

AVIONICS POWER PLANT TEST BENCH

Obazee Valerie Omoefe

Scientific supervisor – Zayarny Vladimir Petrovich

General Concepts and research of avionics power plant test branch

An avionic power plant test bench is a sophisticated system designed for testing and evaluating aircraft engines and related power systems. These test benches are essential in the aerospace industry for ensuring the reliability, performance, and safety of aircraft engines before they are installed in aircraft.

Key Components and Features of an Avionic Power Plant Test Bench.

1. **Engine Mounting and Support System:** This system securely holds the engine in place during testing. It must accommodate various engine types and sizes, providing stability and precise alignment.

2. **Control and Monitoring Systems:** Advanced control systems manage the engine's operation, while monitoring systems collect data on parameters such as temperature, pressure, vibration, and rotational speed. These systems often include data acquisition software that provides real-time analysis and recording.

3. **Fuel Supply System:** A reliable and adjustable fuel supply system is essential for simulating different operating conditions. It includes fuel tanks, pumps, flow meters, and filters.

4. **Air Supply and Exhaust Systems:** These systems ensure the engine receives adequate air for combustion and safely expels exhaust gasses. They must replicate the conditions the engine will face in actual flight.

5. **Cooling Systems:** To prevent overheating and ensure the engine operates within safe temperature ranges, cooling systems using air or liquid coolants are necessary.

6. **Load Absorption Devices:** These devices simulate the aerodynamic and mechanical loads an engine experiences during flight. They can include dynamometers, which measure the power output of the engine.

7. **Safety Systems:** Comprehensive safety measures are critical, including emergency shutdown mechanisms, fire suppression systems, and containment structures to handle potential failures or explosions.

8. **Noise and Vibration Isolation:** Test benches often incorporate systems to reduce noise and vibration, ensuring accurate data collection and a safer working environment.

Types of Tests Conducted.

1. **Performance Testing:** Evaluates the engine's power output, fuel efficiency, and operational limits.

2. **Endurance Testing:** Assesses the engine's reliability over prolonged periods under various conditions.

3. Environmental Testing: Simulates extreme conditions such as high altitude, temperature variations, and humidity to ensure the engine can withstand different environmental factors.

4. Vibration and Stress Testing: Measures the engine’s response to vibrations and mechanical stresses to identify potential issues.

5. Emissions Testing: Monitors the engine’s exhaust gasses to ensure compliance with environmental regulations.

Importance in the Aerospace Industry.

- Safety Assurance: Ensures engines meet stringent safety standards before use in aircraft. – Performance Optimization: Helps manufacturers optimize engine performance and fuel efficiency.

-Regulatory Compliance: Assists in meeting regulatory requirements for emissions and noise. – Research and Development: Supports the development of new engine technologies and improvements to existing designs.

Conclusion.

An avionic power plant test bench is a vital tool in the aerospace industry, enabling thorough testing and validation of aircraft engines. By replicating real-world conditions and stresses, these test benches help ensure that engines are safe, reliable, and efficient, ultimately contributing to the overall safety and performance of aircraft.

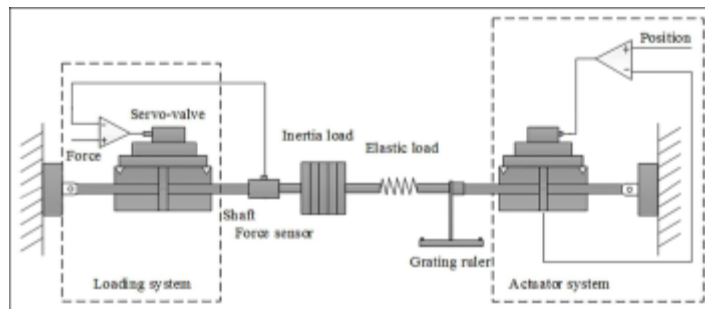


Figure 1. Scheme of the test bench.

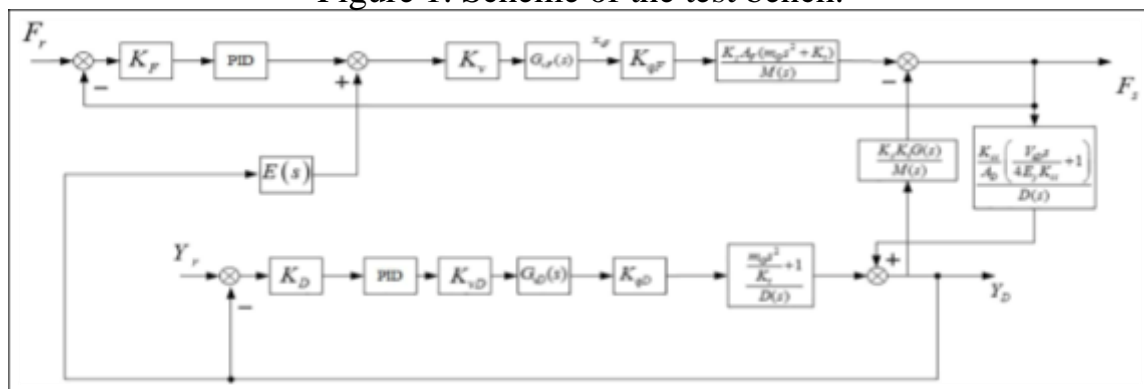


Figure 2. Transfer function of the test bench.

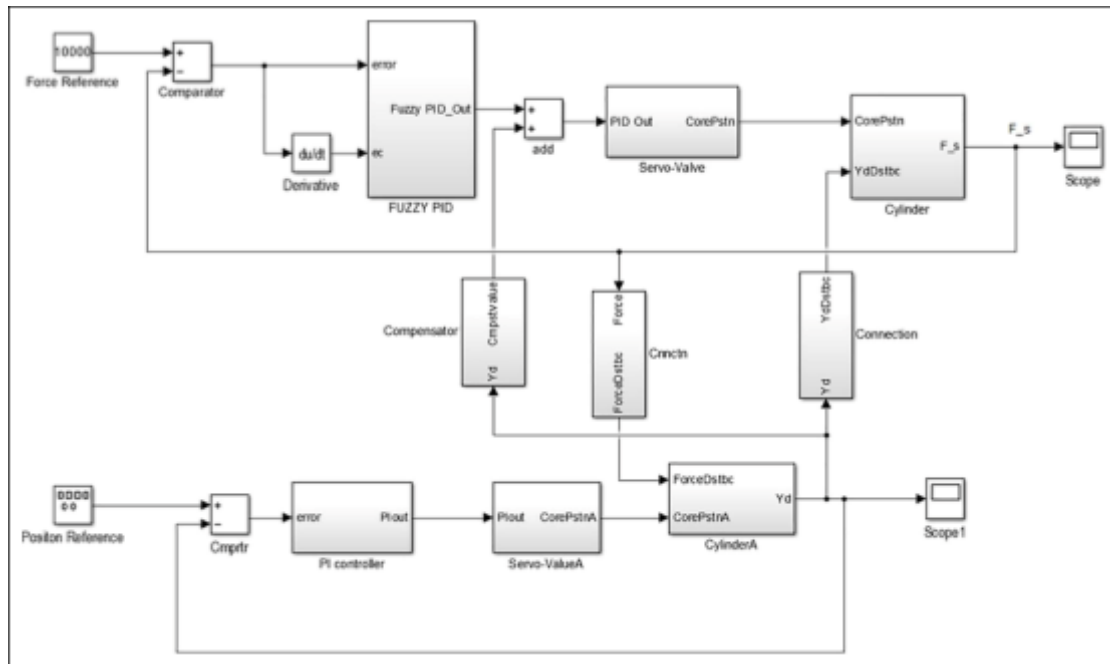


Figure 3. The model of the test bench built in MATLAB/Simulink.

УДК 621.38

AUTOMATED CONTROL SYSTEM FOR THE TECHNOLOGICAL PROCESS OF A TURBINE UNIT

Madduma Patabendige Sadick Ranjith

Scientific supervisor — DUBININ S.V., assistant professor

The main goal of the diploma project is to develop an automated control system for the technological process of a turbine unit.

To achieve this goal, it is necessary to solve the following tasks:

- characterize the automation object;
- study the goals and requirements for the development of an automated process control system for a turbine unit;
- select specific equipment on the basis of which the automated process control system will be built and describe its capabilities;
- develop a block diagram of an automated process control system