MotionSolve for Wind Power

Optimize Wind Turbine System Performance

MotionSolve – Altair's multi-body solution is an integrated solution to analyze and improve mechanical system performance. In the energy industry, MotionSolve is used to simulate wind turbine dynamics systems. An accurate virtual wind turbine can be constructed by considering high-fidelity components, such as aerodynamic loads, wind loads, detailed structural sub-systems and co-simulation with control systems. MotionSolve can be used to predict the loads coming on to the structure, simulate extreme events (such as emergency stop), offshore wind turbine dynamics and extract stress/strain for further durability studies.

Solution Highlights

- Certified by NRELz
- Full suite of analysis capabilities (assembly, kinematics, dynamics, statics/quasi-statics, linear)
- Rigid and flexible bodies
- Library of constraints, motion inputs, concentrated loads, distributed forces and realistic bushings

- Simulate active pitch control, speed control, aerodynamic power control, tower feedback control via Controls co-simulation with Simulink and Simulink Code Import
- Accurate flex body simulation
- Automated utilities to map multi-body loads to FEA

- Coupling with fluid dynamics to accurately simulate offshore floating wind turbines
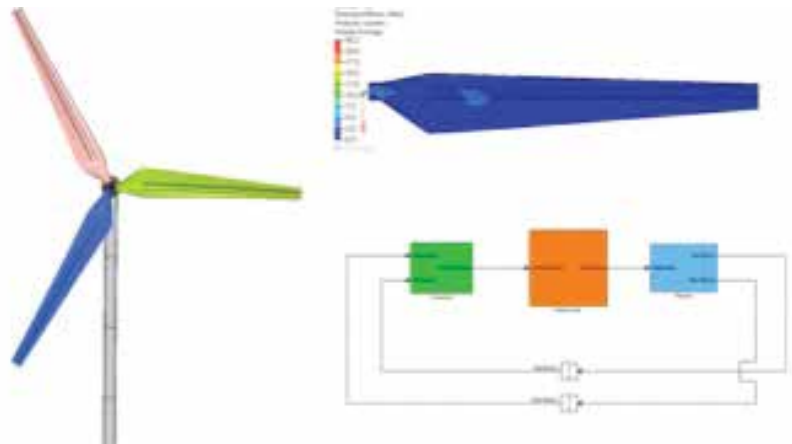
Energy Capabilities

- Flexible and rigid parts
- Sophisticated non-linear components including bushings, dampers, stoppers, air and gas springs, flex bearing forces, friction/stiction
- Library of constraints, motion inputs, concentrated loads
- Integration with Controls, hydraulic and pneumatic systems
- Model can distribute loads on flexible parts or model aerodynamics via live coupling between MBS and Computational Fluid Dynamics
- Accurate setup for component loads prediction for a variety of simplified, quasi-static and transient loads
- Automated utilities to map multi-body simulation loads to FEA
- Simplified, kinematic gear box components and bearings
- Automated report generation

Using Multi-body simulation with MotionSolve allows engineers to model complex dynamical systems with different levels of fidelity in a single modeling environment. It is crucial to generate the simplified real time models from validated high fidelity models.
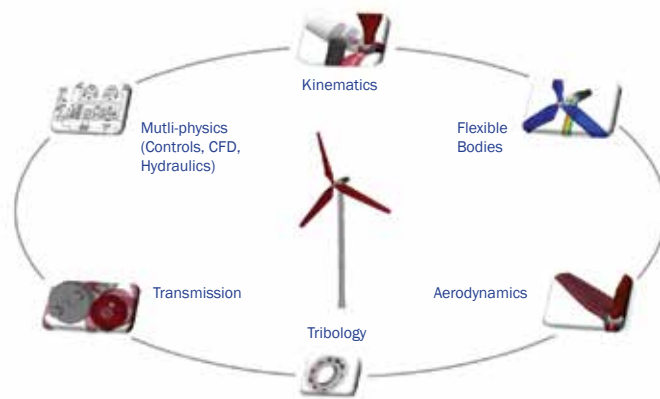
Interfaces

- Aerodynamic software
- Most common industry standard CAD and FEA software
- Control software
- Fluid dynamics
- Fatigue analysis
- Optimization and design exploration

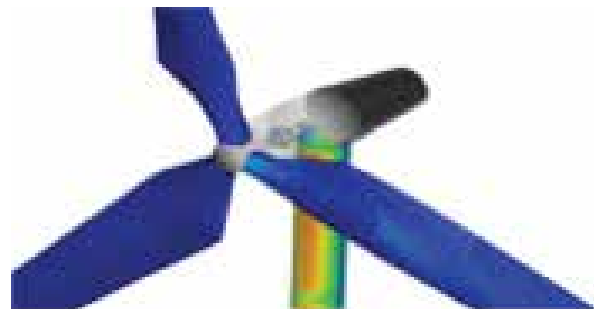*Multi-disciplinary solution*

General Capabilities

- Create parametric templates to extend core functionality
- Python, MATLAB, C++ & Fortran user sub-routines
- Analyses types: Static/quasi-statics, kinematics & dynamics, linear, assembly analysis
- Rich library of modeling elements
- Aerodynamics – coupling with Computational Fluid Dynamics

Stress/strain recovery from MotionSolve