

Precision Move: 800 Ton Dockyard Gate



One of four 800-ton lock gates used to maintain water level on the tidal river at the Chatham Dockyard, in the UK.

rails with dual independent chain drives. The chains' speed and direction, used to pull open and pull closed each dock gate across the access channel are controlled through hydraulic motors and gearboxes.

The total travel of the shuttle is 30 meters (100 feet), and the hydraulic drives had to have precise speed control, synchronized to avoid any shuttle 'crabbing' or slewing which could jar the drive.

The new electro-hydraulic system uses closed loop control with linear feedback transducers along the rails to control the dock gate speed and maintain close alignment of the shuttles.

The Sun (PRDL-EDN-2B24V) proportional reducing/relieving pilot valves were used to control high flow (FKHA-XCN) proportional throttles, and in conjunction with (LPHC-XFN) compensators, combined to offer accurate and sensitive load compensated meter-in proportional flow control for the hydraulic motor speeds. Additionally, two stage proportional pressure relief

Chatham Dockyard on the tidal river Medway in South East England was expanded during the 19th century, and to maintain the correct water level for shipbuilding, four (4) 800 ton watertight dock gates were installed at its access points. The original gates moved on sloping granite surfaces, and were steam driven remaining operational for many years, but by 2012 major repair work was required and Peel Ports, the dockyard owners, decided to update the mechanisms on 2 of the gates with new electro-hydraulic systems and controls.

To meet the challenge and ensure extended design life, Sun hydraulics UK, partnered with Ipswich Hydraulics, with Sun equipment being selected for our recognized product quality as well as valve availability needed to meet the aggressive completion timeline plan at the dockyard.

The new mechanical drives consist of a 'shuttle' linked to each dock gate. The 'shuttle' runs on rollers guided by wall mounted



Location of the four watertight lock gates at the Chatham Historic Dockyard. Photograph courtesy of Peel Ports.

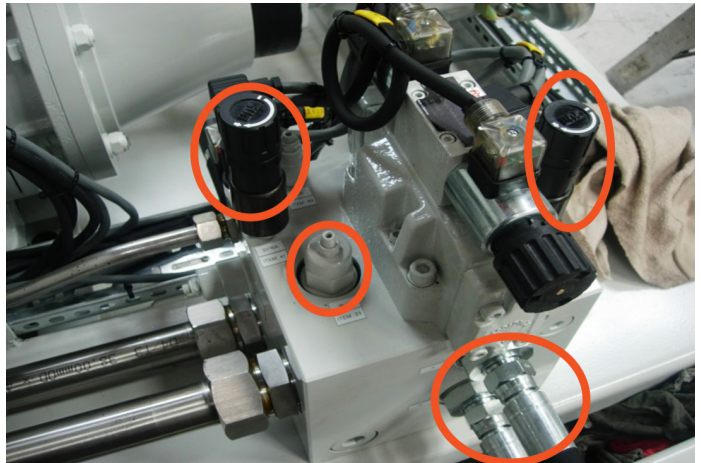
Market Speak...

valves (RPIC-8WN/RBAP-EWN-2B24V) were used for infinitely adjustable maximum tension control on the chains.

All the Sun proportional valves included the rugged embedded digital amplifiers and twist/lock manual overrides which were used during initial commissioning, and left in place for troubleshooting, or emergency operation.

The control systems worked as planned from initial installation with minimal adjustment needed and showed no more than 15mm synchronizing error over the total distance traveled. The project demonstrated Sun cartridge valves perform reliably in the most demanding of applications.

If you would like to discuss a similar project or would like Sun Hydraulics to help you solve your unique application, please contact us at sales@sunuk.com.



Shuttle Hydraulic Control Integrated Package
Photograph courtesy of Ipswich Hydraulics



Dual Shuttle Drive Mechanism
Photograph courtesy of Ipswich Hydraulics

Benefits of Sun Cartridge Valves

- Sun proportional cartridge valves with embedded amplifiers provide easy to tailor plug-and-play features in conjunction with the PLC master controller
- The LPHC pressure compensator can easily be replaced with a cavity plug should instability develop.
- Flow capacity of the large throttle valve can be easily field adjusted if necessary by varying the Sun compensator cartridge.
- A transducer port at the output of the reducing cartridge if closed-pressure-loop control is required for improved hysteresis.
- Higher capacity Sun cartridge valves can be fitted in the existing manifold cavities if higher speeds are required in the future without any manifold changes.



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