IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)
e-ISSN: 2278-1684, p-ISSN: 2320-334X
PP 39-42
www.iosrjournals.org

Design and Optimization of Sheet Metal Enclosure with the Help of Behaviour Modelling

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ABSTRACT: *It is going to be taking this sensor housing which consists of four sheet metal parts and going to take this little assembly and set it up and go through and run through the analysis and while doing that it going to be pointing out some of the changes that have taken place . So the first of these point out before it even go into analysis and that it taken all the options that used to be in the old analysis file and it is incorporated those into the Pro/Engineer preferences editor. So what this lets it do is go ahead and search for all those difficulties. For instance let's say that it used to know that it used to be able to specify where temporary directories were written during an analysis. So it is going to go ahead and say that it wants to search simulation with the help of software.*

I. INTRODUCTION

Electronic equipment has made its way into practically every aspect ofmodern life, from toys and appliances to high-power computers. The reliability of the electronics of a system is a major factor in the overall reliability of the system. Electronic components depend on the passage ofelectric current to perform their duties, and they become potential sites for excessive heating, since the current flow through a resistance is accompanied byheat generation. Continued miniaturization of electronic systems has resultedin a dramatic increase in the amount of heat generated per unit volume, comparable in magnitude to those encountered at nuclear reactors and the surfaceof the sun. Unless properly designed and controlled, high rates of heat generation result in high operating temperatures for electronic equipment, whichjeopardizes its safety and reliability.The failure rate of electronic equipment increases exponentially withtemperature. Also, the high thermal stresses in the solder joints of electroniccomponents mounted on circuit boards resulting from temperature variationsare major causes of failure. Therefore, thermal control has become increasingly important in the design and operation of electronic equipment.In this chapter, we discuss several cooling techniques commonly usedin electronic equipment such as conduction cooling, natural convection andradiation cooling, forced-air cooling, liquid cooling, and immersion cooling.This chapter is intended to familiarize the reader with these techniques and putthem into perspective. The reader interested in an in-depth coverage of any ofthese topics can consult numerous other sources available, such as those listedin the references.One of the things is that's that integrated Mechanica into Pro/Engineers behavioural modelling extension. When create behavioural modelling analysis features it see that there is a new option under the analysis type that can create and that's the ability to incorporate Mechanica as part of this analysis feature definition. So by picking on Mechanica it gives the capability to select any of my previously defined analyses in my Mechanica model…so these are all the static modal steady state thermal analyses that might have created and all the different related measures that are valid for that specific analysis type are listed as well. So what this could create an analysis feature that measures for instance the maximum von misses stress due to certain loading conditions and then It could incorporate that analysis feature in any behavioural modelling design study for instance a multiple objective feasibility study or even a design of experiments. To do an optimization looking at the maximum stress in this housing whilst also trying to optimize the centre of gravity for this component.

II. EXISTING SYSTEM

In current system further modification of assembly doesn't possible due to bottom up approach of the assembly modelling. Current structure is weak and loosens easily, some mechanical damages due to vibration.

III. BEHAVIOUR MODELLING:

Behaviour modelling module is one of extend function module of Pro/ Engineer software of PTC. Behaviour modelling is the analysis feature to be used to study the variation of a feature.The analysis feature is a kind of intelligent model feature; it is quite different from the physical feature, the surface feature and the datum feature in Pro/Engineer. It is the bridge between the basic parameters and behavioural modelling design (such as a goal-driven design), including the measurement analysis, model analysis, geometric analysis, relationship

analysis, spread sheet analysis, user-defined analysis, feasibility analysis, sensitivity analysis and multi-objective design etc.

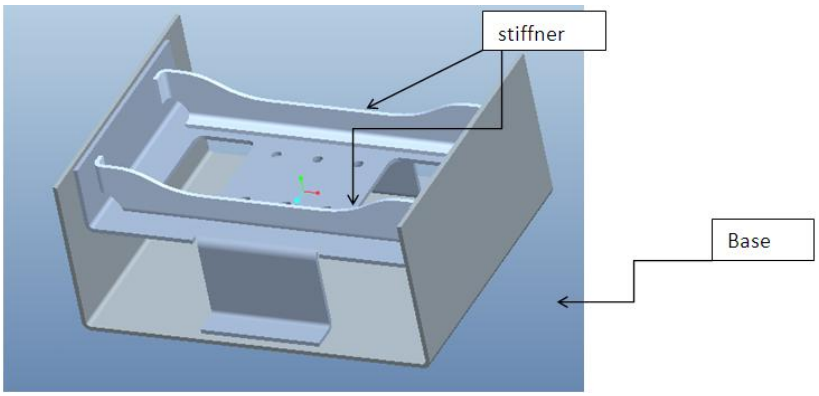
The three features it has intelligent model, goal driven model, opening extensible environment. Intelligent model is able to obtain all engineering standard that relates to one production needs to be defined and designed, such knowledge as geometry, dimension, specification, design intention etc. Goal driven design has the capability of automatic optimization to solve manual contradicted goal problem in traditional design, also is capable of acquiring the optimal resolution scheme even under the limitations of multiple design parameters, constraints, design standard. Engineering can concentrate on designing products with more high performance and more multiple functions by its assistance.

Parametric Modelling: - the feature based parametric 3D modelling is a design method that some of the original design size, such as amorphous positioning or assembly size are defined as variable and by means of modifying the values of these variables, other relevant dimensions can be change automatically by the generator size calculated with the computer by some simple formula and making new parameter values complete the product design process automatically. We can build the model with stretch feature.

Assembly: Assembly can be done by using *Pro Engineer*, first we make the base, add supporting plate the add stiffener. If dimension of the enclosure change then we can change its assembly by using behaviour modelling.

Sheet Metal Enclosure:

A sheet metal enclosure is use for supporting the CD/DVD ROM drive. This enclosure is not just supporting the CD/DVD ROM drive but also reduces the vibration due to rotation of CD/DVD. Current metal enclosure is structurally weak while vibration and shock. If current system added with stiffener as shown in figure 01 which reduces the vibration and also increase the strength of structure. Strength of structures means reduces the stresses and strains of structures.



By adding epoxy fibre glass material use in structure which reduces the uneven heat dissipation in base structures, it saves the CD/DVD ROM sensor from overheating due to continuous run of CPU.

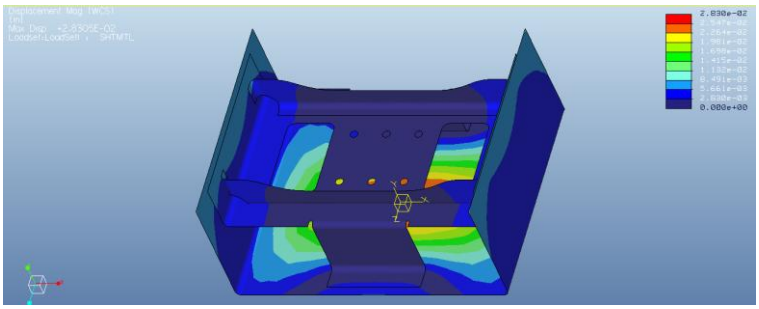
IV. ANALYSIS OF SYSTEM

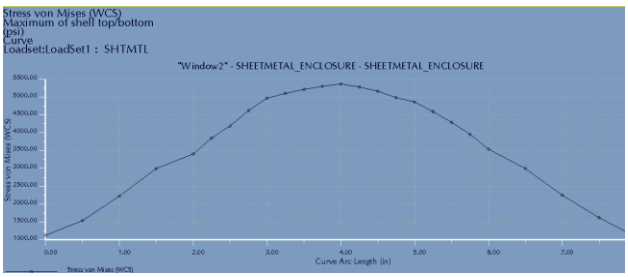
Structural Constants

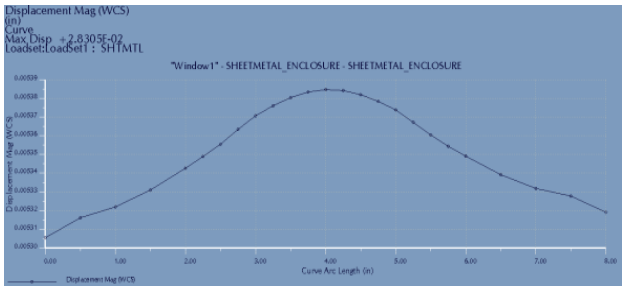
Structural	
Young's Modulus	$2x10^5$ MPa
Poisson's Ratio	0.3
Density	7850. kg/m³
Thermal Expansion	1.2e-005 1/°C
Tensile Yield Strength	2.5e+008 Pa
Compressive Yield Strength	2.5e+008 Pa
Tensile Ultimate Strength	4.6e+008 Pa
Compressive Ultimate Strength	0. Pa
Thermal	
Thermal Conductivity	60.5 W/m·°C

Specific Heat	434. J/kg·°C
Electromagnetics	
Relative Permeability	10000
Resistivity	1.7e-007 Ohm·m

As we analyse the system for its structure we got the following results.







Strain-Life Parameters

Object Name	*Equivalent Stress*	*Equivalent Elastic Strain*	*Shear Stress*	*Shear Elastic Strain*	*Total Deformation*
State	Solved				
Scope					
Geometry	All Bodies				
Definition					
Type	Equivalent (von-Mises) Stress	Equivalent (von-Mises) Elastic Strain	Shear Stress	Shear Elastic Strain	Total Deformation
Orientation			XY Plane		
Results					
Minimum	9.6773e-007 Pa	4.8387e-018 m/m	-3819.8 Pa	-4.9657e-008 m/m	0. m
Maximum	13249 Pa	6.6243e-008 m/m	3824.6 Pa	4.972e-008 m/m	3.1526e-008 m
Minimum Occurs On	INNER_MOUNT[40]		OUTER_CASING[39]		INNER_MOUNT[40]
Maximum Occurs On	OUTER_CASING[39]				

V. CONCLUSION

This paper is useful for study of various design of sheet metal enclosure for CD ROM, as well as design optimization for the same. We can also conclude the material which is suitable for the same. The material

selected is reduces the heat dissipation. The structure is also optimized as per vibration developed in the structure.

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