Merit

Structural Steel Design Awards 2023

Cody Dock Bridge, London

PROJECT TEAM

Architect: **Thomas Randall-Page**
Structural Engineer: **Price & Myers**
Main Contractor: **Gasworks Dock Partnership**
Client: **Gasworks Dock Partnership**

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Cody Dock, near the mouth of the River Lea, is being brought back into use following years of dereliction. This new steel bridge spans over the dock mouth, allowing the passage of vessels into the dock by rolling along a track such that the deck turns upside down. The bridge is carefully counterweighted so that the centre of gravity is level, allowing the 13t bridge to roll using only a hand cranked winch. Despite the simplicity of this movement, the design process and fabrication revealed complex and unique engineering challenges.

The footbridge is a simply supported structure with a monocoque steel deck spanning 7m and tapering in depth from 400mm to 550mm at midspan. Two 5.5m rounded square portals at each end allow it to roll along undulating concrete abutments which are cast into the existing masonry walls. The upper section of each portal is counterweighted such that the centre of gravity is raised to the midpoint of the frame. The path geometry ensures this point remains horizontal when in motion so that the bridge weight is never lifted vertically.

Like its Victorian forbears, the bridge design is tied to its functionality and the environment in which it sits. Most of the structure is weathering steel, which has the desired strength, durability, and fabrication accuracy balanced with minimal maintenance requirements. Oak bearing strips fixed to the hoops roll on the undulating steel track, whilst precision cut weathering steel teeth interlock with Hardox steel pins. The rolling and guiding interfaces are kept separate, and the materials chosen such that the softer component can be easily replaced within each interface, facilitating maintenance over its lifetime.

In order to predict the bridge behaviour during the roll, a staged analysis was carried out to assess how frictional effects affected the rotational and translational movement of the bridge. As the bridge is driven from one side only, ensuring adequate torsional stiffness was paramount to prevent the portals skewing off course. Predictions were made for the frictional forces and resulting cable tensions, that were then tested in-situ, prior to the completion of the mechanical system design.

The bridge aims to be understated when resting but playful in its movement, creating a spectacle when operated. Part of the ambitious footpath and cycleway project along the length of the River Lea, this rolling bridge will become an important landmark and a symbol for the dynamic community growing here.

Judges' comment

This intriguing project was realised thanks to a dedicated team working closely together and applying painstaking analysis with "real time" adjustments as the bridge was being fabricated. This ensured a smooth operation on site with the tight tolerances required of a machine. A project which celebrates its own complexity and encourages the wider community to share the fun.