

Bladed - Zero Tower Deflection with Steady Wind

Zero Tower Deflection with Steady Wind


Similar to the previous tutorial, [Zero Blade Deflection with Steady Wind](#), the tower modes can be set to zero to simulate a wind turbine with zero tower deflection. We will use the Bladed demo project again and adjust the input parameters. The wind condition will be the same as the case with zero blade deflection (steady wind, 11 m/s).

Start-up

Launch GH Bladed and load the demo file (demo_a.prj).

Wind



Click on  to edit the wind characteristic. The default wind is set to **3D Turbulent Wind** with a mean wind speed of 12 m/s. This turbulent wind is defined in the demo wind file. For our case, we will use a steady wind of 11 m/s. Change the option to **No Variation** and change the **Wind speed** to **11 m/s**. Change the **Flow inclination** to **0 degrees**. Click on Apply to save the changes.

Wind

Upwind turbine wake

Define turbulence

Annual wind distribution

Time varying wind

Wind shear

Tower shadow

No Variation

Single Point History

3D Turbulent Wind

Transients

Refer wind speed to hub height

View Wind Data

Environment (other):

Waves

Off

...

Currents

On

...

Tides

Off

...

Earthquake

Off

...

Turbulent wind file name

d:\bladed 4.1\demo_a.wnd

...

Properties...

Mean wind speed

m/s

12

Height at which speed is defined

m

61.5

Turbulence Intensity (longitudinal)

%

16.0108

Turbulence Intensity (lateral)

%

0

Turbulence Intensity (vertical)

%

0

Wind direction (from north)

deg

0

Flow inclination

deg

8

Additional sinusoidal wind direction transient

Amplitude of direction change

deg

0

Start time for transient

s

0

Duration of transient

s

0

Type of transient (half/full wave)

Half

Continuous direction change

Rate of direction change

deg/s

0

Turbulence is valid for 12.5465 %

Turbulence is valid for 8.924723 %

Set wind file defaults

Allow wind file to wrap around

Height of turbulent wind field

Centred on hub height

Best fit for rotor and tower

Interpolation scheme:

Fully Cubic

Apply

Reset

OK

Cancel

Wind

Upwind turbine wake Define turbulence Annual wind distribution

Time varying wind Wind shear Tower shadow

☒ No Variation
☐ Single Point History
☐ 3D Turbulent Wind
☐ Transients
☒ Refer wind speed to hub height

Environment (other):
Waves Off ...
Currents On ...
Tides Off ...
Earthquake Off ...

Constant wind

Wind speed	m/s	11
Height at which speed is defined	m	61.5
Wind direction (from north)	deg	0
Flow inclination	deg	0

Tower Modes

Double click on **Modal Analysis**.

Main calculations

Supporting Calculations

Modal Analysis	<input checked="" type="checkbox"/>
Wind Turbulence	<input checked="" type="checkbox"/>
Earthquake Generation	<input checked="" type="checkbox"/>

Change the number of tower modes to **0**. Click OK to close the Modal Analysis Parameters window.

Modal Analysis Parameters

Blade Modes

Number of blade modes: 4

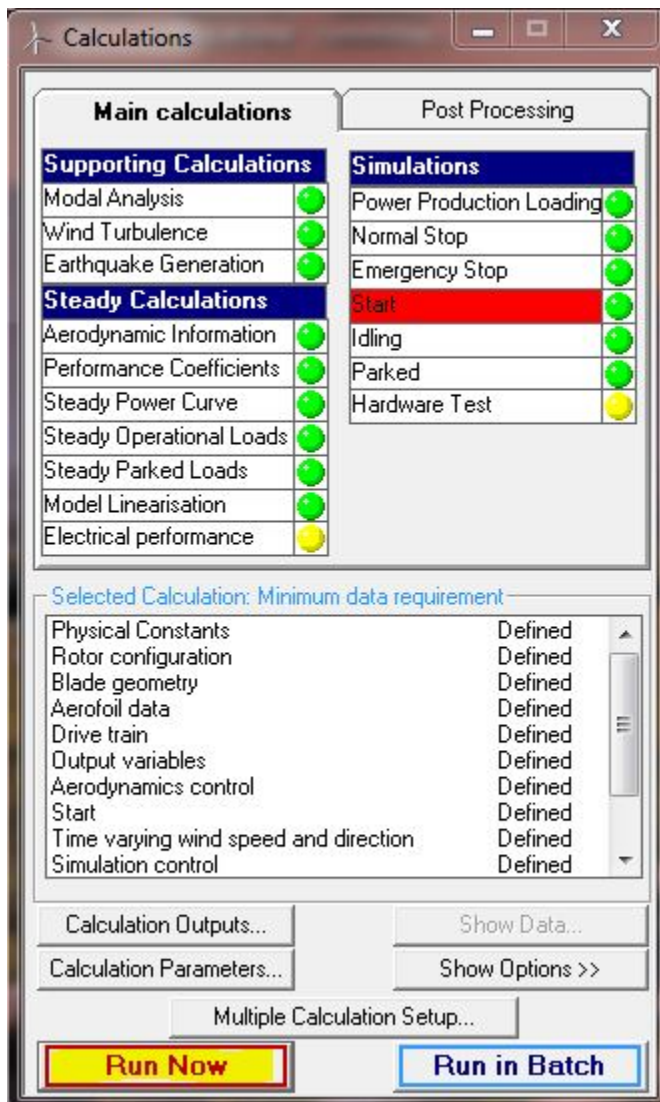
Tower Modes

Number of tower modes: 0

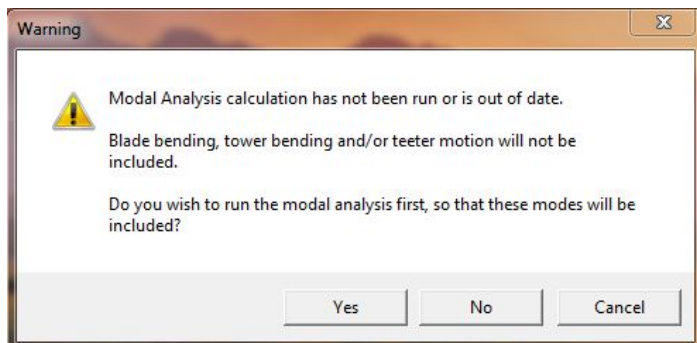
Azimuth angle: deg 0

Simulation

We will run **Start** simulation because it simulates the start up response of a wind turbine. Highlight **Start**, and click on **Run Now**.



A warning message will appear. This message appears because we have changed the blade modes. Click on Yes to update the modal analysis to proceed.



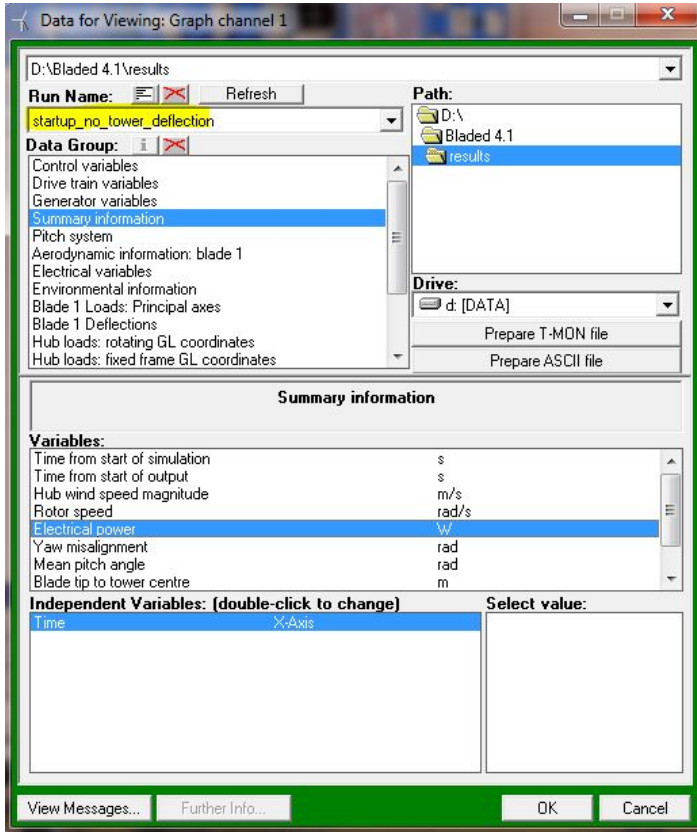
Save the simulation result in the Bladed result folder (bladed 4.1\results). Name it **startup_no_tower_deflection**. Close the Calculation Progress window when the run is completed.

Results

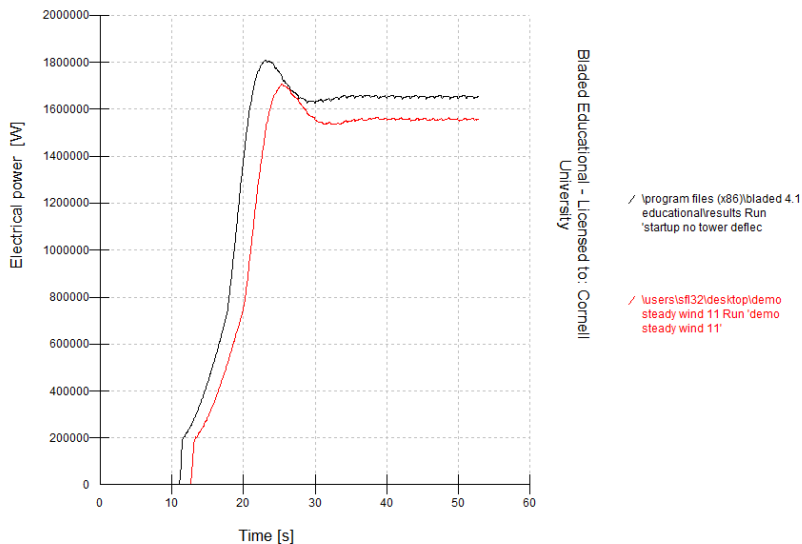
Click on Data View.



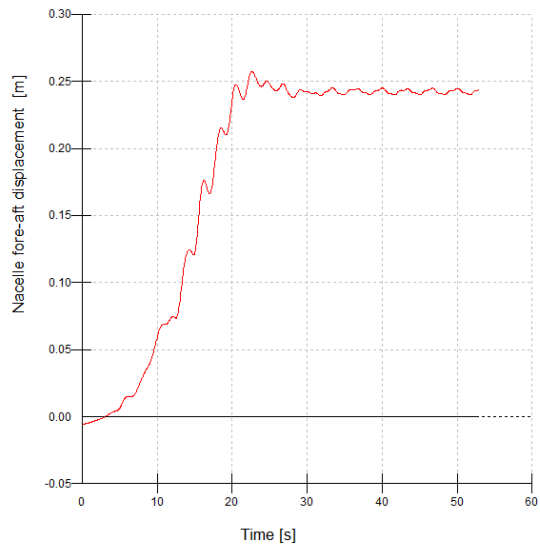
In Channel 1, select **Electrical power** from **Summary information** for "startup_no_tower_deflection".



Select the same variable and independent variable for channel 2, but select "demo_steady_wind_11" for **Run Name**. Click on View Graph:



You can also check the Nacelle motion by selecting **Nacelle Motion** in **Data Group**. Select **Nacelle fore-aft displacement** for Variables and **Time** for independent variable. The nacelle displacement will look like the following:



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✓ /program files (x86)/bladed 4.1
educational/results Run
'startup no tower deflec'

✓ /users/stf32/desktop/demo
steady wind 11 Run 'demo
steady wind 11'