

## Master/Bachelor/Semester's Thesis

Topic: Design of a Test Chamber for a Versatile Cryogenic Rocket Injection Test Bench

Mechanical Engineering, Aerospace Engineering or MSE Student (Bachelor – Master Level)

### Background

At the Chair of Space Propulsion and Mobility a test bench is developed for the investigation of injection characteristics in liquid-propellant rocket engines under non-reacting conditions over a wide operating range. This means to conduct investigations under variation of pressure levels and temperature, corresponding to the real application of liquid propellant injectors. Local pressure and temperature sensors shall be combined with optical measurement methods to allow detailed observations.

In the scope of this thesis, the test chamber shall be dimensioned and designed. The starting point is an existing test chamber which was previously used for investigations of injection into vacuum. However, with the extended scope of the new test bench, the test chamber must allow to test under an increased variety of operating conditions – from vacuum to supercritical pressures, from ambient temperature to more than 100°C in the test chamber. This requires a thorough analysis and major design adaptations.

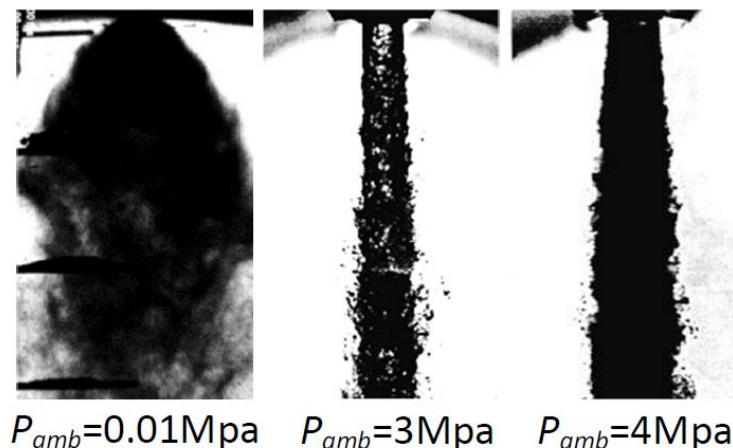


Figure 1: Cryogenic injection of liquid Nitrogen (LN2) at different back pressure levels [1]

### Your Tasks

- Review and assess the existing test chamber
- Develop a test chamber concept that meets the required operating conditions
- Generate a CAD-design of the test chamber including
  - Mechanical design and interfaces
  - Electrical interfaces
  - Test chamber conditioning system
  - Selection of suitable hardware components
- Setup of the test chamber

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[1] Luo, M. (2018). Experimental and Numerical Study of Cryogenic Flashing Spray in Spacecraft Application. Dissertation. Universitätsbibliothek der TU München.

## Your Profile

- Mechanical Engineering, Aerospace Engineering or MSE Student
- Independent working attitude
- Team player
- Ability to trade-off different technical solutions with respect to requirements
- Interest in mechanical design work
- Previous experience with SolidWorks is advantageous

## We offer

- An amazing team that you can work with
- A large network of people
- Challenging exchanges with peers
- The possibility of getting involved into something big