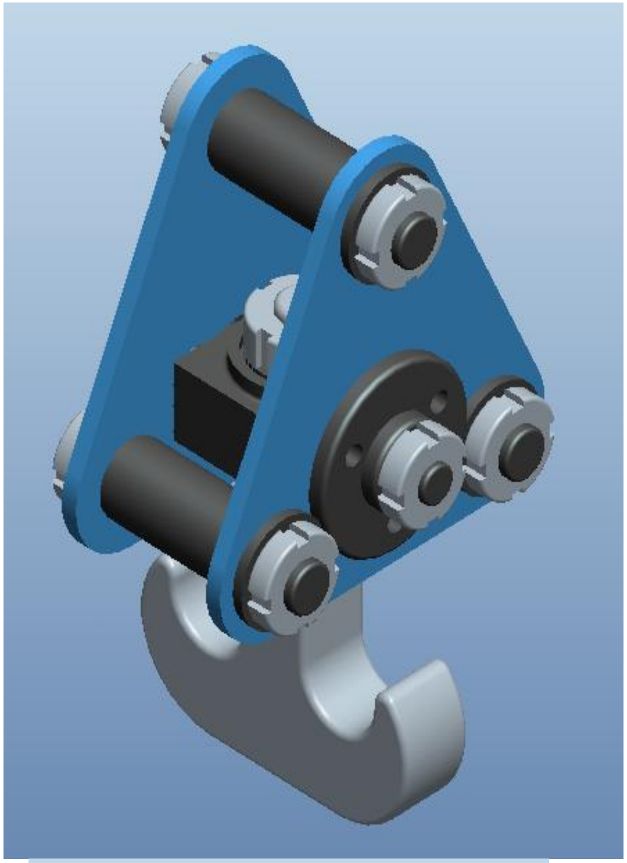
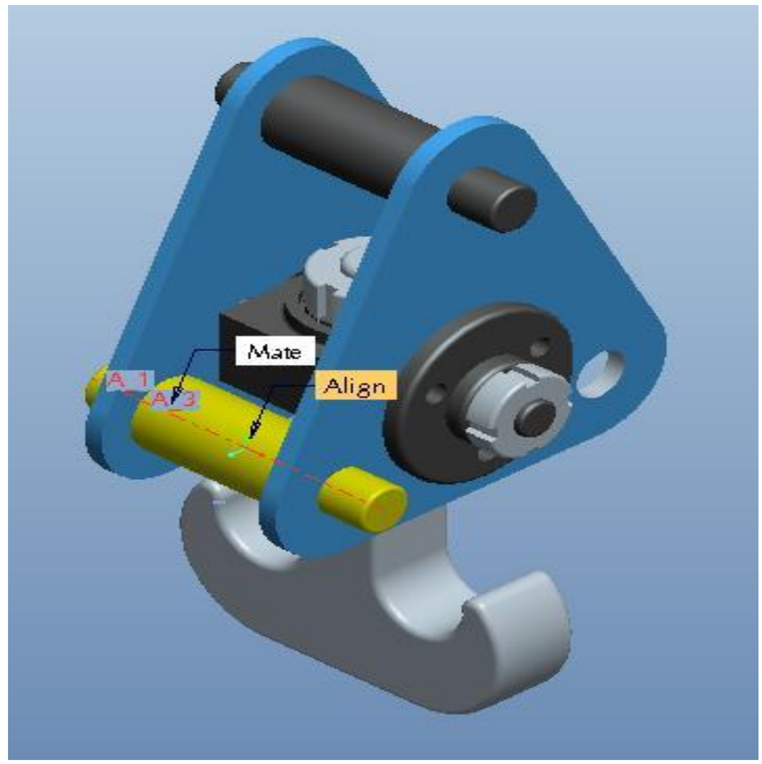
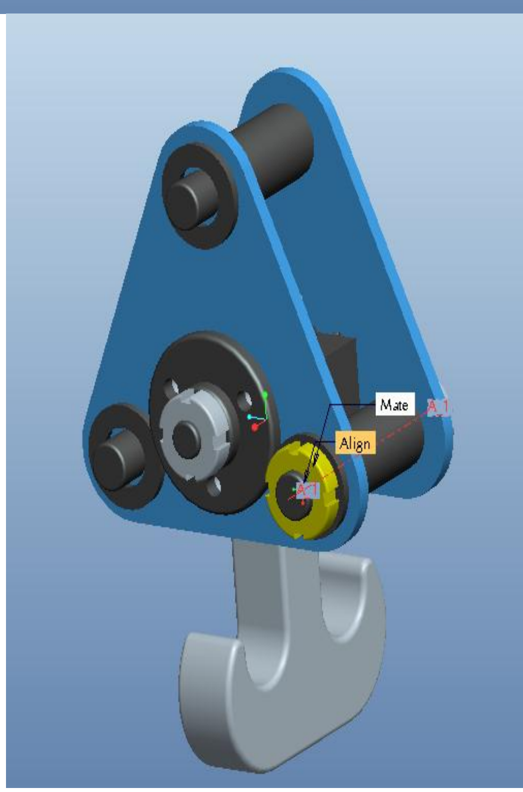
FINAL ASSEMBLED COMPONENT:





Assembling plate spacer2 by using mate and align constraints



Assembling lock nut by align and mate constraints

INTRODUCTION TO ANSYS:

The purpose of a finite element analysis is to model the behavior of a structure under

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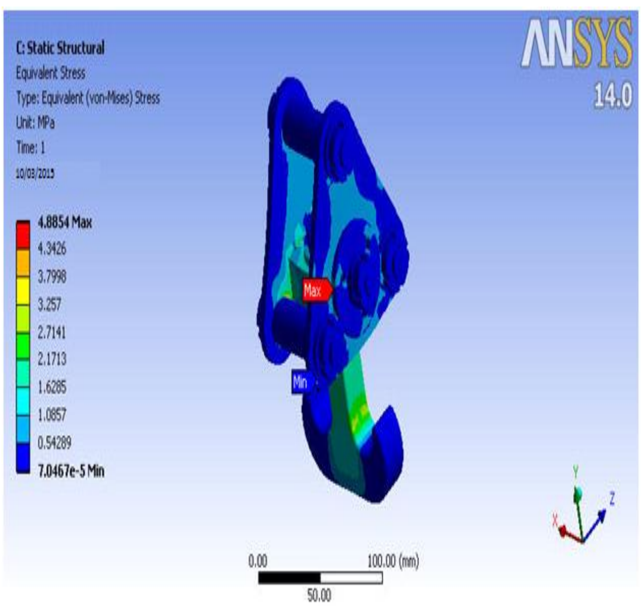
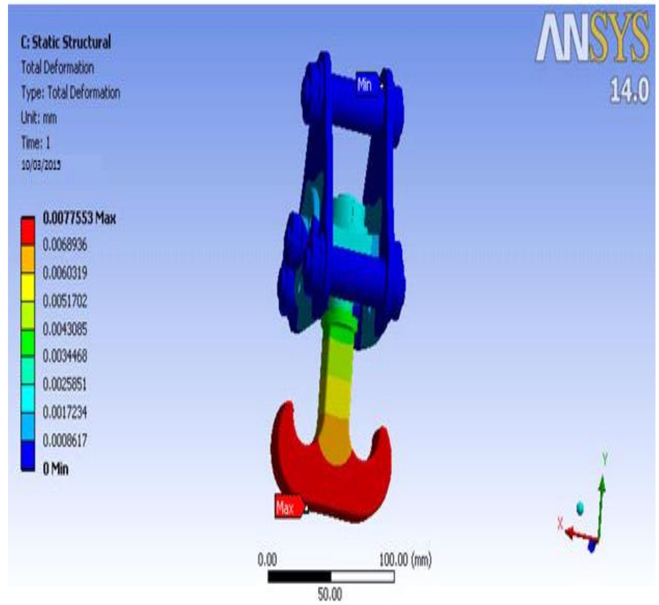
a system of loads. In order to do so, all influencing factors must be considered and determined whether their effects are considerable or negligible on the final result. Many software are used for this

ALUMINUM: At 1000 N:



Equivalent stress at load 1000N for aluminum

At 2000N:



Total deformation at load 2000N for aluminum

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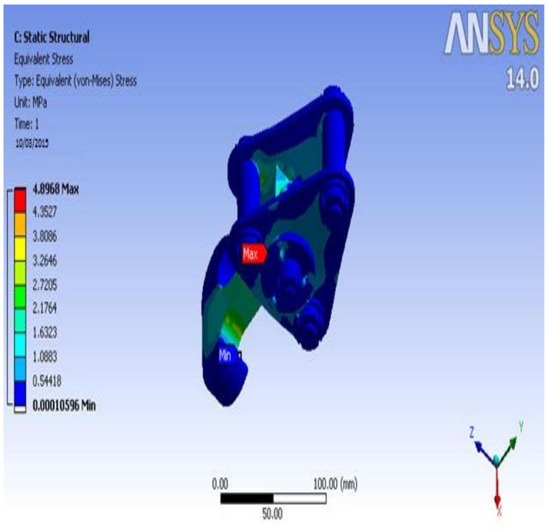
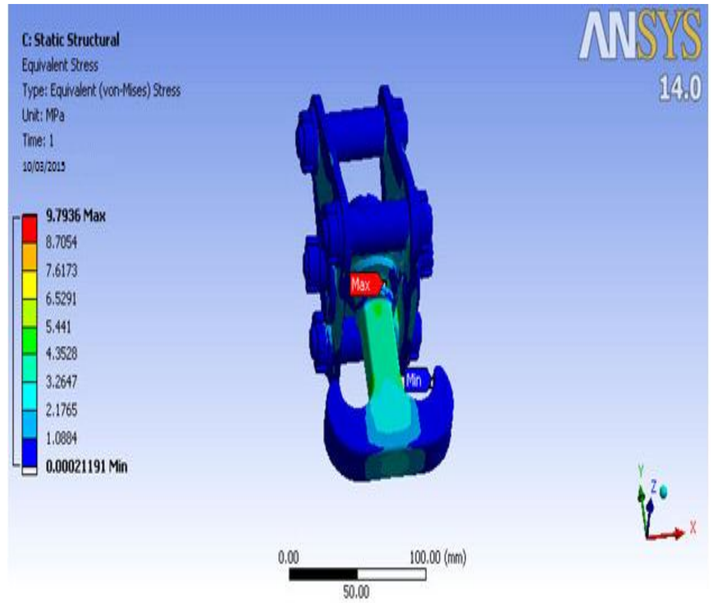
STAINLESS STEEL

At 1000N:



Equivalent stress at load 1000N for stainless steel



Equivalent stress at load 2000N for stainless steel

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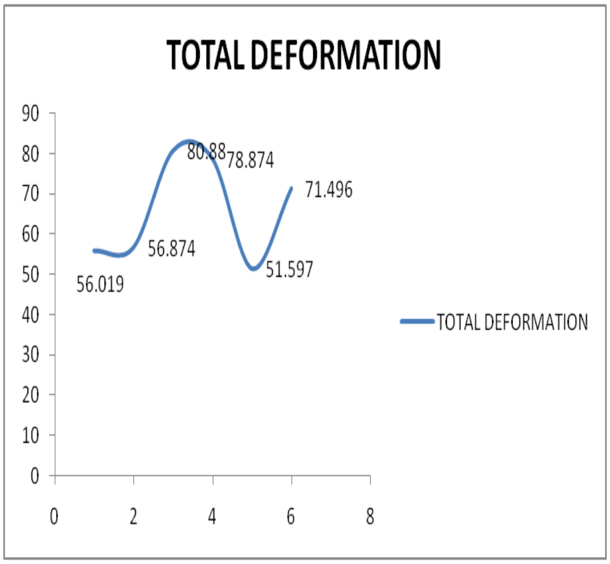
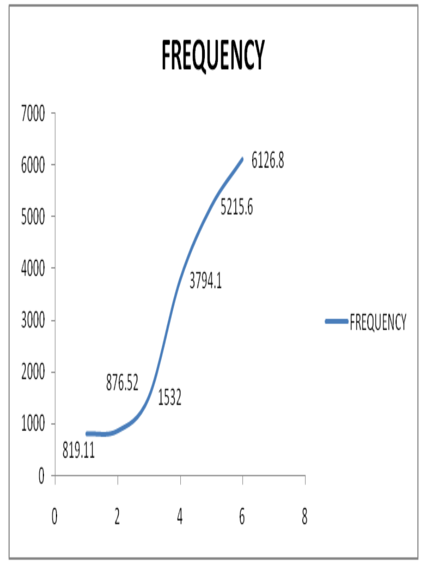
RESULTS:

FOR MODAL ANALYSIS

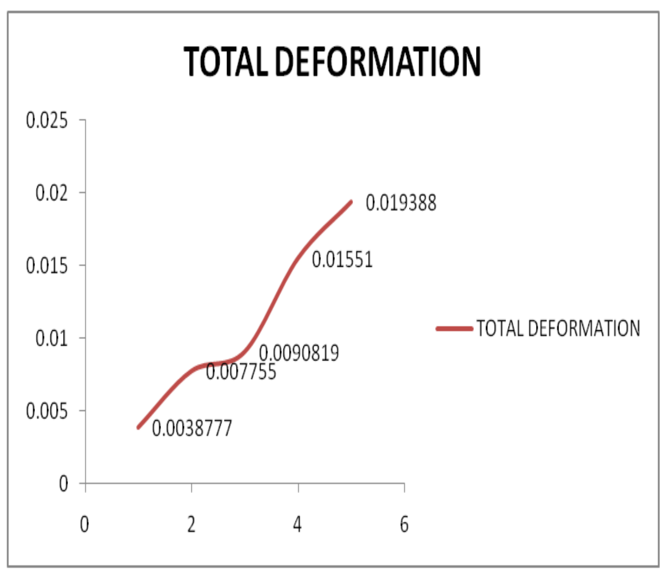


S. NO	LOAD	EQUIVALENT STRESS	TOTAL DEFORMATION
1	1000	4.8854	0.0038777
2	2000	9.7708	0.007755
3	3000	14.656	0.0090819
4	4000	19.542	0.01551
5	5000	24.427	0.019388



STATIC STRUCTURAL ANALYSIS:

FOR ALUMINUM ALLOY:



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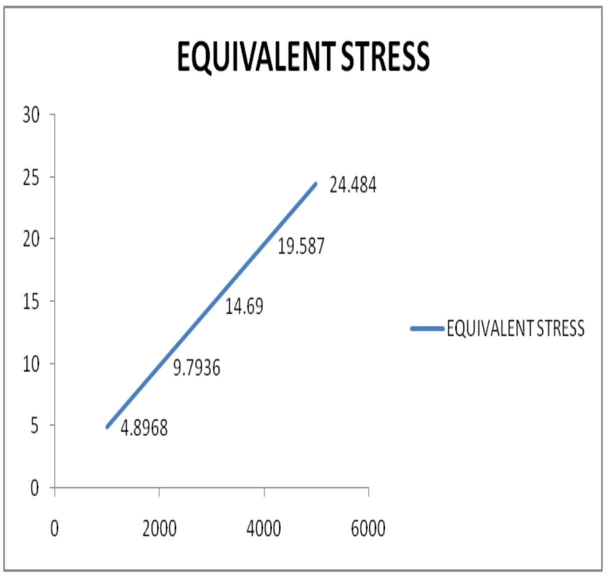
For Stainless steel:



S. NO	LOAD	EQUIVALENT STRESS	TOTAL DEFORMATION
1	1000	4.8968	0.0014294
2	2000	9.7936	0.0028588
3	3000	14.69	0.0042882
4	4000	19.587	0.0057176
5	5000	24.484	0.007147

Conclusion:

According to results achieved from the analysis and by the keen observation the stainless steel would be the better material in the sake of the life of the component, but in the sake of cost and weight aluminum is far better than the steel.

Strength taking to account the steel is very much preferable. In the heavy machinery applications only these hooks will be used and there life is very important when compared to availability and cost.So the final conclusion is the stainless steel will be the better material when compared to aluminum.

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