

Pumping the dock dry for caisson refurbishment

Faced with the requirement to pump 3m litres of water from Liverpool's Langton Dock in just three hours, with potentially serious and costly consequences if things went wrong, Exsel Pumps decided to rely on variable speed drive systems from Ralspeed to control the pumps it would use for the challenging project.



In order to limit the amount of time for which the lock was out of service, and to cater for variations in the tides around the dock, the time available for each of the emptying and filling operations was to be completed in less than three hours.

Currently, £10 million is being invested in upgrading lock gate facilities at the Port of Liverpool, one of the largest and busiest container ports in Europe. An important part of this project involves refurbishing the caissons used in Langton Lock. This Lock, one of the busiest in the port, is divided into three sections, with caissons between the first and second sections, and between the second and third sections..

It would be too costly and disruptive to take the lock out of service for the whole duration of the project, which will take around three years. The decision was therefore taken to refurbish the caissons one at a time, which would allow the lock to continue to function while the work was being carried out, albeit with reduced flexibility.

The first phase of the project was the removal of the 1,600 tonne outer caisson, which was then sailed to the top end of the dock and moored up. Once this was complete, the next phase involved removing the 4,000 ton refurbished middle caisson from the recess from where it had been refurbished and sailed down the lock to the outer recess, where it was then reinstalled and commissioned. The next stage was to sail the outer caisson into the refurbishment recess for repair and refurbishment.

To achieve this changeover of the caissons it was necessary to pump out and refill the caissons recess, which holds 3m litres of water, several times. And, in order to limit the amount of time for which the lock was out of service, and to cater for variations in the tides around the dock, the time available for each of the emptying and filling operations was to be completed in less than three hours.

Exsel Pumps has wide knowledge and experience of supplying pumping systems for such demanding applications, and offered four 200 kW pumps, two of which were configured for emptying the dock, the other two for filling it. The engineers at Exsel knew, however, that they would need dependable variable speed drives to control these pumps not only to ensure smooth flow of water, but also to minimise the peak load on the electrical supply when the pumps started. As the electricity supply was generator fed, the use of a variable speed drive enabled a reduction in generator size and a reduction in fuel consumption.

Since Exsel Pumps required the drives only for the duration of the project, it decided that it would be more cost effective to hire them rather than buy them. It therefore approached Ralspeed, a company that specialises in providing drive systems for hire, and that has the resources and expertise needed to configure systems such a demanding application.

For this project, Ralspeed supplied two custom-built drive systems, each comprising a 200 kW Vacon NX drive and ancillary components mounted in a rugged weatherproof enclosure. Since filling and emptying operations would never be carried out simultaneously, rather than providing four separate drives Ralspeed supplied a changeover switching system that would allow the drives to be switched almost instantly to work with either the filling or the emptying pumps. This arrangement provided a very cost effective solution.

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