

THERMA ANALYSIS OF MUFFLER**Vinod Angadi*, Pruthviraj Mudbi* & Dr. S. Sreenatha Reddy***** Department of Mechanical Engineering, Guru Nanak Institute of Technology,
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Abstract:

A muffler is a device used for decreasing the amount of noise emitted by the exhaust from an internal combustion engine. In general all solid and non-solid model will deform when certain amount of thermal or structural loads applied within the environmental condition. In order to find the changes in product or component, an analysis software is used. Ansys is an analytic software to find changes in deformation, Product life, Failures.

1. Introduction:

Mufflers would introduce inside the exhaust framework for inward burning engines, In spite of those suppressors will be not outlined in serving whatever grade exhaust capacity. The suppressor will be engineered Likewise an acoustic soundproofing gadget outlined to decrease those din of the sound contamination made toward the motor engine Inside a muffler, you'll discover a beguilingly straightforward situated about tubes with a percentage gaps in them. These tubes what's more chambers would really likewise finely tuned concerning illustration and musical instrument. They are designed to reflect the sound waves produced by the engine in such a way that they partially cancel themselves out. An unavailability symptom of suppressor utilize will be a build from claiming back weight which declines motor effectiveness. When those stream of exhaust gasses starting with the motor of the climate is discouraged to whatever degree, go weight a rises and the engine's efficiency hence power comes down Performance-oriented mufflers Furthermore exhaust frameworks in this way strive on minimizing again weight by utilizing various advances Also routines with weakening those sound. Normally two main muffler design are used namely Absorptive and sensitive. Normally automobile mufflers have both absorptive and reactive properties

2. Methodology:

The model is used to calculate the vibration values such as natural frequency and mode shape of a structure or a machine component the output of the model analysis can be further used as input for the harmonic and transient analysis. For Example a cantilever beam attached to a system vibrating at a certain frequency. it is important for the maker to find out whether the beam will sustain the vibrations induced by the machine to which it is connected when cantilever vibrates, various shapes are attained at certain frequency. The shape of the component corresponding to a frequency is known as mode shape. The mode shape is a graphical representations of the deformation attained due it vibration the main aim of the nodal analysis is to find whether the normal frequency of the component is closer to the vibration induced in the component. In this example with this cantilever, the maximum number of modes found is six. Through display the various mode of first second third and fourth modes respectively .if the normal Frequency of a system is very near to the excitation frequency the component Can get into resonance and fail. Therefore to neglect the resonance you need to strengthen the component can get into resonance and fail. There for to neglect the resonance you need to strengthen the component on die basis of the mode shape. However sometimes strengthening the component may not be occur due to the design limitation. Also in actual practice, the displacement produced at resonance may not be infinite due to the presence of damping. Therefore you need to find the response of system under the time/frequency based loads. If the stress/stain/displacement response is less than the permissible limit, the component will not be required to strengthen or redesign.

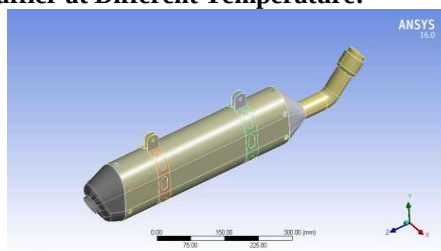
Deformation of Muffler at Different Temperature:

Figure 2.1: Muffler

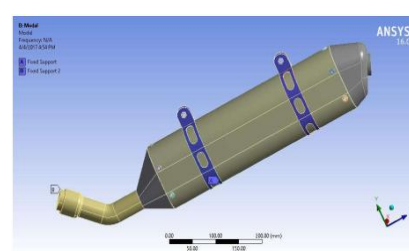


Figure 2.2: Fixed End Points

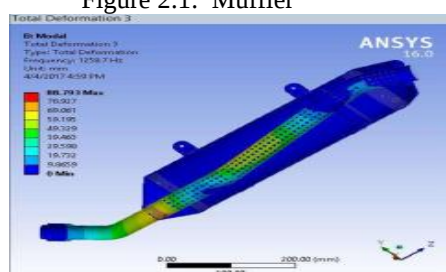


Figure 2.2: Model 1

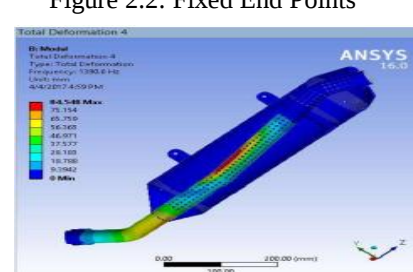


Figure 2.3: Model 2

Results	Minim...	Maximum	Units	Reported Frequency (Hz)
Total Deformation	0.	74.1	mm	581.37
Total Deformation 2	0.	82.858	mm	760.47
Total Deformation 3	0.	88.793	mm	1258.7
Total Deformation 4	0.	84.548	mm	1390.6
Total Deformation 5	0.	128.46	mm	1507.4
Total Deformation 6	0.	125.99	mm	1522.5
Total Deformation 7	0.	112.14	mm	1818.4
Total Deformation 8	0.	111.12	mm	1830.3

Table 2.1: Deformation Results

3. Simulation and Boundary Conditions:

After the mesh is generated you need to set the boundary conditions under which the analysis is to be performed. On right click on node in tree outline and then choose inserted support from the menu displayed: fixed support with a question symbol is added under the modal node in the tree outline also the details of fixed support window is displayed. In the details of fixed support window by clicking on geometry cell to display apply and cancel buttons. If not all ready displayed. Select the side face of the model, as shown in figure. Next choose the apply buttons from the geometry selection box in the details of fixed support window fixed support is applied selected face

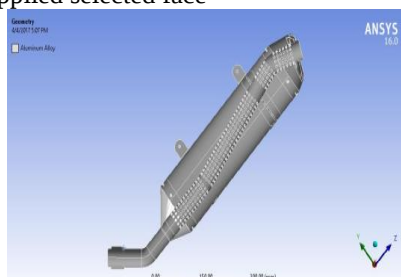


Figure 3.1: Nodal Points.

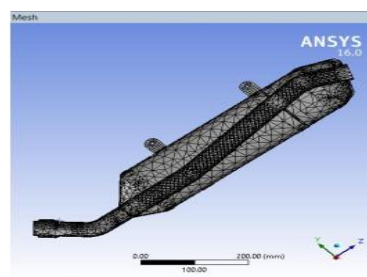


Figure 3.2: Meshed Structures

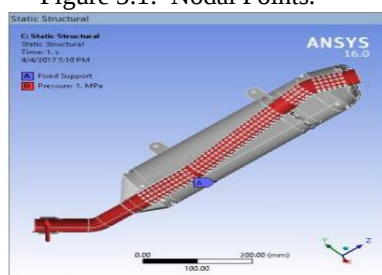


Figure 3.3: Fixed Support

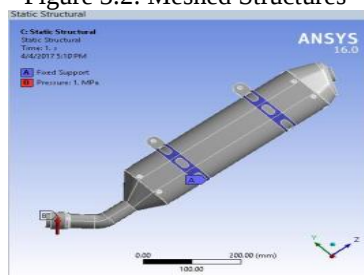


Figure 3.4: Pressure Display

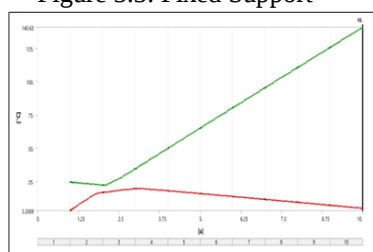


Figure 3.5: Temp 1

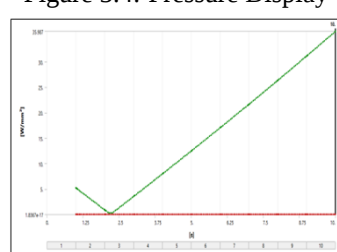


Figure 3.6: Temp 2

It is obvious from the above results that the total heat fluxes maximum in the region where the model is marked red and minimum where it is marked blue each color contour depicts a value and can be seen in the legend in the graphics screen Exit the mechanical window to display the workbench window

Results	Minim...	Maximum	Units	Time (s)
Total Deformation	0.	39.37	mm	1.
Equivalent Stress	0.	714.33	MPa	1.
Life	22415	1.e+032	Units Unavailable	0.
Damage	1.e-023	44613	Units Unavailable	0.

Table 3.1: Deformation Value of Aluminum

S.No	Type	Minimum	Maximum
1	Total Deformation	0	39.37
2	Equivalent Stress	0	714.33
3	Life	22415	1.00e+32
4	Damage	1.00e-22	44613

Fig 3.2: From Structure Analysis**4. Conclusion:**

The muffler with perforated tube produces bigger manual accident than simple amplification alcove at all frequencies. So, it can be chance to be inferred that it will be needed should put a punctured tube onside those muffler. Muffler with elliptical perforated tube is superior to cylinder performed tube muffler Suppressor to sound weakening up to recurrence 2100 Hz. Cylindrical Punctured tube suppressor needs higher sound absorbing limit. Something like that suppressor Might make a superior decision to higher recurrence Be that as to low should medium recurrence range, curved tube suppressor provides for superior comes about Similarly as contrasted with the absolute extension chamber. Transmission passing for two-fold development chamber is 42. 48 which will be additional. Requirement and satisfactory. Also Regular recurrence of two fold extension chamber is inside go from claiming 583. 62 will 1001. Hz bringing about no thunder. By altering the suppressor right away Also two fold development chamber we camwood expansion the recurrence and keep away from the thunder transmission misfortune of the muffler could a chance to be expanded Toward including protrusion channel toward bay What's more outlet it could be seen that the limited component modal dissection need sure noteworthiness in the examine for vibration qualities of the muffler. The time required for optimization of muffler using Ansys and mat lab is very shorthand can be repeated simply after changing the input parameter which provides an easy way it find an optimum solution.

5. References:

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