

Project Title

Client: Molde & Romsdale Havn (Molde & Romsdale harbor)

Location: Fjord quay

Application: Soffit support

Case Study

A unique method of construction has been adopted with the help of RMD Kwikform and Teknikk to build a new quay in the Åndalsnes region in Norway. Main contractor Kristiseter AS was tasked by Molde & Romsdal Havn (Molde and Romsdal Harbour) to extend the existing quay to accommodate the increasing number of larger cruise ships travelling on the fjords.



Åndalsnes is along the main cruise route for tourists wishing to experience the fjords and northern lights. In recent years, the popularity of the cruises has risen substantially and as a result, the cruise ships are running more frequently and have increased in size.

In order to cope with the demand, Kristiseter AS turned to Teknikk, Norwegian-based Formwork provider, and RMD Kwikform to provide a solution to construct the new 17 metre by 17 metre pier, which will be connected with the existing structure by a 60m long, 4m wide foot bridge. RMD Kwikform and Teknikk AS worked in cooperation to design an over slung support solution for Kristiseter AS.

Martyn Henry, export sales and business development manager from RMD Kwikform, said:

“The new quay is a 17 metre by 17 metre insitu concrete structure, situated on eight steel piles, measuring 1.2 metre in diameter, and secured to the fjord bedrock 70 metres below water level. The quay is being cast in two stages, commencing with the concrete beams, and followed by the concrete deck.”

Challenges

One of the challenges RMD Kwikform's engineering team faced, was to provide a soffit support for approximately 780 tonnes of concrete, consisting of 1.2 metre deep concrete beams, with a 0.7 metre deep concrete slab above. However, due to the location of the concrete beams, situated at only 0.7 metres above the water level, the temporary works could only be support by the eight tubular steel piles, which formed the foundations for the entire quay.

After several concept designs, produced by RMD Kwikform's UK engineering team, in collaboration with Teknikk, it was decided to utilise a hanging system for the formwork. The method uses a suspended soffit system with all of the core structural support above the quay.

The suspended soffit is supported by 180 20mm hangar ties, which consist of two layers of Superslim Soldier primary beams, one layer of timber secondary beams and plywood, all of which is fitted around the tubular steel piles. The hangar ties run through the entire concrete structure, and down to the lowest layer of beams in the soffit, beneath the water level.

Morten Hernes, Project Manager at Teknikk AS, said: “Kristeseter AS cast eight steel support posts into the top of each tubular steel pile. Each of these posts protrudes above the top of the core quay slab. Steel header beams then span between adjacent support posts; providing four additional support points at each corner of the quay.

“Two groups of 22m long RANA beams span between the top of the header beams, and provide the support for five R700 truss modules, which in turn are 19 metres long and span at 90 degrees to the RANA beams. There are also wedge jacks situated between each RANA beam and R700 truss; this ensures the load can be easily released, without the need to undo all of the hangar ties.”

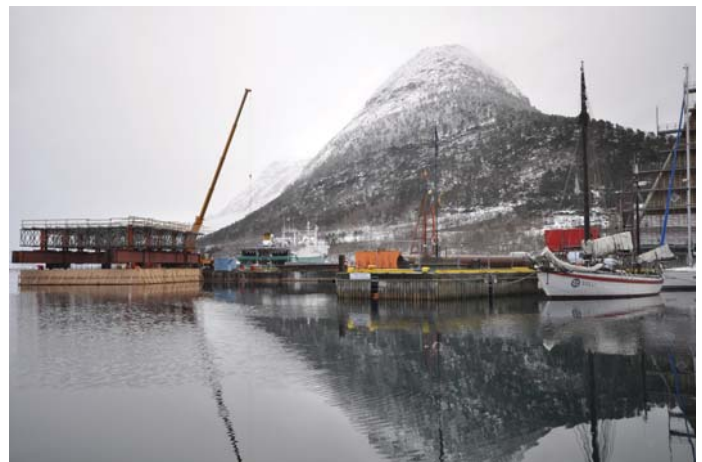
Martyn Henry continues: “The site team are undergoing work in freezing temperatures, and working against the rising tide, day in, day out. It was vital that we provided the main contractor with a simple and efficient solution that allowed for maximum productivity during low tide.

“To make the removal of the equipment easier we have provided waler plates on the hangar ties, these prevent the plastic tie sleeves from lifting during each concrete pour. The waler plates can also be screwed down on to the top of the hardened concrete, allowing the suspended soffit to be held in position whilst the equipment above the quay is removed.”

Guttorm Balstad, Project Manager at Kristeseter AS, said: “This has been a challenging project in many respects. Initially, we were looking into utilising a more traditional method to construct the quay, with the bearing structure designed with an underlying steel system and wedge jacks. However, this system did not provide us with enough space to carry out the works. Due to the headspace granted by the R700 beams, we have been able to utilise the concrete pump, and crane down material very easily. We have been very reliant on this system; otherwise we believe it would have been an impossible task.

“This is truly an ingeniously designed system. After contacting Teknikk and RMD Kwikform, we realised quite quickly that they had the solution we needed. What we have received from RMD Kwikform has been a good illustration of how things should be carried out on site, and how challenges should be solved. We are looking forward to future collaborations and will no longer hold back on taking on board new challenging projects”

The first cruise ships will arrive in the Andalsnes region in March 2016, and the quay will be complete, with the footbridge in place, ready for the summer cruises in June 2016.



Want to know more about this project?

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