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Design and analysis of LPG {Butane} Powered gas Turbine Engine with Hydrated Carbide Thrust Augmentation Technique

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ABSTRACT: Objective of this project is to design and analyze a gas turbine engine which will be capable to perform better than any other gas turbine engine without emitting extra CO_x, SO_x or unburnt hydrocarbon in the atmosphere. This particular design of gas turbine would be capable of to outperform any other gas turbine engine at low emission of SO_x and CO_x; as we are using high calorific value gas fuel sint.

Our main focus is to power heavy machines which consume enormous amounts of energy to be propelled like ships, heavy weight cargo carrier air craft etc.

KEYWORDS: Gas Turbine Combustion Chamber, Turbine, Compressor, Ansys, Catia, etc.

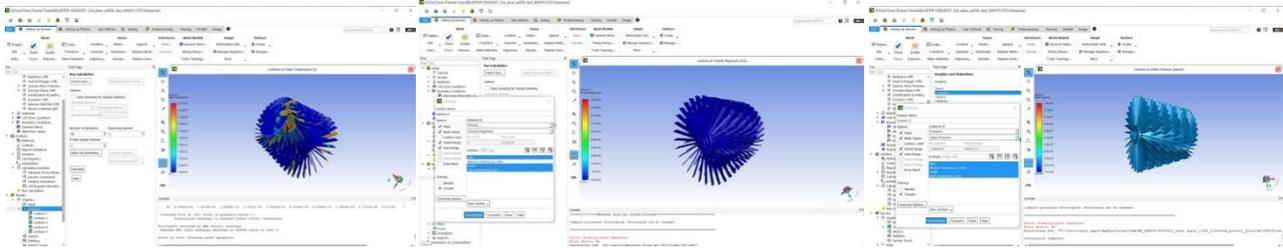
I. INTRODUCTION

In order to produce an expansion through a turbine a pressure ratio must be provided. Hence, the first necessary step in the cycle of a gas turbine plant must be compression of the working fluid. If, after the compression, the working fluid is to be expanded directly in the turbine and there were no losses in either component, the power developed by the turbine would just equal that absorbed by the compressor. Thus, if the two were coupled together, the combustion would do more than turn itself round.

The power developed by the turbine can be increased by the addition of energy to raise the temperature of the fluid prior to expansion. When the working fluid is air, a very suitable means of doing this is by the combustion of the fuel in the air which has been compressed. Expansion of hot working fluid then produces a greater power output from the turbine than the power necessary to drive the compressor. The three main components are, therefore, a compressor, a combustion chamber and a turbine, connected together and make one gas turbine engine.

II. RELATED WORK

- We have designed a six-stage axial compressor coupled with a 2-stage axial turbine.
- For the literature part we took help from V. Ganesan and the design references have been taken from Agent Jayz YouTube channel.
- We have performed thermal analysis in the compressor rotor and general meshing in the shaft cum axial turbine.



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IV. SPECIFICATION

1. DIMENSIONS OF COMPRESSOR ROTOR:

TOTAL LENGTH	44 CM
DIAMETER OF INLET HUB	14 CM
DIAMETER OF OUTLET HUB	28 CM
BLADE ANGLE	75 DEG
CHORD LENGTH	3.5 CM
NO. OF STAGES	6

2. DIMENSION OF AXIAL TURBINE CUM SHAFT:

TOTAL LENGTH SHAFT + TURBINE	45CM + 10CM
TURBINE INLET DIAMETER	34 CM
TURBINE OUTLET DIAMETER	22 CM
SHAFT DIAMETER	6 CM



V. CONCLUSION

In this project we have studied about Axial Compressor Rotor and Axial Turbine and designed it in CATIA V5 R20 and obtained design parameters from Agent Jayz YouTube channel. After designing the Compressor Rotor and Axial Turbine we have also done analysis of the Compressor Rotor in ANSYS 19.2.

We shall keep trying to optimise it by changing the parameters and again analysing till we get the most efficient design and results.

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