

Shipyard Dockgate

Bennett Associates were appointed as consulting engineers for the structural, mechanical and electrical design of a 30x12m horizontally pivoted lock gate that upgraded a dry dock in Glasgow to an impounding dock whilst maximising use of existing structures and equipment. The overall project included upgrading and modernisation of the docks and deep-water berth facilities.

One of the principal challenges for the engineering team was to design a structure to withstand the much higher and more varied stresses to which the new gate would be subjected through having water on both sides at all times when it was used as an impounding dock, allowing for varying water heights on the tidal Clyde Riverside.

The structure, which is pivoted horizontally to open and close, had to have a narrow cross-section in order to avoid the need to lower the well immediately outside the dock which accommodates the gate when it is open. This would have required long and costly civil engineering work. Because the position of the entrance cill to the dock has been lowered as part of the upgrading project, the external well is now shallower than before.

The solution was to incorporate four latches at the base of the gate, in addition to two hinges, which locate behind fixings anchored into the cill at the entrance to the dock when the gate is closed. This arrangement has provided the required strength at the base of the gate while retaining a relatively slim structure.

A large hollow-section beam running the full width of the gate and measuring approximately 2.5m high x 1.5m deep is the main structural component and also acts as a buoyancy box to reduce the load on the winch when the gate is being closed. This has allowed the existing winch to be retained following refurbishment and upgrading to include new motors and electrical system and an inverter to give precise speed control.

When the gate is closed, it is held in position by a single hydraulic latch on each side, the hydraulic latch pins being mounted in the dock wall rather than on the gate, in order to avoid them being frequently immersed in water. Two new hydraulic power packs operate the latch pins.

Effective sealing is provided by double-V flexible rubber primary seals and rectangular-section hard rubber secondary seals, which also act as stops to prevent over-compression of the main elements.

Operation of the gate is controlled by a plug-in pendant, which gives the operator a clear view of the dock, dock entrance and gate. Proximity sensors automatically trigger a slow-speed mode when the gate is almost fully closed and the seals start to engage.

Bennett Associates (originally founded in 1984) was acquired in 2008 by Atkins; bringing their proven technical expertise to the UK's leading engineering consultancy.

Atkins Ltd
 Bennett House, Pleasley Road, Whiston, Rotherham, S60 4HQ, UK. Tel: +44 (0)1709 373782
www.bennettmg.co.uk

