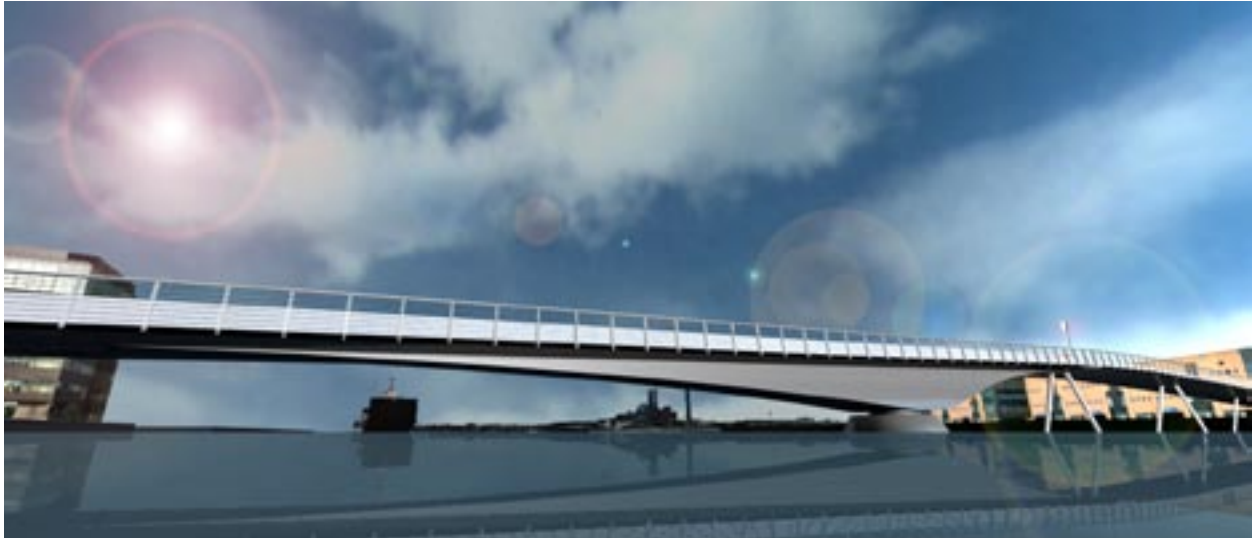


# Bryggebroen – movable bridge in Copenhagen Harbour



The new bridge for pedestrians and cyclists between Islands Brygge and Kalvebod Brygge at Fisketorvet is the first new bridge across Copenhagen Harbour's entrance in 50 years. It is a swingbridge connecting the southern part of Islands Brygge with Kalvebod Brygge, and it creates a new connection for pedestrians and cyclists between two parts of the city which up till now have been separated by the harbour entrance.

The bridge is a distinctive element in the harbour and the architecture has been a very important subject for the client. The bridge structure is very light, and a special illumination draws attention to the structure in the harbour entrance. The bridge is an approximately 190 m long steel structure of which 67 m is a swing span, which makes it possible to open the bridge for passage of ships through the harbour. The swing span is asymmetric with one span of 25 m and one navigation span of 44 m. The approach spans are 25 m each.

The bridge is moved by hydraulic cylinders and opening/closing of the bridge is operated from the quay. The whole process is programmed to be activated by pressing a single button.

The programmed process can be interrupted and the bridge can be operated manually.

There are two navigation spans under the bridge, both protected by dolphins. For passage of minor ships there is a navigation span through one of the fixed spans, and there has been dredged for passage of larger ships through the longest of the movable spans.

The bridge is carried by a central steel box girder, which carries a steel deck for cyclists on one side and a steel deck for pedestrians on the other side. The top side of the box girder is raised above deck level, which gives a natural separation of cyclists and pedestrians as well as a lowering of the longitudinal profile compared to a solution where the whole box is below deck level.

Project period: 2005 - 2006

Owner: Municipality of Copenhagen

Client/Design and build contractor: E. Pihl & Søn A/S, Denmark

## Services:

- Tender design
- Detailed design (bridge structure and dolphins)
- Detailed design (electricity and hydraulics)
- Technical follow-up during construction

## Tender design

In the spring of 2005, the Municipality of Copenhagen invited for tenders for



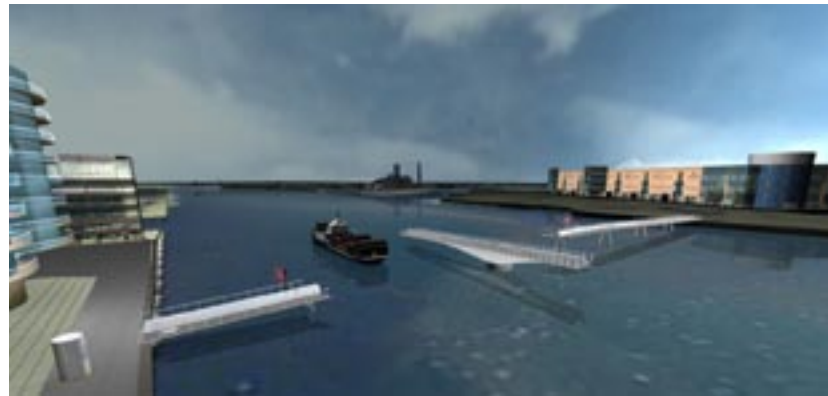
a design and build contract and COWI entered into cooperation with the contractor E. Pihl & Søn A/S, who made a bid for the contract as design and build contractor.

During the tendering phase COWI optimized the design of the bridge structure, in particular the substructure and dolphins, which formed a very significant part of the total bid. COWI's optimization of these structures as well as an alternative to the swing and open/close mechanism were both factors that made the contractor able to make the most advantageous bid.

#### **Detailed design – Fast track**

As the total construction phase was limited to less than one year, the detailed design took place simultaneously to the contractor's construction, and detail solutions were agreed upon with the contractor during the design and adjusted to the contractor's wishes during the construction.

In cooperation with the contractor a concept for the substructure was



developed, where steel piles drilled into the limestone were cast together with prefabricated concrete elements. The prefabricated concrete elements were cast on the quay and lifted in place by a floating crane.

The detailed design of the hydraulics and electricity for opening and closing of the bridge took place in close cooperation with the contractor's steel subcontractor and his suppliers.

