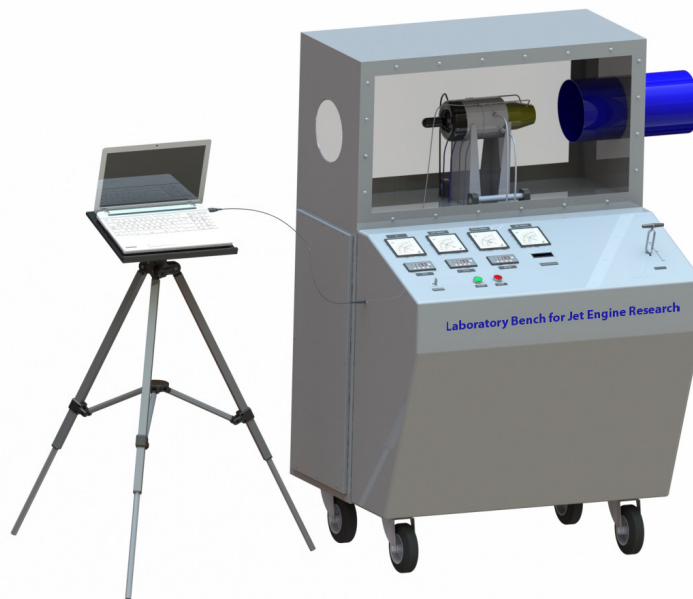


# Laboratory Bench for Jet Engine Research



**NAIRI-STEM**  
science - technology - engineering - math



## Overview

The laboratory bench developed based on a small jet engine equipped with special control and measurement system. The stand provides a visual demonstration of all aspects of the theory of gas turbines.

The gas-turbine engine of the stand consists of a centrifugal compressor, an annular combustion chamber and a power turbine with an axisymmetric flow. These types of engines are used in aviation, weapon systems and ships, as well as in stationary and industrial power generation plants.

Theoretical predictions can be measured by real equipment using the built-in data acquisition system. Sensors located along the gas flow provide accurate measurements of the operating modes at certain points in real-time mode. Explaining the differences and processing the results of real measurements provides unlimited educational opportunities.

The laboratory bench is equipped with special control and measuring equipment based on FPGAs from National Instruments company. Control and measuring equipment in combination with special software, developed in LabVIEW graphical programming environment, allows the user to monitor and record all operational data of gas-turbine engine in real-time mode.

## Features

- Carrying out of hands-on works and analysis the results
- Measurement of pressure, temperature and fuel consumption of a gas-turbine engine
- Plotting dependency curves in real-time mode and outputting parameters to the screen
- Possibility of changing system units
- Saving the measurement results in Excel file for future analysis

## Jet Engine Measured Parameters

- Atmospheric Pressure
- Ambient Temperature
- Temperature and Pressure at the Compressor Inlet
- Temperature and Pressure at the Compressor Exit
- Temperature and Pressure at the Input of the Jet Engine Turbine
- Temperature and Pressure at the Exit of the Jet Engine Turbine
- Temperature and Pressure of Exhaust Gases
- Fuel Consumption
- Engine Speed
- Engine Thrust

## Hands-on Works

1. System overview and study of the it's operation principles
2. Jet engine design overview.
3. Measurement system and sensors locations.
4. Taking measurement and analysis of results.
5. Calculation of the engine technical characteristics.
6. Determination of specific fuel consumption by thrust.
7. Gas turbine engine efficiency analysis.

