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Shielded ABB motor helps wind tunnel avoid overheating

An excessive temperature rise within a new £55 million wind tunnel is avoided by encasing a specially adapted ABB motor within a special shield. The wind tunnel built by Mercedes AMG Petronas at Coventry University's engineering and computing facility is used to model a wide range of objects from F1 racing cars to bicycles.

The tunnel features a specially sized, high efficiency axial flow fan, designed by specialist fan-maker Fläkt Woods, to meet the wide air flow capacities needed. It is important that heat generated by the electric motor did not leak into the wind tunnel system as this would mean a re-sizing of the heat exchangers to cope with the temperature rise, adding cost and increasing energy bills.

Peter Hunnaball, Industrial Products and Applications Manager for Fläkt Woods, says: "The project was a challenge, particularly the drive system for the wind tunnel, as it was important that no additional heat load was introduced into the system from the motor. This would cause a progressive temperature rise of the equipment and an eventual overheat of the system."

Close liaison between ABB and Fläkt Woods enabled the cooling design to be finalised to eliminate this potential problem. "We needed to force air through one half of the tunnel and evacuate it through the other half," says Hunnaball. "For this we needed to customise the motors cooling fan so that the hot air from the motor was drawn away from the motor and didn't enter the wind tunnels air stream. The motor's fan was specially adapted so that it only ran in one direction to ensure the heat of the motor is dispersed as required. ABB's motor specialists were able to help us achieve this with ease."

A 110 kW ABB process performance induction motor was used with an encased through-flow cooling system. This allows heat from the motor to dissipate through the motors' integral vane arrangement. Fläkt Woods used computational flow dynamics software to confirm that the motor and its ventilation system would meet the thermal characteristics required. An ABB variable-speed drive was matched to the motor to provide adjustable control of the wind speeds needed for various test regimes.

"We chose ABB to specify the motor and drive because of the specific requirements we had for the wind tunnel and the excellent technical support ABB can provide to help overcome them. The products specified are very reliable, well-engineered products. ABB also offered a fast response to queries and requests throughout the whole project" added Hunnaball.

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Caption: The Axial Flow Fan controlled by an ABB motor used in the wind tunnel at Coventry University.

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