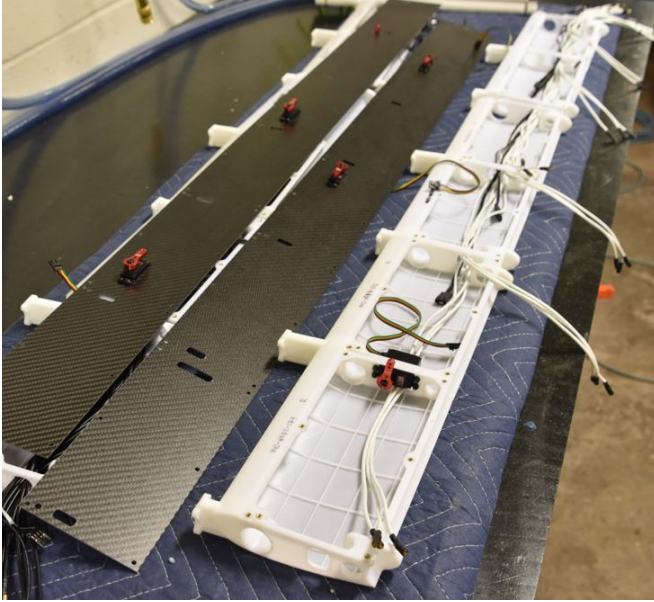


# Modular Air Vehicle Research Intelligent Kit Design, Build, Fly



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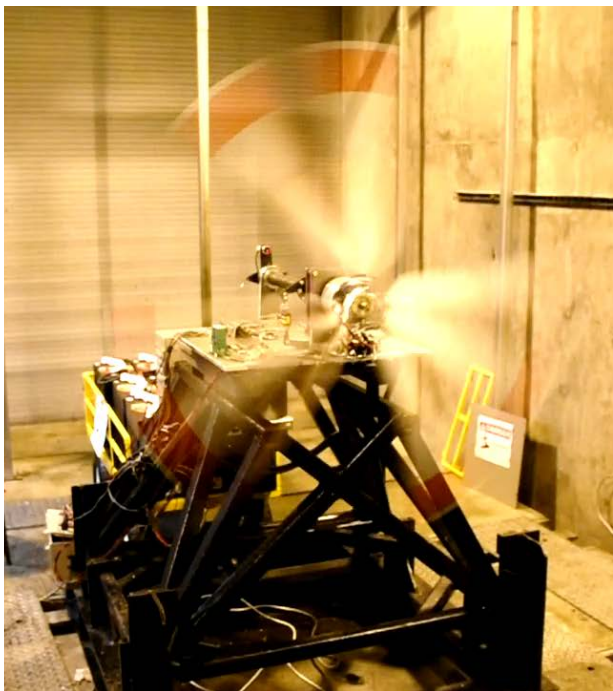
The Modular Air Vehicle Research Intelligent Kit, or MAVRIK, is an unmanned aerial system that can be easily reconfigured by selecting different prefabricated components to perform customized missions and act as a test bed for new technologies, such as a tiltable wing with Distributed Electric Propulsion (DEP).

## Designed From the Ground Up

The MAVRIK system is designed from the ground up using Advanced Aircraft Analysis (AAA). The tilt wing DEP aircraft features 12 motors and propellers installed on the wing, two motors and propellers on the tiltable horizontal tail and a custom-designed tilt mechanism and tilt schedule.

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15 kW Brushless DC Motor Test

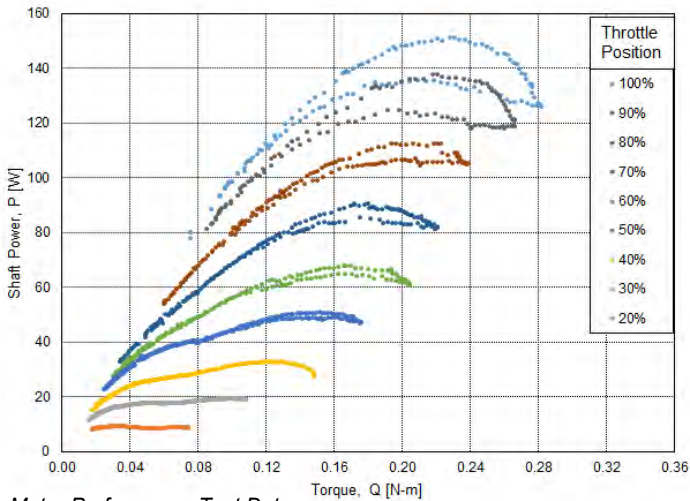
## Measurement Capabilities

- 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

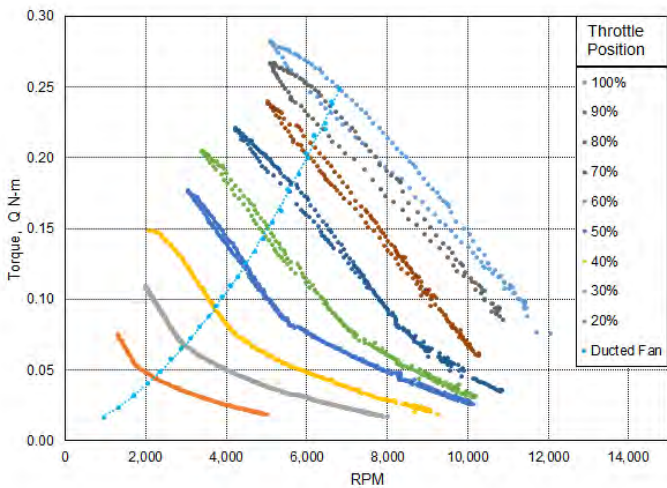


Flight Testing

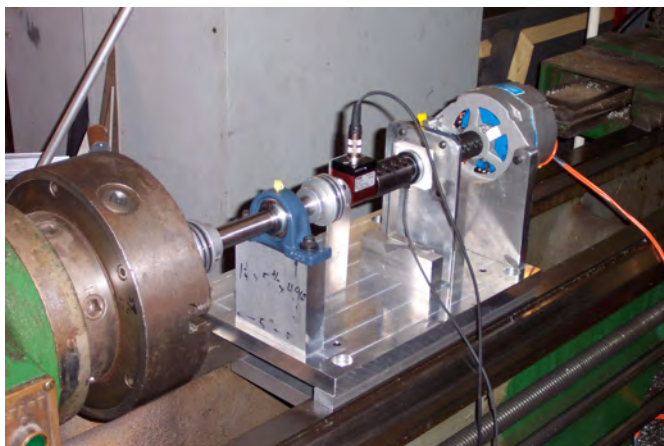
# Motor Characterization TESTING AND QUALIFICATION



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.

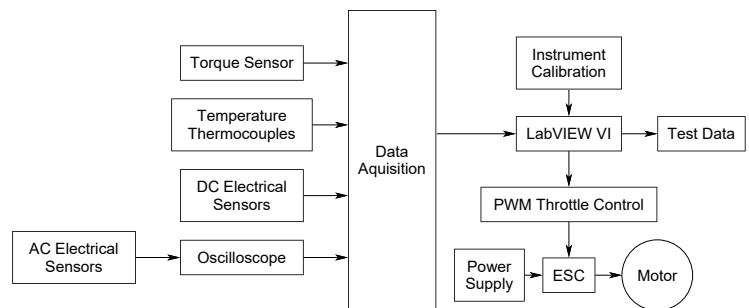
Instrument readings are monitored throughout the test to prevent overloading of the motor or instruments. Automatic stops are programmed to shut off the motor if it exceeds safe operating conditions.

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



Design • Analysis • Research

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