

Marine milestones

Adelaide's niche provider of maritime solutions has a national outlook, as **John Satterley** reports.

The pile guide used at Anthon's Landing jetty in Wyndham, WA





June is a critical month in the order book for Adelaide-based Maritime Constructions.

The Adelaide Brighton Cement plant at Birkenhead on the Port River is going through a \$60 million extension and upgrade program, which includes a retrofit of a new enclosed shiploader crane from Finnish supplier Cargotec.

The unit, chosen for its environmental credentials, replaces one in use for 35 years.

ABC exports cement to Victoria and clinker to Queensland, with a ship arriving every two weeks for loading.

A scheduled maintenance shutdown in June will give Maritime Constructions a window of just 28 days in which to make the changeover.

The replacement Siwertell SSL 700 screw-type shiploader weighs 42 tonnes; its boom is 31m when fully extended. Throughput is 900t/hour for cement and 600t/hour for clinker. The boom arrived from China on the vessel MV Massgracht on April 22.

Maritime Constructions will marry the unit into the existing support structure, ensuring that the turret can bear the weight of cranes as they swing and luff the shiploader.

“In 2008 we undertook a strategic decision to pursue attractive projects wherever they occur in Australia. Since that time we haven’t looked back.”

– Maritime Constructions CEO Shane Fiedler

The retrofit covers project feasibility (the study started last October), detailed design and construction, installation, and commissioning. The work is being let in stages and is so far worth \$4 million, with a total expected project value of \$6.5 million.

Consulting engineer Aztec Analysis is providing structural and engineering services for the duration of the project.

Because the built form is on a wharf on the Port River, all pre-works are done from the waterside.

In service is Maritime Constructions’ 40m by 70m construction barge Aquane. The barge is equipped with an engineered crane pad currently occupied by a Kobelco 150t pin jib crane certified to CraneSafe standard.

For the shutdown, a 600t superlift crane on the land side will reach over the existing structures, lift the existing boom off in one piece and place it on the ground. The boom weighs 105t.

The floating crane will be adequate to lift the boom on to another wharf, where it will be reconditioned for future use if necessary. ▶



Anthon's Landing jetty in Wyndham is an entry in the 2012 WA Engineering Excellence Awards



Maritime Constructions CEO Shane Fiedler

At the time of writing (April), workmen were driving eight steel piles to strengthen the main tower and parking trellis. The shiploader rests on the parking trellis and is locked down when not in use.

Maritime Constructions CEO Shane Fiedler says handling all steps of the project in-house is efficient and cost-effective.

"These are all our own people and our own plant," he says. "We do spend a lot of time ensuring the design is just right in order to reduce time and risk to the client.

"This is particularly important with marine projects where there can be many variables."

Fiedler says the company hasn't looked back since deciding in 2008 "to pursue attractive projects wherever they occur in Australia".

Current projects in SA involve Glenelg and West Beach dredging (\$4 million over three years) and refurbishments of the jetty at Largs Bay (\$330,000) and the causeway at Victor Harbor (\$950,000).

At Portland in Victoria there is dredging for Berth 6, worth \$1.6 million, and a sand bypassing project worth \$750,000 (this project will recur annually for up to 10 years).

Fiedler says Maritime Constructions has

refurbished 90% of the timber jetties in SA. This work resulted in Thumper, a custom designed light duty pile-driving hammer to drive piles on existing jetties.

The new steel piles are driven next to the old timber piles from the deck of the jetty by removing only a few decking planks. In such way, the crosshead loads are transferred from the timber pile to the new steel pile.

Thumper consists of a hydraulic winch powered by a skid steer loader and a steel billet slightly smaller than the inner dimensions of the pile section.

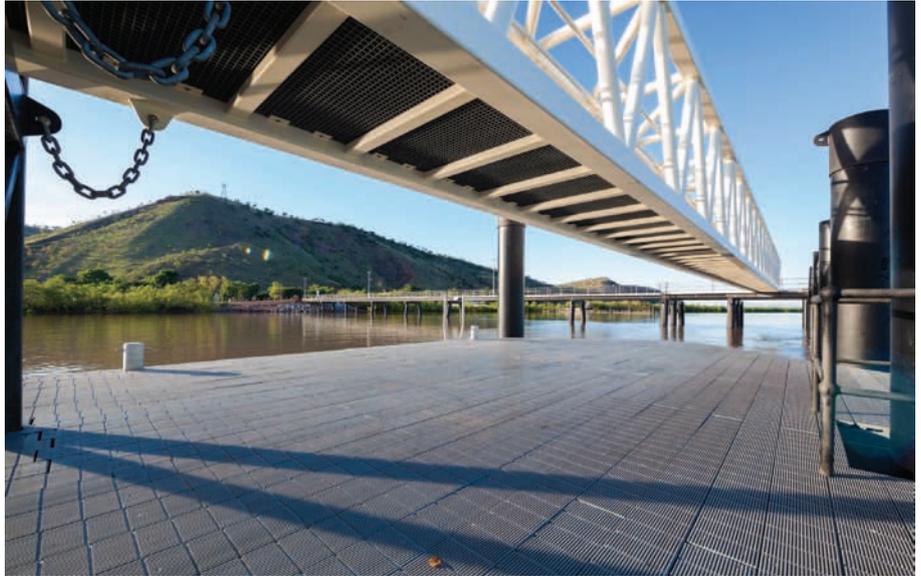
Hoisting the billet and letting it fall free inside the pile performs the driving operation as it hits the base plate which has been welded to the bottom of the pile.

Over in Western Australia, cyclones, crocodiles and a 9m tide influenced the design of the Anthon's Landing jetty in Wyndham, undertaken by Maritime Constructions in 2011.

The fixed jetty is 108m long by 4.5m wide, increasing to 9m at the head to allow small vehicles turning space. The deck comprises precast concrete panels reinforced with FRP reinforcing bars instead of steel to increase overall durability.



Thumper, a custom built light duty pile-driving hammer designed to drive piles on existing jetties



Cyclones, crocodiles and a 9m tide influenced the design of Anthon's Landing jetty

The jetty piles – 43m long and weighing 13t – were handled and driven as one continuous section.

Maritime Constructions fabricated a hydraulically operated pile guide to achieve piling accuracy and to ensure the correct raker angle was maintained.

Piles were driven from floating plant, which comprised of a 72m barge with a 100t crawler crane and IHC S70 double impact pile hammer.

The pile guide itself was supported on three temporary piles of 36m lengths.

The long temporary piles were necessary to drive past the silt layer and provide sufficient lateral restraint to the pile guide, which was subjected to significant over-turning moments from the raker piles during the driving process.

The pile guide uses a system of hydraulically operated top and bottom gates. Piles were loaded vertically through the gates and prior to

releasing the pile, the gates would be moved in opposite directions to obtain the correct raker angle on the pile.

Maritime Constructions western region general manager Imran Lambay will be presenting a paper on construction of the jetty at the Australian Structural Engineering Conference in Perth in July. The project is also an entry in the 2012 WA Engineering Excellence Awards. 



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Sugar over sea

Lucinda bulk sugar terminal was decimated by cyclone Yasi in 2011. Experienced with the nuances of Far North Queensland, Abergeldie put its hand up for the massive repair job.



*The bulk sugar facility at
Lucinda in North Queensland*



Q ueensland Sugar's 5.8km long jetty and bulk sugar loader at Lucinda, 150 km north of Townsville, was severely damaged by Cyclone Yasi in February 2011.

Abergeldie Complex Infrastructure was engaged in September 2011 to carry out a \$33 million repair contract to have the loading facility back up to speed in six months – in time for the first bulk sugar shipment of the 2012 Far North Queensland sugar harvesting season. No easy task.

Abergeldie drew upon its vast experience of engineering in Queensland to complete the job.

"Abergeldie has a lot of experience in FNQ and as a result we have this year established a permanent office in Townsville," Abergeldie

managing director Mick Boyle says. In recent times we have built a large satellite base station and a water pumping station in Mt Isa.

"We have constructed several large-diameter 5.3m shafts to 300m depth in the Bowen Basin as well as a foreshore boardwalk in Mackay."

Damage to the jetty structure included displacement of many of the pre-cast concrete decking units and destruction of much of the overlying in-situ poured topping slab.

Several of the supporting piles were damaged with parts of the cathodic protection, navigation equipment and berthing facilities swept away.

There was severe damage to the structural, mechanical, hydraulic and electrical ►



The contract scope covered a broad range of electrical, mechanical, marine and structural works

systems of the 5km long conveyor system, which carries sugar from the onshore stockpile to the loading facility at the end of the jetty.

The loading facility itself was also damaged, with much of the equipment beyond repair and requiring replacement.

The contract scope covered a broad range of electrical, mechanical, marine and structural works, equipment procurement, installation and commissioning.

The range and complexity of equipment and materials to be procured and the large number of trade disciplines involved posed challenges for procurement management, sub-contractor engagement and coordination, document management and quality management. Ensuring sufficient numbers of properly-trained personnel were available was another challenge.

On any one shift between 50 and 65 personnel were on the job at various locations along the jetty structure and the loader and conveyor installations.

Trades engaged included: fitters, boilermakers, abrasive blasters, riggers, dogmen, scaffolders, crane operators, electricians, divers, under-water welders, boat crew and concrete workers, all under the immediate supervision of at least six Abergeldie leading hands.

“No project we do is the same, so our multi-

skilled workforce is used to having to adapt to the conditions and restraints of any job,” Boyle says.

“We were fortunate to secure the services of very experienced sub-contractors such as HEB Constructions from New Zealand.”

“We have constructed several large diameter (5.3m) shafts to 300m depth in the Bowen Basin as well as a foreshore boardwalk in Mackay.”

– **Abergeldie managing director Mick Boyle**

Onsite project management was coordinated through Abergeldie’s Far North Queensland office in Townsville, backed by management support from the Brisbane regional office and contract management and systems support from the Sydney head office.

Safety, access, environmental protection, procurement management, subcontract arrangements, quality assurance and the extremes of Far North Queensland weather conditions were major project management

issues. Flexible programming and highly responsive contingency management were also essential.

The contract allowed for just 24 days of “inclement” weather despite the contract period being almost entirely within the Far North Queensland wet season.

Throughout the months of February and March, heavy rain disrupted work nearly every day.

Safety restrictions called for works to be suspended on some parts of the jetty and its mechanical installations whenever the wind speed exceeded 20 knots.

The 24 day inclement weather interruption estimate was exceeded very early in the contract period, with interruptions totalling as little as an hour.

But the firm encountered a full day of interruptions on 48 occasions between October and March alone.

Nearly all of the works were carried out at heights, over water, up to 5km out to sea, and sometimes under water.

Because the damaged jetty and loader structures were extremely unstable, specialised marine access, work platform and lifting equipment was used.

The key element was a Sea Lift 4 jack-up barge, with a capacity of up to 250 tonnes, supported by four hydraulic “spud” legs.



A 150t lattice jib crawler crane and two smaller cranes worked from the jack-up barge platform

This provided a stable work platform above the high water level in depths up to 36m.

It was delivered to the site by road, in 26 semi-trailer loads.

A 150t lattice jib crawler crane and two smaller cranes worked from the jack-up barge platform.

The list of specialised marine equipment

also included two shuttle barges and the Black Panther, a 24m utility vessel to move the barges around.

The tug, barges and cranes enabled a complex array of gantries and access platforms to be erected to allow access for repairs to the jetty piles and decking.

These temporary access structures

required detailed design to ensure safety and functionality.

Abergeldie's in-house design studio engaged specialist marine design consultants from SMEC to advise on design alternatives.

Structural engineering design specialists from Demlakian carried out detailed load calculations and advised on a safe ▶

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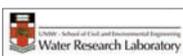
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 **MONASH** University



Divers welded steel repair plates below the water line to restore the integrity of steel pile casings and some new concrete was poured



methodology and sequence of works for fabrication and installation of the temporary access facilities.

Some of the demolition and reconstruction tasks proved to be more complex than anticipated; others less so.

“No project we do is the same, so our multi-skilled workforce is used to having to adapt to the conditions and restraints of any job.”

– Abergeldie managing director Mick Boyle

On close inspection, it was found that damaged pilings could be repaired insitu and did not need to be completely replaced.

Divers welded steel repair plates below the water line to restore the integrity of steel pile casings and some new concrete was poured.

Demolition and replacement of the damaged jetty decking, however, was a major undertaking.

Several hundred prestressed precast concrete decking modules had to be replaced.

Nearly all of the decking restraint connections had to be replaced and much of the underlying support restructure repaired or renewed. 



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Joinlox and Marky Industries combine to stop the rot

BRISBANE-BASED Joinlox has inked a manufacturing and supply agreement with Australian composites manufacturer Marky Industries.

The agreement allows Marky Industries to use Joinlox's joining systems to manufacture protective jackets and sleeves with the potential to extend the lives of wharves and old bridges.

The licence is for five years, with an option for a further five years.

"Australia and many other countries face significant and ongoing infrastructure funding challenges," Joinlox CEO John Pettigrew said.

"Joinlox joining systems enables the manufacturing and ease of installation of the PileJax sleeves that can extend for decades the lives of many old bridges and wharves. These sleeves are typically applied in the tidal zone, where water and air combine to accelerate corrosion and degradation."

Pettigrew said ageing bridge, pier and wharf piles were currently strengthened by costly steel sleeves joined together by nuts and bolts, which had corrosion issues of their own.

He added that due to the firm's joining technology, loads were spread uniformly along joins.

Protective sleeves can be made of lightweight material like fibreglass and do not corrode.

Potential users include governments, engineers and contractors, transport companies and builders of oil and gas platforms.

"These groups – as well as the suppliers of surface protection coatings and grouts – can easily incorporate the PileJax products into their repair and rehabilitation processes," Pettigrew said.

The size of the pile repair and rehabilitation market in Australia is believed to be in excess of \$300 million.



PileJax sleeves are applied in the tidal zone

SA deepwater port one step closer

A NEW deepwater port for South Australia's Eyre Peninsula is a step closer to development, following Golder Associates' delivery of an environmental and social impact assessment for the \$250 million project.

Golder's ESIA team has submitted – on behalf of iron ore miner Centrex – a public environment report to the South Australian government for the proposed Port Spencer bulk commodities export facility. The report contains an environmental and social impact assessment for stage one of the facility.

The PER has now been released for public and regulatory comment.

Located 210km northwest of Adelaide, the

private multi-user port will accommodate Cape class vessels ranging from 165,000 to 200,000 tonne capacity and also Panamax vessels of 65,000-90,000t capacity.

Golder Associates managing director Australia Darren Watt said the report was a major achievement following four years of project activities. "Port Spencer is one of the few direct loading Cape class deepwater facilities planned in South Australia and will open up the Eyre Peninsula to significant mineral and agricultural exports," Watt said.

Welcoming the announcement, Centrex managing director Jim White said it was a crucial step in the advancement of the project.

"Infrastructure is vital to the success of any iron ore project, and critical to this is a port facility capable of handling large-scale export vessels," White said. "I look forward to our continued collaboration with Golder in the delivery of this important facility for the region's future growth."

The advantage of Port Spencer, according to developers, is that it will facilitate direct ship loading, removing the need for trans-shipment loading and not requiring seabed dredging during operations.

The port will primarily export hematite and magnetite from Centrex's regional mining ventures, in addition to grain exports.

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