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Design and Flow Analysis on Dynamic Supercharger Using FEA

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ABSTRACT: The Supercharger is a compact or compact device that is delivered to the inside of the engine. The oxygen level in the engine tends to burn more fuel which leads to more work, i.e. an increase in power discharge. Supercharger is one of the large volume guides with complex geometry in the Internal Engine Combustion (I.C). It has to do a lot of work to provide a better job. In this study we performed Model and Damage Analysis with high charge to identify the main mechanisms and areas of major stress. In this study the model of the supercharger is released from the CATIA V5R20CAD software and Using ANSYS. In this study The material strength, miss presses, and various engineering processes are the main considerations.

KEYWORDS: Supercharger, FEA analysis, CATIA, ANSYS,

I. INTRODUCTION

The power transmits to the overhead driver using a gear, shaft, belt attached to the engine crankshaft. When a turbine produces a power with exhaust gas it is called a Turbo Supercharger. Most Dynamic executives with heavy loading qualifications rely on raising the air at a higher cost which leads to exacerbating the problem by reducing it. Supercharger is a component that can automatically increase air pressure by pressing

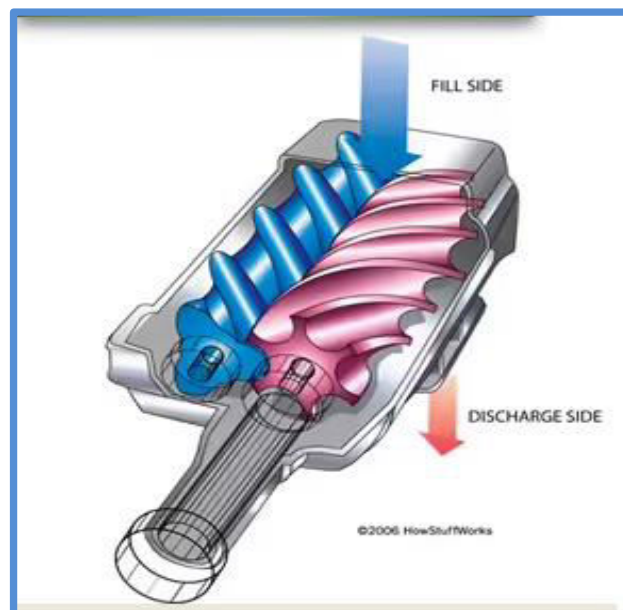


Fig1.shows the supercharger model

The above figure shows the working procedure inside the supercharger it has been clearly shown that air inlet to the supercharger chamber which is regulated by the Bypass valve actuator and falls on the rotors.



The hosingears are in contact with rotor. The phasing gear attached to the shaft and the power output is driven by the drive pulley.

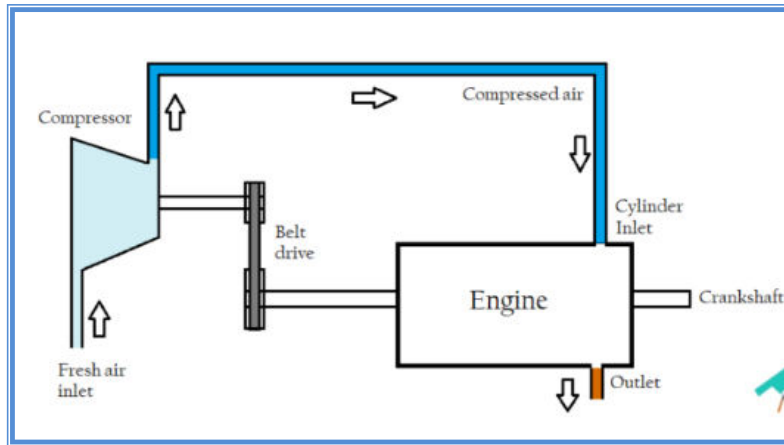


Fig 2.Schematic diagram of Air flow inside the engine

From the above schematic diagram It is clearly shown that fresh air starts with pressure to increase the pressure level and then goes to the cylinder section of the engine which is the carburetor where the air and fuel are mixed and to room temperature. A supercharger that receives compressed air from the compressor chamber. The main function of a large charger is to compress the compressed air to produce a long-lasting net function.

The paper is arranged as follows. Phase II presents related information about the Supercharger, phase III lists the various materials and production processes of the Supercharger while phase IV introduces Modeling and Analysis and section V introduces Border Condition Loading, Section VI presents the Test Results and VII presents the Conclusion.

II. RELATED INFORMATION

The great advantage of the supercharger is to increase the network performance performed reflects the high power transmission in relation to proper fuel consumption. Depending on the operating conditions and air conditioning, the Supercharger gas transmission is divided into two

III. MATERIALS AND MANUFACTURING PROCESSES

Material selection should be based on the requirements of the set result. A few requirements that require weight gain, resilience, resilience to various environmental hazards, service life and reliability. The materials must withstand various mechanical properties such as bending, Torsional loads and binding, pressure cutting, elastic limit, fatigue and pressure conditions. Secondly the goods should be less expensive and more easily accessible. In this study we considered the relatively lightweight Aluminum alloy with good heat dissipation and a life-sustaining gel for god fatigue, model analysis is a continuous model with aluminum .The visible aluminum structures are as follows:

Material type	Poissons Ratio	Youngs Modulud	Density	Bulk Modulus	Shear modulus
Aluminium	0.33	7.1E+10 pa	2770 kg ⁻³	6.9608E+10 pa	2.669E+10 pa

Table1.shows the material properties of aluminum alloy

IV. MODELING AND ANALYSIS

The computer-assisted drawing program uses geometric construction and planning techniques to create a basic model. This creates models for the ropes and areas that can be arranged by geometric arrangement, later in periodic testing the

modeling parameters systems are introduced, which will be used to build relationships between geometric organizations. These techniques are based on user-defined parameters and parameters used to construct basic models, but sometimes the user faces an error from making modifications due to limitations parametric systems also rely heavily on bodies created with swept drawings, high bodies produced at the top. Modeling and did not have a variety of building and planning techniques.

In this study we have an area over flow analysis of an dynamic supercharger to observe the various velocity streamline and pressure differences on the designed model.

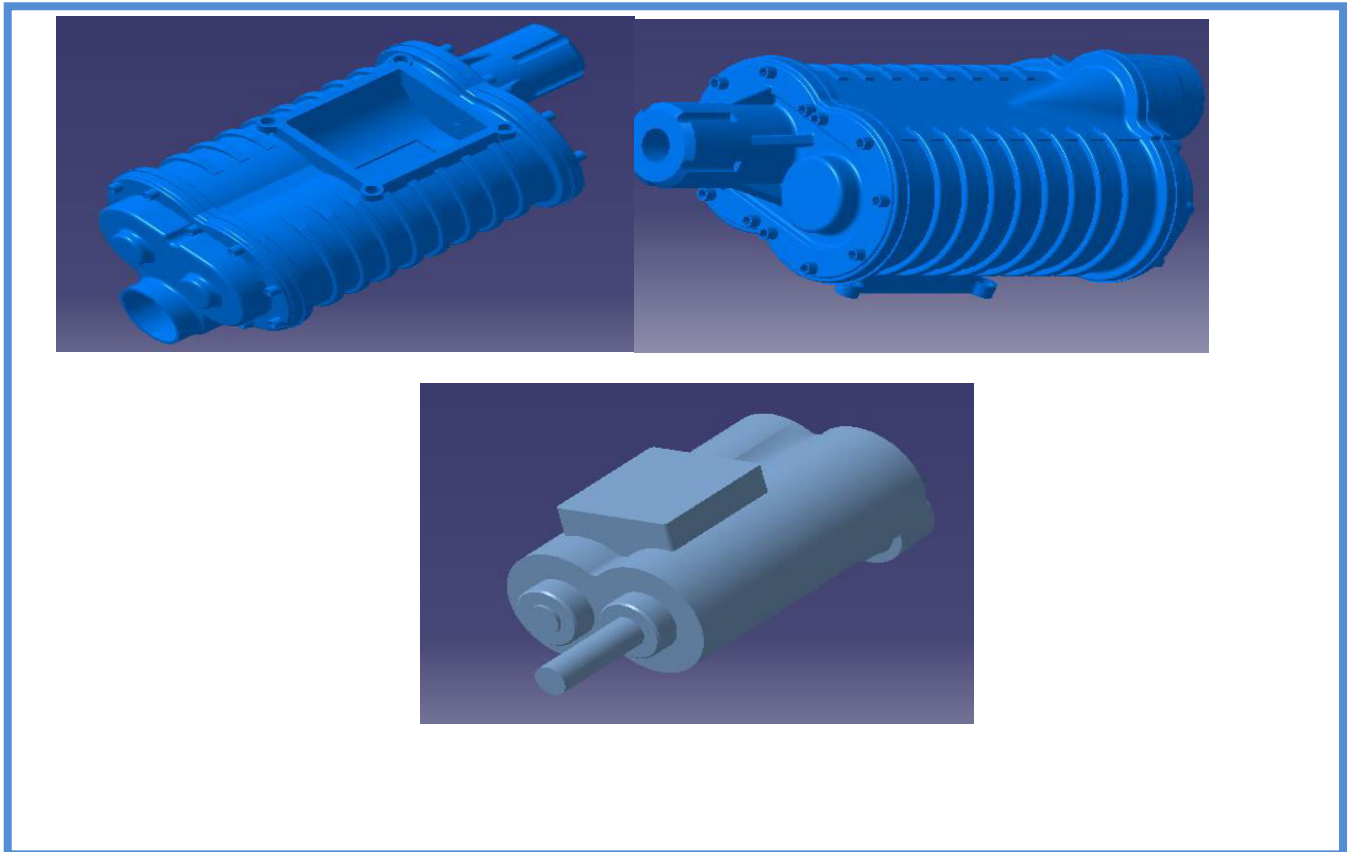


Fig3.shows the model after designed in catia

The process at CATIA in comparing a solid bar is as follows; To produce 2D Sketch which is a web profile; The profile is considered using the "3D project" option and requires converting the imaginary 3d element into a structure and the "rotate" option is used to rotate the proposed profile from the center of the axis and fillet according to the terminal in Catia Software. and turn this part of the cat into step file that can covert easily in any application.

The FEA method relies on finding a foundation or subdividing a small fraction of the number of sub-domains (elements) in which a fixed solution is applied using different or remaining weighted methods. This is one of the most widely used methods in each stage of mating.It actually reduces the problem of having a limited amount of anonymity by dividing a domain into categories and by identifying a different anonymous field in relation to assets between available assets. These functions are defined by the degree of domain flexibility in specific, integrated nodes. The limited feature method is a type of numerical method that can be used to find solutions to major engineering problems that include authentication analysis, power dissipation, cost overruns, and water dispersion.Analysis systems commonly referred to as "ANSYS" is a software package for analyzing a limited aspect is a numerical method of subtracting a complex system into very small pieces (user-defined design size) called elements. Internal software creates an ethical equation of elements after construction. Workbench benchmarks in ANSYS are a limited quantitative analysis tool used in conjunction with CAD programs and / or Design Model. was the most preferred software to solve complex problems in structural, thermal, and electromagnetic analysis. ANSYS and the working bench focus on existing geometry, scattering element, and loads applied according to the problem-solving requirement and ultimately look at the results.

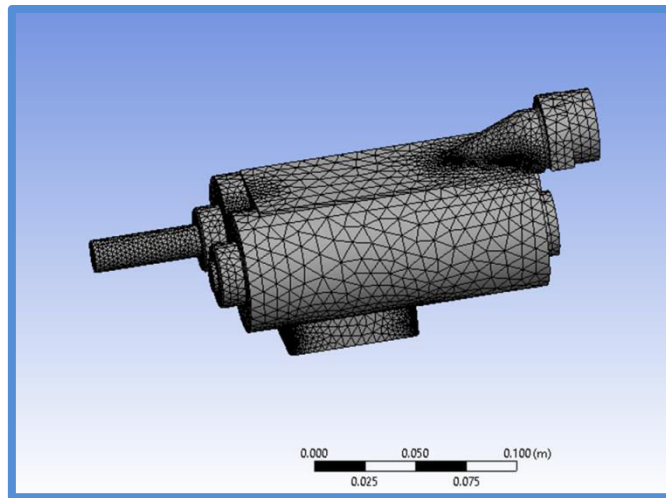
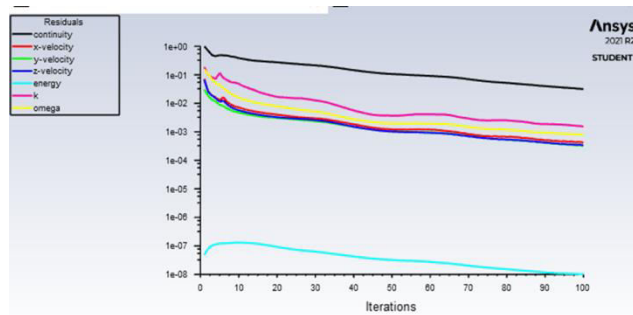


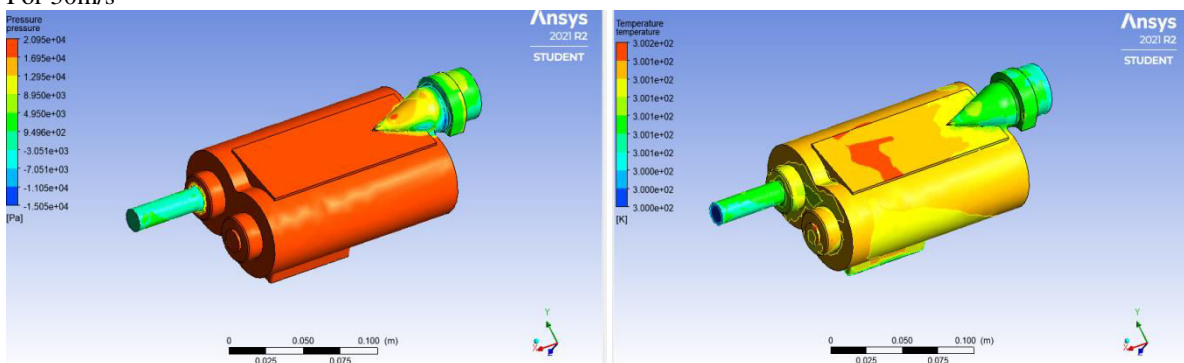
Fig4.shows the mesh presentation

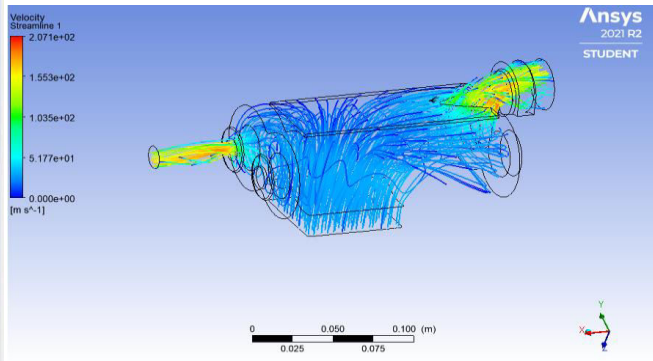
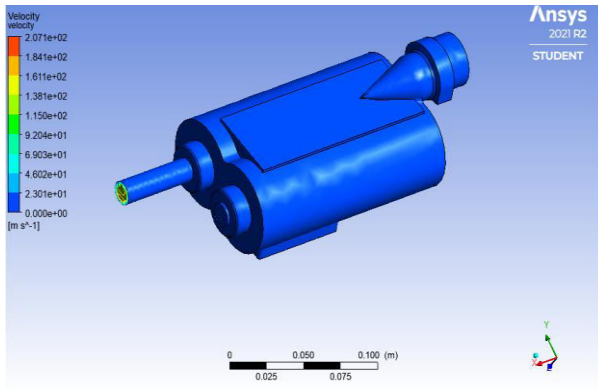
V. EXPERIMENTAL RESULTS

The flow analysis has been carried out in supercharger at 30,45,55,60 m/s air flow rate inside the supercharger.

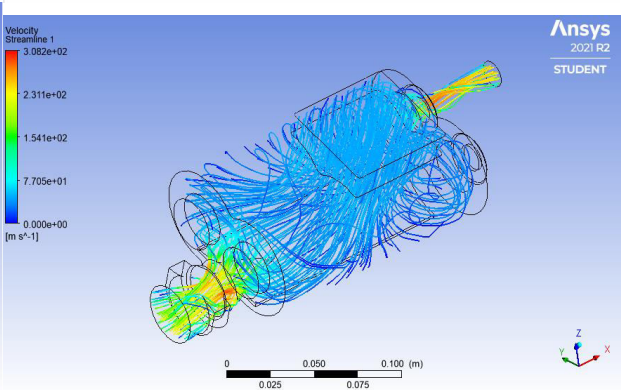
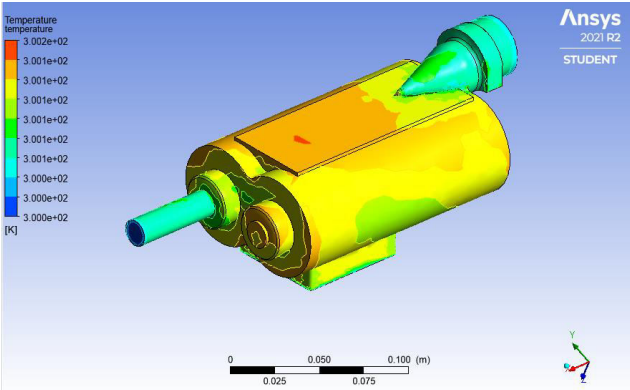
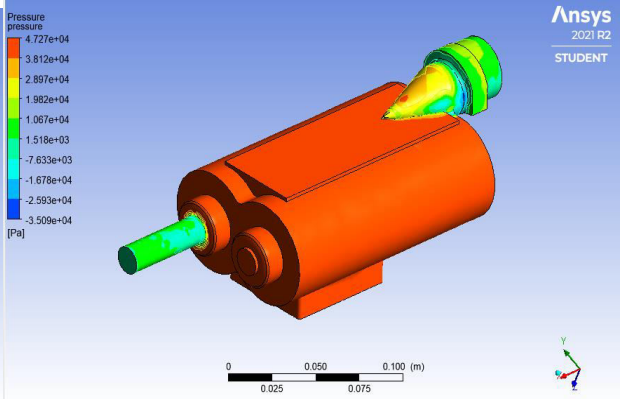
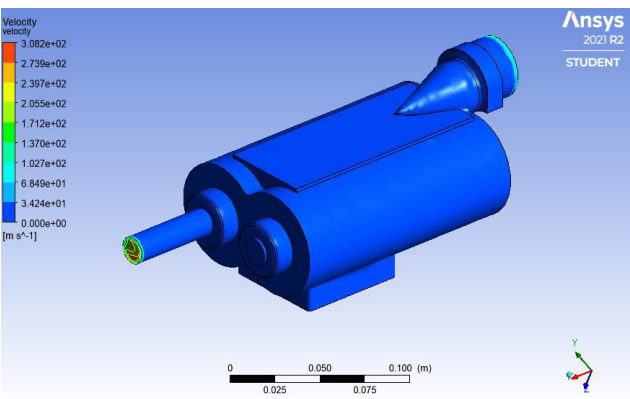


For 30m/s

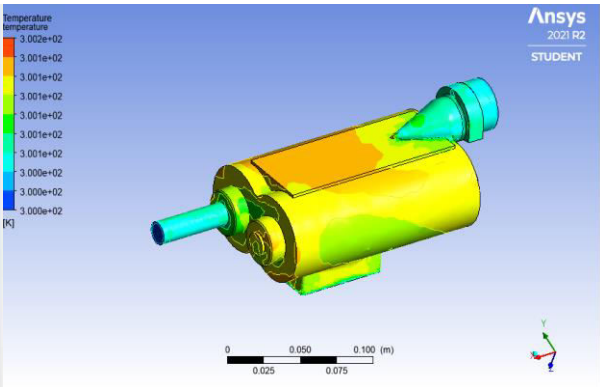
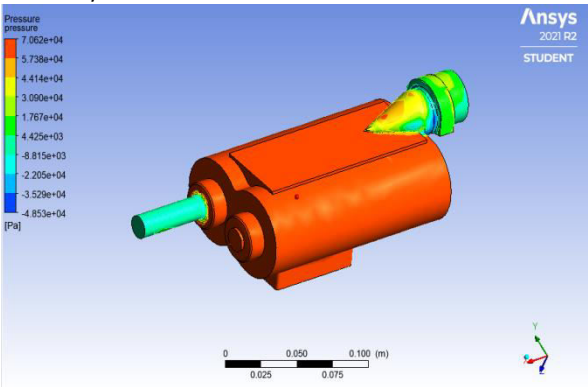




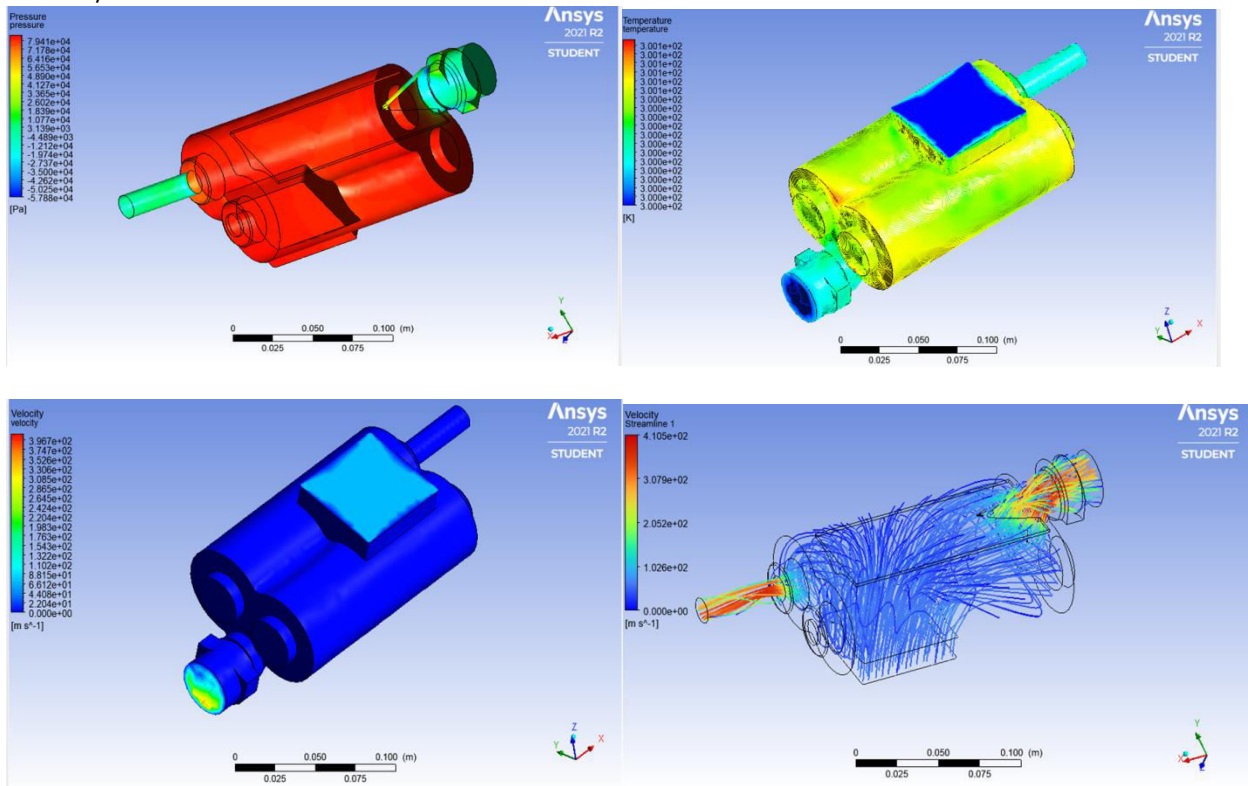
For 45m/s



For 55m/s



For 60m/s



V. CONCLUSION

The flow analysis has been carried on supercharger with four different air flow velocity rate the velocity of air flow was appeared at outlets since the channels are comparatively smaller in cross section and wider in the inlet. The pressure on the supercharger gradually increases with the increase in air velocity rate mainly around the body. And the temperature effect is cause by surrounding gradients. The flow of air is tangential an smooth flow inside supercharger and observed to be safe till the higher velocity rates.

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