alpha wind

windcomp

ROMEG REPORT USER GUIDE

Alpha **Wind** SAS

Toulouse, France

www.alphawind.fr

Official Partner

for France of

windcomp

GmbH

www.windcomp.de

Legend of defects	
	Severe defect requiring to stop the turbine and to repair it immediately.
	Moderate defect requiring to adjust the turbine within 1 to 3 months.
	Minor defect needing a regular control in time.
	No defect noticed
	Suggestion, observation, for information or axis of possible improvement.
	Not inspected (too high or too low wind speed * / Topography did not allow the control ** / Rain ***).

Example of result table

Results

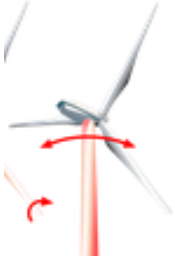
Initial	Blade 1	Blade 2	Blade 3	Difference
Root[°]	-0,34	0,76	-0,42	1,18
Tip[°]	-0,42	1,17	-0,75	1,92
Full Twist[°]	-0,08	0,42	-0,34	
Half Twist[°]	-0,03	0,56	-0,53	1,09
Sharing(°)	0,04	-0,01	-0,04	

Root blade angle difference:
Orange if above 0,8°
Orange if between 0,6° and 0,8° with important tower oscillation
Yellow if between 0,6° and 0,8° with normal tower oscillation
Yellow if below 0,6° with important tower oscillation
Green below 0,6° (Limit for aerodynamic asymmetry in the Directive Germanischer Lloyd 2010 Section 4.3.4.1.)

Tip blade angle difference and twist:
Usually for information only (as this value is less precise than the root one)
In blue when below 2°
Yellow if above 2° and root blade angle is within the tolerance

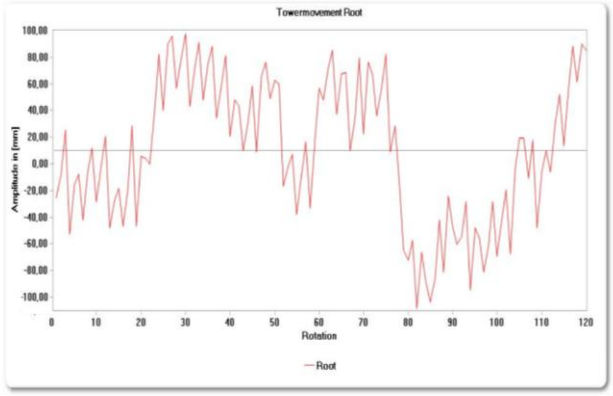
Sharing or radial angle difference :
This value indicates a potential mass imbalance of the rotor
Green if the difference is below 1,25°
Orange if above 1,25°

Half blade twist difference :
The precision of the Romeg allow to control the blade angle at the blade half length, therefore to provide an accurate twist measurement of the blade from the root to the middle of the blade (Half Twist):
In blue if below 0,6°
Yellow if above 0,6° and root blade angle is within the tolerance
Orange if above 1,2° and root blade angle is within the tolerance

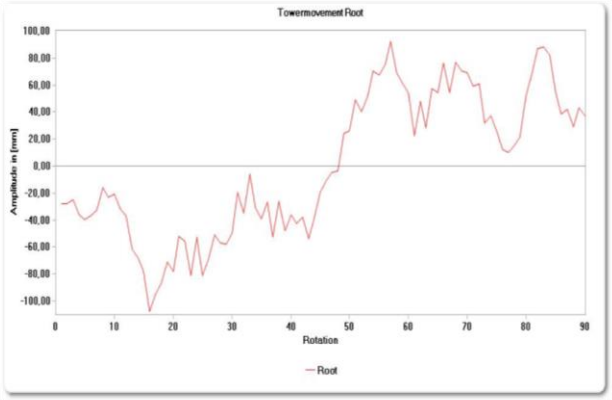


Tower vibration due to aerodynamic imbalance

Tower vibration with 1.2° blade angle difference



Tower vibration with 0.2° blade angle difference



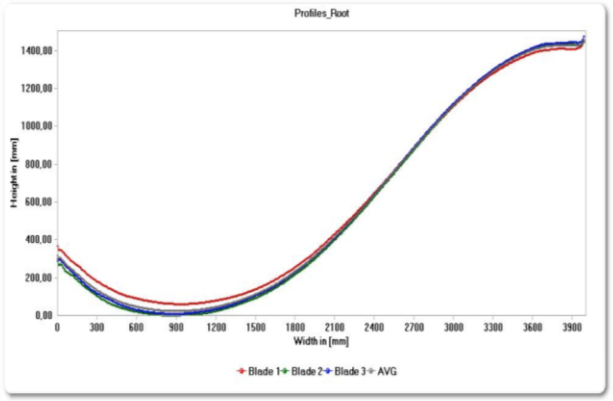
Tower vibration due to aerodynamic imbalance is usually visible starting at a 0,8° blade angle difference.

In the graphs above, a high frequency vibration is visible with the 1,2° blade angle difference tower oscillation. The amplitude of the vibration is up to 60mm, while after adjustement, the high frequency is barely noticeable.

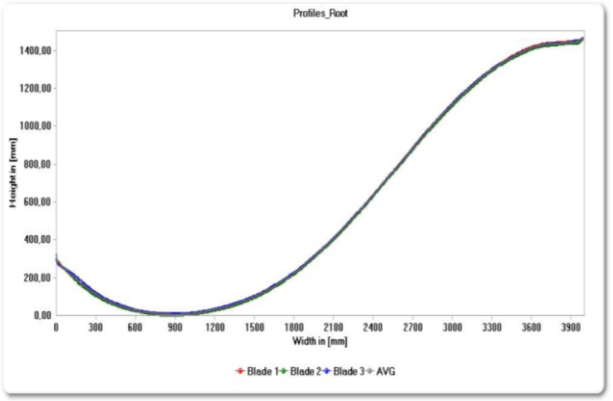
In some cases, the tower oscillation can also be important with a 0,6° blade angle difference and therefore require an adjustment. In that case, we compare the potential defective tower oscillation with a well adjusted WTG tower oscillation. If the high frequency oscillation is at least twice higher than the frequency of a well adjusted WTG oscillation, we advice to adjust the blade angles.

Blade angle difference

Blade angle difference of 1.2°



Blade angle difference of 0.2°



The blade angle difference is the most important result from the Romeg inspection.
The 2 graphs above show the 3 blade profiles and the average one before and after correction.

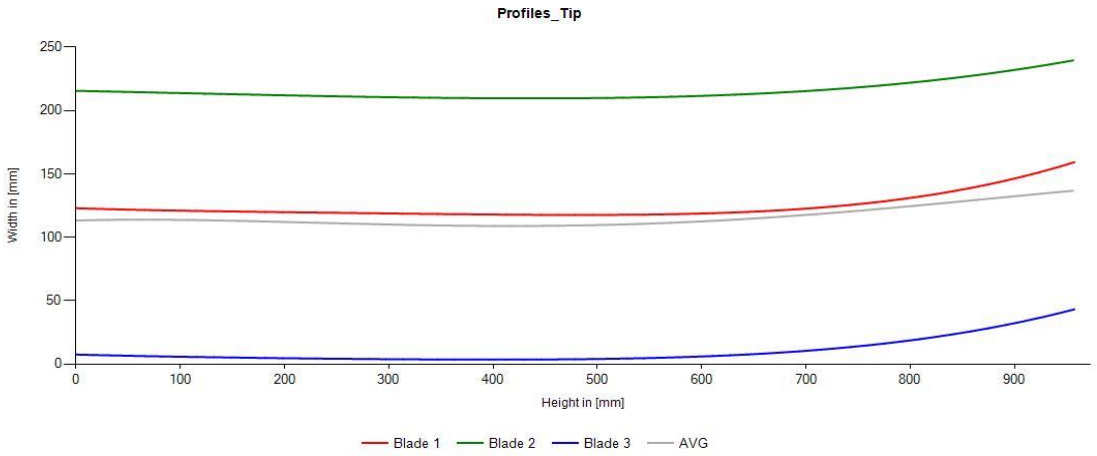
We can see on the left graph that the blade 1 (in red) does not have the same pitch angle as the 2 others.

The right graph is of the same turbine after adjustment of the blade 1 pitch angle. The 3 profiles are now overlapping and the blade angle difference is now equal to 0,2°.

The blade angle difference value is defined in the result table on the first page of the report.

Blade Tip Profiles and tower clearance

Blade tip profiles with 0,9° blade angle difference

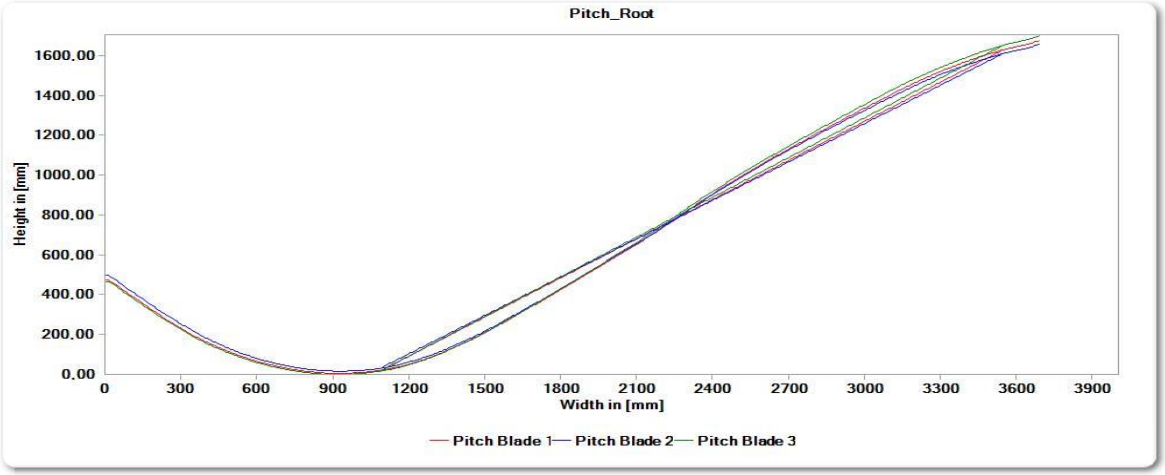


The blade tip profile graph indicate whether a blade is closer to the tower compared to the 2 other ones.

This graph is used when the root blade angle difference is within 0,6°. In this configuration, if a blade tip profile position is higher than 500mm with the two others, this could indicate a structural defect of the blade. This defect is therefore represented in Orange and require a control/adjustment.

Pitch root graph

Pitch root graph with 0,9° blade angle difference



This graph is only for information, indicating how the blade angle of each blade is calculated.

The blade angle difference is usually well visible on this graph.