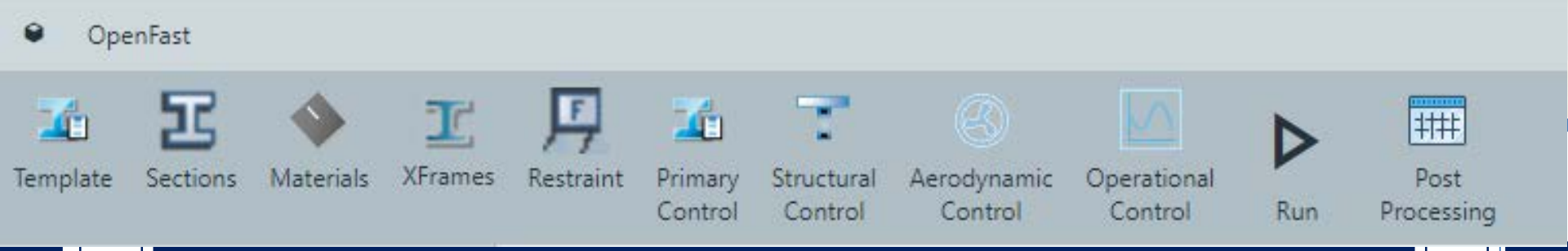
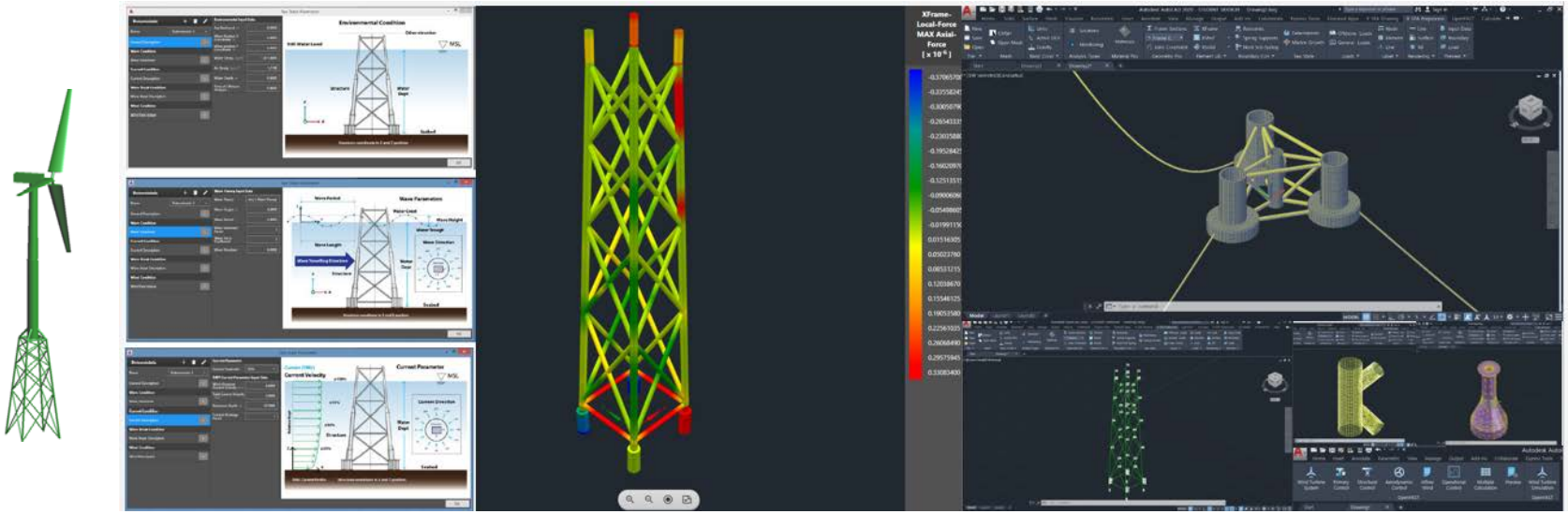


Web-OpenFAST

(Web base program of OpenFAST:
Fixed Framed offshore Structure is available at present)

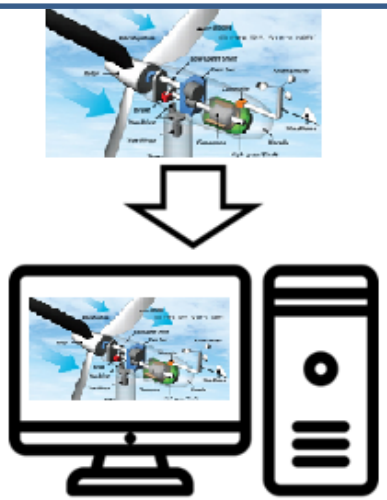


www.xfinas.com

Professor Ki-Du Kim (kimkd@konkuk.ac.kr)
XFINASIT Co. LTD, Tera Tower 2 B 521, Songpadaero 201 Seoul. KOREA, 05854 tel/fax) 82-2-881-5760

Introduction

- **A web base program** is also called a web application, which is a web service that allows you to use the functions of an application through a web browser without installing a separate application.
- It can be a web service that allows various functions of engineering solutions to be performed in one web after network connection.



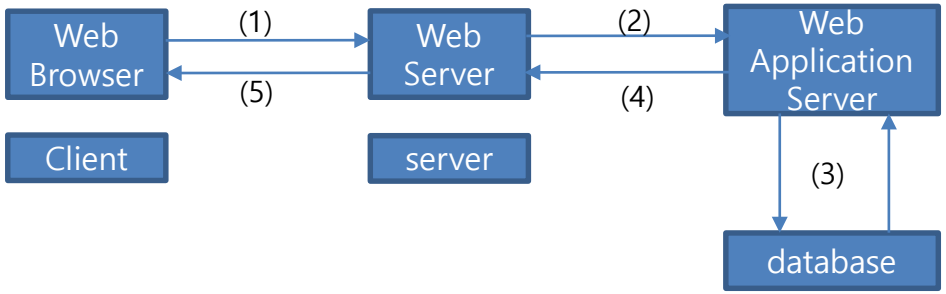
OpenFAST is installed inside website.

- Web programming basically takes the form of a client/server method. When a client (web browser) requests a specific content to a web server, the web server processes it and responds to the client (web browser).
- Cloud computing is a model that enables integrated access and use of the network to meet the needs of users from anywhere. It allows users to choose which services to receive and how according to their needs.

OpenFAST is in clouding system.

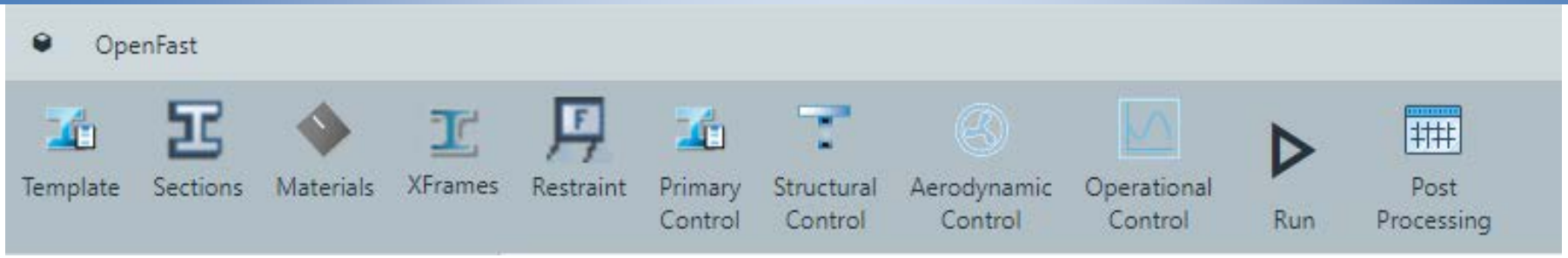
Structure of web application

A web application is a program that runs on the web. Therefore, the relationship between web programming and web applications can be said to be 'implementation of web applications through web programming'. The structure of the web application is as follows.



The processing order of the web application is
(1) when a web browser requests a anlysis from a web server,
(2) the web server receives the web browser's request and requests the application server to process them for interworking with the logic and database of the requested page.
(3) At this time, the web application server performs database and data processing if it needs to interwork with the database.
(4) Sends the processing result of the logic and database operation back to the web server.
(5) The web server then responds to the web browser again.

Ribbon Menu of Webase Program: Web-OpenFAST.



Ribbon menu

OpenFAST (Fatigue, Aerodynamic, Structures, Turbulence) integrated software package is a comprehensive aeroelastic simulator capable of predicting both extreme and fatigue loads of two and three bladed horizontal axis wind turbines on onshore and offshore system. The main component of the program is contained template, section, material, element library (Xframe), restraint, primary control, aerodynamic control, operational control and post processing

Template

Generate offshore wind turbine structure using tools in SI unit, is allow edit length of section and size of mesh for monopile, jacket, tripod and tetrapod structure.

Monopile template

Jacket Template

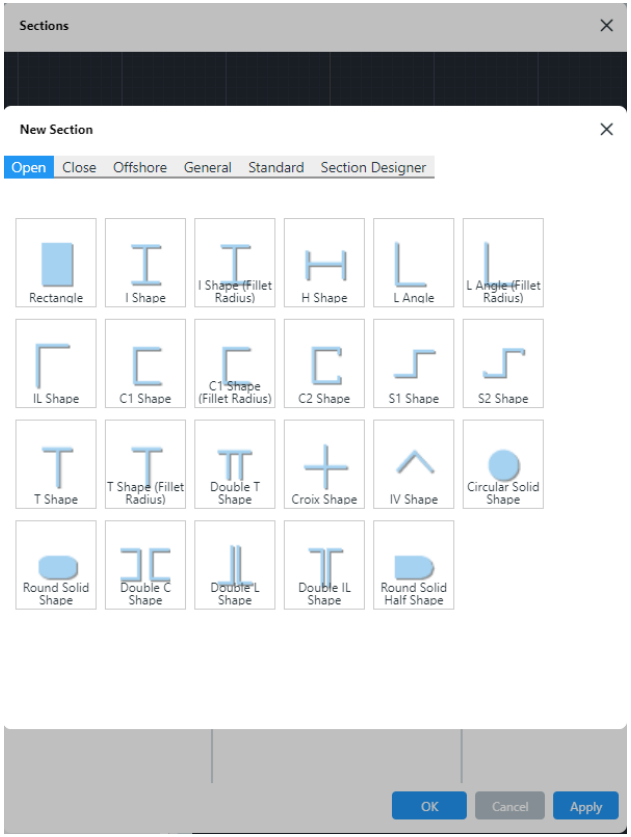
Tripod template

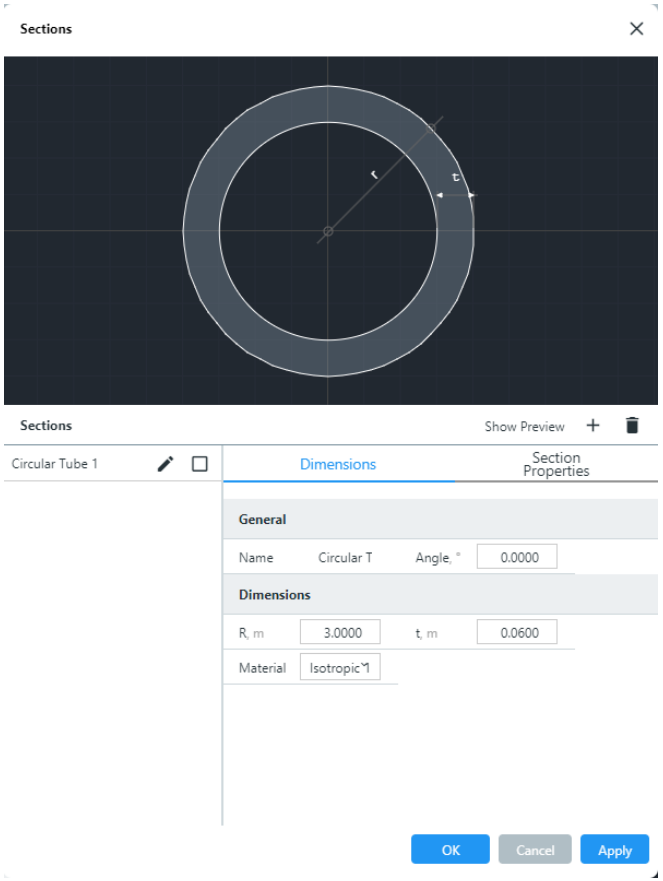
Tetrapod Template

Ribbon Menu of Webase Program: Web-OpenFAST.

Section

The geometric properties of elements that cannot be defined by the coordinates of the nodes. This usually refers to the element cross-section properties. There are five section types, integrated into program: open section, close section, offshore section, general section, standard section and section designer.





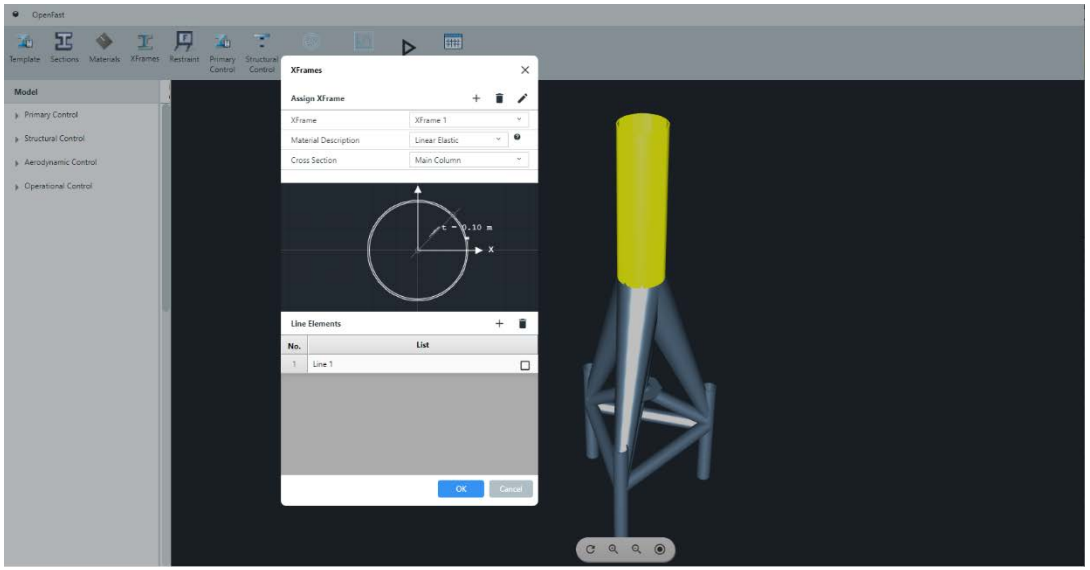
Ribbon Menu of Webase Program: Web-OpenFAST.

Materials Properties

An intensive property of a material for wind turbine offshore structure, may use variety of material type including isotropic, steel, geotechnical, concrete, cable and prestress properties are provided

Xframe

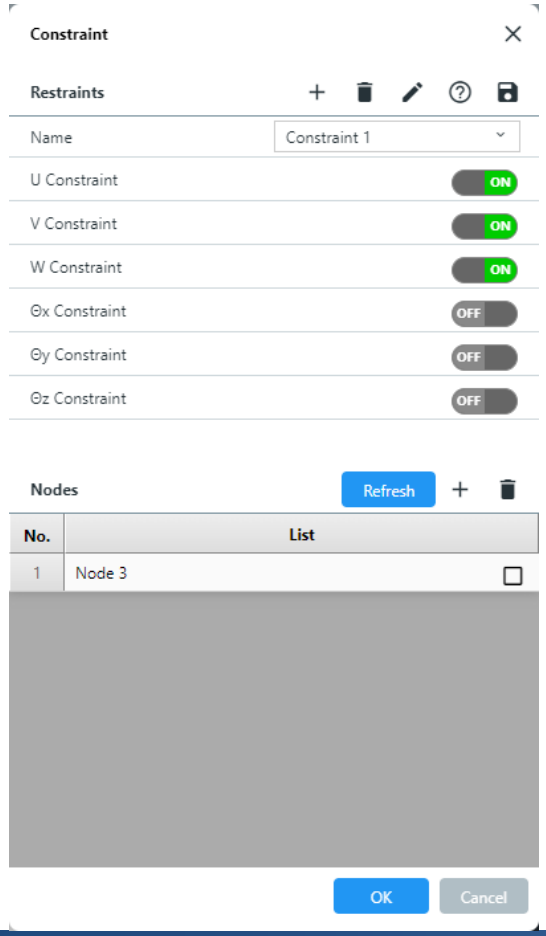
Xframe is assigning tools for geometry section into drawing frame structure which is a three dimensional (3D) and 2-node frame element model.



Ribbon Menu of Webase Program: Web–OpenFAST.

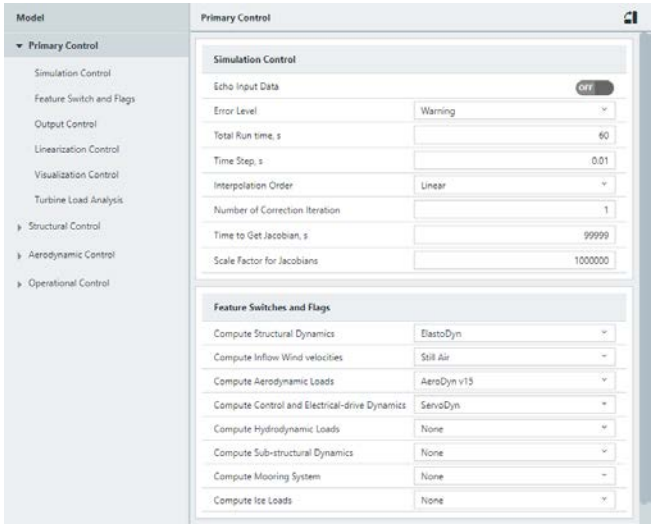
Restraint

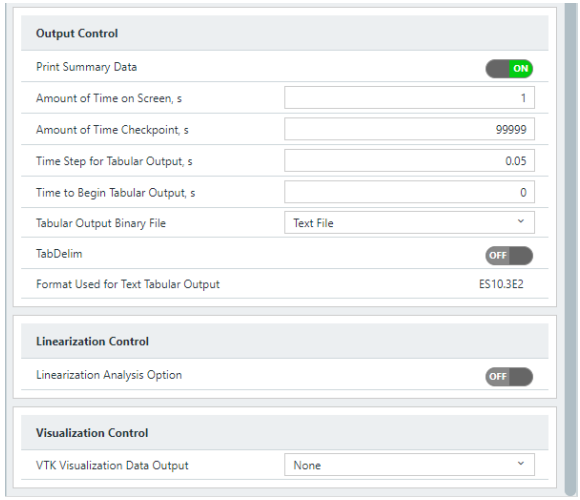
Boundary conditions at the supported nodes are specified by means of global supports. Three translation and three rotational restraints are provided for each global support whose directions.



Primary control

A Primary control is describing a wind turbine file controller. A blade, tower, furling, structure and aerodynamic parameters and wind-time histories are read from separate files. Most of input files are divided into five window sections: (1) Simulation Control, (2) Feature switch and flags, (3) Output control, (4) Linearization control, (5) Visualization control.

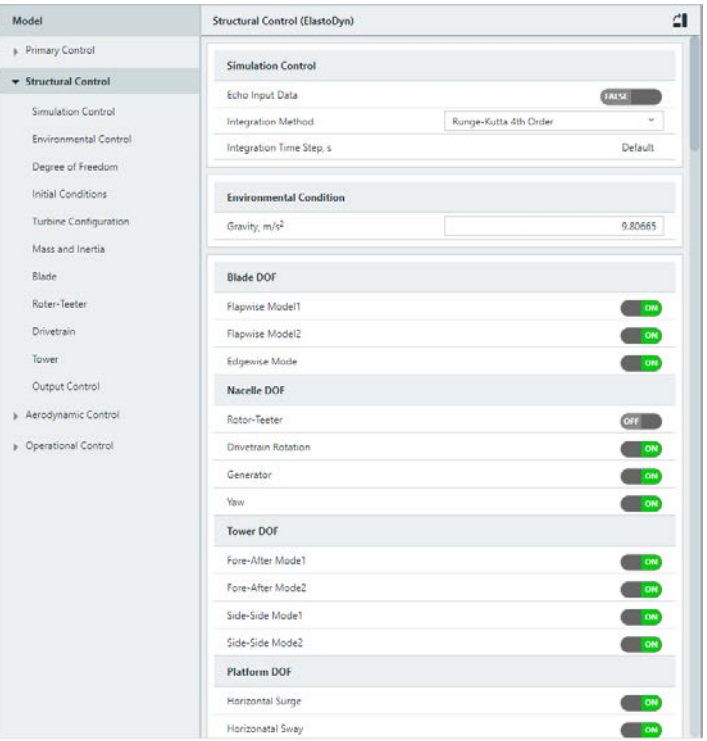


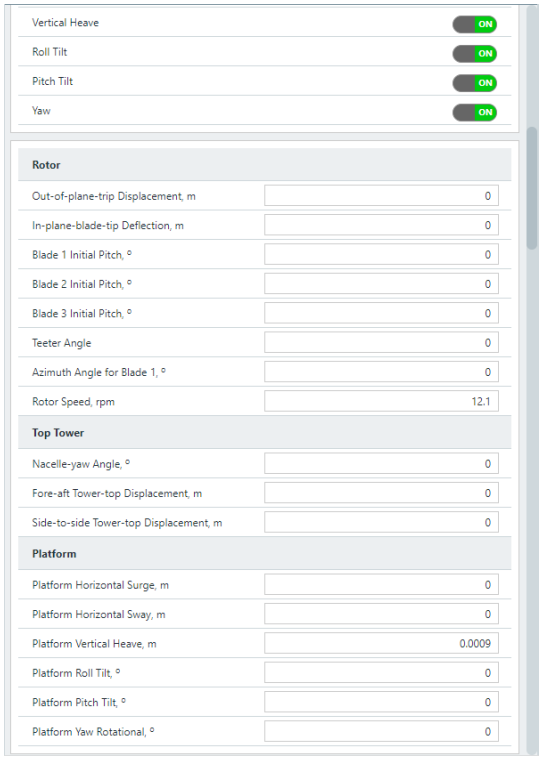


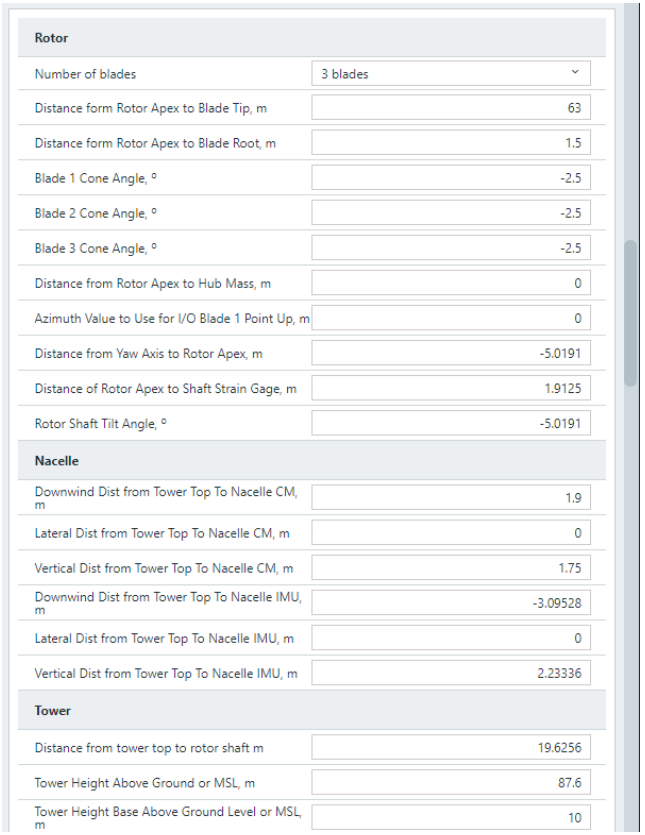
Ribbon Menu of Webase Program: Web–OpenFAST.

Structural Control

The structural control is divided 11 modules: (1) Simulation Control, (2) Environmental Condition, (3) Degree of Freedom, (4) Initial Condition, (5) Turbine Configuration, (6) Mass and Inertia, (7) Blade, (8) Rotor-Teeter, (9) Drivetrain, (11) Tower, (12) Output Control. Most of data describe basic tower properties, bladed properties and structure degree of freedom.



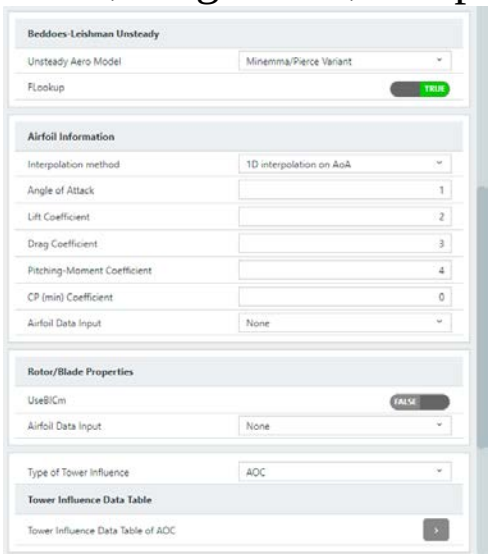


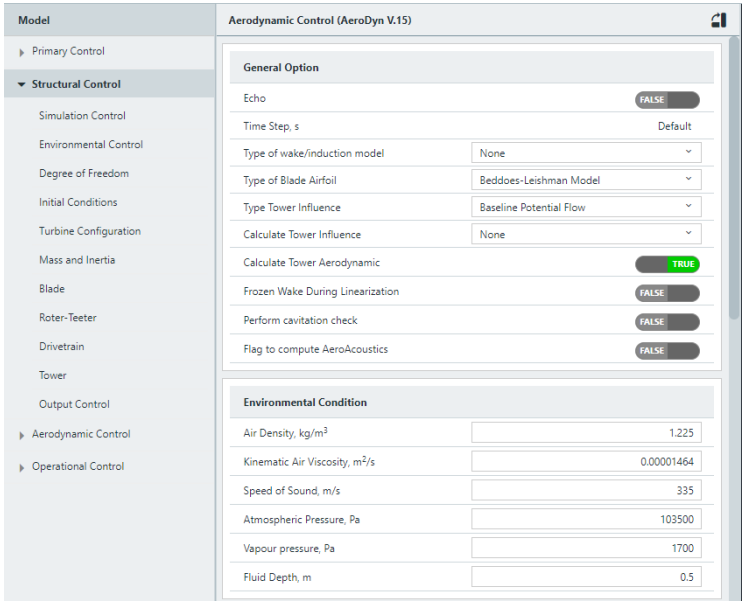


Ribbon Menu of Webase Program: Web–OpenFAST.

Aerodynamic control

Aerodynamic 15th version is based on the principles of actuator lines, where the three-dimensional (3D) flow around a body is approximated by local two-dimensional (2D) flow at cross sections, and the distributed pressure and shear stresses are approximated by lift forces, drag forces, and pitching moments lumped at a node in a 2D cross section

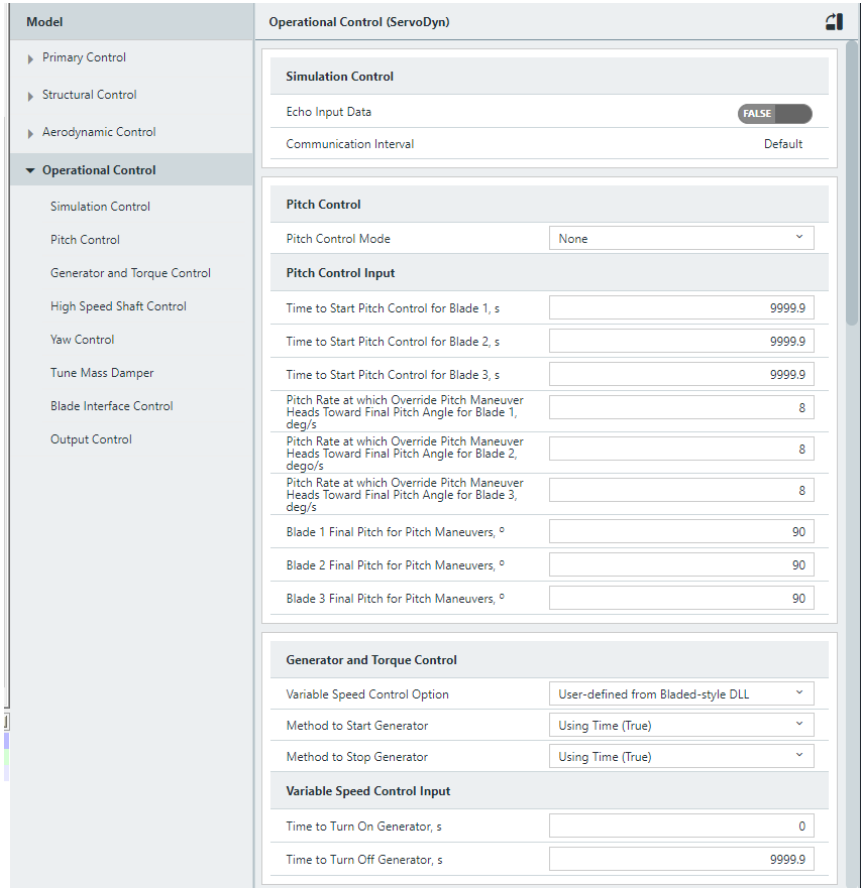


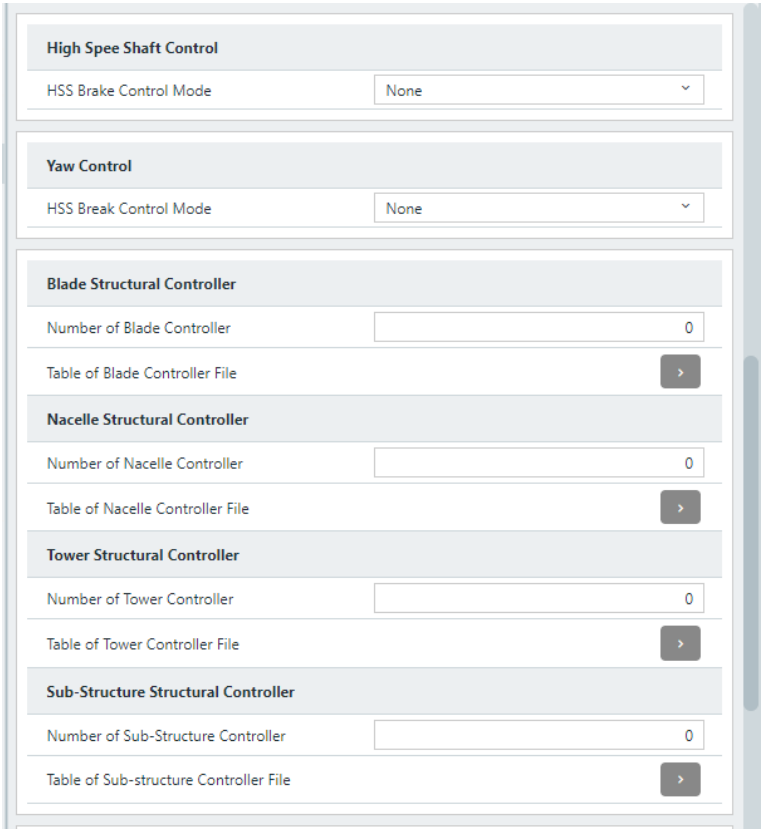


Ribbon Menu of Webase Program: Web–OpenFAST.

Operational control

The dynamic controller of electrical-drive for blade, drivetrain and nacelle are included. it is described in simulation control, pitch control, generator and torque control, high speed shaft control, yaw control, tune mass damper and output control.

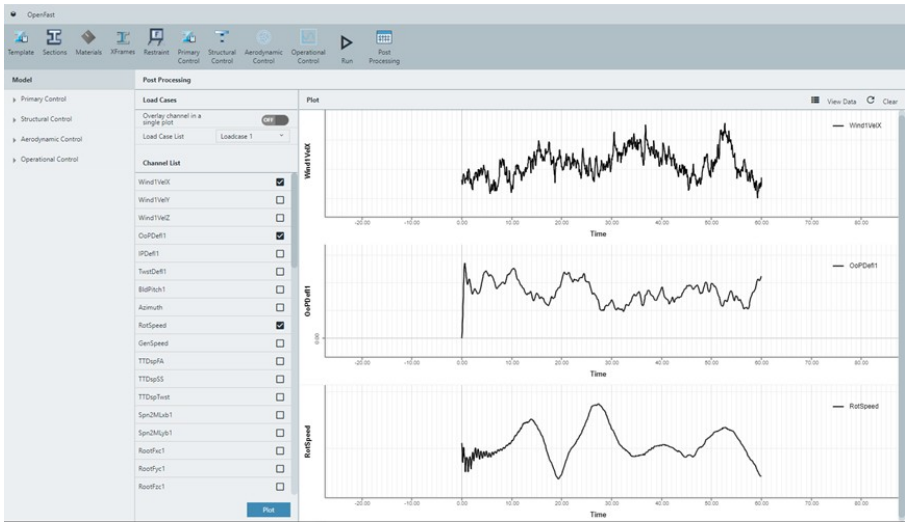




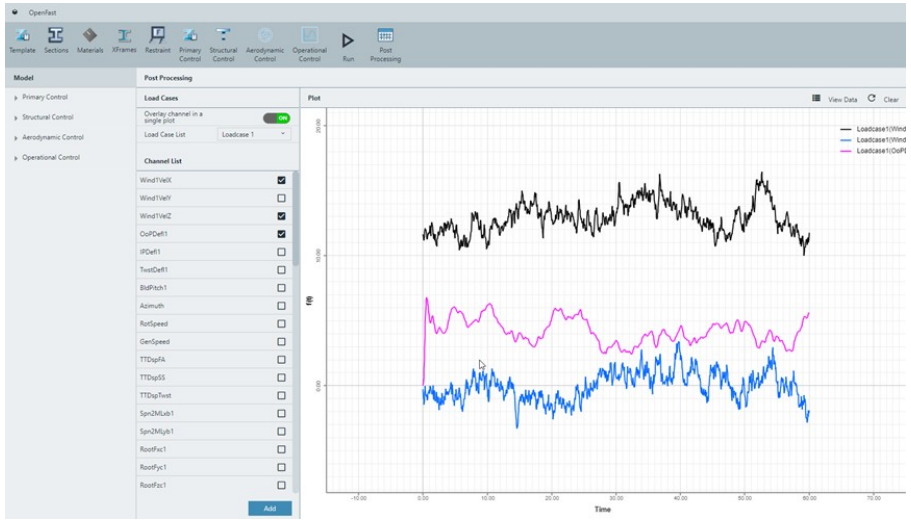
Ribbon Menu of Webase Program: Web-OpenFAST.

Post processing

Plotting an output result in single or multiple channels. It is allowed overlay data in a single channel plot and export into spread sheet form.



Overlay data in a single channel plot



Multiple channel plot

Web-OpenFAST will be announced somtime in this year