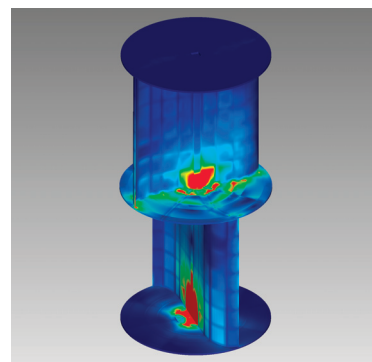
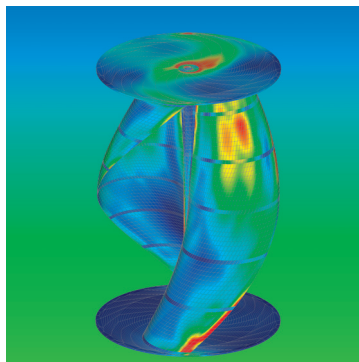


Wind Turbine

DESIGN, PROTOTYPING AND TESTING

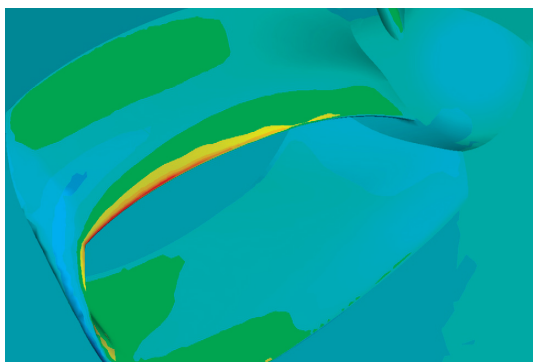


***DAR*corporation**

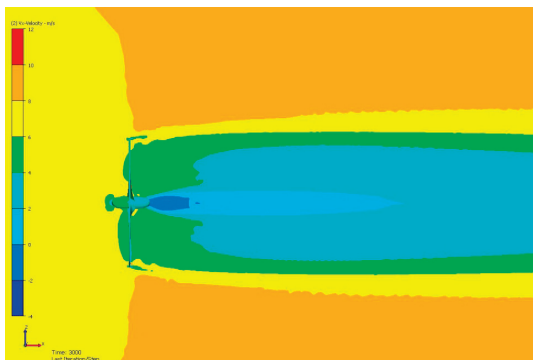
Design • Analysis • Research

Design, Analysis and Research Corporation (DARcorporation) is a world class aeronautical engineering and prototype development company that boasts a team of highly skilled aeronautical engineers, software developers, project managers and prototype production personnel. Our primary objective is to help you design, prototype and test your horizontal axis, vertical axis and unconventional wind turbines.

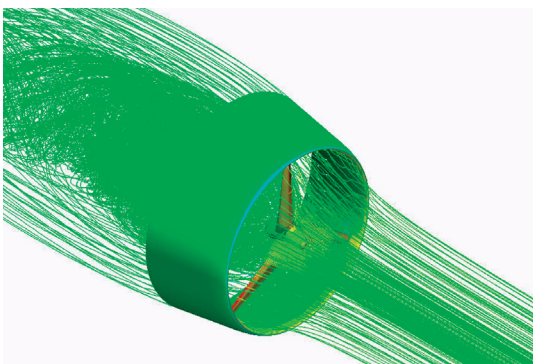
Our expertise includes horizontal axis and vertical axis wind turbine aerodynamic and structural design and analysis, structural testing, generator calibration, acoustic analysis, test planning and management and field testing. Besides horizontal axis and vertical axis wind turbines, DARcorporation also analyzes unconventional wind turbines.



Hi-Q Wind Turbine CFD



Chance Morgan Wind Turbine CFD



Ducted Wind Turbine CFD

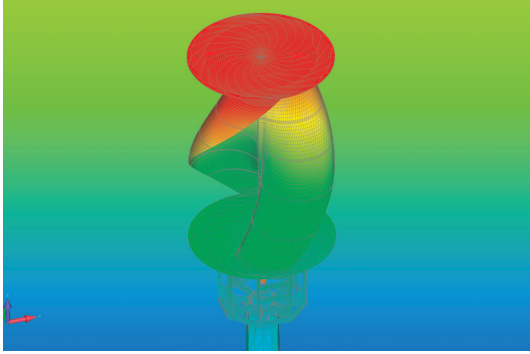
DARcorporation engineers work with customers to solve their most critical problems and combine extensive engineering experience with computerized simulation tools to provide the services our customers want. Through the following four disciplines, DARcorporation provides professional services for the design and analysis of wind turbines.

Aerodynamic Design and Analysis

Based on Blade Element Momentum (BEM) theory, DARcorporation has developed and customized in-house software for initial aerodynamic design of the wind turbine power generating surfaces to handle any type of wind turbine configuration and blade shape. Using high-fidelity computational fluid dynamics (CFD) software with rotation simulation, the full power curve of the wind turbine can be created. Pressure distribution over the blades is calculated and torque (and thus power) curves are constructed. The interaction between the power generating surfaces and the rest of the structure can also be analyzed. The deliverables of aerodynamic design include recommendations on the number of blades, airfoil selection, chord and pitch distribution, rotor diameter, RPM, etc. DARcorporation engineers have the ability to select the ideal generator for your configuration and will perform dynamic startup simulation, so the effects of wind speed changes on your wind turbine energy generation is captured. Services include:

- Blade Element Momentum Analysis
- Full Navier-Stokes CFD
- Airfoil Design and Analysis
- Rotor Blade Design and Analysis
- Aerodynamic Loads for the Rotor, Hub and Tower
- Generator Selection and Calibration
- Dynamic Startup

Wind Turbine DESIGN, PROTOTYPING AND TESTING



Wind Energy Corp Wind Turbine FEA



SkyDrill Wind Turbine Wind Tunnel Test



SkyDrill Full Scale Model Construction



SkyDrill Full Scale Model

Structural Design and Analysis

Our engineers use Finite Element Analysis (FEA) methods and software to analyze wind turbine structures for strength, stiffness, dynamic modes, fatigue, flutter, etc. Results such as stresses, deformations, buckling factors, natural frequencies, flutter speeds, etc. are compared against possible failure modes to ensure structural integrity. Unwanted vibrations are identified and designed out of the system. The structural analysis yields a selection of materials, material thicknesses and composite layup schedules and produces an optimized structural configuration. Services include:

- Loads Analysis
- Structural Analysis
- Fatigue and Crack Growth
- Structural Testing and Ground Vibration Tests

Prototyping and Manufacturing

DARcorporation can generate manufacturing drawings and build a designed structure for structural, aerodynamic and performance testing. We have experience using composite, metal and 3D printed plastic materials. DARcorporation engineers have worked with many horizontal axis and vertical axis wind turbines as well as many unconventional designs. In addition to designing your wind turbine, we will provide close engineering support for fabrication and assembly. Services include:

- Manufacturing Drawings
- Prototype Assembly
- Manufacturing Engineering Support

Scaled Model Testing and Field Testing

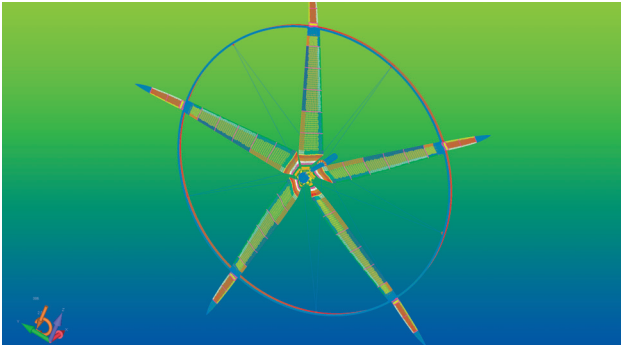
Our engineers have extensive experience in data acquisition, test planning and test management to ensure the wind turbine performance meets your design goals. In addition to designing your wind turbine, we will use our state-of-the-art testing facilities to test your wind turbine system through a range of sizes and operating conditions. Sub-scale systems tested in a wind tunnel utilize a small generator or an electronic brake and torque sensor to measure the power output. By varying the RPM and measuring the torque the power curves can be constructed and verify the aerodynamic design. Services include:

- Wind Tunnel Test Planning and Management
- Field Test Planning and Management

DARcorporation

Design • Analysis • Research

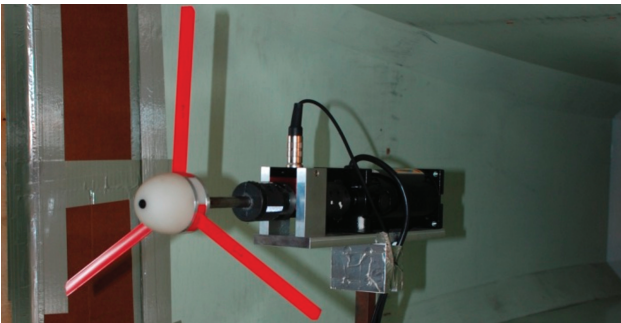
Sample Projects



Chance Morgan Wind Turbine FEA



Wind Energy Corp Wind Turbine Wind Tunnel Test



Wind Turbine Wind Tunnel Test

- 100 kW Horizontal Axis Wind Turbine Aerodynamic Design
- Chance Morgan Windwheel™ 100 kW Wind Turbine Aerodynamic and Structural Design and Analysis
- Aerodynamic Performance of Wind Turbine Blades for Wetzel Engineering
- Design Method Development and Design of a Low-Speed Wind Turbine for Hi-Q Products
- CFD Analysis on a Wind Turbine rotor for Dynastrosi Laboratories
- CFD Analysis on a Vertical Axis Wind Turbine
- Wind Turbine Performance Analysis and Structural Analysis for Wind Energy Corporation
- SkyDrill Wind Turbine System Dynamics Structural Analysis
- Novel Ducted Wind Turbine Design
- Wind Tunnel Testing on a Vertical Axis Wind Turbine for Dynastrosi Laboratories
- Wind Tunnel Testing of Several Low Speed Horizontal Axis Wind Turbines for Hi-Q products
- Wind Energy Corporation Wind Turbine Wind Tunnel Testing
- SkyDrill Vertical Axis Wind Turbine Wind Tunnel Testing
- Manufacturing and Full Scale Testing of the Hi-Q #61 Wind Turbine
- Wind Tunnel Testing of a New Propeller/Wind Turbine Concept

About Us

DARcorporation (Design, Analysis and Research Corporation) is an aeronautical engineering firm, located in Lawrence Kansas, that has been offering aeronautical engineering consulting services, software and books since 1991.

Experience in the design, detailed analysis and building of prototypes gives DARcorporation a unique advantage over other companies, since we can go from initial design all the way through full size prototype manufacturing and testing. We will work with you to design and optimize your wind turbine for performance, manufacturability and cost. Let us know how we can support your projects.

