KARMAVIR DADASAHEB KANNAMWAR
COLLEGE OF ENGINEERING, NAGPUR
DEPARTMENT OF MECHANICAL ENGINEERING

SESSION 2012-2013

CERTIFICATE

Certified that the project titled "Analysis of low pressure steam turbine blade" is a bonafide work done under our guidance and is submitted to "Rashtrasant Tukadoji Maharaj Nagpur University", Nagpur for the partial fulfillment of the requirements for the award of Post Graduation degree of Master of Technology (M.Tech.) in Mechanical Engineering Design (MED).

Dhananjay Jagannathrao Walke

COLLEGE OF ENGINEERING

Prof. A. P. Ninawe
Guide

Dr. S. K. Choudhari
Guide

Dr. C. C. Handa
Head of Department

Dr. D.P.Singh
Principal
K.D.K.C.E, Nagpur

ABSTRACT

In this research project a single blade of 24^{th} and 28^{th} stage rotor is studied and analyzed. The 24^{th} and 28^{th} stage rotor is situated in rear and front LP turbine which are dynamically balanced and fitted axially opposite to each other.

This low pressure steam turbine (L.P.T) is fitted in assembly with intermediate steam turbine (I.P.T) and high pressure steam turbine (H.P.T) in series. Together they are generating 210 mw of power in MSEB power plant situated in Koradi power station and Chandrapur thermal power station.

In above analysis all design parameter are collected from C.T.P.S Chandrapur power plant and K.T.P.S Koradi power plant of same 210 Mega Watt power unit assemblies.

Blade is analyzed by 3D modeling in CATIA followed by its testing and analysis in ANSYS software.

Static Structural Module and Thermal analysis module of ANSYS are coupled to obtain result for observing condition of blade. A Steam Turbine Blade is analyzed in complex environment of static load and Temperature. The effect of Load and temperature were combined and there results were obtained individually to analyze the condition of blade.

Dhananjay Jagannathrao Walke

IV Semester, (M.E.D)

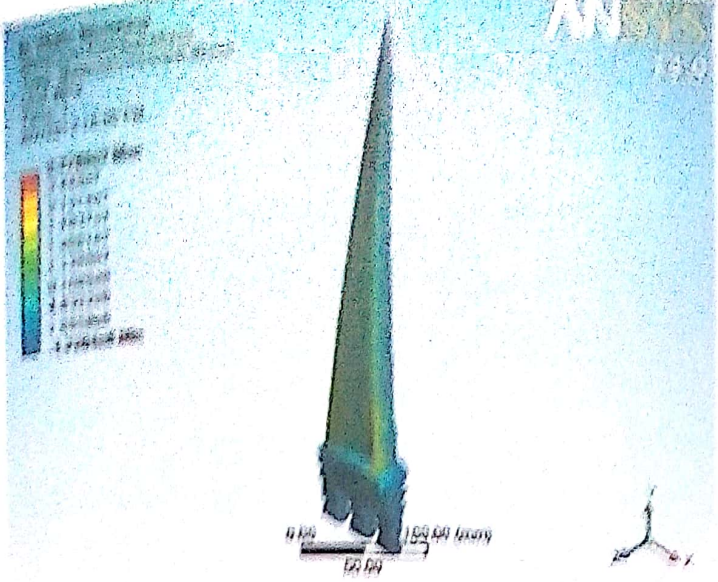

Fig No 6.40 shows principal stress in turbine blade.

TEMPERATURE

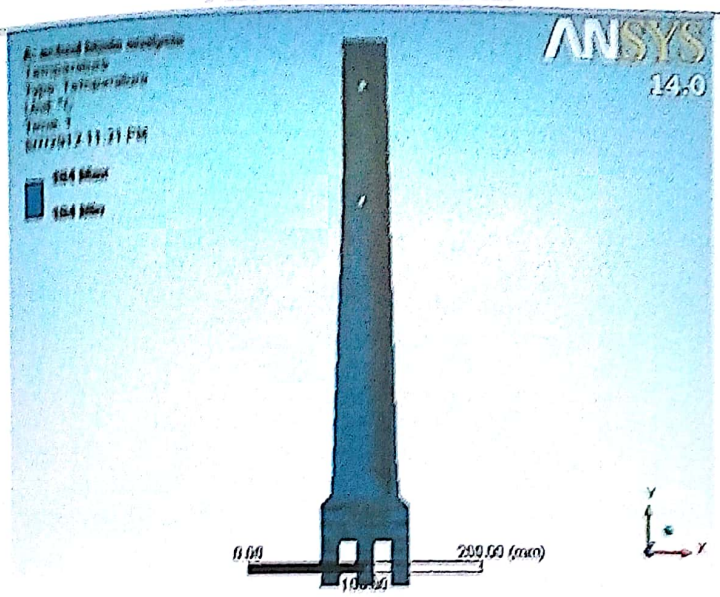

Fig No 6.41 shows temperature in turbine blade as viewed in plane xy.

TOTAL HEAT FLUX

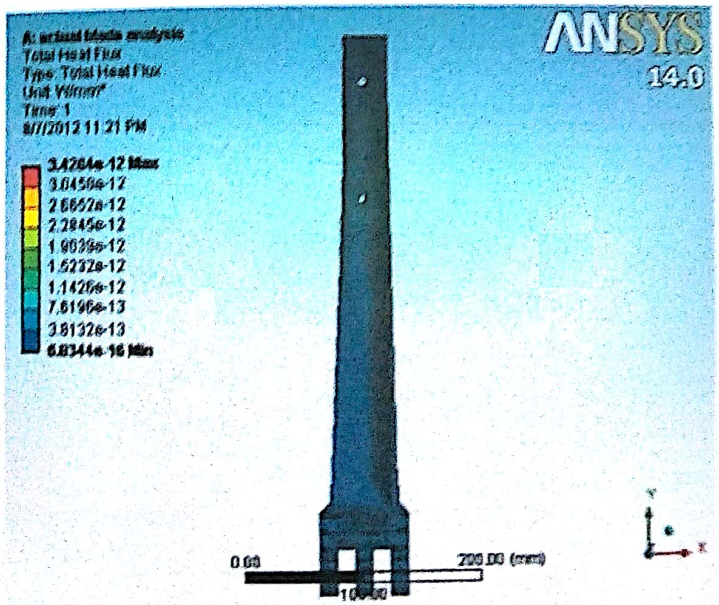

Fig No. 6.42

CONCLUSION

We consider distributed load in the direction of motion of blade. ANSYS - 14Version software is used for testing result of actual blade under observation. The CATIA V5 environment is supportive to ANSYS 14 software. The CATIA V5 image is imported to ANSYS-14 software where it was tested under Load and temperature circumstances under static condition. Conclusion of comparative analysis of turbine blade on model "A" as shown in FIG NO 5.9 under static load and temperature condition for Ti-Alloy and SS in CATIA & ANSYS software is as under.

7.1 CONCLUSION

1. Strength to density ratio of Titanium is higher in comparisons to Steel. Steel blade is heavy and less efficient compare to Titanium blade. Centrifugal stresses are less generated and easily handled by Titanium blade. Hence Titanium Alloy blade is better option for design of Blade in all respect to steel and preferred for last stage of Low Pressure Steam Turbine".

2. From the observation of color-images shown in chapter-6, we gate an idea about the effect of different type of property of blade with respect to environment around the blade.

3. Three types of stresses were studied under load and temperature in static condition.
   i. Principal Stress.
   ii. Von-Miss Stress
   iii. Shear Stress.
4. And for to know effect of temperature on Blade fallowing property observed like...
   i. Temperature