

Dolphin dive

Construction of a 360-metre jetty and marine offloading facility was a crucial part of developing the new Gladstone Liquid Natural Gas (GLNG) plant and the success of one of Queensland's major mining projects.

Located on Curtis Island on the Central Queensland Coast, the extensive facility comprises a new barge berth, sea water intake pump support structure, adjoining passenger ferry berths and associated access catwalk, bulk aggregate berth and a load on-load off (LOLO)/roll on-roll off (RORO) facility.

Construction of the new plant was taken on by Bechtel Oil & Gas on behalf of some of the world's best-known oil and gas companies, including Santos, Petronas, Total and KoGas.

A highly complex and large scale project, Bechtel engaged John Holland to oversee its engineering, procurement, design and construction. ARUP was selected as the engineer, while Stresscrete was chosen to supply and deliver the specialised precast elements.

The precast side of the project required work on a large scale. This included manufacture of 137 dead man anchors weighing 14-tonne each, 25 fender panels at 14-tonne and 11 'dolphin shells' weighing between 35 and 42 tonnes. The precaster also oversaw the procurement of structural steel cast-in items for the dolphins.

Dolphins are self-contained marine structures used for the mooring and berthing of ROPAX berthing vessels. They are essentially a structural, sacrificial formwork system which is permanently exposed. Soon after casting, all inner surfaces are green-cut, providing a construction joint surface

Project Owner

Bechtel Oil & Gas

Project Superintendent

John Holland

Service Engineer

ARUP (major works)
Ashton Engineering
(steel cast-in beams for dolphins)

Precast manufacturer

Stresscrete

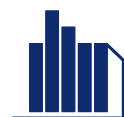
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for the in-situ concrete to bond to. The dolphins are supported on steel piles driven into the sea bed. Use of both dolphins and piers enables the overall size of the piers to be considerably condensed.



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As Stresscrete's Craig Zinn explains, the biggest challenge for the job involved creating the formwork systems to accommodate complex shapes and other requirements.

"The steel reinforcing was quite congested and complex around the steel cast-in items and at corners where the base joined the walls," he explains. "We used a high performance self-consolidating S50 concrete mix to assist the mobility of concrete around the congested reinforcing bars. To protect against the aggressive marine environment, the finished concrete was treated with a waterproofing protective coating."

Transporting the 7-metre wide dolphins also posed challenges, and was achieved with the help of two police escorts, taking up two lanes of traffic on the Bruce Highway between Rockhampton and Gladstone.

Despite some of the logistical challenges, the clear advantages of using precast over casting in-situ were unmistakable to all concerned, delivering time, cost and, perhaps most important of all, safety benefits that helped keep the project running smoothly despite tight timelines.

"The hazards of working over water are minimised with precast, because construction personnel work in a contained area with built-in edge restraints," says Craig Zinn. "Using precast also means there is no need to assemble and strip complex framework systems over water, saving considerable time in construction and time working over the water, making it a far more economical option."