

Experiment No 5

Objective: - Studies on Compressor Cascades.

- To develop a geometric model for compressor blades.
- To plot the detailed cascade geometry of A Compressor Rotor.

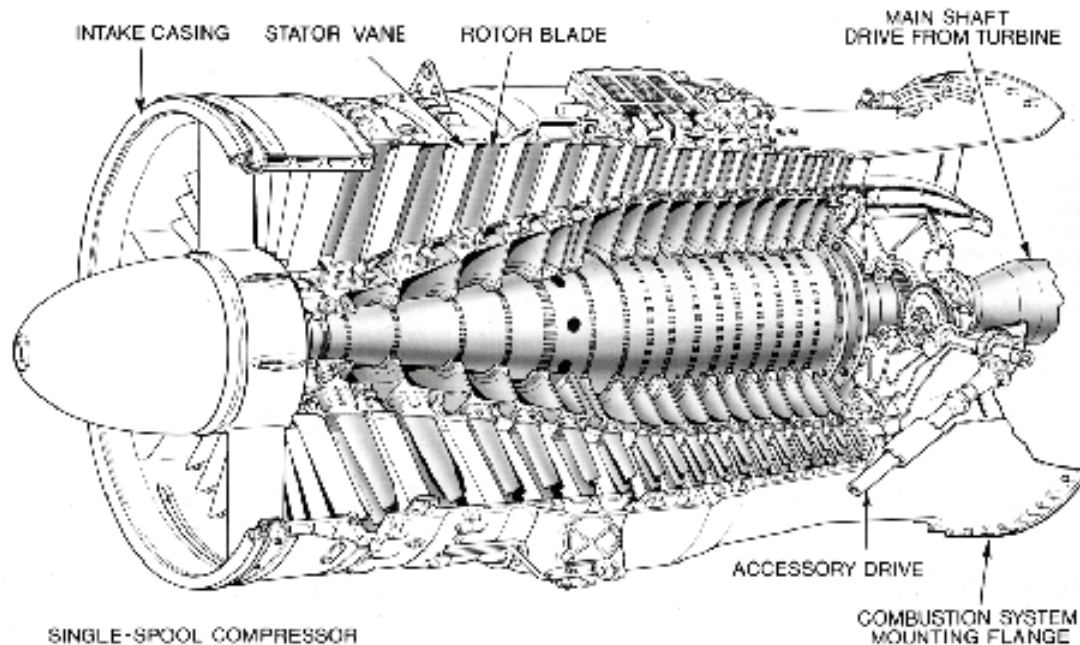


Prerequisites: -

1. Basics of airfoils and blade shape for compressor.
2. Concept of Axial flow compressors and Compressor Stage.
3. Self Reading before Coming to The Laboratory:
 - What are Axial flow compressors?
 - How to organize experiments to draw the blade shape and cascade geometry?
 - Prepare Brief Planning and show it to the instructor, before starting the experiments.

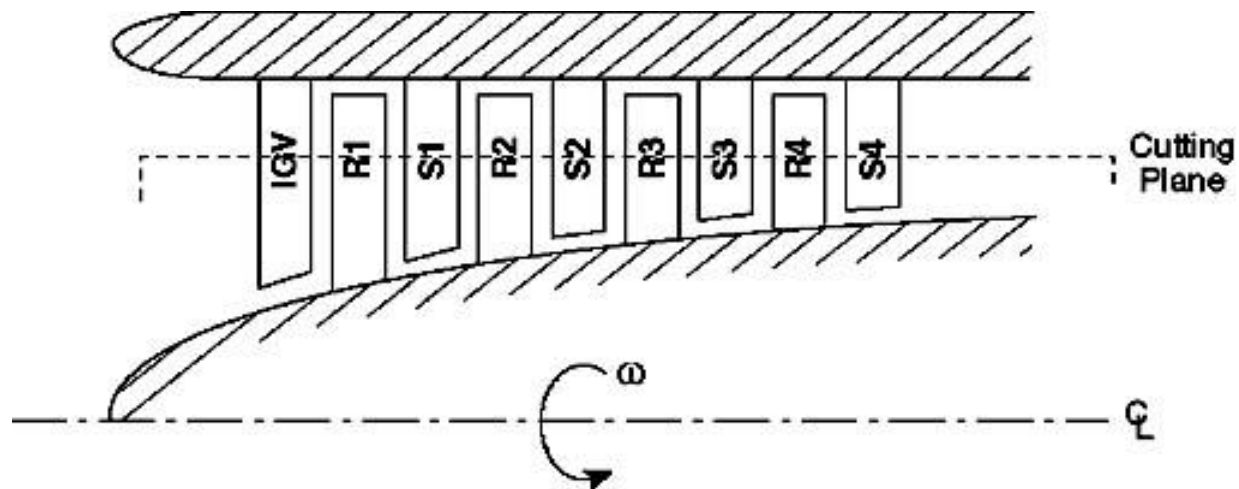


Minute details about the practical Setup :-(or the theoretical brief background)

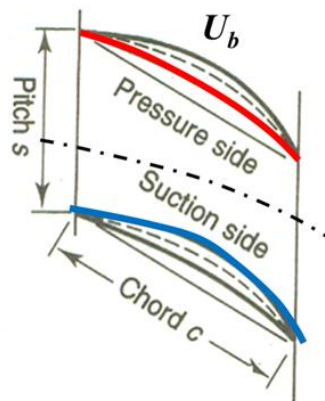


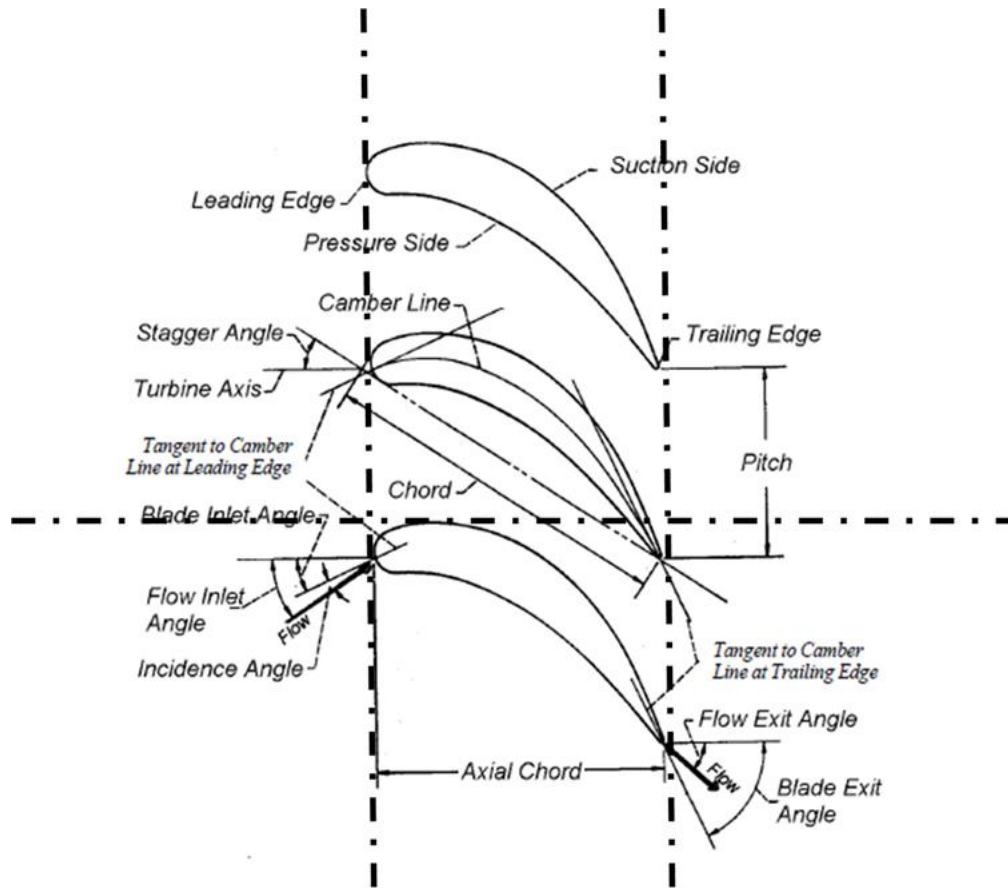
Axial-flow Compressors are turbo machines which deliver air at a desired high pressure and accordingly at a high mass flow rate.

The rise in static pressure across a stage is relatively lower and is never more than 1000 mm of water gauge. An axial-flow compressor uses multiple stages for achieving high discharge pressure.



In axial flow compressors, a cascade is a simplified, two-dimensional aerodynamic model of a row of blades, used in experiments and analysis to understand fundamental flow physics and blade design principles under complex, interacting conditions. By studying the flow through a cascade of blades, engineers gain insights into crucial performance parameters like total pressure loss and efficiency, despite the inherently three-dimensional nature of actual compressor flow. Following figures describe various geometrical and kinematic details of a compressor cascades.





What are the details of experimental Analysis to be Carried out in the Laboratory?

1. Study the models of stator and rotor of a compressor stage available in the laboratory.
2. Sketch, trace and measure all the geometrical details of these models.
3. Highlight the main differences between stator and rotor of a compressor stage.
4. Consider a suitable rpm of the rotor and construct example velocity triangles for stator and rotor.



Submission of Report:

- A single report per group.
- All are equally responsible for the preparation of the report.
- Should answer the question on your report.

- Each Report will be evaluated for 10 points.



References: -

1. Turbines, compressors and Fans by S. M. Yahya.