



Custom Solutions Bulletin

Industry: Research

Application: Effects of Ice on Wind Turbines

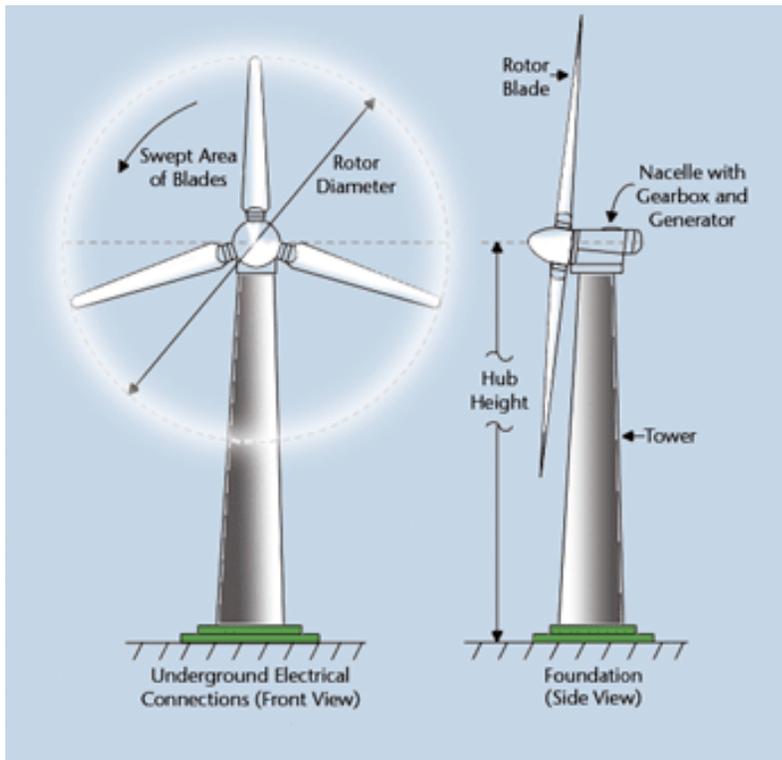
Product Description: ½" MP250W, 2.5" SC50M, 4" SC180N

Situation: A research center at a university was investigating the effect that ice has on a large wind turbine. They requested that the droplets have a range of diameters up to 3000 μm , have the nozzle spray 150 m (492 ft), and cover an area of 5026 m^2 (54105 ft^2). Their goal was to spray water in freezing conditions from a safe distance using an average wind speed of 10 m/sec (32.8 ft/sec) to carry the droplets to the turbine. The 1.8 Megawatt turbine has a rotor diameter of 9.14 m (130 ft) and a hub height of 59 m (195 ft).

BETE's solution: Because the droplet range was so large, it was broken into three size groups: 40-500 μm , 500-2000 μm , and 2000-4000 μm . The ½" MaxiPass 250W, 2.5" SC50M, 4" SC180N were selected for the 40-500 μm , 500-2000 μm , and 2000-4000 μm groups respectively at 10 bar (145 psi) water pressure. The nozzles were selected to reduce the external area on which ice could build up. Droplet trajectories were calculated using several drop sizes in order to determine where the nozzles should be mounted to have the droplets reach the intended target at the correct height. It was determined that to reach the wind turbine from 150 m (492 ft) with a 10 m/sec (32.8 ft/sec) wind, the nozzles must be mounted 100 m (328 ft) in the air.

Technical Questions?

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