Journal of Engineering and Applied Sciences 13 (Special Issue 7): 5458-5460, 2018
ISSN: 1816-949X

Design and Analysis of Emissionless Silencer for Spark Ingnition Engines

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Abstract: The point of the research is to plan and control of outflow and clamor by charcoal. A charkcoal silencer is fitted to the fumes pipe of motor. Sound created submerged is less hearable than it delivered in climate. This is a result of little sprockets in water particles which brings down its sufficiency consequently bringing down the sound level. Due to this property water is utilized as a part of this silencer. The commotion and smoke level is impressive less then the regular silencer, it is less expensive, no need of exhaust system and this is anything but difficult to introduce moreover.

Key words: Outflow, silencer, smoke level, exhaust system and analysis, smoke level, silencer

INTRODUCTION

The perpetually expanding interest for gasses emanation that leaves the IC motors and furthermore along these lines diminishing the sound brought on by them effortlessly. climate of high caliber has made extensive consideration be engaged towards recuperation and reuse of poisons (Shi and Wang, 2010; Jie and Yue, 2010; Aravindan and Thiruvenkatasamy, 2016). Many costly strategies for expulsion for air toxins are accessible in created nations however in creating nations like India these techniques are difficult to apply as a result of its cost (Rajesh *et al*., 2017; Shao, 2011). So, an procedure to diminish the contamination. The new modified silencer was shown in Fig. 1.

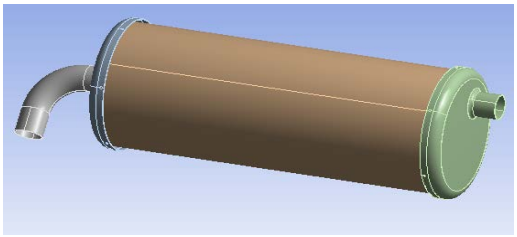

Fig. 1: Silencer model

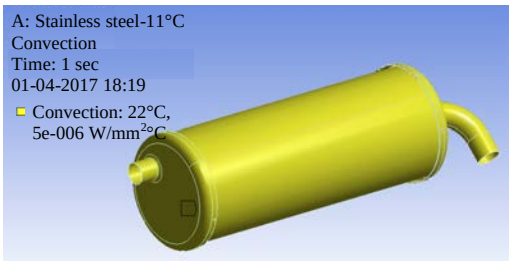

Fig. 2: Silencer 3D Model

MATERIALS AND METHODS

The mild steel alloy is presently used material for fabricate the silencer for maximum bikes and cars. The mild steel material properties are shown in Table 1. And also mechanical properties of silencer like density yield strength and etc. are clearly showed.

The silencer was designed by the SolidWorks Software. The 3D Model was created in sldpt format in the SolidWorks Software. After complete the design the model was convert to the step format for analysing. In the ANSYS WorkBench, the mechanical properties like deformation, stress, strain and etc. are investigated under the boundary conditions.

Table 1: Properties of silencer

Variables	Values
Volume	1205.12 (mm^3)
Material	Mild steel
Coordinates type	Cartesian
Mass	3.142e-003 (kg)
Nodes	310
Elements	120
Density	8.13 (g/cm^3)
Yield strength	180 (MPa)
Compressive strength	3451 (MPa)
Modulus of elasticity	320 (GPa)
Vickers hardness	2360
Thermal conductivity	10.14

Designing of silencer: Figure 2 shows the solid model of the silencer which was created by the SolidWorks Software. This model was created by the new dimensions which it was varies from the presently used silencers. This model was created in the sldpt file then it was converted to step file and finally, it was export to the ANSYS Software.

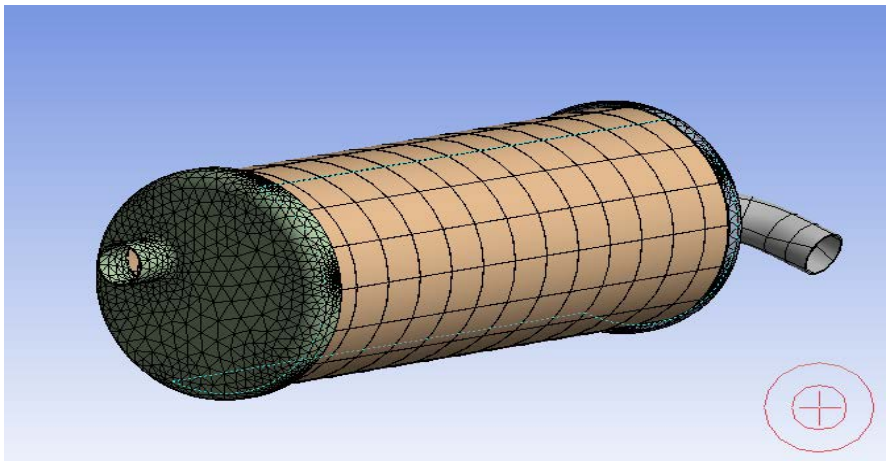

Fig. 3: Silencer meshing image

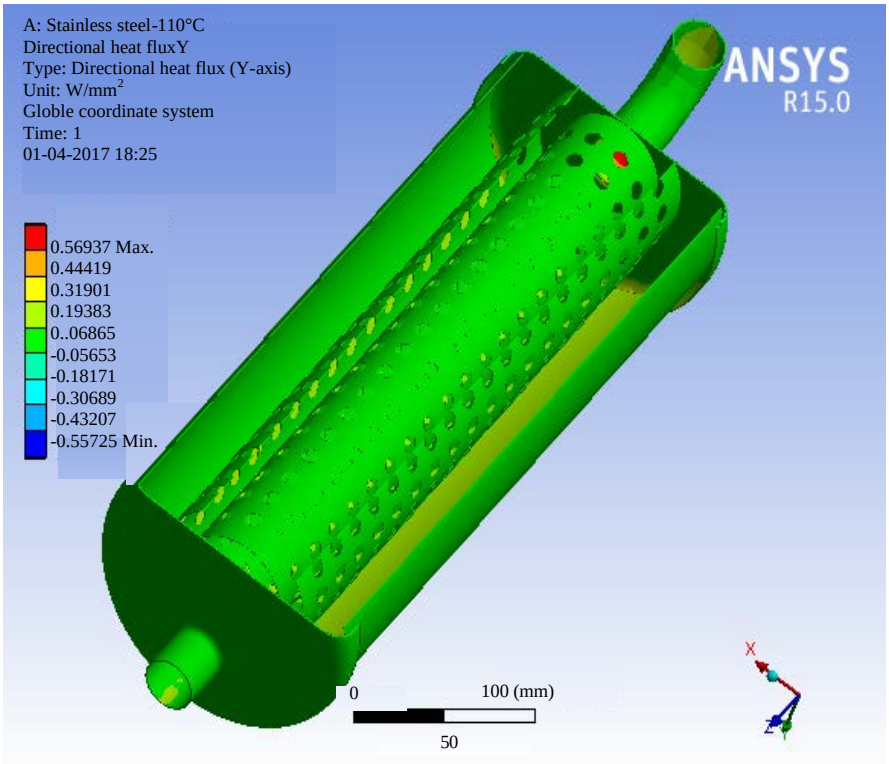

Fig. 4: Silencer directional heat flux in Y direction

Analysis of silencer meshing: The meshing is important step in the analysis. In this step, the created solid model was divided as many number of nodes and elements. The silencer has two different meshing. One is top and bottom flange fine meshed and another one is the mid part and silencer bend are normally meshed. These meshing differences are shown in Fig. 3 and 4. The analysis is done in the FEM method by the help of ANSYS WorkBench Software. The created silencer was analysis by different boundary condition and different materials. The results of the analysis are shown in Fig. 4 and 5. Figure 4 and 5 show the directional heat flux under the load conditions. Figure 4 shows the directional deformation of the silencer in the Y-direction and Fig. 5 shows the directional deformation rate in the Z direction.

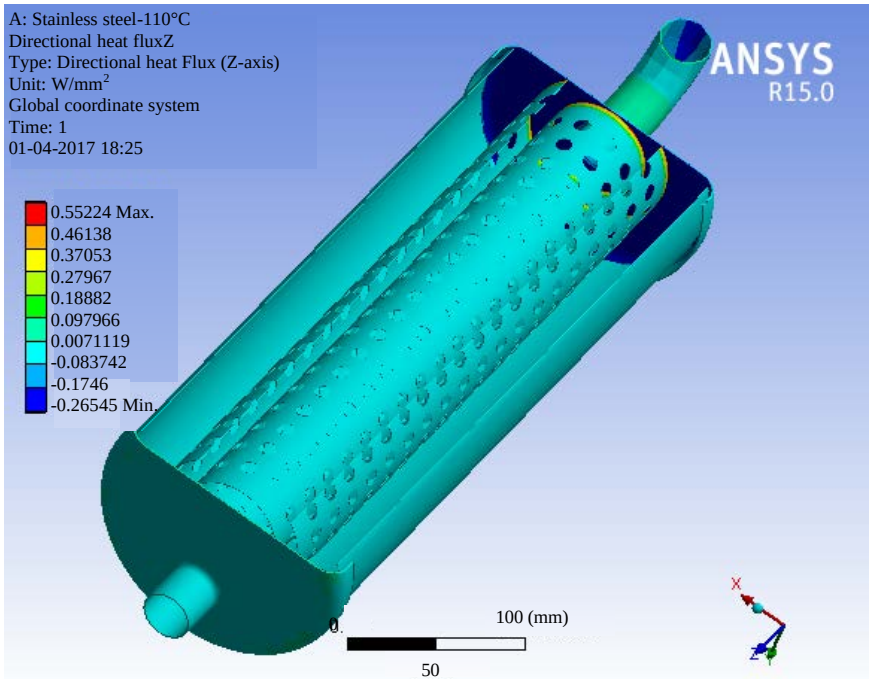

Fig. 5: Silencer directional heat flux in Z direction

Table 2: Results

	Results		
Material	Stress	Displacement	Sliding contact
Mild steel alloy	14.23	0.12e-3	0.132e-5
Coir fibre	10.45	0.23e-3	0.165e-4
Jute fibre	6.23	0.65e-3	0.198e-4

RESULTS AND DISCUSSION

The silencer was analyzed with the various materials in different load condition. Results are noted in Table 2 for comparing the materials and select the best material which was have better efficiency than existing material. The mild steel is having more stress value than the coir fiber and jute fiber. The jute fiber is having very less stress value than the mild steel alloy and coir fiber. And also it is economically efficient than mild steel alloy material.

CONCLUSION

The silencer was analysed by the ANSYS WorkBench Software for all three materials. Mild steel alloy, coir fiber and jute fiber are the materials used for investigate the silencer. Total heat flux and directional heat flux are calculated by the FEM method. Directional heat flux found in both Z and Y directions. The jute fiber is suitable for fabricating the silencer. Because it is mechanically good and it is having less weight than the present material. And the jute fiber is economically lower than the silencer materials used presently.

REFERENCES

Aravindan, S. and K. Thiruvenkatasamy, 2016. An analysis on the modeling of container terminal operations. Indian J. Sci. Technol., Vol. 9, 10.17485/ijst/2016/v9i39/98563

Jie, W. and D.P. Yue, 2010. The modal analysis of automotive exhaust muffler based on PRO/E and ANSYS. Proceedings of the 2010 3rd International Conference on Advanced Computer Theory and Engineering Vol. 6, August 20-22, 2010, IEEE, Chengdu, China, ISBN:978-1-4244-6542-2, pp: V6-251.

Rajesh, S., G.B. Bhaskar, R. Subash, K. Pazhanivel and S.S. Sagadevan, 2017. Optimization of composite leaf spring design using response surface methodology. Romanian J. Mater., 47: 98-105.

Shao, Y.L., 2011. A study on exhaust muffler using a mixture of counter-phase counteract and split-gas rushing. Procedia Eng., 15: 4409-4413.

Shi, Y. and L. Wang, 2010. The muffler suspension parts forepart fatigue damage problem study and improvement design. Proceedings of the 2010 2nd International Conference on Education Technology and Computer Vol. 4, June 22-24, 2010, IEEE, Shanghai, China, ISBN: 978--4244-6370-1, pp: V4-66.