Test Stand Design

DARcorporation engineers have the ability to design and manufacture custom test stands. We have extensive experience designing test stands to accurately measure the performance of the system, model or device being tested. Previous projects requiring test stands and fixtures include:

- Propeller Testing
- Electric Motor Testing
- Engine Testing
- Wind Tunnel Testing
- Wing Testing
- Acoustic Testing
- Fluid Pump Testing
- Wind Turbine Generator Testing
- Structural Load Testing

Several of these projects are shown here. In the upper right is the propeller test stand developed by DARcorporation engineers. This stand is designed to test propellers up to 24" in diameter. It measures RPM, thrust, torque, electrical and shaft power, temperature and atmospheric conditions. The custom LabVIEW code for this test stand records raw and processed data during each test and charts the processed performance data of the tested propeller during the test.

The wing test stand, shown in the lower right, is designed to measure the forces and moments generated by a distributed electric propulsion wing. It includes a 5 axis force balance measuring lift, drag, roll, pitch and yaw. The forces and moments are intentionally isolated as much as possible to provide accurate data. It also records data on all motors including RPM, electrical power, voltage, current and temperature.

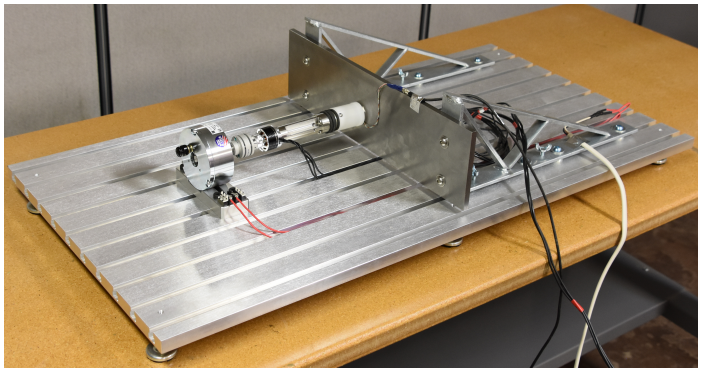
Besides these examples DARcorporation has handled test stands involving multiaxis force and moment measurements, pressure rakes, fluid flow, thermal testing, acoustics and others.

Based on the objective of the test, instruments and other hardware are selected by our engineers to measure the test cases. The accuracy and resolution of the instruments selected is carefully determined to provide useful data for the entire range of the test. If there is a wide range of test cases this may require switching components for different capacity. Our test stands are designed to make this a straightforward process and provide a method of calibration for all cases.

Propeller Test Stand

Distributed Electric Propulsion Wing Test Stand

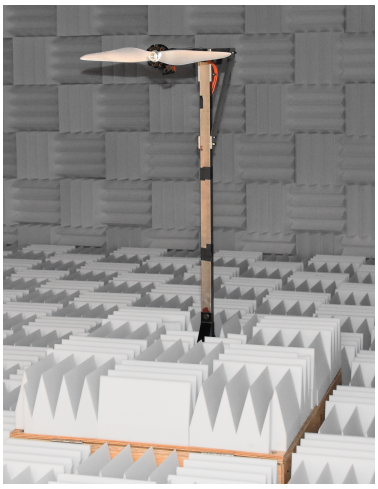
Test Stand Design



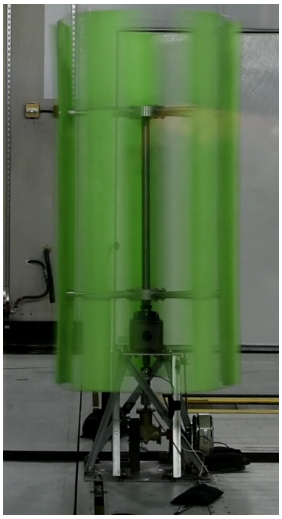
Motor Characterization Test Stand

Calibration

Calibration of the instruments on the test stands our engineers develop is always an important consideration. We design fixtures and develop methods for calibrating the test stands to verify that the data generated is valid. These methods can include pulleys and weights to apply loads for multiple axis force balances and then generation of a load cell matrix. For the cases where the stand interference and blockage is an issue a solution such as a mirror test stand or fixture is used to correct for the error.



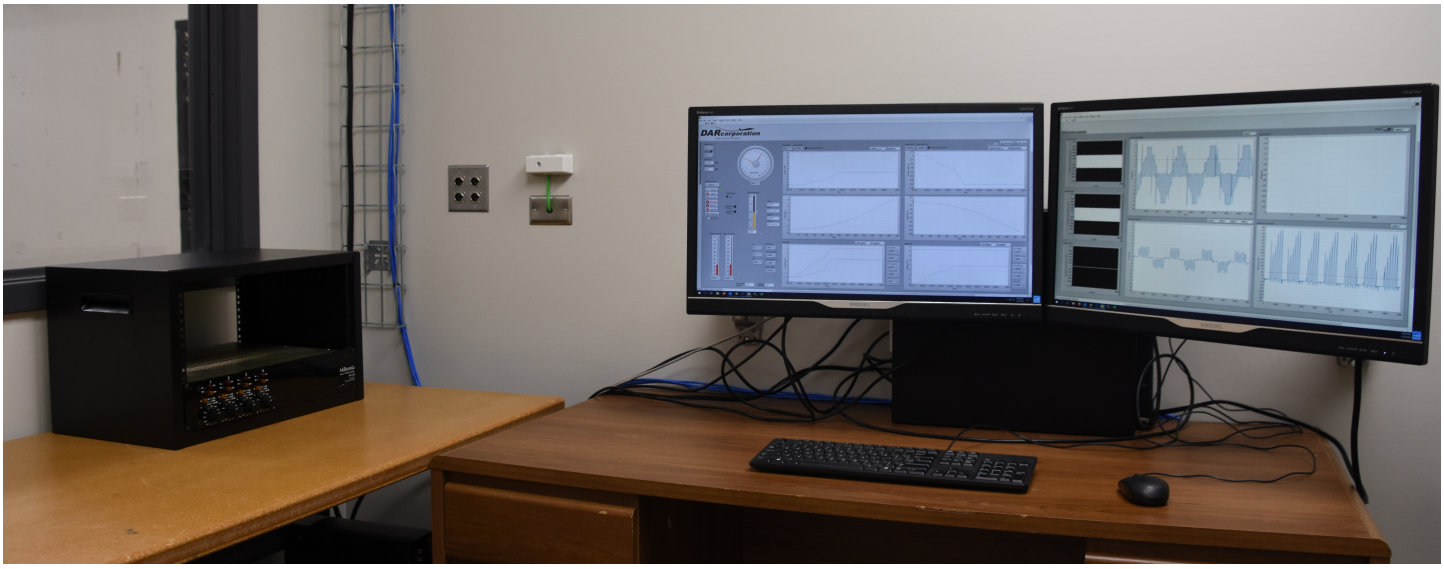
Anechoic Chamber Propeller Test Stand



Vertical Axis Wind Turbine Test Stand

Test Stand Software

We also develop software to control the test and record data during testing. Our capabilities include real time data processing and display to monitor a test while in progress. This allows for monitoring critical values which can be used to abort the test and prevent equipment damage. Full data post-processing capabilities can also be included in the software. We can also provide signal output channels within the software for uses such as throttle control. Typically we provide LabVIEW programs, but can also use other programming languages.



DARcorporation Control Room with Propeller Test Stand Instruments Displayed

DARcorporation

Design • Analysis • Research

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