DESIGN AND ANALYSIS OF CERAMIC(SIC) GAS TURBINE VANE

A Project Report submitted in partial fulfillment of requirements for the Award of the degree of

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

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2014-2018

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CERTIFICATE

This is to certify that this project work entitled "DESIGN AND ANALYAIS OF CERAMIC(SIC) GAS TURBINE VANE" that is being submitted by G.VINEETH (15815A0318), CH.VIKAS RAJ (15815A0307), G.DILEEP KUMAR (15815A0316), G.SAI KUMAR (15815A0315) to AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, Makavarapalem, Visakhapatnam in partial fulfillment of the requirements for the award of degree of BACHELOR OF TECHNOLOGY in MECHANICAL ENGINEERING is a bonafide work carried out by them under my guidance and supervision during the year 2014-2018.

The result embodied in this have not been submitted to any other College or University for the award any other degree.

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ABSTRACT

During past few decades there has been significant increase in turbine entry temperature (TET) in order to improve gas turbine ability and efficiency, which represents a huge challenge to turbine blades design.

The objective of this Project was to develop design concepts for a cooled ceramic vane to be used in the first stage of the High Pressure Turbine (HPT). To insure that the design concepts were relevant to the gas turbine industry needs. The first was an analysis of the cycle benefits arising from the higher temperature capability of Composite materials (SIC) compared with conventional metallic vane materials

The size, shape and internal configuration of the turbo shaft engine vanes were selected to investigate a cooling concept appropriate to small vanes. Shape Optimization made on geometry using CATIA V5 software. Using blade geometry and materials like SIC (silicon carbide) analysis done using ANSYS 15.0.

Gas turbine play a vital role in the today's industrialized society, and as the demand for power increase, the power output and thermal efficiency of the gas turbine must also increase One method of increasing both the power output and thermal efficiency of the engine is to increase the temperature of the gas entering the turbine. In the advanced gas turbine, the inlet temperature of around 1500^0c is used, however this temperature exceeds the melting temperature of the metal airfoils. Therefore, along with high temperature material development, a refined cooling system must be developed for continuous safe operation of the gas turbines with high performance.