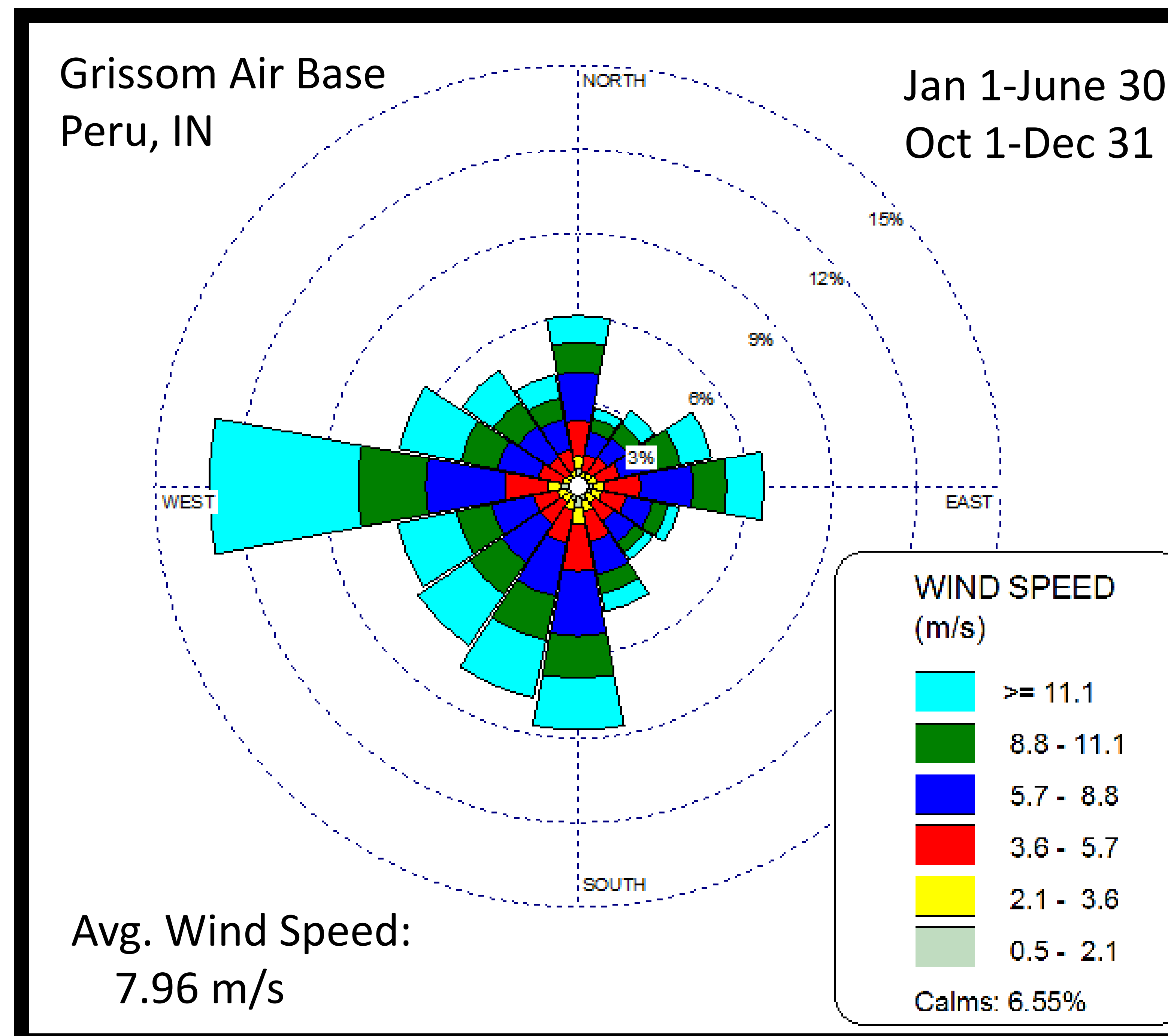
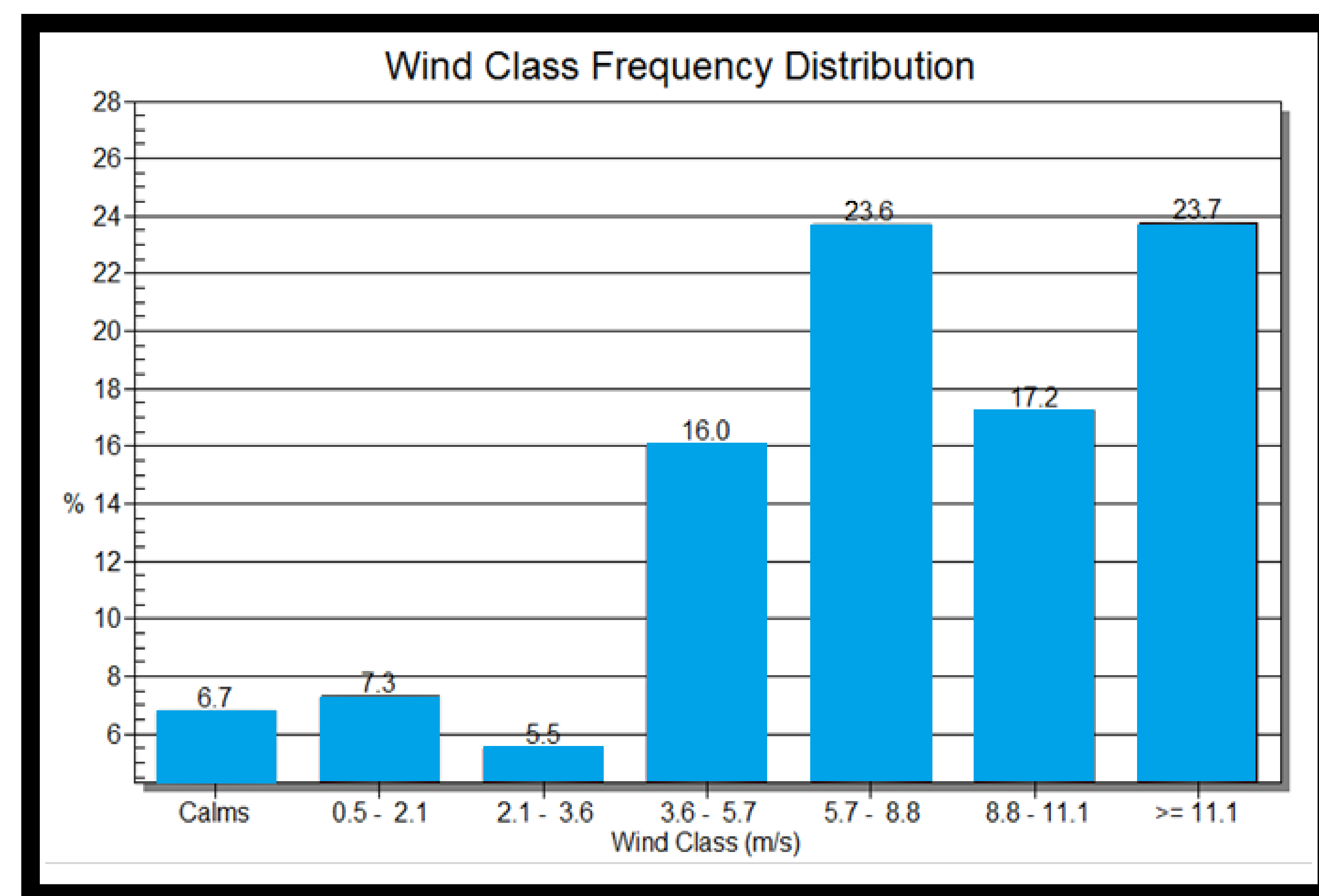
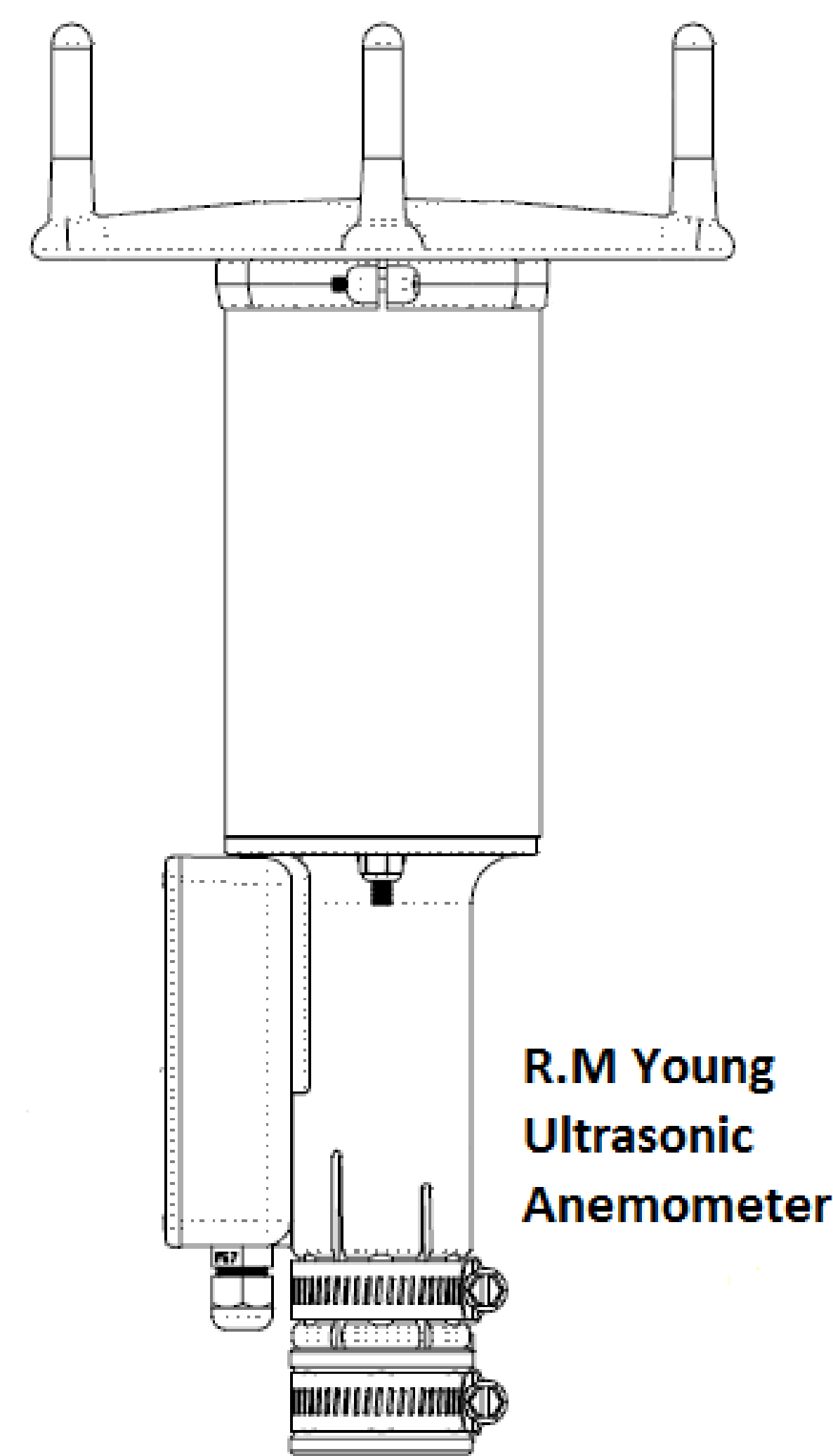
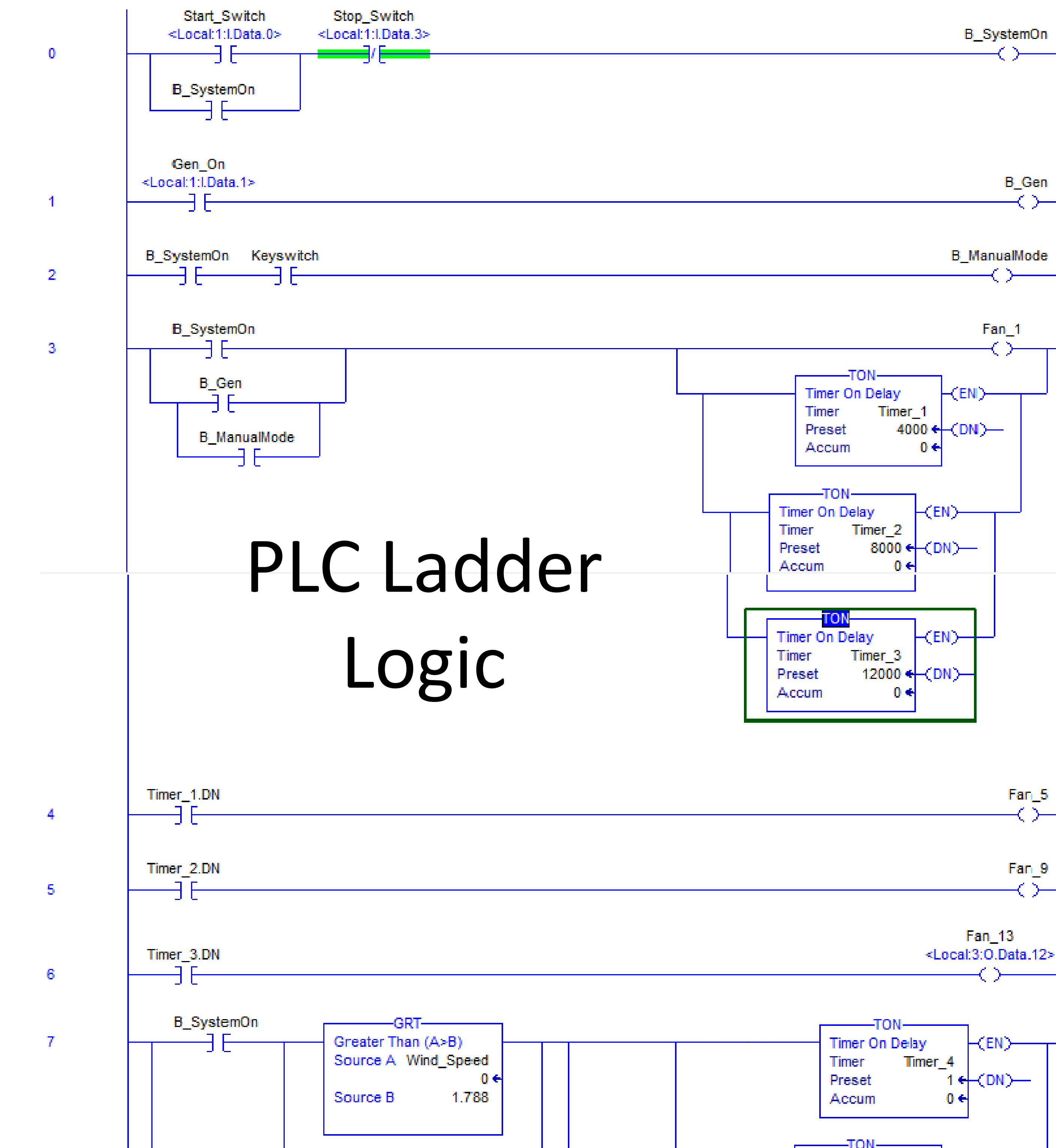


Dan Entile (ASM), Luke McDonald (ASM), Kurt Hubbell (ASM)

Problem: ADM wants to reduce overall energy consumption and limit grain shrinkage on ground grain piles.

Background Information: The project will address the use of aeration fans used to keep tarps on ground grain piles and keep the grain in condition. Corn needs to be under 15% moisture to keep from spoiling. The fans aerate the grain to prevent hot spots from forming and starting a fire. The fans keep the tarp on by negative pressure.

Alternative Solutions: Use pressure sensors under the tarp to measure the down pressure against the corn. If any loss in down pressure is recorded the PLC could turn on more fans. Another alternative would be to use variable drive fans and change the speed of the fans to save energy.



Economic Benefit: The design ultimately helps reduce the electricity cost for running the aeration fans and helps reduce the amount of grain shrinkage in the pile. On average, the electric cost to run all fans on is around \$40,000 annually.

Final Solution: A Programmable Logic Controller (PLC) will be used to synchronize the 16 fans to turn on as wind speeds increase and shut fans off as wind speeds decrease. Wind speeds will be measured by an ultrasonic anemometer placed near the grain pile.

- 4 fans will be on all the time
- 4 mph (1.8 m/s) - additional 4 fans on
- 8 mph (3.6 m/s) - additional 4 fans on
- 12 mph (5.4 m/s) - all fans on

Total cost: \$13,820

*does not include all materials for installation on-site