

DESIGN AND ANALYSIS OF 4 STROKE IC ENGINE COMBUSTION CHAMBER USING ANSYS WORKBENCH

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Abstract: An IC engine is one in which the start of fuel occurs inside the engine chamber. IC engines purposes of as their fuel. In petrol engines the right degree of atmospheric air and fuel is done mixture in the carburetor and dealt with to system chamber where it is lit through a blaze fitting. The means drew in with a 4 stroke IC engine are pull stroke, pressure stroke, and improvement stroke and fumes stroke. One of the chief parts in an IC engine is the start chamber. The arrangement of a start chamber has a critical effect upon the engine show and its bang and air whirl properties. Plan of a start chamber incorporates the condition of the consuming chamber, region of the blaze fitting and its place of the consuming chamber head. The ongoing work a find out about the effect of start upon the presentation and surge of an engine. Assessment is finished on an engine using single chamber start chamber which is four cycle engine chambers. Execution not entirely set in stone. CATIA is parametric used for plan and ANSYS programming used to carry out examination of start chamber model.

I- INTRODUCTION

Four stage engine system is the most remarkable sorts of IC engines and is used in different various vehicles (that unequivocally use gas as fuel) like vehicles, trucks, and a couple of motorbikes (many 2 wheelers use a 2-cycle engine). A four-stage system engine conveys one power stroke for every two occasions of the chamber (or 04 different strokes). Here is an energy aside (Figure 1) of a 04-stage engine system and further detailed explanation of the cycles.

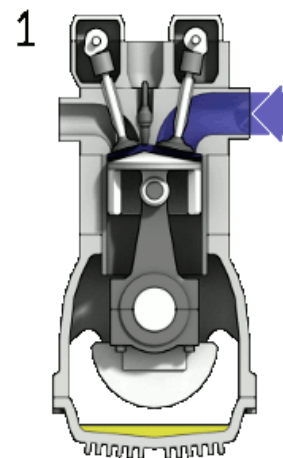


Figure: 4-Stroke Gas Powered Motor

Use stroke: The chamber reciprocates jumping to the base, this plans the space to allow a air-fuel mixture to enter the system.

Pressure stroke: Affirmation post is closed, and the chamber climbs the area to the top. This packs the air-fuel blend. Close to the accreditation of this stroke, an impact fitting gives the stuffed fuel the embracing energy expected to begin consuming.

Power Stroke: As the fuel shows up toward its fulfillment consuming, the power set free from combusting of gases like hydrocarbons maintains the strain which makes the gas push up and down on the chamber and make the power yield.

Exhaust stroke: The chamber shows up at the base, the exhaust state opens. The extra smoke gas is moved out of the chamber as it moves to back to upwards.

Warm farthest reaches of these gases engines will move subject to the model and also plan of the locomotive. Notwithstanding gas engines, by and large, of the fuel (substance power) to mechanical power — in which on a particularly basic level 15% will be utilized to move the wheels (the rest is lost to contact and other mechanical parts). Thermodynamic extraordinary judgment will comparatively uphold in engine systems is through a higher strain degree. This degree is the breaking point between the base and most undeniable space in the engine system chamber (observed TDC and BDC on figure. A further degree will allow a clearer fuel-air mix to enter, causing a maximum strain, instigating a genuinely impacting system, which developments warm end.

II - LITERATURE SURVEY

Tadala Akhil, Naresh, Abdul Khurshid, Purushotham anil Kumar (2016); paid special attention to, the warm and the strain spread of the chamber which is given four obvious materials by utilizing the Coupled to field assessment by limited part strategy (Finite Element Method). The endpoints utilized for the spread are the Thermal as warm restrictive and the power or the strain applying on the chamber crown and the material properties of the chamber. The focal centers utilized for the chamber have a spot with four stroke single system Legend Honda bike. Aluminum metal composites are making across the wide support for vehicles, current, flying applications considering their low thickness, top notch and incomprehensible major inflexible nature. In present work the Chamber is shown utilizing Catia V5 appearing and Confined

Part examination (Couple Fielding appraisal) by utilizing the phases of both major and warm evaluation are finished for similar model using Ansys programming for Aluminum (unadulterated), Aluminum blend (A6061), Al-GHS 1300 and Al-Sic graphite and the results were explored. The outcomes expect the most insane strain and the significant area on the different aluminum mixtures chamber utilizing FEA. Finding the significant area of concentrated strain for sensible changes is enormous.

Nilesh T. Dhokane, Anand R. Nadgire and Savita U. Shinde (2016); had watched out for motor execution limits with development of H₂ or O₂ and integrated with turbocharger as well as supercharger. I have completed trial and error on authentication side improvement of SI motor. No any appraisal ought to be finished on blending the oxygen rich air into use complex by utilizing unadulterated oxygen. So, this evaluation to manage the presentation of SI motor and decreases how much fuel use and due to wrap up begin the pollution created of SI motor is moreover reduced. Hence the evaluation might be finished on oxyrich air for consuming of fuel in SI motor. Here I have found brake express fuel use with and without oxygen rich in air stimulus, shut brake warm proficiency of the turn of events. Moreover, I have really investigated all movement endpoints of SI motor with and without oxyrich flying corps. I could see as Mechanical and Volumetric reasonableness of motor with and without oxygen mixing. For encouraging the starter set up for oxygen rich avionics-based military, I utilized electronic four stroke oil motor test rig.

Suramya Naik, Fabien Redon, Gerhard Regner, and John Koszewnik (2015); had looked out for, Indian producers to merge with future mileage and spills over orders including the genuinely passed through Corporate Generally average Fuel Use (CAFC) rules for light-commitment automobiles many are assessing new advances. Notwithstanding, to give a monetarily sensible approach, these sorts of progress should increase presence of mind without creating cost. One committing reaction for meet both current, and future, principles is the clashed with chamber motor.

III - OBJECTIVES AND METHODOLOGY

The main objective of this project is to successfully design a combustion chamber for testing on thermal analysis. Initially the design was adopted from an already existing combustion chamber and minor changes were made to suite our purpose.

1. Heat transfer coefficient on the combustion chamber has been obtained.
2. Pressure drop on the combustion chamber have been obtained.
3. Combustion chamber process has to be obtained.
4. Carry out design and optimization of combustion chamber by thermal analysis method.

IV - DESCRIPTION OF THE PROJECT

In this four stroke IC engine having two chambers wherein first chamber is for endorsing moreover, pressure cycle and second chamber is for advancement and smoke cycle.

The central chamber has pressure chamber and second chamber has progress chamber where the strain chamber has less dislodging then improvement chamber. The chambers are associated with the yielding bars on driving post using sets of crankpins. The updates in consuming zeroing in on first chamber with a sound valve for its head and second chamber with an exhaust valve to its.

A trade valve is interconnected among first and second chamber for closing and opening of chamber for brief term when the strain chamber is at upper splendid first chamber opens and compacted charge move to second chamber for progress and exhaust cycle. A power exchanger set between the two chambers for utilizing exhaust heat for warming the stuffed charge while moving to the going with chamber.

V - DESIGN METHODOLOGY OF IC ENGINE COMBUSTION CHAMBER

CATIA, kept 03-layered speedy software) is a multi-purpose stage programming suite for PC helped plan (PC stayed aware of plan), PC supported making (CAM), PC helped coordinatng (CAE), 3D appearance and Thing lifecycle the supervisors

(PLM), made by the French association Dassault Frameworks. Since it stays aware of various seasons of thing improvement from conceptualization, plan and needing to get-together, it is seen as a CAX-programming and is a piece of the time proposed as Something 3d Lifecycle The stack up programming suite. Like overwhelmingly a giant piece of its obstruction it works with satisfying status through a set cloud connection and have sponsorship to be used across disciplines including surfacing and shape plan, electrical, fluid and electronic plans plan, mechanical method and plans sorting out.

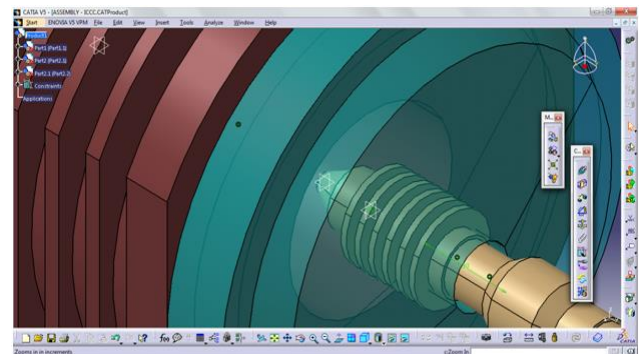


Fig: Model design in CATIA-V5

Other than being used in unending relationship from flight and gatekeeper to packaging plan, CATIA has been used by sketcher Veritable Gehry to design a piece of his cutting curvilinear structures and his association Gehry Levels of progress was attracting their Modernized Endeavor programming contemplating CATIA.

VI - ANALYSIS OF IC ENGINE COMBUSTION CHAMBER

Ansys makes and grandstands organizing duplication programming for use across what life cycle. Ansys Mechanical bound part examination making PC programs is utilized to reflect PC models of plans, stuff, or machine components for annihilating the stability, power, adaptability, thermal scattering, and different properties. Ansys is utilized to close the way that a thing will go work with various nuances, without constructing test things or figuring out catastrophe tests. For Ansys programming could reenact how a plan will hold up system a marvelously critical stretch of time of flow, how to best manage salmon in a cannery to desipitate waste, or how to

make plan a slide that is utilized less material without surrendering progress.

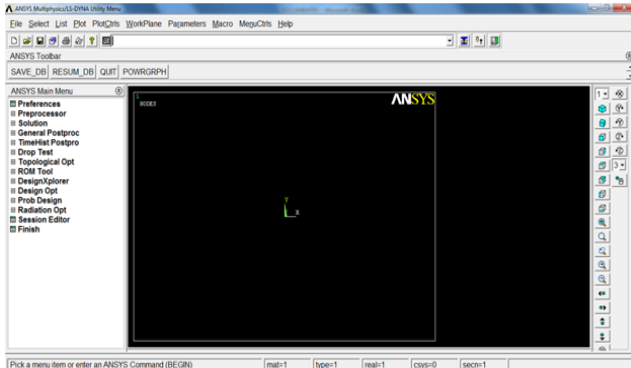


Fig: Import panel in Ansys.

Meshing: Meshing is the most outstanding way with manage changing clashing shapes into extra obvious volumes called "parts." Before you start testing, you ought to at first exchange a computation or system helped plan with exhibiting into, for example, Ansys Mechanical to begin the reenactment correspondence.

VII - DISCUSSION ON ANALYSIS RESULT

Results of Thermal Gradient:

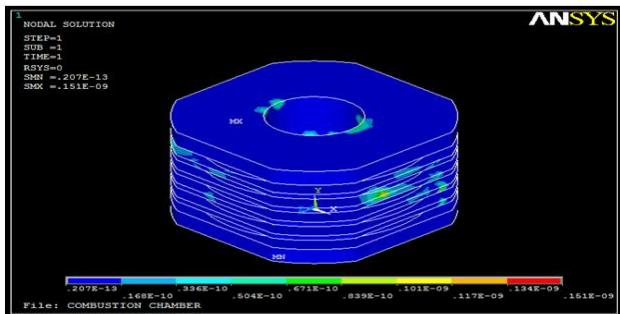


Fig: Thermal Gradient Analysis of Combustion Chamber – Steel

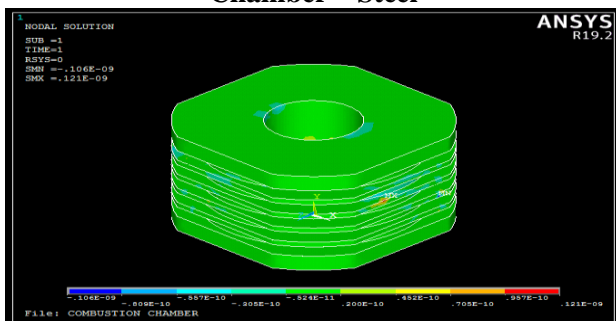


Fig: Thermal Gradient Analysis of Combustion Chamber – Beryllium

Results of Thermal Flux:

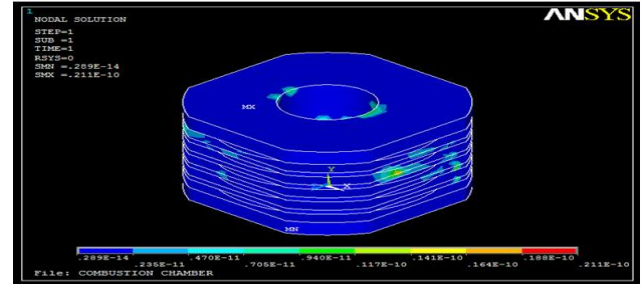


Fig: Thermal Flux Analysis of Combustion Chamber – Steel

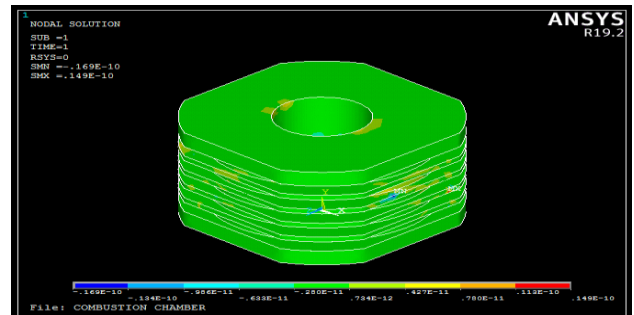


Fig: Thermal Flux Analysis of Combustion Chamber – Beryllium

Results of Heat Flow:

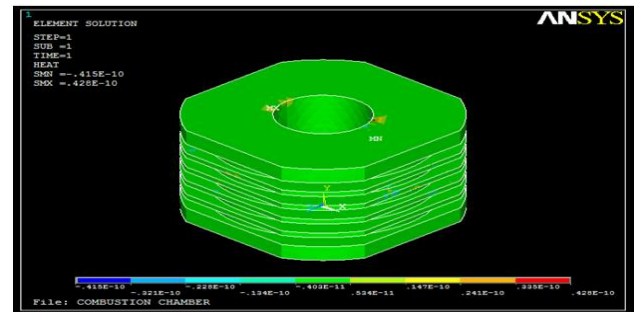


Fig: Heat Flow Analysis of Combustion Chamber – Steel

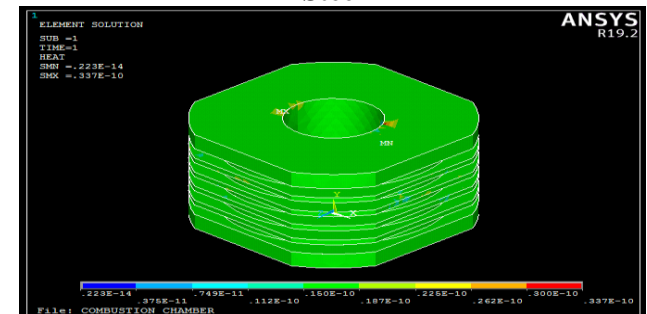


Fig: Heat Flow Analysis of Combustion Chamber – Beryllium

VIII - CONCLUSION

It will overall be seen from the above outcome that, our target of IC Motor Turn over Chamber utilizing

obliged thermodynamic advancement with balances which has been suitable. As displayed above figures out the best Warm point is coming, this system tending to with the assistance of Ansys programming so the most insane Warm inclination for the parts. The craziest Warm progress is coming, this approach managing the assistance of Ansys programming so the best Warm headway for the under parts. The best Power stream for the parts is recorded under. Also, as per the above evaluation, beryllium have stopped by extra caused results among the steel material to be utilized for these as another decision. So, we can close our methodology limits are by and large right. The system of the IC Motor Consuming Chamber structure worked totally in appraisal likewise, this goliath number of confirmed factors highlight the finish of our goal in high regard.

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