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# Technical Center M3

DLR site Lampoldshausen

## brief description

The Technical Center M3 consists of three test positions (M3.1, M3.3, M3.5) for tests with cryogenic media such as liquid oxygen, liquid nitrogen and gaseous fuels, such as gaseous hydrogen and hydrocarbons, at system pressures of up to 40 bar.


## goals

The M3 Technical Center was set up for research work on rocket propulsion technologies. The operating conditions that can be realized at the test field correspond to the conditions in orbital engines and, in individual aspects those of staged engines. The aim is to investigate cryogenic media and their flow, injection and combustion properties.

## applications

- Analysis of dynamic processes in fuel lines
- Investigation of ignition and flame stabilization in combustion chambers
- Investigation of spray formation during the injection of liquid fuels
- Component tests for turbopumps
- Cavitation in cryogenic flows

## perspectives

- Competence for LOX/methane combustion
- Competence for LOX/hydrogen combustion
- Technology development for turbopumps
- Reusable space systems and propulsion technologies for the future

## facts and figures

Equipment Techikum:
- Fuel supply system for cryogenic media cryogenic media
- Fuel combinations such as oxygen & hydrogen, oxygen & methane, oxygen & propane, oxygen & propene propene
- Optical measurement technology
- Altitude simulation system
- High-speed cameras
- Continuous operation possible

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The M3 Technical Center enables a large number of tests on a reduced scale with many different configurations.

The M3 Technical Center consists of three test benches with different tasks. Test stand M3.1 deals with tests on rocket combustion chambers. The focus here is on investigating the transient transient processes during the injection of cryogenic propellants into the combustion chamber, ignition and combustion of the propellant mixture. For example, basic research can be carried out on the thermal load capacity of new materials for the construction of combustion chambers, or new ignition methods such as laser ignition can be investigated. The high modularity of the test vehicles is a major advantage of the M3 Technical Center and allows several configurations to be investigated quickly and flexibly.

The two test benches M3.3 and M3.5 deal with the investigation of transient two-phase flows. These are of great importance in the flow of cryogenic fuels through the engine components (valves, injection heads, turbopumps, etc.) and in the injection of fuels into the combustion chamber. The latter can take place in a vacuum if, for example, the combustion chamber of an upper stage engine is to be ignited in space. Here again, the M3 Technical Centre is characterized by its high modularity and flexibility, so that there are practically no limits to the configurations to be investigated.



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