Semester/MSc thesis project proposal
Mechanical Design of a side-pressurization system for very high-speed shafts running on gas bearings

General Information

Laboratory: Laboratory for Applied Mechanical Design (LAMD)
Supervisor: E. Guenat; Prof. J. Schiffmann
Location: Neuchâtel (travel and lunch allowance offered)
Starting date: ASAP
Duration: 3/6 months
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Background and objective

High-speed turbomachines require the use of aerodynamic bearings to prevent the destruction of the shaft due to a contact between the rotor and the stator. Such bearings take advantage of the high speed of the shaft to generate a film of compressed gas, lifting up the rotor a few micrometers away from the stator.

An existing test rig requires the possibility to pressurize a side of a gas bearing to study the effect of asymmetrical ambient pressure on the characteristics and performance of such high-speed bearings. (Figure 1). A motivated student would have to evaluate the different technical possibilities to accomplish the task, select one, and design it. Depending on the available time, the project would also include the manufacturing and commissioning of the designed setup.

![Illustration of a side pressurization system using compressed air](image)

Tasks (working plan guideline)

1. Literature review and documentation
2. Determination of specifications
3. Functional analysis
4. 3D design and concept proposal
5. Manufacturing and commissioning
6. Delivery of a report

NB: adjustments may be required according to progress, results and project duration. Drawings and manufacturing from the workshop are expected for the 30-credit version of the project.