REPORT

To: MEDOW

From: Mohammad Meraj Alam

Subject: Lecture on Mechanical Concept of Alstom Offshore Wind Turbine

Date: Tuesday, December 1, 2015

On the second day of our MEDOW Late winter meeting 2015, many presentation were given by speakers. A presentation related to mechanical concept of Alstom Offshore Wind Turbine, Haliade, was also given by Alstom, Spain. The presentation was mainly focused mechanical design of *Haliade 150-6 MW*.

The Haliade 150-6MW is a three bladed wind turbine with a 150 m diameter rotor and a rated power of 6 MW. The turbine has been designed following Class I-B specifications of the standards IEC-61400-1 / IEC-61400-3. It is suitable for sites with a reference wind speed of 50 m/s (10 minutes average) and a 50-year extreme gust speed of 70 m/s (3 seconds average).

The Haliade 150-6MW is equipped with a direct-drive permanent magnet generator and three identical full-power converters operating at 900 V each. This voltage is increased by means of a transformer included in the turbine. The inverter, transformer, switchgear and low voltage electrical distribution cabinet are located at the tower base.

A distribution cabinet in the nacelle supplies power and signals to pitch, yaw and cooling fans and collects signals from all system sensors.The wind turbine is air-cooled and pressurized. Construction materials and protection treatments are specifically designed for offshore environments. Heat exchangers and pressuring units prevent salty air entering while dehumidifiers prevent corrosion of components inside the wind turbine.

The main bearing is a 2xtapered roller bearing mounted back to back setup and the generator bearing is a double row tapered roller bearing. The pitch bending moment is kept below 1 percent and nearly constant along the power curve, independent of wind speed while the Yaw bending moment is kept below 1 percent.

Nacelle module: 3 frames GJS-400 nodular cast iron with spheroidal graphite

- Yaw systems: yaw bearing + 7 X yaw drives
- Yaw brake system: brake disk + brake calipers
- Raceways Automatic lubrication outside the frame
- Gears automatic lubrication devices inside the frame