A permanent magnet synchronous generator (PMSG) based wind turbine has been designed and manufactured to be installed in an educational area within SWIP project (“New innovative solutions, components and tools for the integration of wind energy in urban and peri-urban areas”).

During the design stage, several finite element studies have been performed to evaluate the PMSG behavior and calculate parameters such as no-load voltage, generated power, or cogging torque analysis among others. During this stage dimensions are “ideal” and no machine deformations are considered. However, when the real prototype is manufactured, dimensions may differ due to manufacturing tolerances, and the results obtained in the design stage can get away from those measured in the prototype. Therefore, before PMSG manufacturing stage, a previous analysis must be done considering the influence of these manufacturing tolerances and the eccentricity on the different parameters.

This study allows to identify possible differences between the PMSG behavior expected from design stage simulation studies and measurements obtained in the test bench and later when the generator is installed in the wind turbine.

**Experimental setup**

The generator analyzed is a radial flux PMSG with surface mounted magnets, inner rotor and fractional slot winding.