Fairfield control systems

FALKIRK WHEEL BOAT LIFT

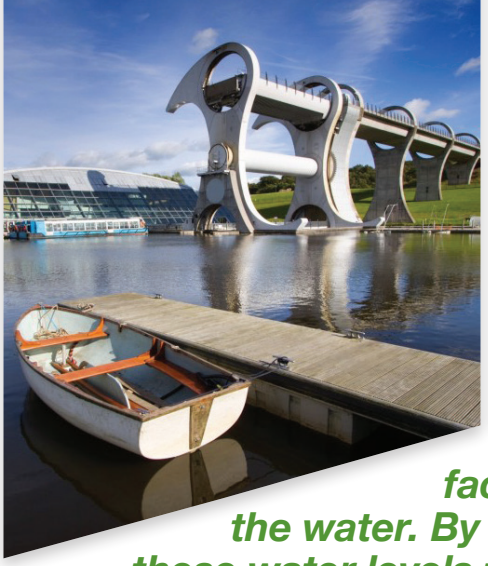
PROJECT ELEMENTS

- Feasibility
- Specification
- Design Risk Assessment
- Hardware Design
- Software Design
- Graphical User Interface Design (GUI)
- Safety Verification
- Panel Build and Supply
- Factory Acceptance Testing (FAT)
- Installation
- Commissioning
- Site Acceptance Testing (SAT)
- Training
- Preventative Maintenance
- 24/7 Support

PROJECT BACKGROUND

The Millennium Link Project has restored the Forth & Clyde and Union Canals to their former glory. It links the West and East Coasts of Scotland with fully navigable waterways for the first time in 35 years. The project included the construction of a new section of canal, two aqueducts, three locks, a tunnel, railway bridge and canal basin, but the centrepiece of the project is the Falkirk Millennium Wheel Boat Lift. The £84 million project (supported by the Millennium Commission) is the largest canal restoration ever undertaken in the UK.

The Falkirk Millennium Wheel Boat Lift is the world's first rotating boat lift, measuring 35 metres in height. It was designed to bridge the gap between the canals; restoring the waterway between the cities of Glasgow and Edinburgh. Not only is the boat lift a feat of engineering, the first to be built in Britain since the Anderton Boat Lift in 1875, it is a sculpture for the 21st Century. Four years in the planning, the boat lift is a collaboration between some of the UK's best architects and engineers.



Crucial to the operation of the whole facility is the management of the water. By monitoring and controlling these water levels to a very close tolerance, a smooth flow of craft through the interchange is guaranteed.

DESCRIPTION

Fairfield Control Systems designed and installed the electrical system to control the hydraulic motors responsible for wheel control and water management. From this system, all other major functions can be viewed and controlled, including:

- The lighting system
- CCTV
- Fire and intruder alarms
- The tunnel.

The circular basin in which the boat lift stands is 100 metres wide and has moorings for more than 20 boats. Construction materials for the boat lift include 7,000 cubic metres of concrete, 1,000 tonnes of reinforced steel and 1,200 tonnes of prefabricated steel. The boat lift consists of two massive support arms, each weighing approximately 500 tonnes and measuring 38 metres in diameter, nicknamed “dog bones” because of their shape. These are linked by one load bearing axle that is centrally located and measures 26 metres in length by 3.8 metres in diameter and is of hollow construction.

The two gondolas are supported on a roller track which runs in two circular cut-outs at each end of the support arm. It is these water filled gondola’s, each weighing a massive 160 tonnes and capable of carrying 250 tonnes of water that transfer the boats between the varying levels of the canals, which can reach differences of up to 30 metres. The boat lift is able to carry eight or more boats at a time and a single trip will take about 15 minutes.

CHALLENGES

Crucial to the operation of the whole facility is the management of the water. The boat lift relies on the descending gondola balancing the ascending gondola, this is achieved by the accurate control of the water levels in both the basin and aqueduct. By monitoring and controlling these water levels to a very close tolerance, a smooth flow of craft through the interchange is guaranteed.

Another challenge that was addressed was how to retain the essential features of the original 1920s ride, as listed by English Heritage, whilst ensuring that the ride complies with today’s health and safety standards.

OUTCOME

Since its official opening by The Queen in 2002, the wheel has become one of Scotland’s most successful tourist attractions with more than 5.5m visitors to date and around 400,000 visitors annually.

It has won multiple awards for its design and construction, including:

- Structural Steel Design Awards 2002
- Glasgow Institute of Architects Award ‘The People’s Choice’
- ICE Brunel Medal 2002
- Civic Trust Award
- Saltire Society Award 2002
- Dynamic Place Award Supreme Award 2003
- EAA Presidents Award 2003
- Scottish Design Award ‘Best Original Work’
- Saltire Society Award 2005
- FIDIC Major Civil Engineering Project of the Last 100 Years 2013

The Falkirk Wheel continues to receive regular service visits from Fairfield engineers.

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