

ABB wins major Heathrow Express contract



A substantial six figure order for a system of drives, motors, switchgear and control equipment from ABB Industrial Systems is being installed in the Heathrow Express rail link to protect passengers in the unlikely event of a fire, and maintain comfortable temperatures in the stations.

Eleven sets of equipment comprising close coupled HV transformers, control panels with direct-on-line starting equipment, PLC control and main circuit protection equipment have been supplied to control an emergency smoke extraction system in the 11km underground section of the Heathrow to Paddington high speed rail link. Eight systems include an

ACS 600 variable speed AC drive to control the station temperature during railway operation. The panels were designed and built by ABB Industrial Systems in the UK. The company will also be project managing and commissioning the systems.

Eleven fans in five locations along the tunnel section at Heathrow are designed to remove the smoke and the 20MW of heat that is calculated to be created by a train fire. Integrated PLC and drive systems, built to order by ABB Industrial Systems, control fan speed and direction to extract smoke, should a fire occur, providing clear access for emergency teams and escaping passengers.

An ABB drive system protects Heathrow Express passengers in the unlikely event of a fire and maintains comfortable temperatures in the stations.

“We are working closely with Her Majesty’s Railway Inspectorate (HMRI) to ensure that the highest possible standards in passenger safety are met,” comments Geoff Moorby of the Laing Bailey Joint Venture team, contractors to the project. “The system is designed to produce a flowrate that prevents smoke from a train fire going back upstream to the passenger areas.”

Fast response

Depending on the location of a fire, the Heathrow Express control room will call for a particular incident mode, the PLCs then instruct the drives in which direction the fans should operate to prevent smoke reaching the passengers. As the 225kW to 315kW fans could be running at the time of the emergency, the system must be able to switch the fans’ direction and run up to full speed in the opposite direction in less than 30 seconds.

High temperature operation

For the system to be successful, fan motors in the tunnel must be able to operate under extremes of temperature. ABB included in the system 11 of its standard M2000 motors ranging from nominal 225kW to 315kW and one 315kW test motor which was tested by Ventiloren Sirocco Howden in an oven to prove operation for more than two hours at 2500°C.

Energy saving chill factor

During normal operation, the drives run eight of the eleven fans intermittently at 63% to 86% of full speed depending on their location in the tunnel to keep the passenger areas at comfortable temperatures. If the temperature in the tunnel and platforms rises 50°C above the outside temperature, a PLC sends a signal to the



drive to start the fan. Once the temperature has dropped, the PLC tells the drive to stop.

Drives instead of control dampers are being used to control flow as drives can cut energy bills by 80% compared to dampers. “As the drives supply only the energy needed to produce the specific air flow requirements, rather than running the motor at full speed and restricting the flow downstream, the energy savings can be quite significant,” explains Steve Ruddell, Manager for System Drives at ABB Industrial Systems.

“ABB’s ACS 600 units have a Flux Optimisation feature which uses just-in-time switching to supply the optimum amount of power to drive the load, which can reduce energy costs by a further 10% compared to other drives,” adds Ruddell.

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