# What happens 20. July to 20. August?

11. - 14. August appears different than other “normal” periods according to Figure 1. The wind speed reaches 18 m/s in this period and the wind direction stays somewhat constant. The rotor operates at around 15 rpm somewhat constant.

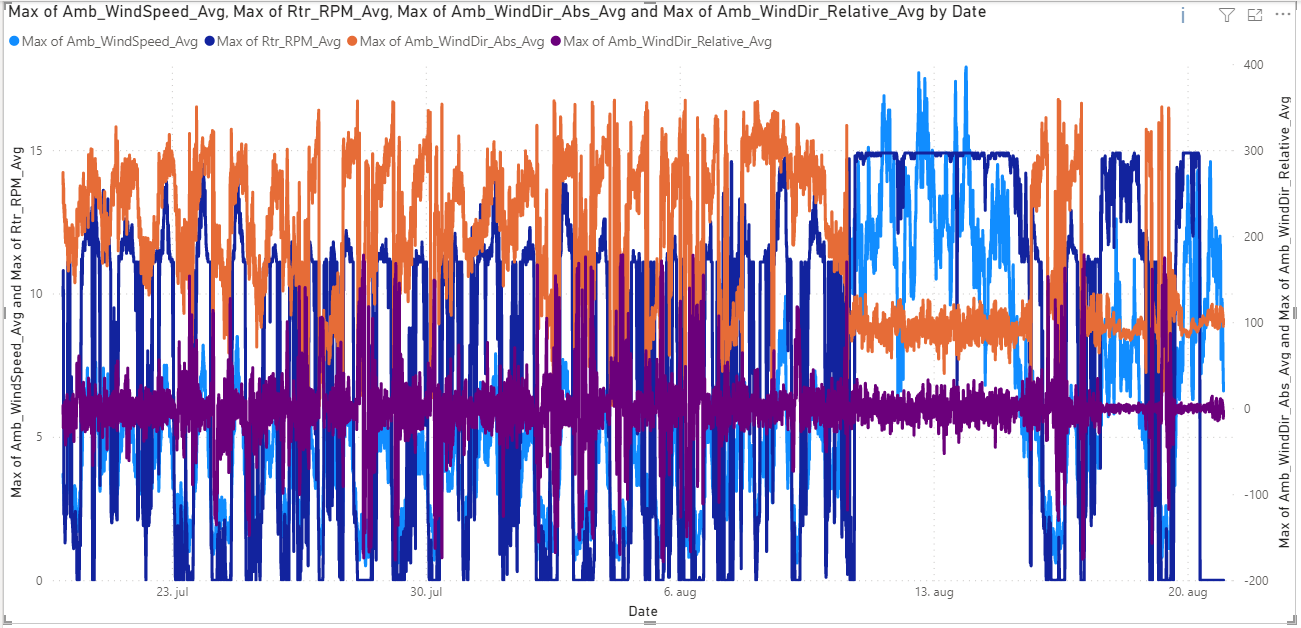


Figure 1: Wind direction and wind speed

Pitch angle remains low while wind speeds are higher according to Figure 2. Wind speed of ca. 14 m/s gives a pitch angle of ca. 10 degrees.

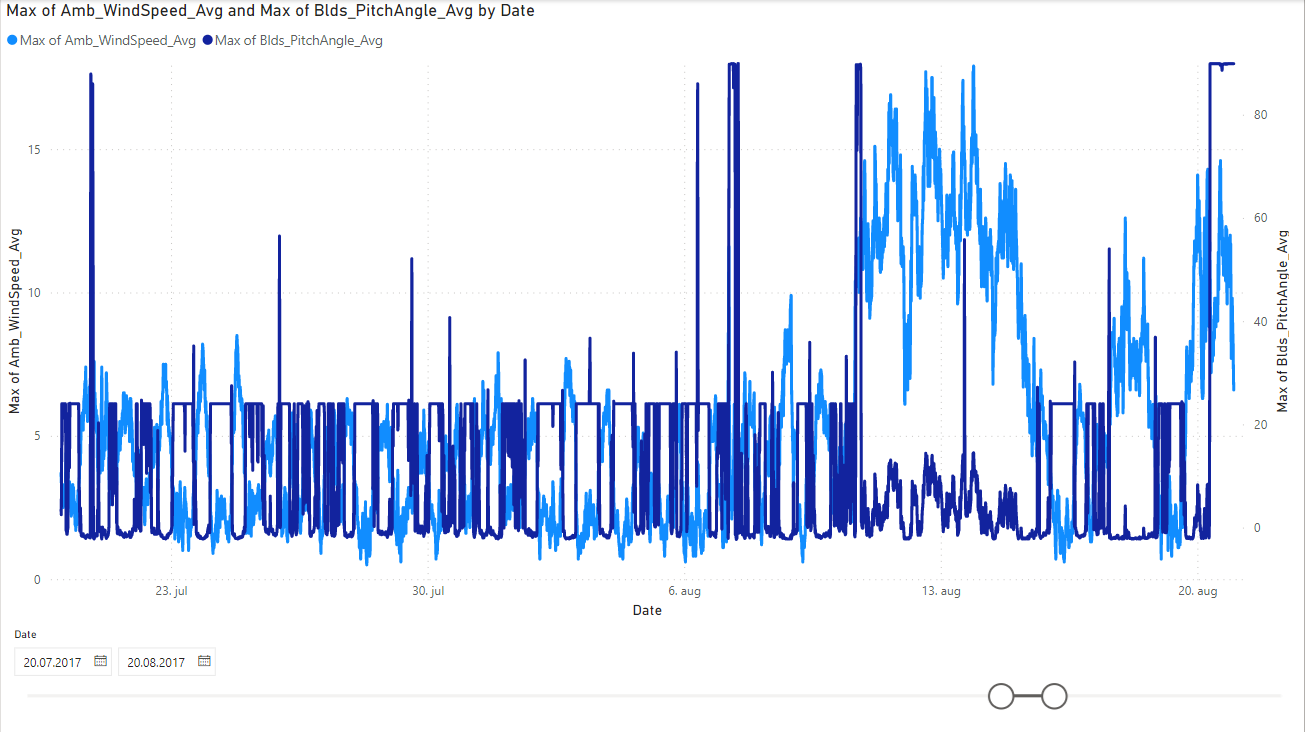


Figure 2: Wind speed and blade pitch angle

It is difficult to conclude that the pitch system is failing when comparing to other periods with similar wind speed, such as in Figure 3.

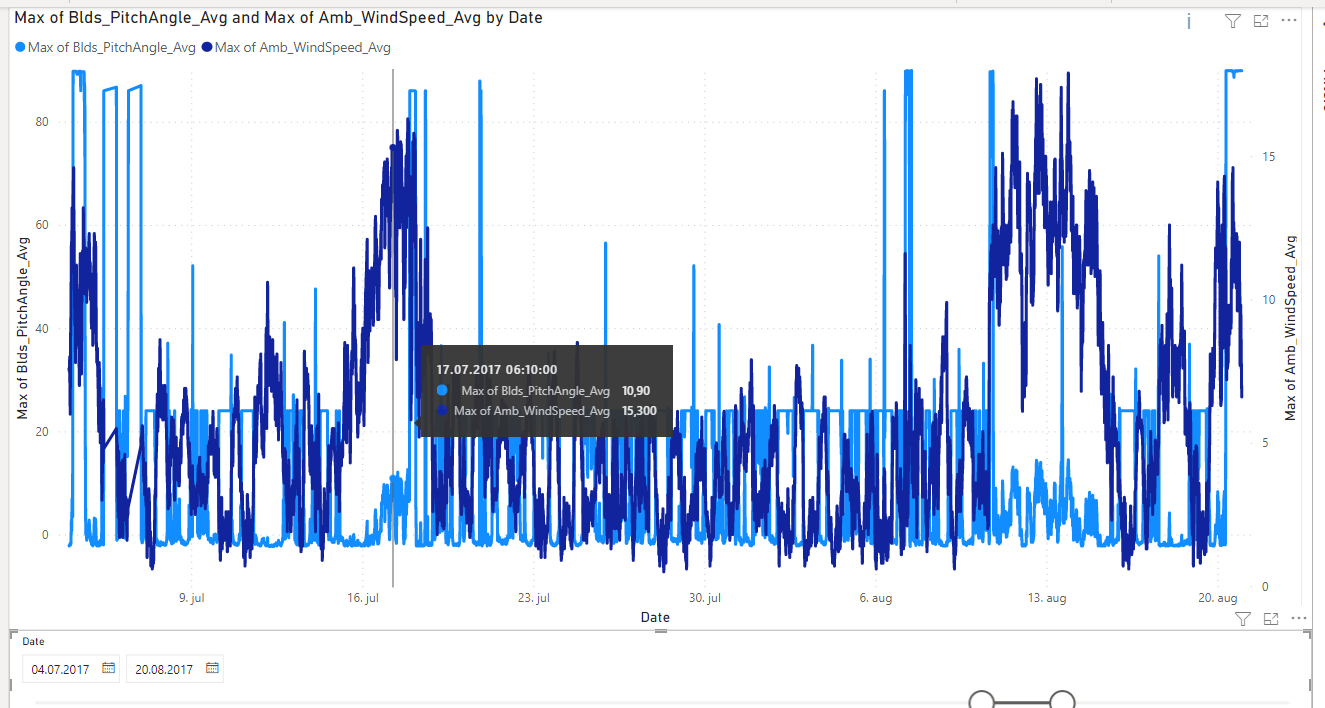


Figure 3: Blade pitch angle and wind speed at different time

Figure 3 shows temperature of gearbox bearing and bearing 1 and bearing 2 in generator.

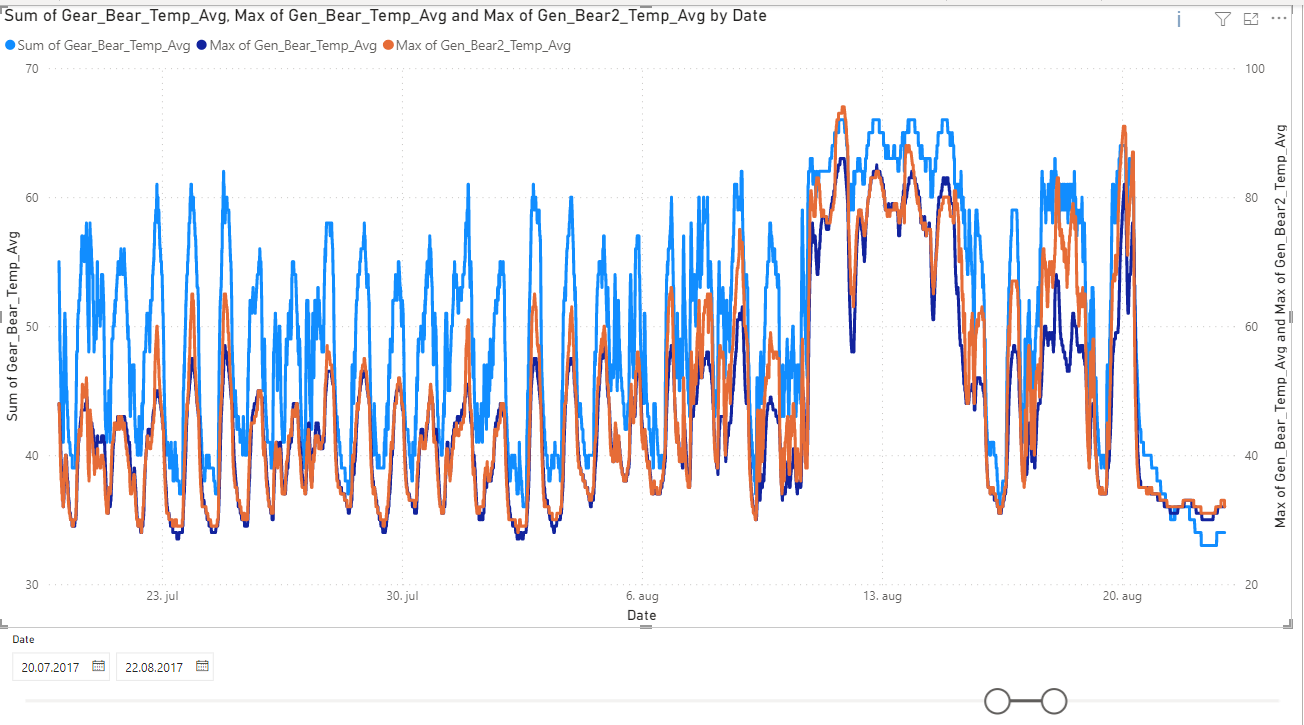


Figure 4: Bearing temperatures

Max generator rpm over the 10 min intervals shoots up before reaching the constant level in the 13. Aug period, and again right before the turbine shuts down.

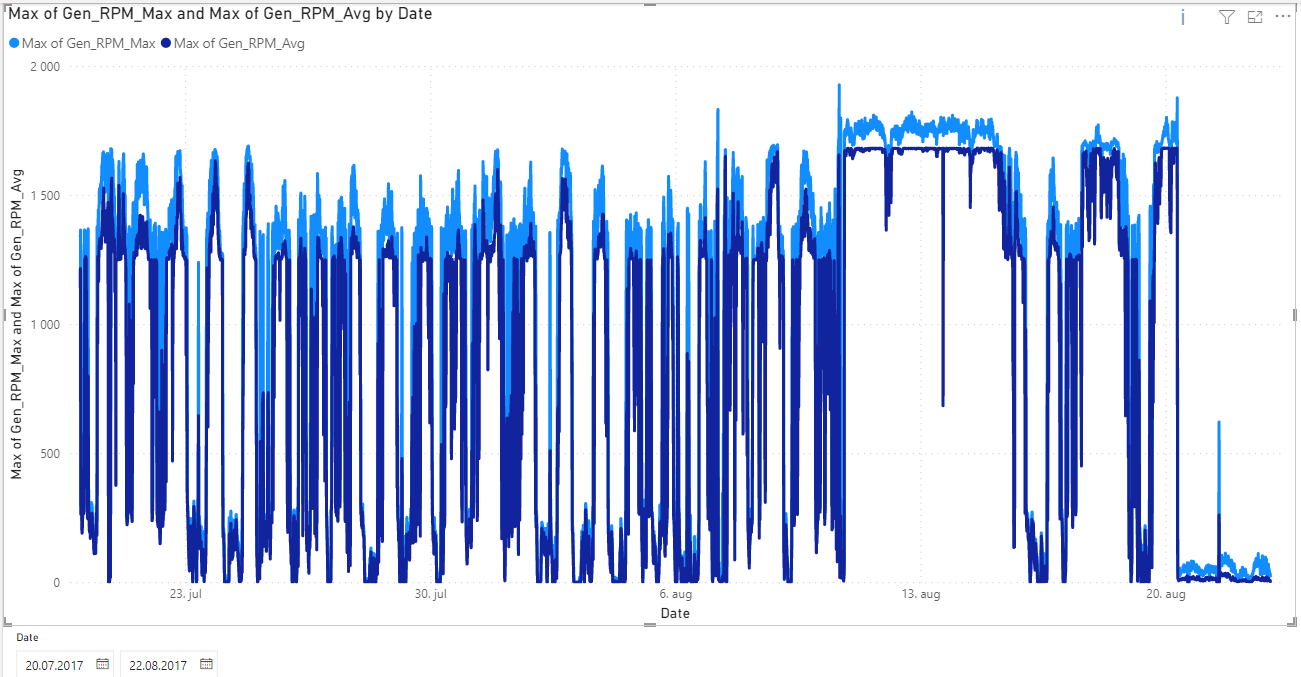


Figure 5: Avg and max generator rpm

Nacelle direction stays constant in the period mentioned, which seems right according to the wind direction. The nacelle temperature is also displayed in Figure 5

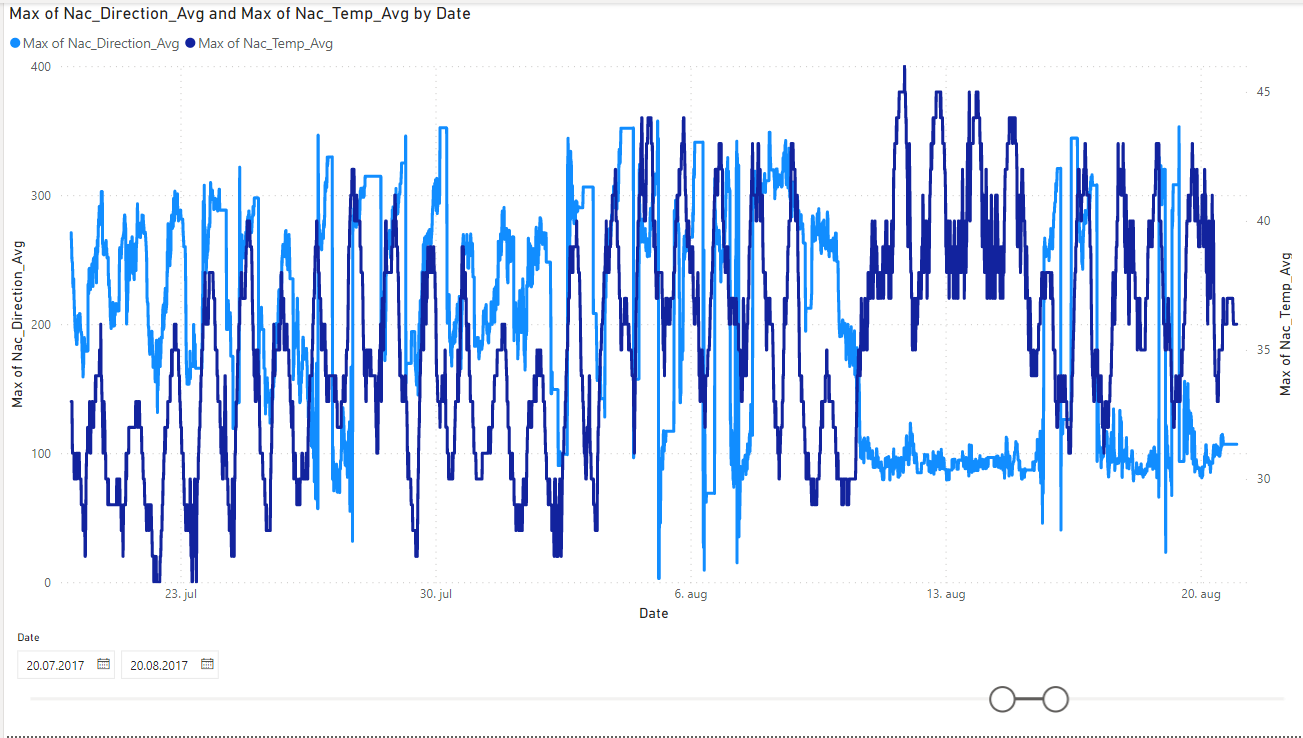


Figure 6: Nacelle direction and temperature

Rotor rpm and generator rpm are highly correlated according to Figure 7.



Figure 7: Rotor rpm and generator rpm

Generator bearing 2 temperature tends to be higher than generator bearing 1 temperature as displayed in Figure 8.

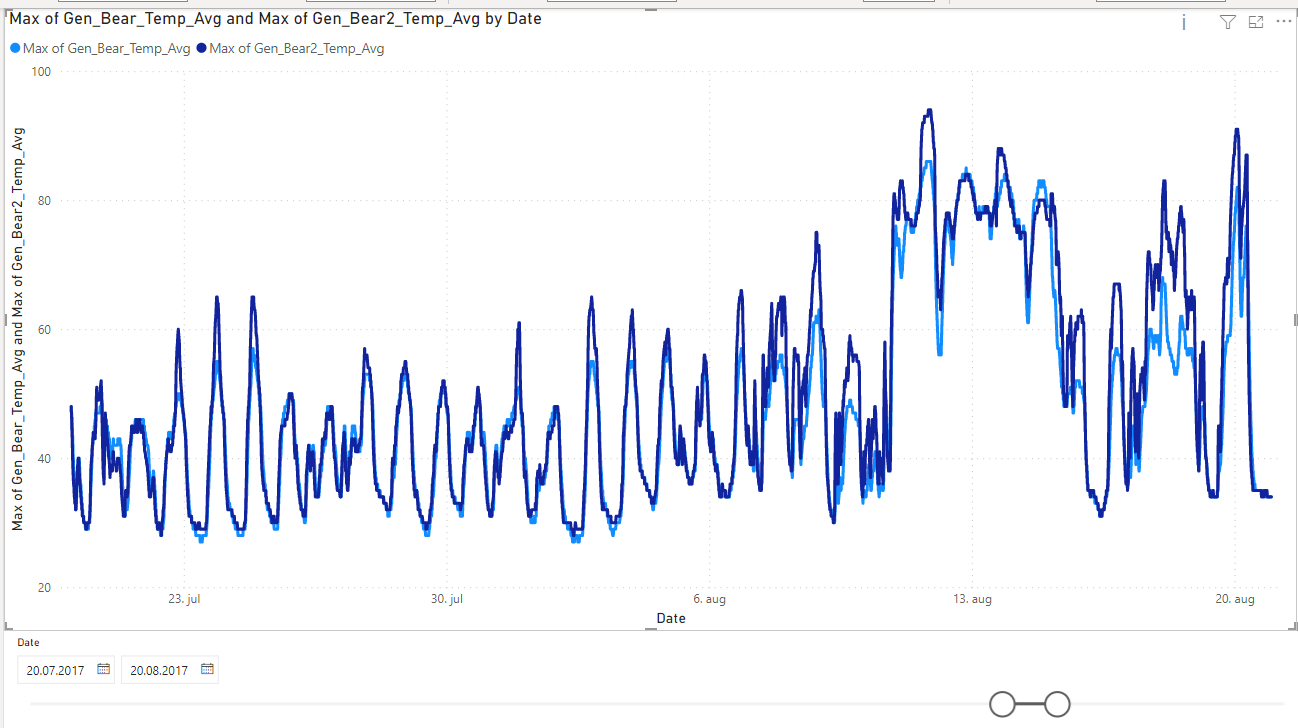


Figure 8: Gen bearing 1 and 2 temperatures

## Correlation matrix

Findings in Figure 9 involve a negative correlation of -0,71 between pitch angle and difference in theoretical power and actual power produced.

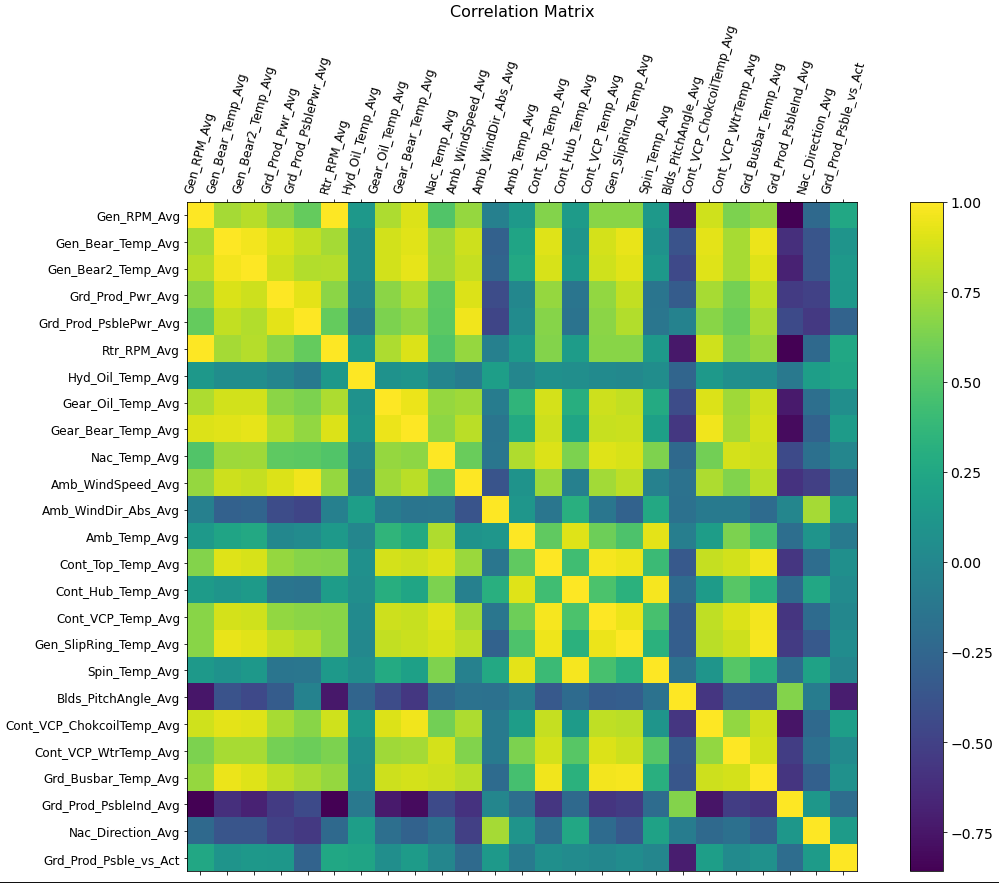


Figure : Correlation matrix 20.07.2017-20.08.2017

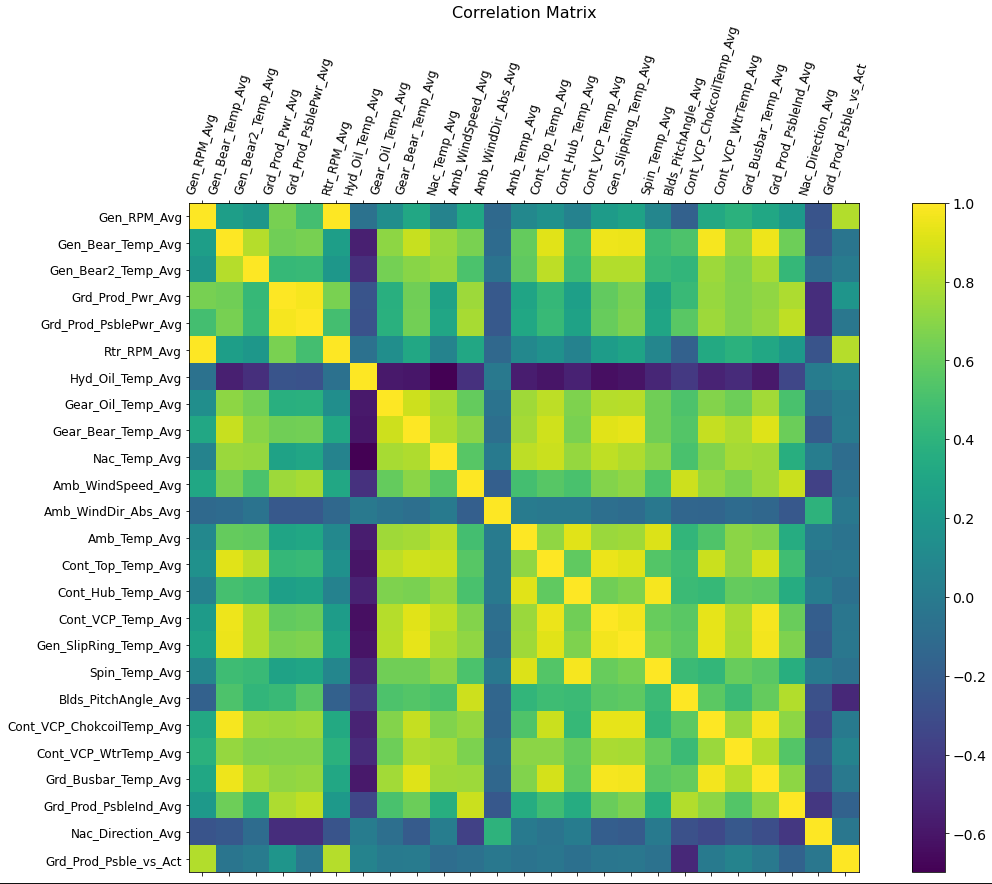


Figure 10: Correlation matrix 11.08.2017-14.08.2017

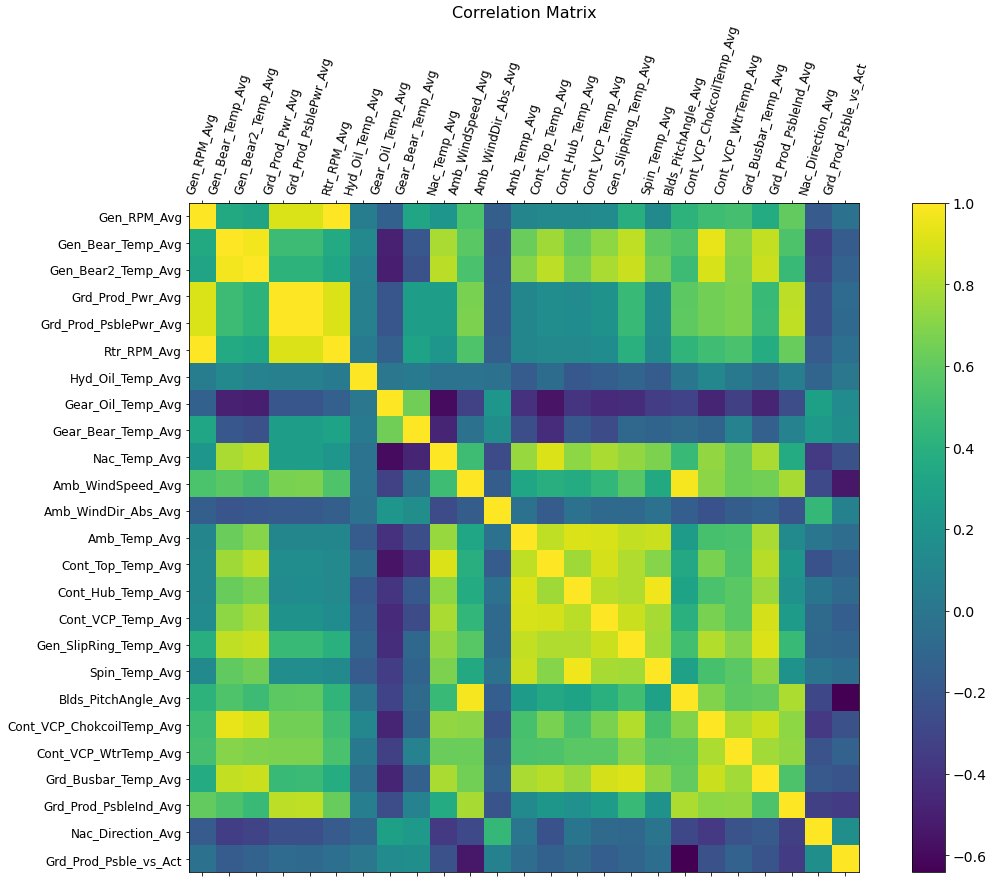


Figure 11: Correlation matrix 07.04.2017-10.04.2017

## Blade pitch angle vs wind speed

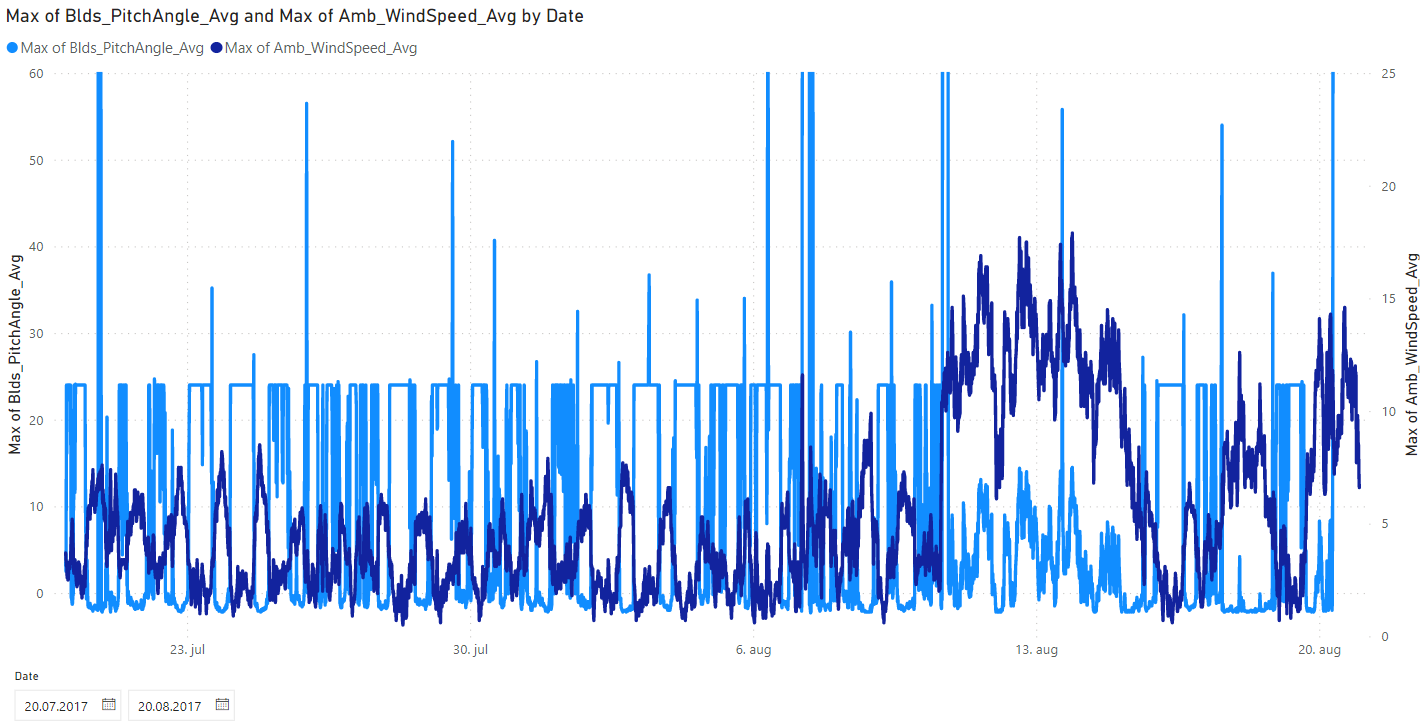


Figure 12: Blade pitch angle vs wind speed 20.07.2017-20.08.2017

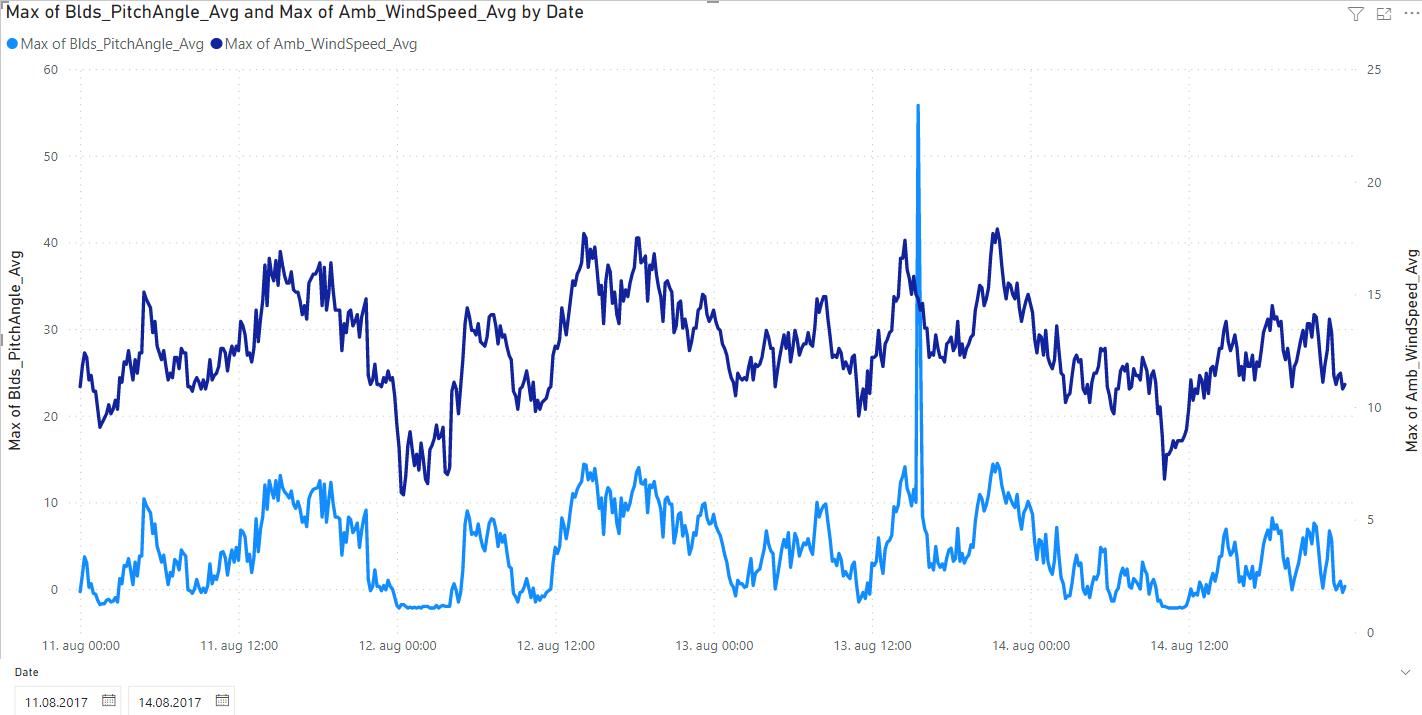


Figure 14: Blade pitch angle vs wind speed 11.08.2017-14.08.2017

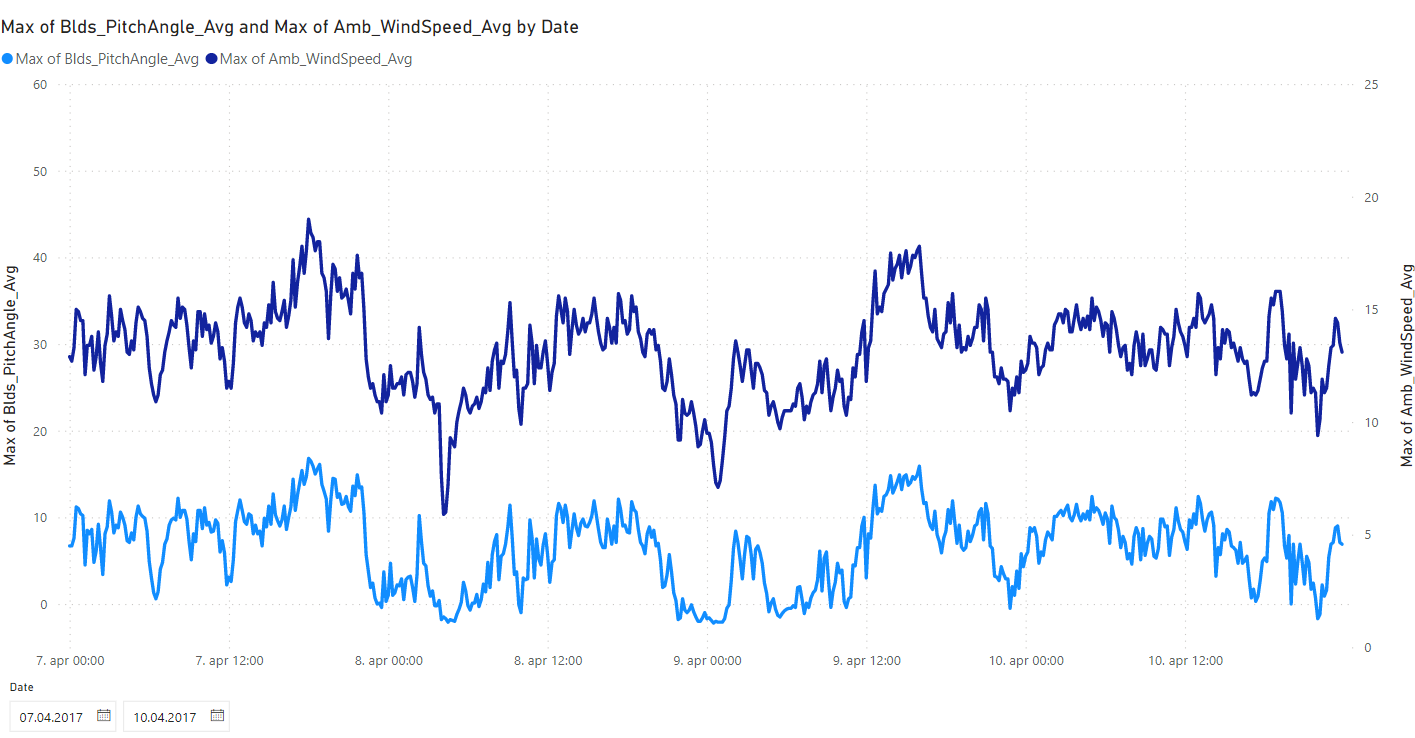


Figure 13: blade pitch angle vs wind speed 07.04.2017-10.04.2017