

Motor Characterization TESTING AND QUALIFICATION



DLE-222 Engine Test

Motor characterization testing can be performed by DARcorporation engineers to provide motor performance data. Testing results can be used with propeller or ducted fan test data to provide detailed performance and efficiency curves for propulsion systems. Motor characterization testing can be used for motor selection and is often used directly with propeller and ducted fan designs. Our engineers have experience working with both electric motors and piston engines.

Motor Testing Capabilities

- DC Motors
- AC Motors
- Piston Engines
- Wind Turbine Generators

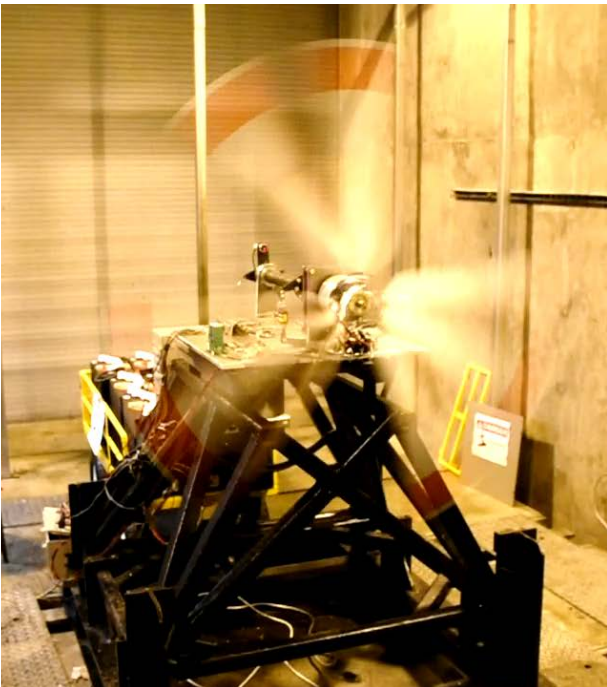
Test Stand Configurations

Depending on the application, the motor can be loaded with a brake or a variable pitch propeller. Generators are loaded with resistor banks or electronic brakes. Motor torque, RPM and temperature are measured during each test. A full list of instrumentation capabilities is given below. Compressed air cooling is available for the motor and the brake.

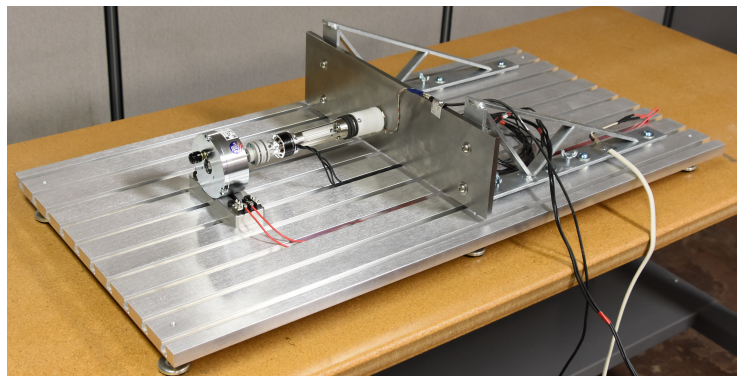
Existing equipment can be modified to accommodate a large range of motors on current test stands by changing instrumentation and mounting hardware.

Measurement Capabilities

- Torque
- RPM
- Shaft Horsepower
- Temperature (at multiple engine locations)
- Fuel Flow Rate
- AC Power
- AC Voltage & Current
- DC Power
- DC Voltage & Current
- ESC Output Waveforms
- Acoustics

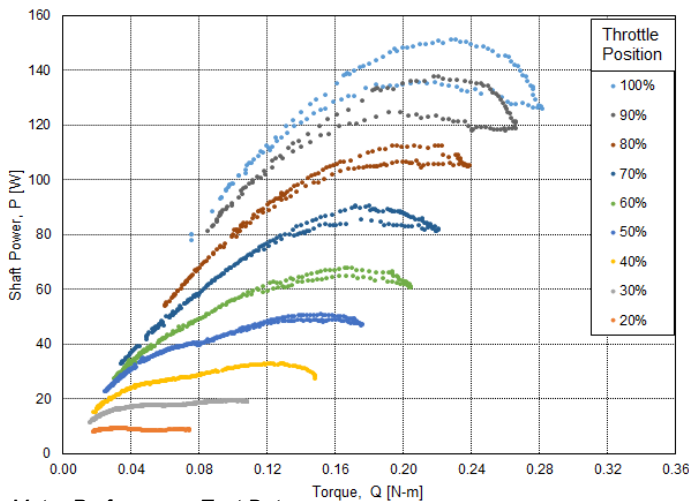


15 kW Brushless DC Motor Test

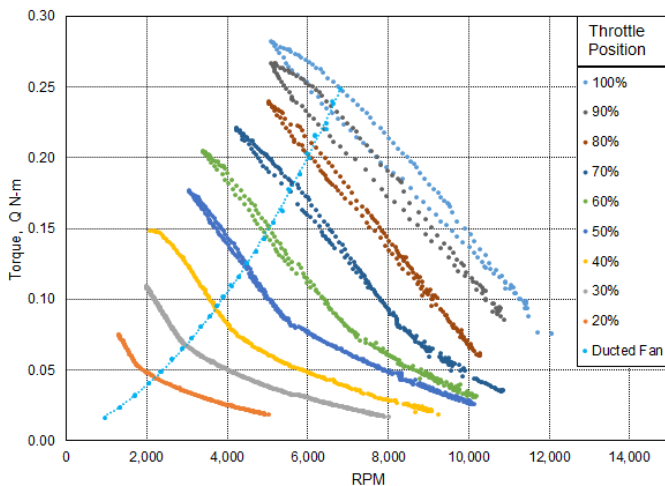


Small Motor Characterization Stand

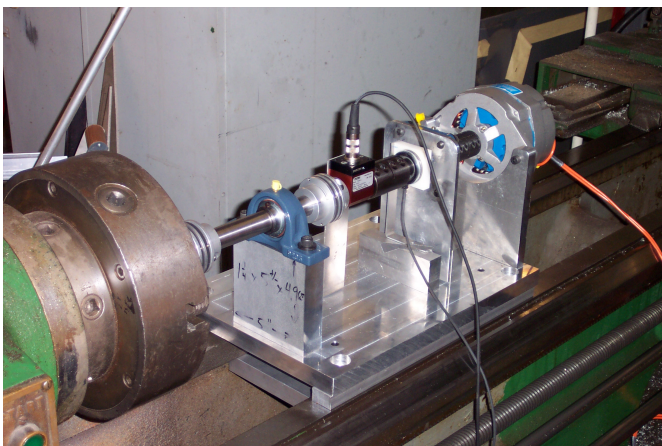
Motor Characterization TESTING AND QUALIFICATION



Motor Performance Test Data



Motor Performance Test Data shown with Ducted Fan Performance Curve using Motor



Wind Turbine Generator Testing

Test Procedures

Our engineers review the objectives of the test and develop a test schedule prior to motor characterization testing. Instrument calibration is always performed before testing and verified regularly.

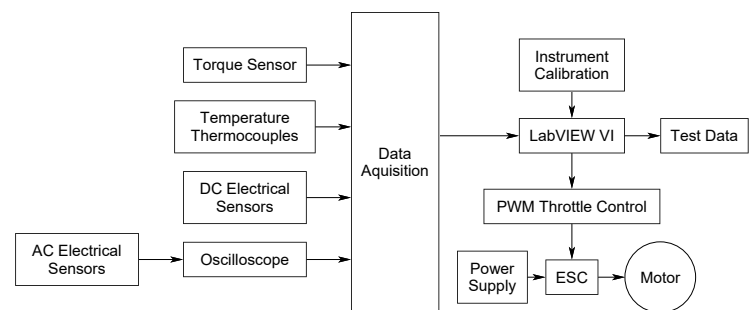
Instrument readings are monitored throughout the test to prevent overloading of the motor or instruments. Automatic stops are programmed to shut off the motor if it exceeds safe operating conditions.

Tests can be performed by varying parameters such as applied torque and throttle setting. Manipulating both parameters allows for testing of multiple loading cases on the motor using the brake. This is a significant benefit to ducted fan testing where motor torque is difficult to measure and can provide the efficiency curves of the motor within the ducted fan. Longer term tests at steady state conditions may also be performed.

A preliminary analysis of test results follows testing to ensure reliable results and avoid issues such as unwanted vibrations. Repeatability testing is performed as needed to verify the accuracy of the data.

Test Data Analysis

DARcorporation engineers analyze the test results and data to provide insights into the design. Steady state and transient conditions are recorded and can be analyzed. After analyzing, processing and formatting the test data, our engineers provide technical reports documenting the results and findings.



Instrumentation Diagram for Brushless DC Motor Testing

DARcorporation

Design • Analysis • Research

www.darcorp.com • (785) 832-0434 • info@darcorp.com