

COVER STORY

SA PROJECT FEATURE

OSBORNE SOUTH DEVELOPMENT PROJECT

Australian Naval Infrastructure / South Australia





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STEEL IN... SHIPS OUT AT OSBORNE NAVAL SHIPYARD

DEVELOPER : Australian Naval Infrastructure
MAIN CONSTRUCTION COMPANY : Lendlease

The Osborne South Development Project (OSDP) involved the construction of a new state-of-the-art naval shipbuilding facility to support the build program for 9 Hunter-class Frigates, create hundreds of Australian jobs, and to keep Australia's naval ships at cutting edge capability.

A world class commercial shipyard fully funded by the Australian Government for the end-to-end fabrication of naval surface vessel combatants, the OSDP is the first facility of its type in Australia.

The project was delivered by shipyard owner Australian Naval Infrastructure (ANI), a federal government business enterprise tasked with developing, expanding and modernising Australia's submarine and surface ship production facilities.

"The project complements our existing operations at Osborne and is intended to foster a continuous ship building process to generate increased productivity using the latest in systems and equipment," said Paul Bates, ANI's General Manager of Operations.

"When we continued development of the 90% design and functionality provided by the Commonwealth, we knew it would be used for the Hunter Class Frigate programme but we didn't have an end user yet," explained Phil Cornish, ANI's Project Director responsible for the delivery of the project. "Robust design and high flexibility were the key value drivers. We wanted to deliver a facility that provided an end-to-end fabrication capability that maximised Australian steel going in and Australian ships coming out."

The project comprises several buildings and areas, each focused on a different stage of the shipbuilding process from steel fabrication to hull forming, blasting and painting, ship assembly and consolidation, outfitting and final commissioning. The shipyard is designed to accommodate production of ships up to Destroyer class size and provides for the potential manufacture of two ships at a time.

The construction timeframe was tight with the main contractor, Lendlease, appointed in late 2017. Lendlease immediately started working with ANI on initiatives to accelerate the works.

"The piling activities were massive, with 4,500 piles to be placed under the buildings," said Phil. "That was a major engineering challenge with noise and vibration requiring careful management to minimise disruption to the existing shipyard operations and nearby residents. Lendlease had five piling rigs working concurrently and the piling was finished three months ahead of schedule."

Lendlease also introduced two specialist steel fabricators to the project on tender award. "Having access to steel fabrication expertise meant that we could order the structural steel earlier, enabling the steel erection activities to commence in Q3 2018 and be completed in Q4 2019, which was a great result," said Phil.

One of the biggest challenges on the project was the ship assembly and consolidation hall, the largest building on site with a 50m height, 190m length and 90m width.

"Stick building such a large structure is a major challenge, especially with the local prevailing south-westerlies causing safety risks and potential unproductive time," Phil said. "Lendlease proposed a strand jacking methodology with as much work as possible to be undertaken at ground level. We expanded this philosophy further to construct the walls on the ground too, with cladding and services installed, before rotating and locking them into place."

As well as creating greater certainty and lower risk, the strand jacking approach saved four to six months of construction time and allowed a staged commissioning and handover to the new yard's operator, ASC Shipbuilding, to commence on time, despite the late challenges caused by COVID-19 resulting in split working shifts, physical distancing and health checks being implemented onsite.

"There isn't often an opportunity to do infrastructure at this scale in South Australia," said Phil. "The strand jacking approach allowed the team to work safely through rain and wind events and minimised the need for extensive works at height, which was a great advantage. In 1.5 million working hours, there were no disruptions to existing operations at Osborne and no major safety issues, which was a terrific achievement and testament to the safety focus of all parties involved."

As well as showcasing Australian capability in large infrastructure delivery, the Osborne Naval Shipyard has become a new landmark on the local landscape and represents a leap forward for Australian shipbuilding.

Modernisation of the existing southern yard, as well as the design and construction of the Osborne North Development Project for the production of Attack class Submarines are now underway at the Osborne Naval Shipyard, which has expanded to 109 hectares of the Lefevre Peninsula in South Australia.

For more information contact Australian Naval Infrastructure Pty Ltd, 61 Veitch Road, Osborne SA 5017, phone 08 7078 4575, email enquiries@ani.com.au, website www.ani.com.au



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Below Lendlease were appointed to be the managing contractor for the naval Shipyard, the largest South Australia build they have undertaken.

The Osborne South Development Project, recently completed in South Australia, represents the start of a new chapter in Australia's defence capability. Lendlease were appointed by Australian Naval Infrastructure (ANI) to be the managing contractor for the project, comprising world-leading facilities for the end-to-end fabrication of naval surface ships.

Lendlease were engaged in October 2017 and, working in a collaborative approach led by ANI, Lendlease and project leads to ensure a seamless delivery process, achieved a very tight programme with the phased completion of works handed over to ANI between March and June 2020. Lendlease also took the 90% design provided by the Commonwealth to completion with the novated consultant team.

As part of Lendlease's tender proposal an innovative erection methodology was proposed for Building 22, the largest building onsite.

"Building 22 is a single-span structure large enough to house 2 full-size frigates," said Gary Meaney, Senior Construction Manager. "We proposed strand jacking of the roof to eliminate working from height. This helped with our safety performance but also gave us more control, mitigating the impacts of the wind that is prevalent in the area."

During construction the strand jacking approach for the roof was successfully implemented. In addition, the walls were assembled at ground level including all services and cladding before being rotated into place. The roof structure of Building 22 was also upgraded to allow the internal large gantry cranes to be lifted into place from inside the building using strand jacking in order to minimise potential programme impacts caused by a conventional gantry crane installation.

The location of the site presented contaminated and potentially hazardous soil and groundwater challenges. The original design called for removal of the contaminated materials and importation of new quarried material but Lendlease developed an innovative alternative proposal to encapsulate the material by in-situ cement stabilising the existing pavement and connecting to the piled supported building with concrete rocker slabs. This solution minimised the maintenance required to deal with differential

settlement of the pavements to the buildings and also removing the environmental cost of relocating the contaminated materials.

Lendlease engaged with traditional owners during planning and arranged Indigenous attendance during excavation works to ensure nothing significant was disturbed. During construction Lendlease also partnered with six Indigenous-owned businesses with a total spend of over \$14 million as well as maintaining a 7% Indigenous participation rate within Lendlease and 2.3% overall Indigenous participation rate.

Lendlease had the experience and expertise to deliver this large and complex project. The project included 99 separate tender packages with contracts awarded to 97% Australian businesses, 89% of them local Adelaide companies. The project incorporated 14,000 tonnes of asphalt, 4,173 piles and 25,000 tonnes of steel and the supply and install of specialist equipment worth \$83 million.

"The sheer size of the job suited us," said Gary. "We had to manage multiple workfronts on site, the complex procurement of unique specialist equipment and multiple subcontractors with a site workforce that peaked at nearly 600 workers onsite at one time."

"We specialise in these complex, large construction projects and we have the right people to ensure we can deliver for the client. We were able to offer not only value but also certainty of delivery."

Safety is a top priority for Lendlease and Osborne South Development Project was no exception. "The level of safety we maintained onsite was exceptional," said Gary. "In 1.5 million hours we only had a few minor incidents and our initiatives helped reduce the risk both to our operatives and the client."

The Osborne South Development Project is Lendlease's largest ever building project in South Australia. "To successfully deliver that is something I will always be proud of," said Gary. "The project was very demanding but also very rewarding and the result will be talked about for decades."

For more information contact Lendlease, Level 14, Tower 3, International Towers, 300 Barangaroo Avenue, Barangaroo NSW 2000, phone 02 9236 6111, website www.lendlease.com/au

Below ASSA ABLOY designed and installed the Gigadoor, a 34m x 35m single leaf door, the largest in the world.

Osborne South Development Project is a flexible facility to support the continuous fabrication of warships and represents a significant modernisation giving Osborne best-in-class shipbuilding facilities on a massive scale. ASSA ABLOY, the global leader in access solutions, played a key role in making the project a reality.

The ASSA ABLOY Group is the global leader in access solutions. Every day helping billions of business's and people to experience a more open world. ASSA ABLOY Entrance Systems provides solutions for efficient and safe flow of goods and people. Offerings include a wide range of automated pedestrian, industrial and residential doors, loading dock equipment and services.

ASSA ABLOY is a global company with 53,000 employees and operations in over 70 countries around the world and over 25 years experience providing products suitable for all climates, building types and requirements with the right quality, design and price.

The Strength of ASSA ABLOY Entrance Systems lies in their portfolio of well-established ASSA ABLOY brands including Albany, Megadoor, Crawford and Besam. These have been the market leaders in their fields for decades, which means all have a strong history of proven solutions and extraordinary service expertise. Today they are gathered under a single roof, where they now form a complete offering for the front, back and interior of your building.

The biggest challenge for ASSA ABLOY on the Osborne South Development Project was the main door to Building 22, the Outfitting and Ship Erection Hall. "We call that the 'Gigadoor,'" said John Boyle, Business Unit Manager. "At 34m x 35m in size it's the biggest single leaf door in the world!"

Innovative thinking was required to make the Gigadoor a reality. "The Gigadoor is a top-hung single sheet that is raised into a concertina shape by cables powered by four separate drive motors," said John. "Even for aircraft hangars a typical height requirement is only 22m so this is significantly larger at a scale that's never been done before."

"The installation process was complex and different to anything we have faced. We had to coordinate the cabling locations

with the structural steelwork while ensuring the structure could take the heavy load of the door. All the doors are programmable and safety overrides had to be provided to prevent freefall," explained John.

In addition to the Gigadoor, ASSA ABLOY provided 11 high speed doors, 28 roller shutters and eight 'Megadoors'. "Everything was designed to suit the needs of the project," John said. "We received the required dimensions and performance specification and designed all the doors for approval."

ASSA ABLOY have prior experience supplying doors for other buildings on the Osborne Naval Shipyard site. They also have extensive prior experience working with Lendlease and many of the other subcontractors involved with the project.

"We already knew a lot of the staff from previous projects including the AIR7000 aircraft hangar project which helped us manage the coordination," said John. "For Lendlease, ASSA ABLOY is seen as a viable company to deliver complex projects with low risk. They knew that we had the experience and capability to support the project."

ASSA ABLOY were one of the earliest trades to be appointed to the project, partly due to the long lead times for engineering, manufacturing and shipping the Megadoors and Gigadoor which were manufactured in Sweden. "All the doors arrived onsite in February which was just in time for us to minimise the negative impact of COVID-19," said John.

Due to COVID-19, all doors were installed and commissioned by ASSA ABLOY's Australian team with remote collaborative support from engineers in Sweden and the works were finished according to schedule.

In a short time, the Osborne South Development Project has transformed Adelaide's industrial landscape. "It's amazing what the team managed to achieve in such a short period," said John. "The sheer scale of it is just unbelievable."

For more information contact ASSA ABLOY Entrance Systems, 50 Orchardleigh Street, Yennora NSW 2147, phone 1300 666 232, email info.au.entrance@assaabloy.com, website www.assaabloyentrance.com.au



Image supplied by ANI (Gary Francis)
Strand jacking in progress of Building 22.



Below Freyssinet used a innovative hybrid strand jacking approach to rotate the walls of building 22.

Below Lincoln Engineers specialise in the design, manufacture and installation of steel structures for a wide range of retail, commercial and industrial projects.



With leading capability in specialist civil engineering, post-tensioning and remediation, Freyssinet Australia is a contractor with a reputation for innovation. Freyssinet were contracted to design, supply, certify and operate the heavy lifting systems on the Osborne South Development Project including 14 separate heavy lifts to assemble Building 22, the largest building onsite.

Freyssinet were appointed to the project following a series of successful heavy lift operations including the ICC Convention Centre for Lendlease in Sydney. During the early contractor involvement, the concept of wall rotating was floated as a potential alternative to conventional stick-built construction, a solution that Freyssinet helped to develop.

“Rotation is a fairly new innovation in its application to buildings but it is often applied to bridge projects,” said Murray Watts, Project Engineer. “We were able to apply the specialist skills we have developed on bridge construction projects around the world.”

For the wall rotation Freyssinet used H200 strand jacks in conjunction with long stroke push-pull jacks supplied by Hebetec Engineering, their specialist heavy lifting subsidiary. “The lifting system was designed to provide constant angular rotation and load feedback to

ensure the relative limits were not exceeded,” said Murray. “This gave the lift director full control over the rotation process.”

As the rotation neared completion, the wall was clamped between the strand and push pull jacks. The clamping prevented over-rotation and enabled more precise control in the vertical position relative to conventional solutions.

The innovative approach of wall rotation combined with roof lifting enabled the bulk of the steel assembly works to be done at ground level, significantly reducing the need for working at height.

“The project was a fantastic opportunity to work with a team who valued technical solutions and were eager to push the limits of construction,” said Murray. “It was refreshing to work in such a solutions driven environment and together we achieved a fantastic outcome.”

For more information contact Freyssinet Australia, Level 3, 13-15 Lyonpark Road, Macquarie Park NSW 2113, phone 02 9491 7177, email sydney@freyssinet.com.au, website www.freyssinet.com.au

Lincoln Engineers is a family owned and operated company based in Port Adelaide specialising in the design, manufacture and installation of steel structures for a wide range of projects including commercial, industrial, retail and shopping centres. They were contracted by Lendlease to supply the structural steel for several support buildings at the Osborne Naval Shipyard.

The project was Lincoln Engineers’ first major infrastructure project for a Tier 1 contractor in over a decade. “All of our management, quality assurance, environmental and workplace health and safety schemes were upgraded to meet the client’s needs,” said Peter Atsikbasis, General Manager and Owner.

Lincoln Engineers maintained a good collaborative relationship with Lendlease and the other contractors and their scope was extended during the project. “Our initial scope was for fire tanks and Buildings 19, 23 and 27 and by the end we also did the turnstiles, Building 26 and exhaust towers for Building 20,” Peter said.

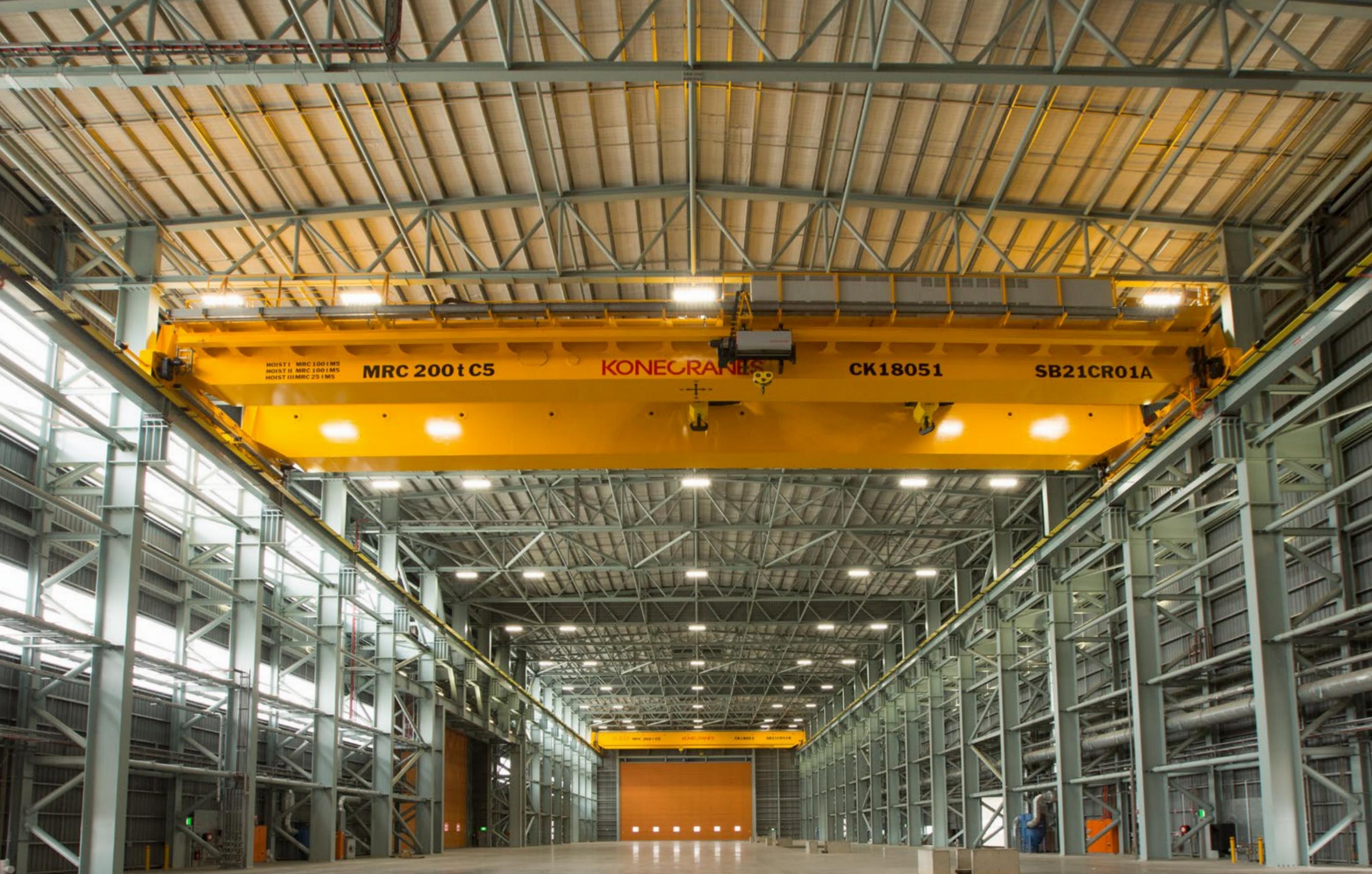
Lincoln Engineers have developed their own innovative ERP (enterprise resource planning) software package Acesoft, which gives them total control of projects at every stage of construction. They

were recently certified to deliver complex projects of Construction Category 3 (CC3) under the National Structural Steelwork Compliance Scheme.

“Our company is an industry leader and one of the original steel fabricators in South Australia,” said Peter. “For more than five decades we have played a part in the South Australian steel construction landscape. We are a family business and apply our family values to every project large or small.”

Other recent projects successfully completed by Lincoln Engineers include a 28,000m² wine distribution warehouse, a \$50 million shopping centre redevelopment in Port Adelaide and a new Bunnings Warehouse in Darwin. They are also currently working on several education projects in South Australia and targeting further major projects for Tier 1 contractors.

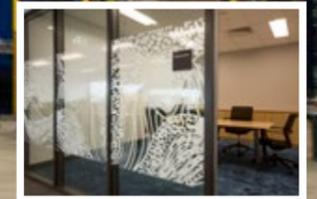
For more information contact Lincoln Engineers, 37-40 Webb Street, Port Adelaide SA 5015, phone 08 8447 7022, email reception@lincolnengeers.com.au, website www.lincolnengeers.com.au



Below O'Connors completed airconditioning, ventilation, smoke control and exhaust systems as well as gas reticulation systems to support shipbuilding activities.



Below Signscope manufactured and installed full wall murals and privacy films for internal areas that were digitally printed with customised graphics.



O'Connors are an engineering based mechanical construction and services company supporting South Australia's construction industry with diverse experience and a commitment to achieving excellent outcomes.

O'Connors were appointed to complete mechanical works to the Osborne South Development Project, a groundbreaking modernisation of the ANI (Australian Naval Infrastructure) facility at Osborne to support the planned delivery of surface combat vessels over the next 50 years. The works included airconditioning, ventilation, smoke control and exhaust systems as well as gas reticulation systems to support shipbuilding activities in buildings 20, 21 and 22.

To deliver a successful outcome O'Connors undertook extensive spatial coordination and applied engineering. They prepared comprehensive documentation of the works which were completed by a multi-skilled composite construction crew. Offsite prefabrication was used to accelerate the works where possible and lead times for imported items were managed in order to meet the schedule.

"The buildings are pretty big which took some getting used to," said Alan Porter, General Manager. "We needed to carefully consider

working from height and accessing equipment in such a large space. Everything had to be planned in a certain sequence."

A positive atmosphere was maintained on the project, supported by O'Connors' prior experience of working with the main contractor Lendlease and their good relationship with ANI. "ANI treated us well and they were very engaged and interested in the process which is great to see from a client," said Alan.

O'Connors were not daunted by the complexity of the project, having a history of taking on 'difficult' jobs. "We have a very good broad based team with a lot of experience in the industry and we are proud of what we have achieved on this project," said Alan.

For more information contact O'Connors, 107 King William Street, Kent Town SA 5067, phone 08 8410 4099, email admin@oconnorservices.com.au, website www.oconnorservices.com.au

For the Osborne South Development Project, Signscope manufactured and installed the wayfinding and building identification signage throughout the whole project, including statutory and Braille signage.

Signscope also provided full wall murals and privacy films for internal areas that were digitally printed with customised graphics. The scale of the project was quite large but well within Signscope's capacity to deliver.

"We were able to meet the total requirements of the job from the statutory signage through to all other aspects. We worked closely with ANI and the main contractor Lendlease and the project team to understand the client requirements" said Andrew Baohm, Director. "My business partner, Ryan Westley is a qualified industrial designer and his knowledge and experience was a key strength for us, helping to make the client comfortable in our capability to deliver."

Andrew and Ryan's understanding of how to deliver the range of signage required while achieving the quality required in a challenging marine environment was an important factor in Signscope's success on the project. "The level of attention to quality and detail that

Signscope is known for was really required on a project like this," said Andrew.

Signscope are an established company supplying signage services to all sectors in Adelaide and South Australia. The company specialises in challenging design and construction projects. "We like projects that require a high degree of quality in production and need to go the extra mile," Andrew said.

Signscope offers a comprehensive service encompassing all the steps required in taking a signage project from concept to completion. They apply the same attention to detail, problem solving approach and high quality ethos on all projects no matter how big or small.

For more information contact Signscope, 216 Brighton Road, Somerton Park SA 5044, phone 0418 500 778, email andrew@signscope.com.au, website www.signscope.com.au



Below Samaras Group supplied, fabricated, painted and erected the primary and secondary structural steelwork for Building 20 and 21.



Samaras Group specialises in fabrication, surface treatment and erection of structural steel including long span and high rise structures. They also have strong capability in heavy lifting and machinery relocation, as well as surface treatments including intumescent and multi-coat architectural paint systems.

The firm has been in business since 1974 and has grown to become one of Australia's largest privately owned multi-disciplinary heavy engineering and construction service providers with a national workforce of over 195 experienced tradesmen and construction professionals.

On the Osborne South Development Project project, Samaras Group were engaged to supply, fabricate, paint and erect the primary and secondary structural steelwork for Building 20 and 21 in addition to other site works related to Building 22. Samaras Group also assembled and installed the main facility overhead cranes located in Buildings 20, 21 and 22.

The large buildings at Osborne South Development Project, required Samaras Group to erect some very substantial elements, including 30m long trusses, using multiple mobile cranes. Samaras Group were able to draw on their extensive resources to meet the tight fabrication and surface treatment lead times and keep the overall project on schedule.

With experience on some of the largest and most complex projects the construction industry can offer, Samaras Group had the expertise to deliver a successful result on this complex project. The strategic location of their corporate headquarters and 75,000m² manufacturing facility in Gillman, South Australia, allows them to serve all major growth areas in the country.

Other current and recent projects include the Sydney Modern Art Gallery, The Ribbon Sydney and the Quay Quarter Tower in New South Wales, the Monash Freeway Upgrade in Victoria and the Adelaide Airport Terminal Expansion in South Australia.

Samaras Group was founded by the Samaras family and remains family owned today. They have built a reputation for innovation, quality, service and safety across multiple sectors on some of the nation's most complex and challenging projects.

For more information contact Samaras Group, (Head Office) 96-106 Grand Trunkway, Gillman SA 5013, (Melbourne) Unit 207, 23-35 Gipps Street, Collingwood VIC 3066, (Sydney) Suite 503, 135 Macquarie Street, Sydney NSW 2000, phone 08 8447 7088, email management@samarasgroup.com, website www.samarasgroup.com