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Modeling and Analysis of Piston and Connecting Rod in I.C Engine

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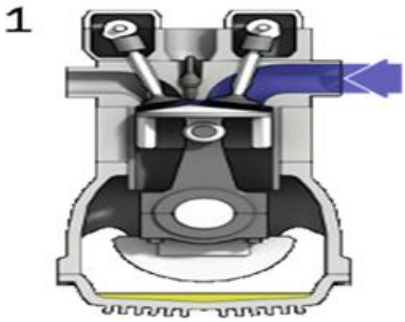
ABSTRACT:

The project Modelling and Analysis of Piston and Connecting Rod in I.C Engine is and Assembly of a IC engine according to the forces acting on it from the gases, which are released during the combustion. The piston head acts as a particular case and hence the piston is analyzed for the stresses developed due to the conditions. At first, the piston is designed according to the specifications. After the designing, the model is subjected to certain conditions. According to the conditions we have checked the stresses acting on it and checked the failures of the model. After the analyzing the changes are done to the model if required. In the analysis a model of piston is generated using CATIA. the finite element model of the piston is generated using Ansys. It is applied with loads and boundary conditions. Thus solved for the engine response. The result are calculated and tabulated below and the stresses acting on the body are shown

INTRODUCTION:

The internal combustion engine is an engine in which the combustion of a fuel (normally a fossil fuel) occurs with an oxidizer (usually air) in a combustion chamber that is an integral part of the working fluid flow circuit. In an internal combustion engine (ICE) the expansion of the high-temperature and high-pressure gases produced by combustion apply direct force to some component of the engine. The force is applied typically to pistons, turbine blades, or a nozzle. This force moves the component over a distance, transforming chemical energy into useful mechanical energy. The first commercially successful internal combustion engine was created by Étienne Lenoir.



Four-stroke
1. Intake
2. Compression
3. Power
4. Exhaust

The term internal combustion engine usually refers to an engine in which combustion is intermittent, such as the more familiar four-stroke and two-stroke piston engines, along with variants, such as the six-stroke piston engine and the Wankel rotary engine. A second class of internal combustion engines use continuous combustion: gas turbines, jet engines and most rocket engines, each of which are internal combustion engines on the same principle as previously described. The ICE is quite different from external combustion engines, such as steam or Sterling engines, in which the energy is delivered to a working fluid not consisting of, mixed with, or contaminated by combustion products. Working fluids can be air, hot water, pressurized water or even liquid sodium, heated in some kind of boiler. ICEs are usually powered by energy-dense fuels such as gasoline or diesel, liquids derived from fossil fuels. While there are many stationary applications, most ICEs are used in mobile

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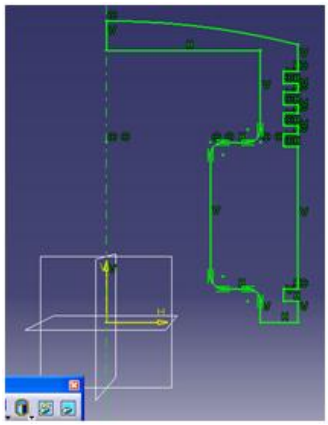
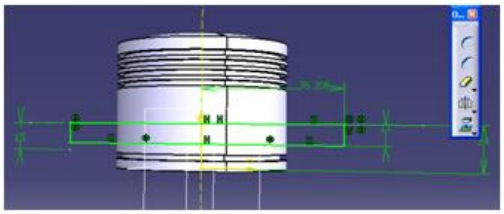
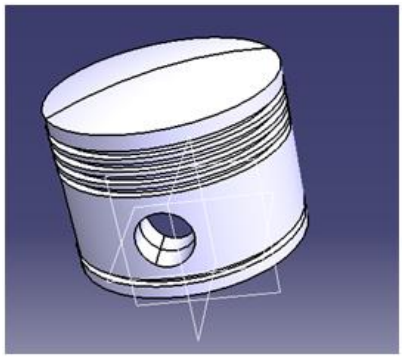
applications and are the dominate power supply for cars, aircraft, and boats.

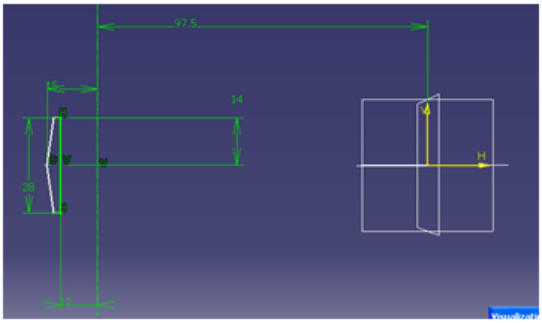
SKETCHER OF PISTON

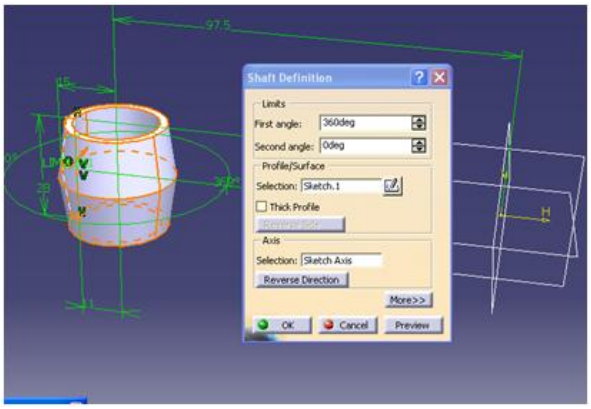


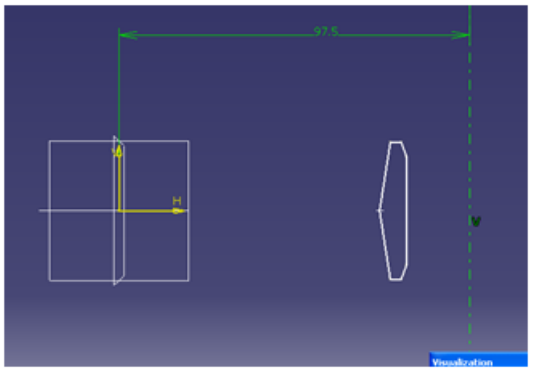


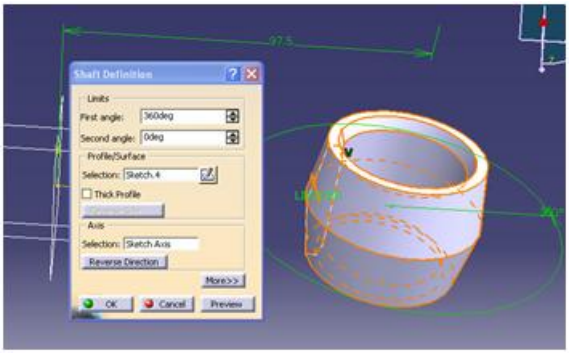


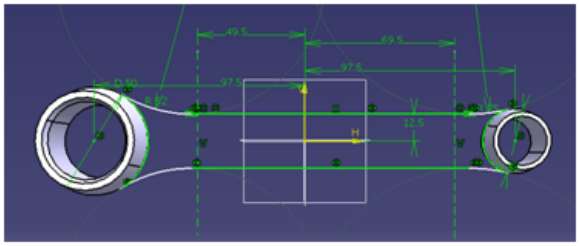
SKETCHER OF CONNECTING ROD

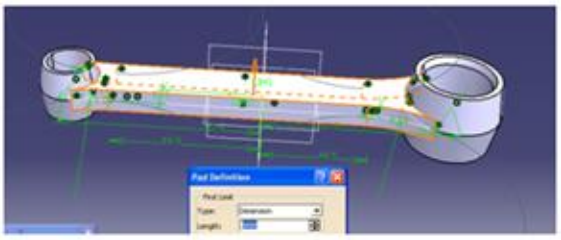












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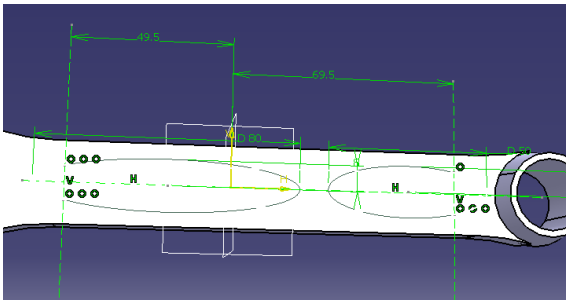
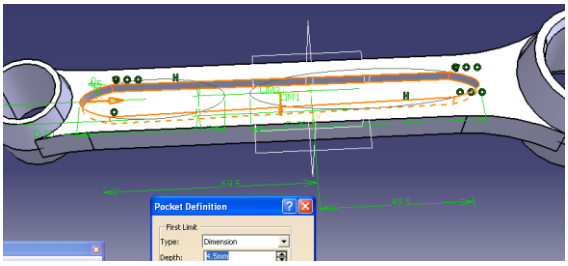
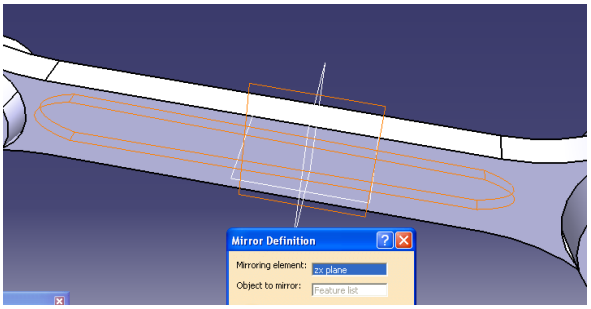
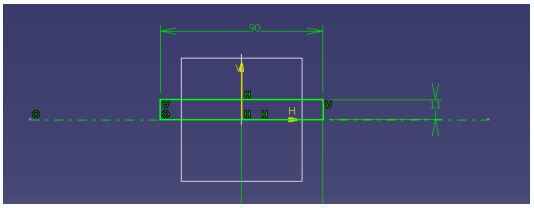
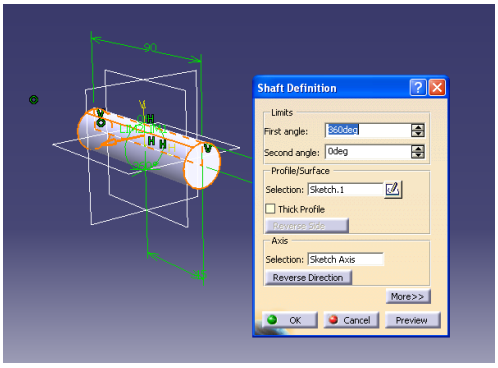




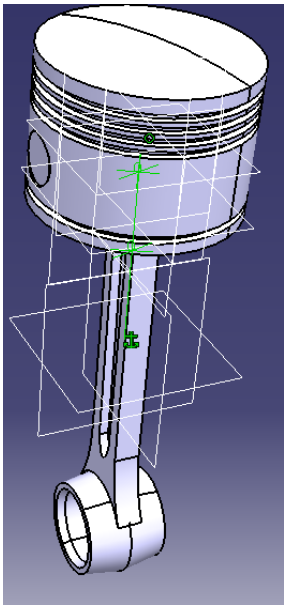


SKETCHER OF PIN

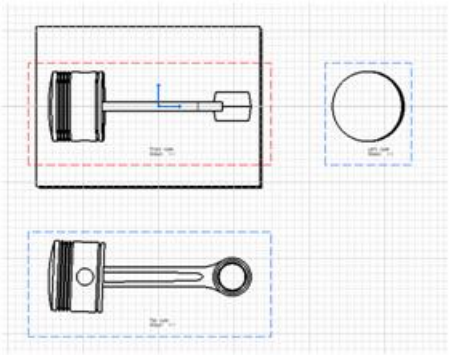




ASSEMBLY OF PISTON AND CONNECTIN ROD



DRAFTING OF PISTON AND CONNECTING ROD



- Material Data
  - Alumina 96%

FIGURE 1 Model (B4) > Geometry > Figure

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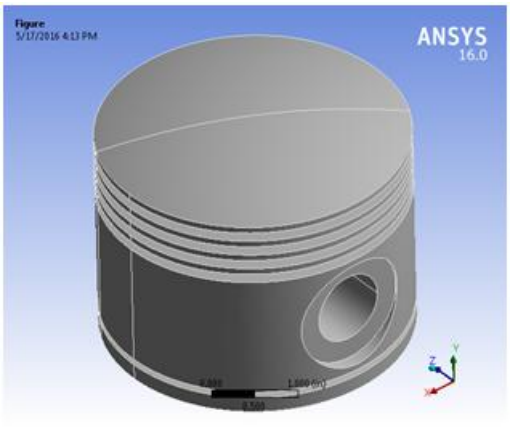


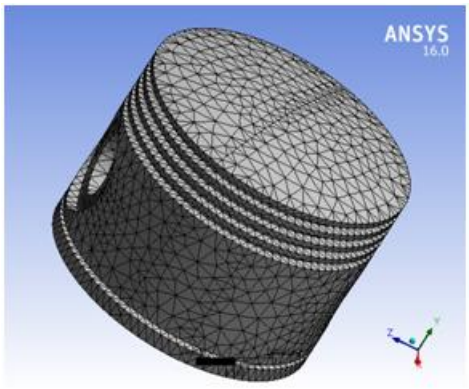
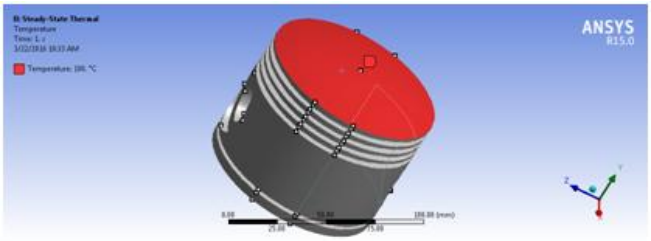


FIGURE 4 Model (B4) > Steady-State Thermal (B5) > Temperature > Image



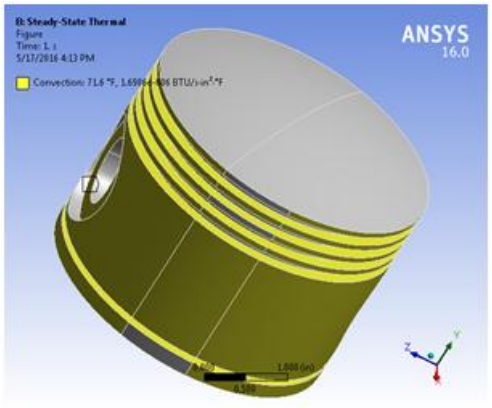


FIGURE 7 Model (B4) > Steady-State Thermal (B5) > Solution (B6) > Temperature > Figure

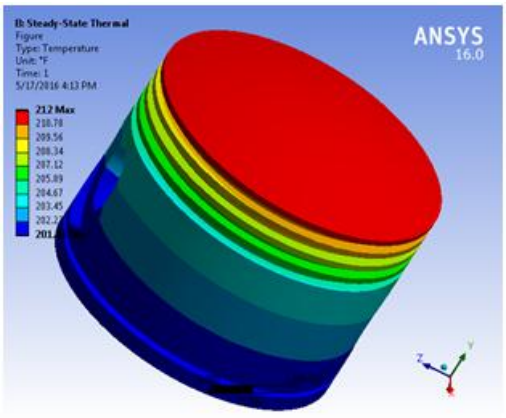
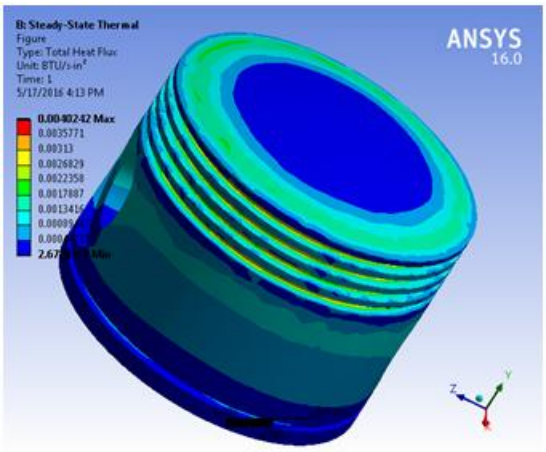


FIGURE 8 Model (B4) > Steady-State Thermal (B5) > Solution (B6) > Total Heat Flux > Figure



- Material Data
  - Aluminum Alloy

FIGURE 2 Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation > Figure

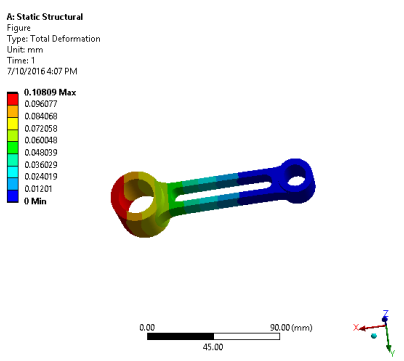


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FIGURE 3 Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Elastic Strain > Figure

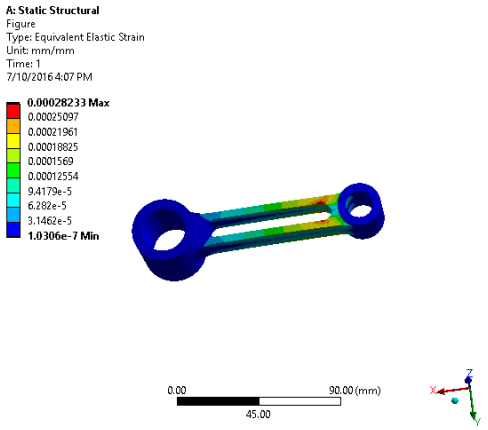
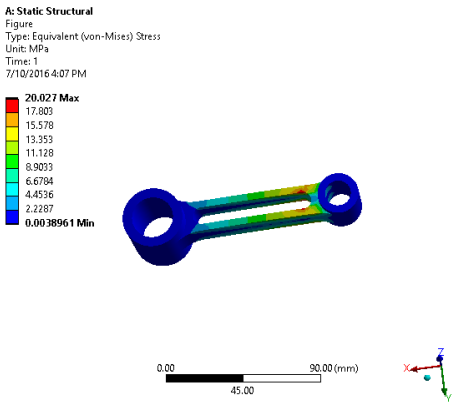


FIGURE 5 Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress > Figure



CONCLUSION:

Finite Element analysis of the connecting rod of a Hero Honda Splendor has been done using FEA tool ANSYS Workbench. From the results obtained from FE analysis, many discussions have been made. The results obtained are well in agreement with the similar available existing results. The model presented here, is well safe and under permissible limit of stresses. Conclusion is based on the current work that the design parameter of connecting rod with modification gives sufficient improvement in the existing results.

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