



case study



# Halifax Fans aids Dounreay decommissioning

case study 19

Because of the radiation hazard, decommissioning of any nuclear facility takes a great deal longer than building it in the first place. Consequently, decommissioning of the Dounreay fast reactor research site is scheduled to last until 2025. Dounreay was built in the 1950s and, during its active life, over 180 separate facilities were built on the site. Of these, some 50 involved the presence of radioactive material and of necessity, special controls are in place around these to contain any radiation hazard during decommissioning.

Decommissioning and demolishing such a facility is a complex process and Dounreay Site Restoration Ltd employs a workforce of over 1,000 people and has had to source a great deal of new equipment such as robotic equipment and new ventilation systems.

As part of the decommissioning of one of the most hazardous areas, the Fuel Cycle Area which includes fuel reprocessing plants, chemical works and waste and fuel stores, a new ventilation system was required to replace the original system which dates back to the 1950s and would be incapable of supporting the phased clean-out and demolition of the various plants. The new ventilation system will give greater protection to both the workforce and the environment and ensure regulatory compliance.



*Dounreay fast reactor research site*

Each of the dozen buildings that comprise the Fuel Cycle Area has its own extract ventilation system with high integrity fans and ductwork, extracting contaminated air through high efficiency filters and exhausting into common ducts which terminate in the existing 55m high, 4.5m diameter vent stack. By 2010, the existing stack will have been replaced by a new system comprising two 30m high vent stacks 2m in diameter, each fed by duty / standby inverter-driven 90kW & 132kW fans connected to the existing common ducts. The variable duty provided by inverter control will meet the decreasing ventilation needs efficiently as the facilities are demolished sequentially over the coming years.

The selection and design of the fans for this exhaust system were critical. Despite the fact they are handling clean air, a belt and braces approach has been taken and gas-tight fans to nuclear specification were specified. Main contractor JGC Ltd of Halkirk, Caithness, selected Halifax Fan Ltd to supply the four fans required. "We have dealt with Halifax for fans for nuclear applications for many years now" said JGC Project Director Tim O'Brien, "and we were confident, based upon past experience, that Halifax could meet our demanding specification competitively. In the end, works testing went smoothly and delivery was made on time"



According to Malcolm Staff, Managing Director of Halifax Fan, “at 69 ins and 78 ins impeller diameters and weighing 8.5 tonnes each, these are the largest nuclear specification gas-tight fans we have built to date. It meant manufacturing our largest ever single piece casings and the fans have been fitted with our own gas-tight shaft seal arrangement. We not only supplied the fans, we also supplied Danfoss variable frequency inverter drives for the fans, selected on the basis of their proven reliability and high efficiency. This placed the onus on Halifax to ensure reliable, efficient operation of the fan system as a whole, with correctly rated inverter drives, before the equipment arrived on site.”

### Application benefits

- Gas tight fans to nuclear specifications
- Custom designed gas-tight seals
- High integrity chemical works paint system
- Rotation sensors and vibration monitors
- Fully pressure tested in-house
- Supplied and tested complete with high efficiency inverter speed control

The fan impeller design was based upon Halifax’s Beaufort fans, with backward curved impellers which can be withdrawn from the drive side so that should it prove necessary for maintenance reasons, removal can be achieved without the need to disconnect any ductwork. The exterior steelwork was shot blasted and painted with a high integrity offshore/chemical works 3-coat paint system with a minimum dry film thickness of 220µm. The fans were fitted with rotation sensors and vibration monitoring equipment along with gas-tight EPDM rubber flexible connections on the fan inlets and outlets and each unit was supported on anti-vibration mounts. Following fabrication, all four fans were pneumatically pressure tested in-house and witness run-tested prior to despatch to site.



*Halifax fans en-route to Dounreay*

### Halifax Fan Limited

Mistral Works, Unit 11, Brookfoot Business Park, Elland Road, Brighouse, West Yorkshire, HD6 2SD, UK  
 T: +44 (0)1484 475123 F: +44 (0)1484 475122 E: sales@halifax-fan.co.uk

### Halifax-Fan (Shenzhen) Co Ltd

1 & 2F, No. 4 Building, Creative Industrial Park, Shang Xia Wei, ShaJing, ShenZhen, GuangDong Province, China  
 Telephone No. 0086 755 8149 0059 Fax No. 0086 755 8149 0019

[www.halifax-fan.co.uk](http://www.halifax-fan.co.uk)