

BACHELOR THESIS – DESIGN OF COMBINED RAKES

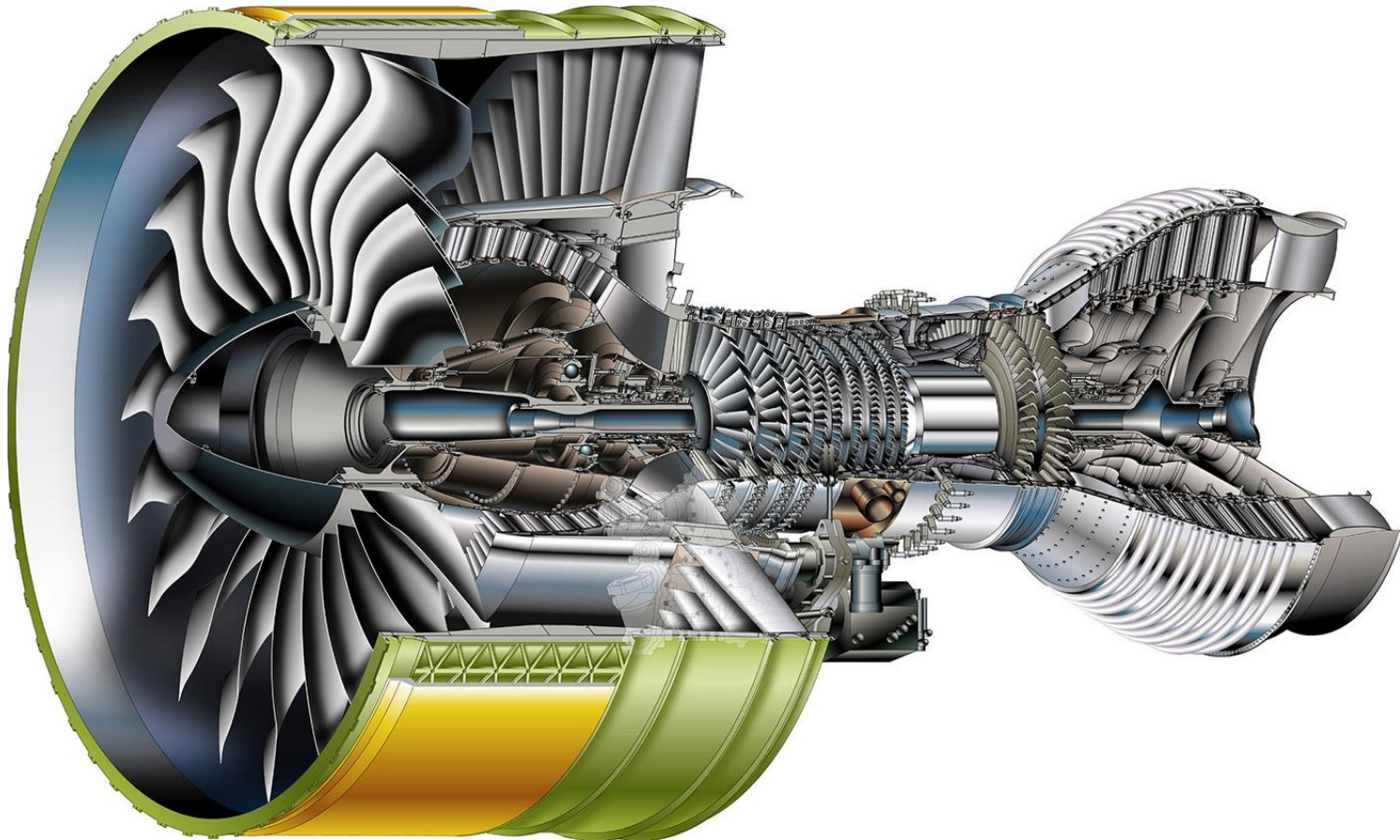
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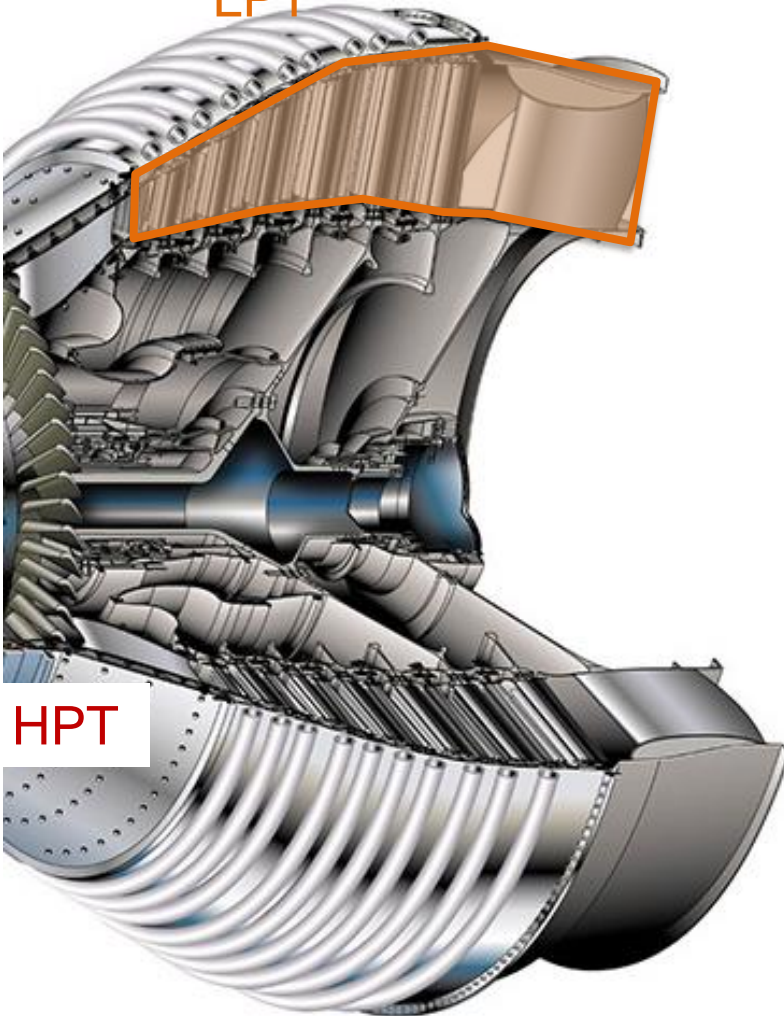
INTRODUCTION

Reducing the emissions and the fuel consumption of aero engines are of primary importance for both economical and environmental reasons.



INTRODUCTION

LPT



HPT

The Low Pressure Turbine (LPT) plays an important role in increasing the efficiency of an aero engine.

- Lightweight materials
- Higher stage loading
- Reduction of axial distance

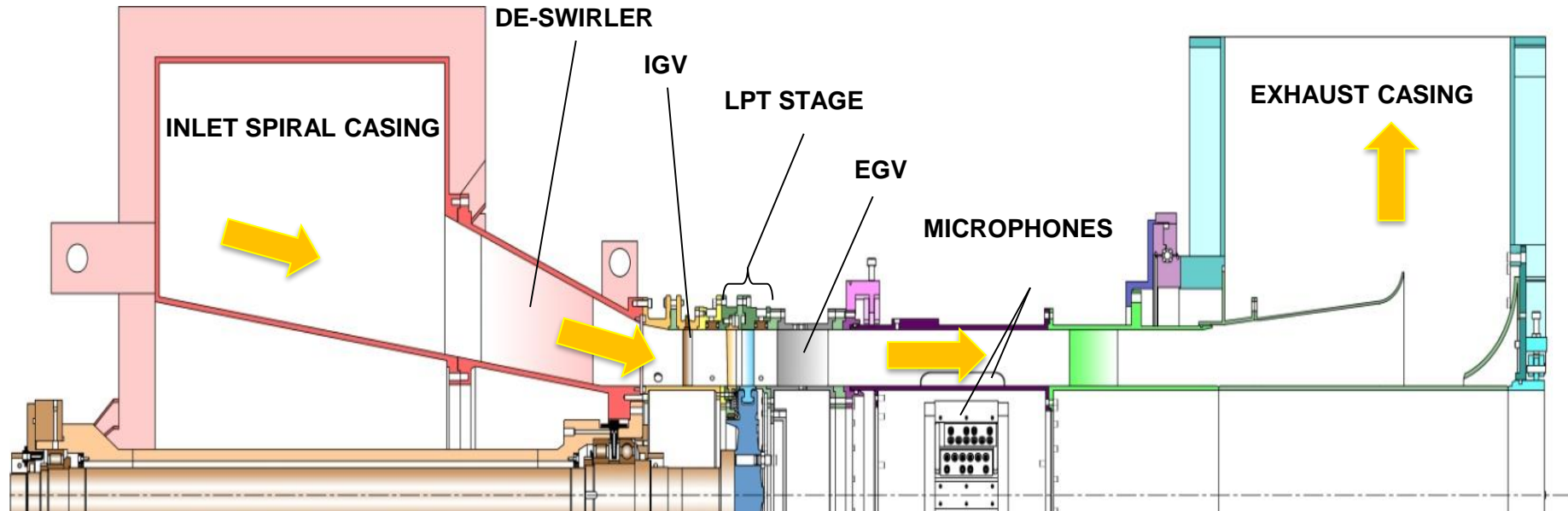
Altered
blade-vane
interaction

This **Bachelor thesis** focuses on flow measurements in a test LPT environment.

- CAD Design of **combined rakes** for the measurement of the pressure the and temperature of the flow.



SUBSONIC TEST TURBINE FACILITY



- Subsonic Test Turbine Facility For Aerodynamic, Acoustic, And Aeroelastic Investigations (STTF-AAAI)
- LPT stage test setup driven by a 3 MW compressor station
- Unshrouded LP turbine rotor
- Engine realistic operating conditions

COMBINED RAKES

- **Rakes:**

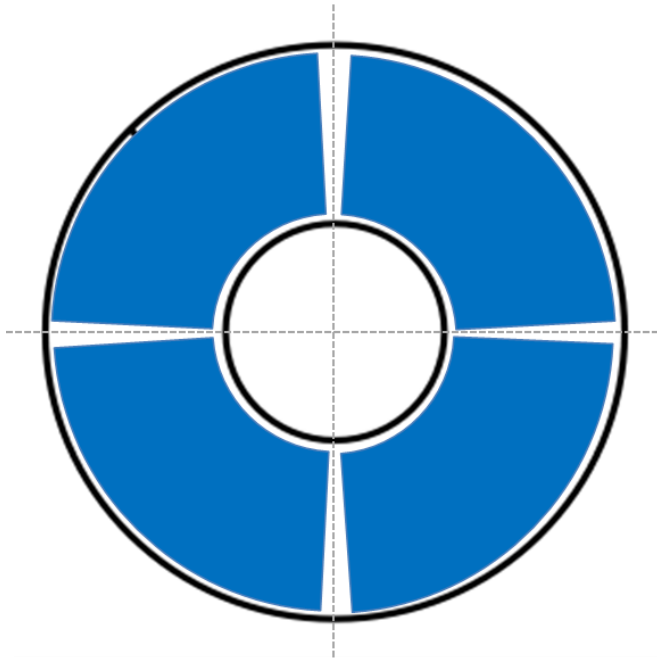
Pitot tube
Thermocouple

- **Measurement grid:**

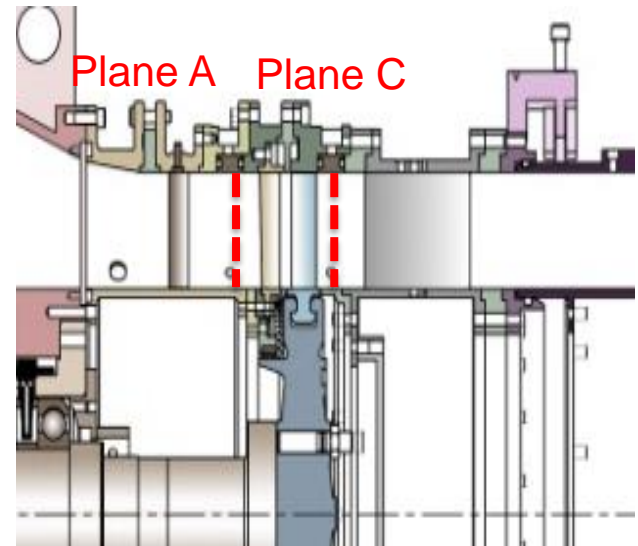
Covers 4 sectors of 60° each, 95% of the passage height.

- **Measurement planes:**

Plane C and Plane A.



Combined Rakes:



COMBINED RAKES

Tasks of the thesis:

Study of the rakes specifications
CAD Design of the measurement rakes
Calibration
Data analysis

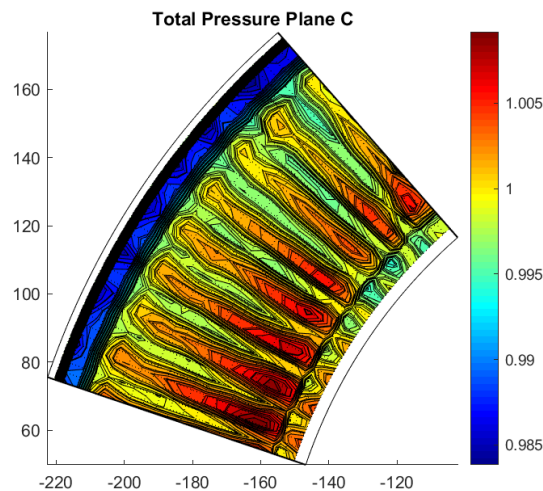
Tools:

CATIA
Matlab

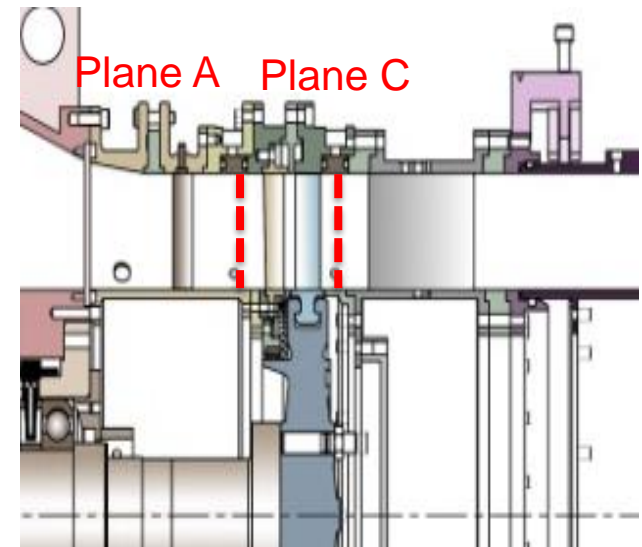
Language:

English/German

Example of result:



Combined Rakes:



QUESTIONS?!

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