



UNIVERSITÀ
DEGLI STUDI
FIRENZE

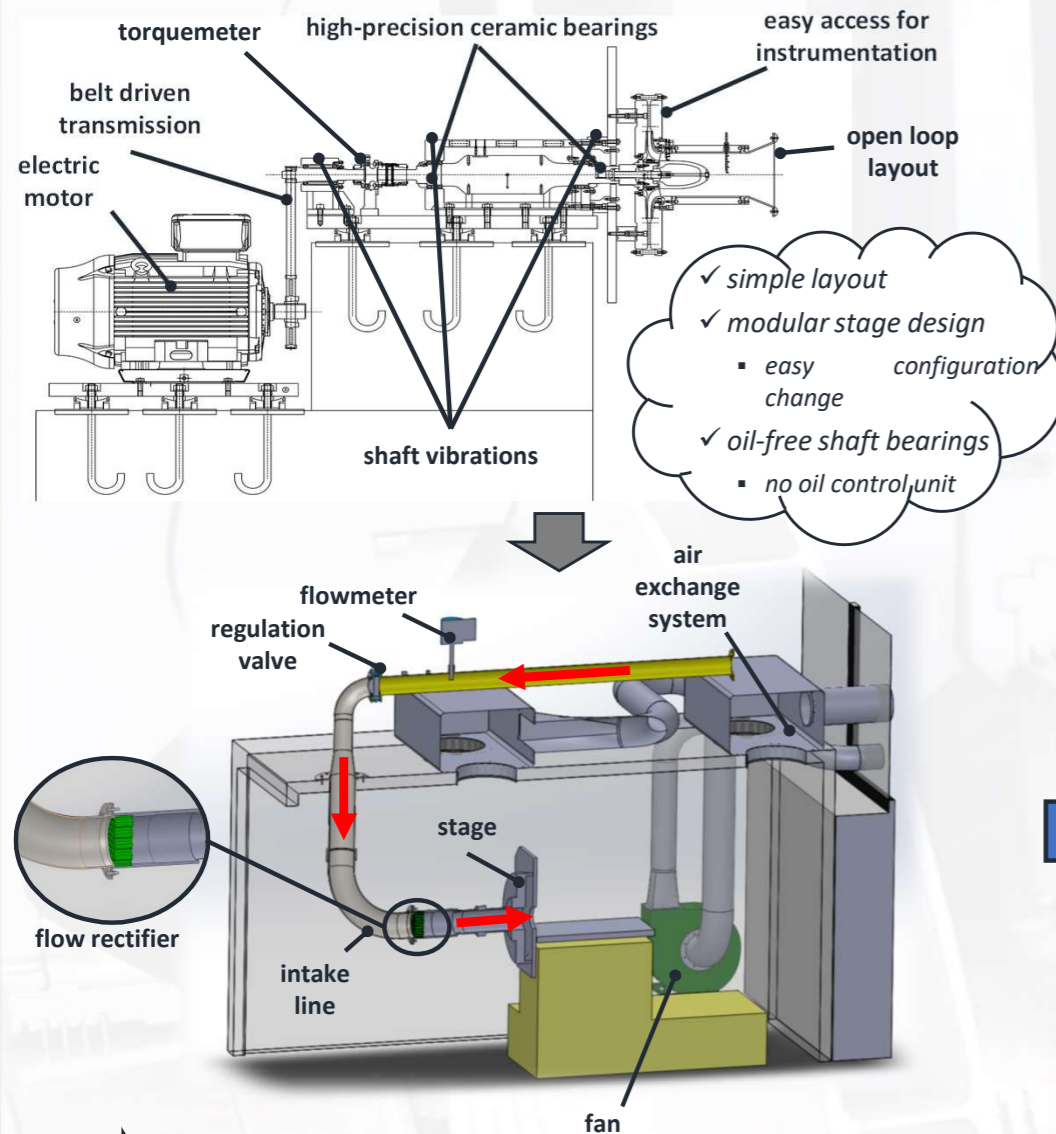
Lab-scale experiments for the early validation of innovative hydrogen centrifugal compressor designs

PhD program in
Industrial Engineering

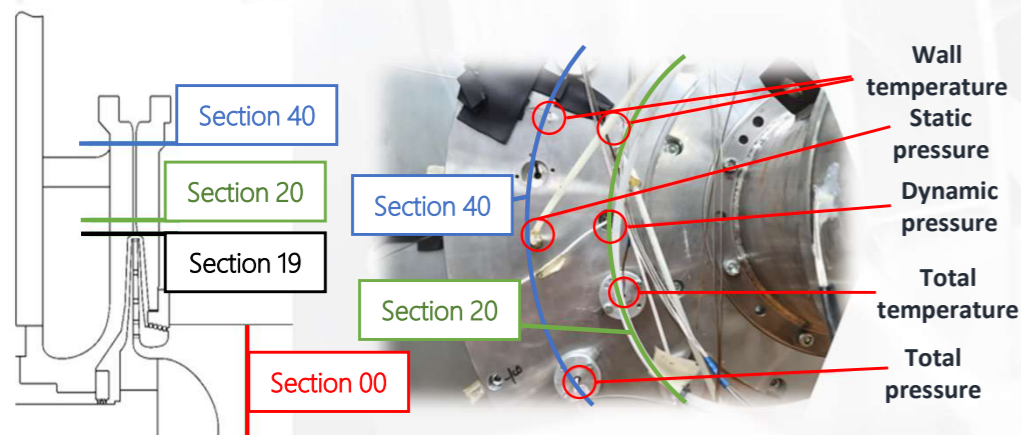


Author: **Alberto BARONI**
Department of Industrial Engineering
Laboratory: **Laboratorio LInEA**

Experimental test rig



Instrumentation and measurements



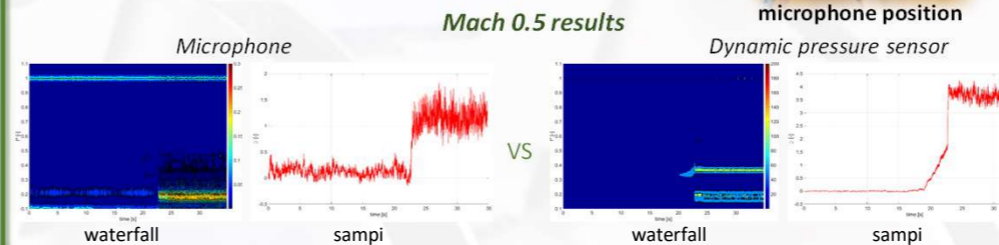
Latest research

“Detection of vaneless diffuser rotating stall by means of dynamic pressure sensors and acoustic measurements”

Luca Romani, Lorenzo Bosi, Alberto Baroni, Lorenzo Toni, Davide Biliotti, Giovanni Ferrara, Alessandro Bianchini

Stall investigation performed by using **dynamic pressure sensors** at the diffuser inlet and an ambient microphone. Aims of the study:

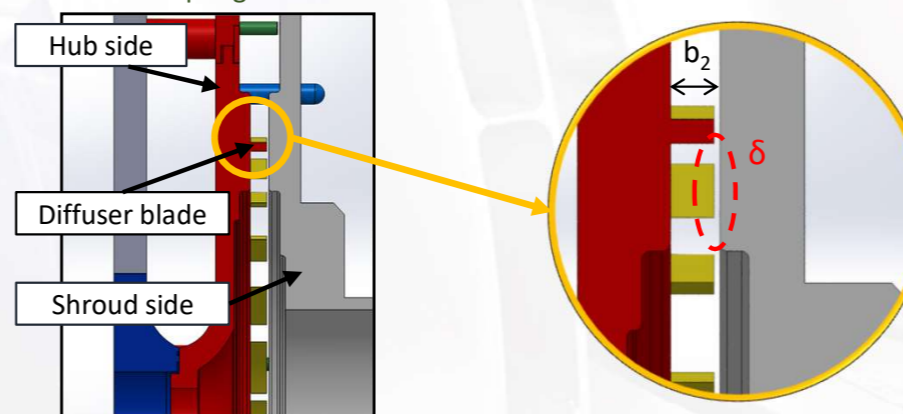
- ✓ detection of the stall onset
 - simple non-intrusive technology
 - easily applicable in industrial machines



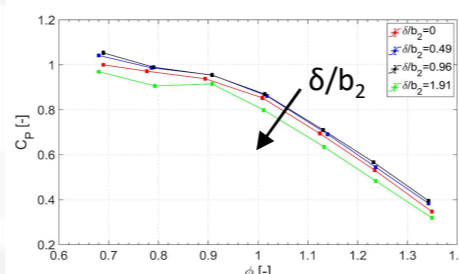
“An experimental and numerical investigation on the impact of tip gap on the performance of vaned diffuser for industrial centrifugal compressors”

A. Baroni, L. Romani, I. Catalani, L. Toni, D. Biliotti, F. Balduzzi, A. Bianchini, G. Ferrara

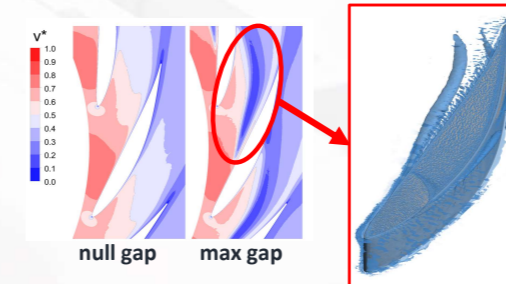
Experimental test was performed at four δ/b_2 gap (0 – 1.91%) and design mach. The **numerical 3D CFD model** was calibrated through experimental results in order to provide detailed analysis of the phenomena that occurred in the blade tip region.



Effect on pressure recovery coefficient



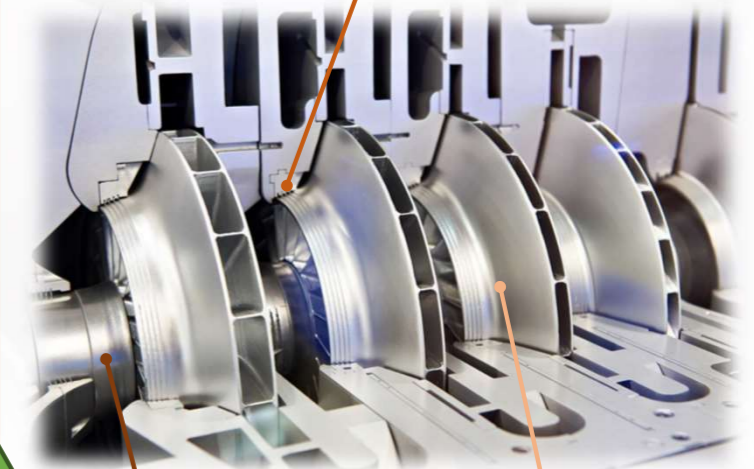
3D CFD vortex detection



(© 2023 Baker Hughes Company - All rights reserved)

Next planned research: new design for Hydrogen compression

- Leakage losses**
- ✓ new seal design
 - ✓ cavity profile



- Impeller design**
- ✓ high speed
 - ✓ high work coefficient
 - ✓ aerodynamic instabilities

- Experiment**
- ✓ measurement intrusiveness
 - ✓ innovative probe design
 - ✓ innovative methodology (PIV, PSP ecc.)

Vote for this poster

Baker Hughes

LInEA
Laboratory for Innovation in Engines and Advanced systems for energy

