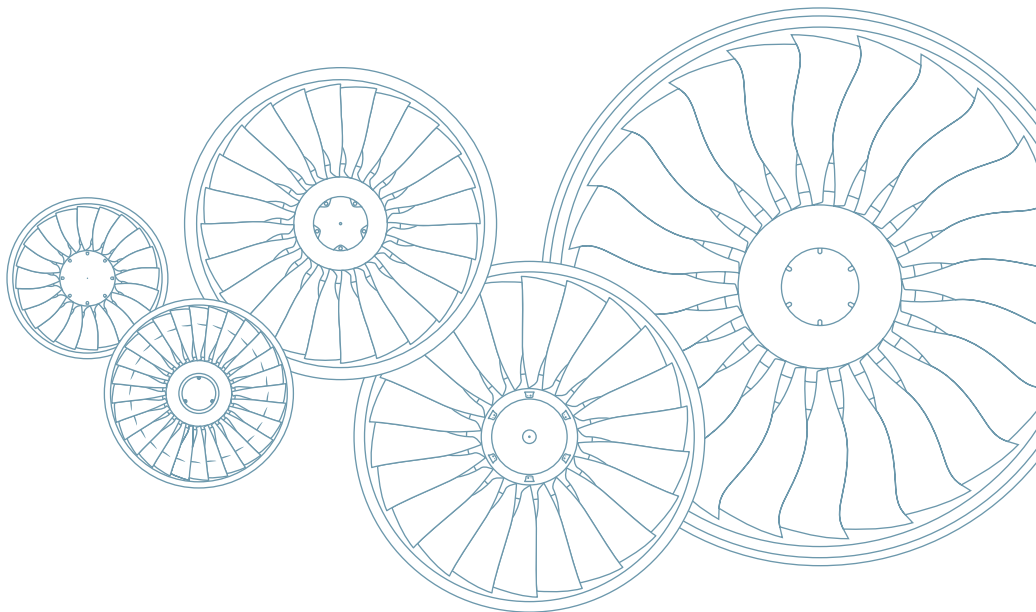# Rig testing

Our competences

MTU Aero Engines is Germany's leading manufacturer of aircraft engine modules and components.

MTU designs, develops, manufactures, assembles, markets and supports commercial and military engines, as well as industrial gas turbines. Through cooperations with the world's largest engine makers, MTU has been involved in major engine programs for decades and has a presence in all major markets.

The department for rig testing, which is part of MTU's engine control and testing center, has 30 years of experience in the field of hardware and rig management activities, including the procurement and testing of compressors, combustion chambers and turbines. Probe calibration rounds out the department's testing support capabilities.

The highly professional staff with its wide range of experience ensure solutions tailored to the customers' needs and customer satisfaction.

The entire rig testing process can be offered as an all-inclusive package; alternatively, specific customer requests can be accommodated, such as:

• Hardware procurement, including configuration
• Compressor testing
• Combustion chamber testing
• Turbine testing
• Probe calibration
• Data analysis

MTU Aero Engines' advanced technology and unprecedented flexibility provide optimum solutions that meet the most exacting requirements – anytime and anywhere.

The complete range of engineering solutions to satisfy customer requirements –
from hardware procurement through to testing and final stripping.
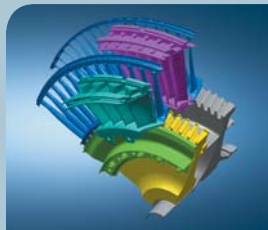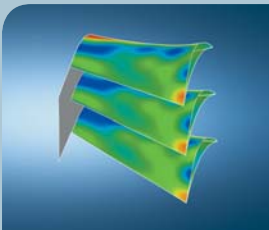
Customer: order

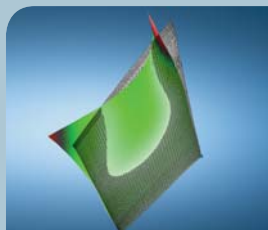## Planning

Design of modules/test beds

Design and procurement: instrumentation/probes

Testing: • component • module

Objective: meet customer requirements

H/W procurement

Monitoring

FPI/SIR

Configuration

Knowledge management

Compressor rig – Test facilities and auxiliary equipment

MTU's facilities for rig testing offer a wide range of test capabilities. The facilities are suitable for testing highly-instrumented technology rigs as well as engine parts rigs to support engines in service. Irrespective of the task on hand the department's main focus is on customer satisfaction. Through the testing of 75 different rigs with several individual builds over the course of 30 years, an unparalleled level of experience has been developed.

Compressor test facilities:
- 16 MW electrical power
- Heated inlet
- Simulation of bypass engines
- 4 VGV stages per control unit
- Surge detection system
- 1,700 measurement channels
- Steady-state measurements up to a 5,000 Hz cut rate
- High-response data acquisition up to 200 KHz
- Health and safety monitoring during all conditions
- Online data reduction
  – aerodynamic data
  – structural data

Auxiliary equipment:
To ensure maximum support of the test facilities a free-stream calibration channel for probe calibration and three compressors for external air supply are available:

External air compressors
- 6 kg/s mass flow
- 12 bar

Probe calibration
- 6-axis-traversing unit
- Fully automated calibration
- Mach No. 0.2 – 1.0
- Five-hole direction probes
- Recovery calibration
- Reynolds No. variation
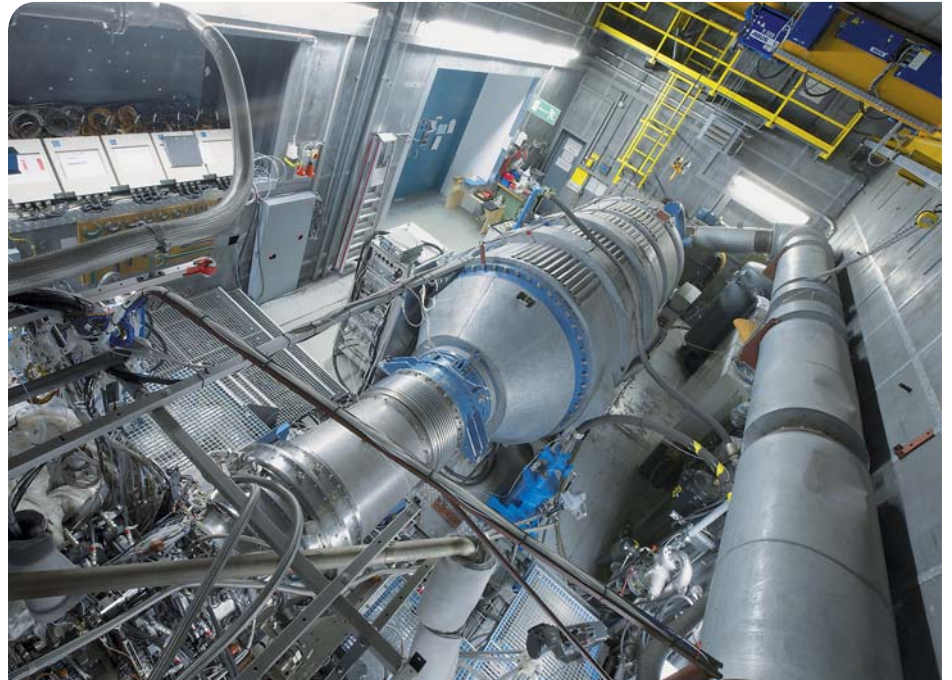
Turbine rig and combustion chamber – Test facility

MTU's turbine test facility is located at the university of Stuttgart. At this altitude facility MTU has performed tests since 1970. With an experience of 30 rigs and several individual builds, MTU offers an unrivaled amount of know-how to meet customer demands successfully.

Turbine test facilities:
- 20 MW electrical power
- Various auxiliary compressors to simulate inlet and exit conditions
- 2,000 measurement channels
- Simultaneous control of 20 traversing units
- Continuous health and safety monitoring
- Online data reduction
  – aerodynamic data
  – structural data

MTU's experience in combustion chamber testing is based on 35 years of experience with a variety of military engine programs.

Combustion chamber test facility:
- 6 kg/s mass flow
- 12 bar inlet pressure
- 1,120 K inlet temperature
- More than 650 steady-state and dynamic measurement channels
- Emission measurement (CO, CO_2, NO, NO_X, O_2, smoke)
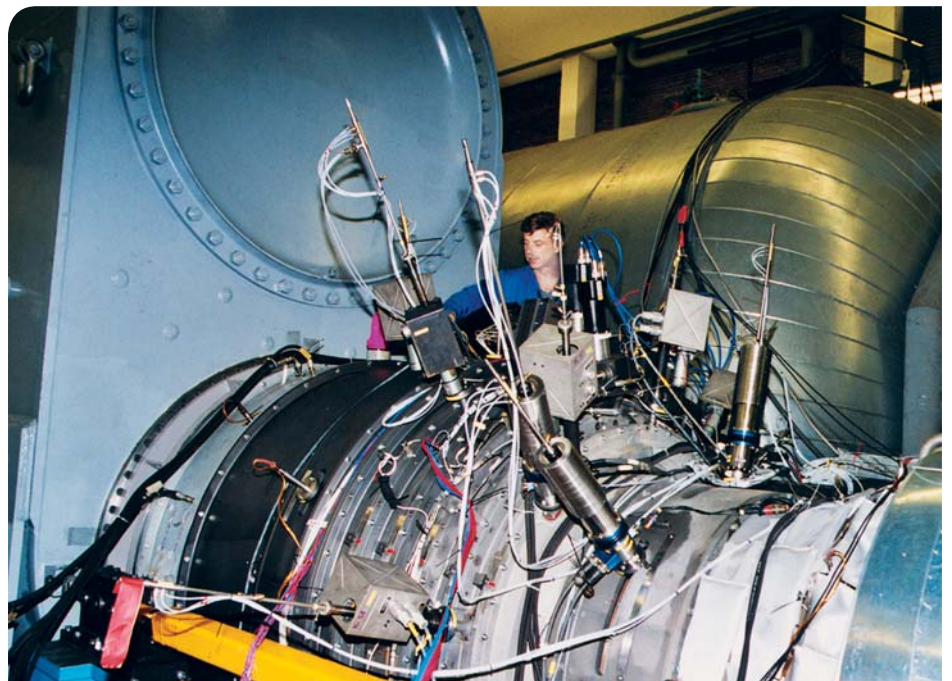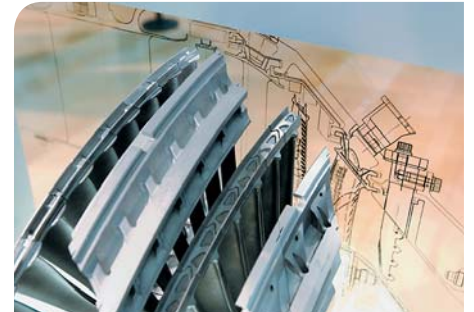
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