

Electric tugs tackle nuclear flask handling

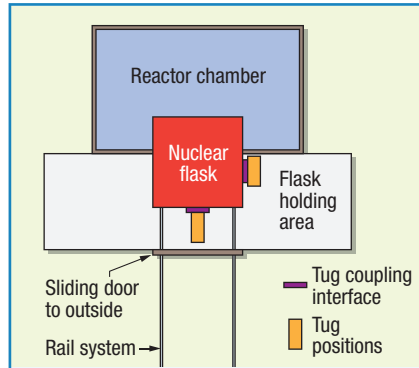
Engineers at the Chapelcross nuclear power station are reporting reduced manual handling risks for staff since moving to electric-operated tugs for moving large, heavy nuclear flasks, ready for decommissioning.

They also say that the tugs are providing a cost-effective solution to moving the flasks in confined spaces.

Stephen Bennie, fuel route systems support engineer at Chapelcross, says that the tugs are currently being used in two reactor chambers to pull the flasks from the reactors to flask handling bays.

He explains that this involves guiding the flasks on bogies along a track in the secure area to a holding bay, where the lids are torqued for shipping to Sellafield.

The problem, he says, has been the sheer lack of space to manoeuvre the 50 tonne flask and bogie to secure the lid in place. "We did consider motorising the bogie system, but decided that the



cost and time would be prohibitive," says Bennie. "We couldn't use a forklift or locomotive in the flask-handling bay, as this must remain as a radioactive contamination controlled area," he adds.

Hence the MasterTug MT20/1500, which can pull, push and steer wheeled loads weighing up to 15,000kg – ample for guiding the flask and bogie along the

rails in the plant's flask-handling bay.

To make its unit work for the main decommissioning contractor Magnox North, MasterMover removed the tug's tiller arm and engineered a coupling system between the MT20 and the flask and bogie, which enables the machine to be connected and disconnected easily and safely.

Now, in operation, a single Magnox North operator 'pulls' the flask and bogie along the rails to the flask holding area, with the tug either on the front or side.

"With such tight spaces to work in, the compactness of the MT20 and its ability to move heavy loads around within these confined areas were decisive factors," states Bennie.

And he adds: "The braking on the MT20 means that the risk of an operator being accidentally crushed against a door while pulling the flask is now completely eliminated."

Mersen controls improve quality and yield

Thermal insulation supplier Mersen's site at Eurocentral, Scotland, is now running a new wet moulding station and effluent treatment plant that entirely automates a manual manufacturing process.

Mersen Scotland Holytown, which serves the electronics, aerospace and automotive industries, among others, installed a Burkert control system and says it has successfully improved quality, yield and output volumes.

Burkert provided the complete process control system, including its level and flow instruments, as well as valves and the control panel, which now houses Burkert's AirLine 8644 system, integrating solenoid valves with I/O from the controlling PLCs.

In brief detail, the moulding station comprises large mixing tanks where carbon, water and resin are mixed under recipe control, before being pumped to the vacuum mould tank for profile forming. Slurry is drawn down and pumped to vacuum tanks for discharge to the integrated treatment plant.

Among other interesting features, the



plant is a study in the use of level sensing technologies. Burkert 8110 vibrating level switches provide high and low level monitoring in the mould and resin mix tanks; its 8175 ultrasonic level transmitters look after the mix tanks and vessels linked to the pump sets, while type 8185 guided microwave level transmitters monitor the vacuum tanks.

As for flow monitoring, Burkert's Inline 8035 flow transmitters manage batch control of water to the resin mix tanks, while two 8045 electromagnetic flow transmitters monitor the slurry rate and control slurry pump speed – also monitoring effluent discharge to the water treatment plant.

Automation of the mould plant is via Allen Bradley PLC, with twin HMIs and Burkert's 8644 Airline process actuation control system, said to save around 40% of conventional system costs, through its integrated digital I/O, solenoid pilot valve outputs, analogue I/O and fieldbus connectivity.

Mersen went for Burkert actuated butterfly valves to control mains water supply to the resin mix tanks and discharge from the mould tanks to the vacuum tanks. It also chose T-ported ball valves for the drain function on the mix tanks, and Type 330 solenoid valves to control Teepol wetting agent dosing, while Burkert's full bore, actuated ball valves control mains water to the effluent treatment plant.

Compressor to pay for itself within two years

Petrochem Carless' Harwich refinery reports savings of more than 430,000kWh per annum from its investment in new energy-efficient compressors – which, it says, will pay for themselves in two years.

Andy Lee, engineering manager at the plant, says the result was confirmed by a data logging study by rotary vane manufacturer Mattei earlier this year.

"The exercise confirmed the estimated annual saving ... and compressor performance has continued to deliver the reliability paramount at the Harwich operation," says Lee.

"We have also seen a reduction in our maintenance costs. The added bonus is that, as well as making ongoing substantial annual energy cost savings, the compressors will have paid for themselves in two years," he adds.

The refinery operates continuously 24 hours a day, 365 days a year, and the reliability of its compressed air supply is a key consideration for the smooth running of the plant.

The supply serves a variety of requirements, including instrument air,



valve actuators and air driven motors. Prior to the data logging research, Petrochem Carless was using two 90kW Mattei compressors installed 12 years previously and was backed up by service support from the manufacturer.

Andy Jones, general manager of Mattei, explains: "In principle, the existing compressors were doing everything Petrochem Carless asked of them, but, as part of a programme to reduce energy consumption in general, the customer asked us to carry out a data logging exercise.

"This revealed substantial potential savings and, as the existing

compressors had put in 12 years of service, this was an ideal opportunity to invest in new technology. The decision was made both on the basis of saving energy and also taking into consideration the need to secure the supply of compressed air to the plant in the future."

To first determine the integrity of the air supply, the refinery commissioned an air leakage survey to be carried out prior to the datalogging exercise. This identified minimal leakage, confirming the effectiveness of the site's maintenance procedures, and enabled the focus to be placed on the energy-savings potential of the compressors.

Data logging showed no requirement for variable-speed control, with the Harwich plant showing a consistent demand for compressed air, owing to the continuous operation of the plant.

Mattei recommended two Maxima 75kW compressors. Although effectively down-sizing from 90kW to 75kW machines, the replacements were shown to be capable of delivering the same volume of 32m³/min of air.

Peristaltic pump tackles troublesome pH

Food manufacturer Greencore is reporting "significant savings" in downtime and repair costs on water treatment plant at its site in Selby, North Yorkshire, thanks to a high pressure peristaltic hose pump.

Peter Wadsworth, craft technician at United Utilities, explains that the plant produces sauces, pickles and soft drinks to the tune of 250 million jars per annum, across 500 product lines. So cleaning and changeover processes result in small quantities of liquid waste that can move pH from 4 up to 12.

Until recently, pH levels at Selby were corrected using 32% caustic soda through the facility's water treatment plant (owned and operated by United Utilities), with Greencore responsible for consumable costs.

"The Greencore Grocery facility is a high volume plant where there can be between 10 and 26 washouts a day,



depending on order schedules," says Wadsworth.

"So, to find a more cost-effective method of correcting the pH in the processing machinery, we trialed a product called Mag Mex 1060... We started off using fairly cheap and cheerful dosing pumps, but this proved

to be inefficient, as we spent two days a week repairing them," he adds.

The problem was that, because magnesium hydroxide has low solubility in water, it makes a fairly abrasive fluid. "We found the grit would attack the mechanical seals and drain plugs on the dosing pumps, thus requiring repair," recalls Wadsworth.

Following good experience of peristaltic pumps from Watson-Marlow at one of United Utilities' sister sites, he says, a Bredel SPX50 high pressure peristaltic hose pump (50mm diameter) was installed and, since then, there have been no abrasion issues.

"Any downtime in an operation of this magnitude can be very costly," comments Wadsworth. "So I'm sure the pump paid for itself extremely quickly. In fact, we are now going to trial an identical pump on-site for sludge transfer between tanks."