

SAILING AWAY

The Brisbane International Cruise Terminal is a 2-storey 9,800m² world class facility designed to cater for the largest cruise ships in the world. The development includes building management systems, 275m of elevated walkways, public open spaces, transport interface, as well as long and short term parking.

Cruising has become hugely popular and Queensland is seen as a highly desirable destination for both domestic and international travellers. The cruise ships visiting Brisbane have been growing, both in quantity and in length, and with larger vessels unable to travel to existing cruise facilities further upstream, a viable, long-term solution was needed to accommodate the influx of larger vessels.

A purpose built cruise terminal facility was approved through the Queensland Government's Market-Led Proposals framework in October 2017, with the Port of Brisbane fully funding, managing and maintaining the project.

"Together with the cruise lines and government, we identified an underutilised greenfield site at the mouth of the Brisbane River suitable for a dedicated cruise facility," said Roy Cummins, CEO of Port of Brisbane. "In fact, this is the only location in Brisbane that

could accommodate the new cruise terminal with natural deep water, an existing swing basin and ideally located close to Brisbane Airport with good connectivity to major arterial roads."

As the site was undeveloped, all aspects of the terminal needed to be constructed, both on land and in the water. The Port of Brisbane teams began onsite in November 2017 to start with the necessary reclamation and groundworks. To meet the required flood immunity levels, a significant volume of fill material (over 2m in some areas) was needed, and the subsequent ground settlement was a major challenge faced before construction could begin. Avoiding an underwater sewer main and negating the proximity to a nearby wastewater recovery centre were other hurdles overcome in the early stages.

Wharf construction commenced in early 2019 and reached practical completion in March 2020, while the terminal work itself began in

April 2019 and finished on time in August 2020, adhering to strict public health directives due to COVID-19 and importantly, supporting local construction jobs.

"The key concept was to design a dedicated fit-for-purpose cruise facility that focused on operational efficiency and passenger experience and was capable of servicing the largest cruise vessels in the world," Roy said. "The terminal was designed specifically to meet the needs of the cruise industry, so we consulted extensively with the cruise lines as well as others who will operate within the facility such as border agencies, transport/logistics operators and others to finalise the design."

Using pedestrian modelling software known as MassMotion, project designer Arup and its architect Arkhefield were able to design a facility to ensure the seamless and efficient movement of passengers between the vessel, the terminal and into the transport zones outside.

Considering the Brisbane International Cruise Terminal had received over 180 bookings for its first season pre-COVID, this optimised

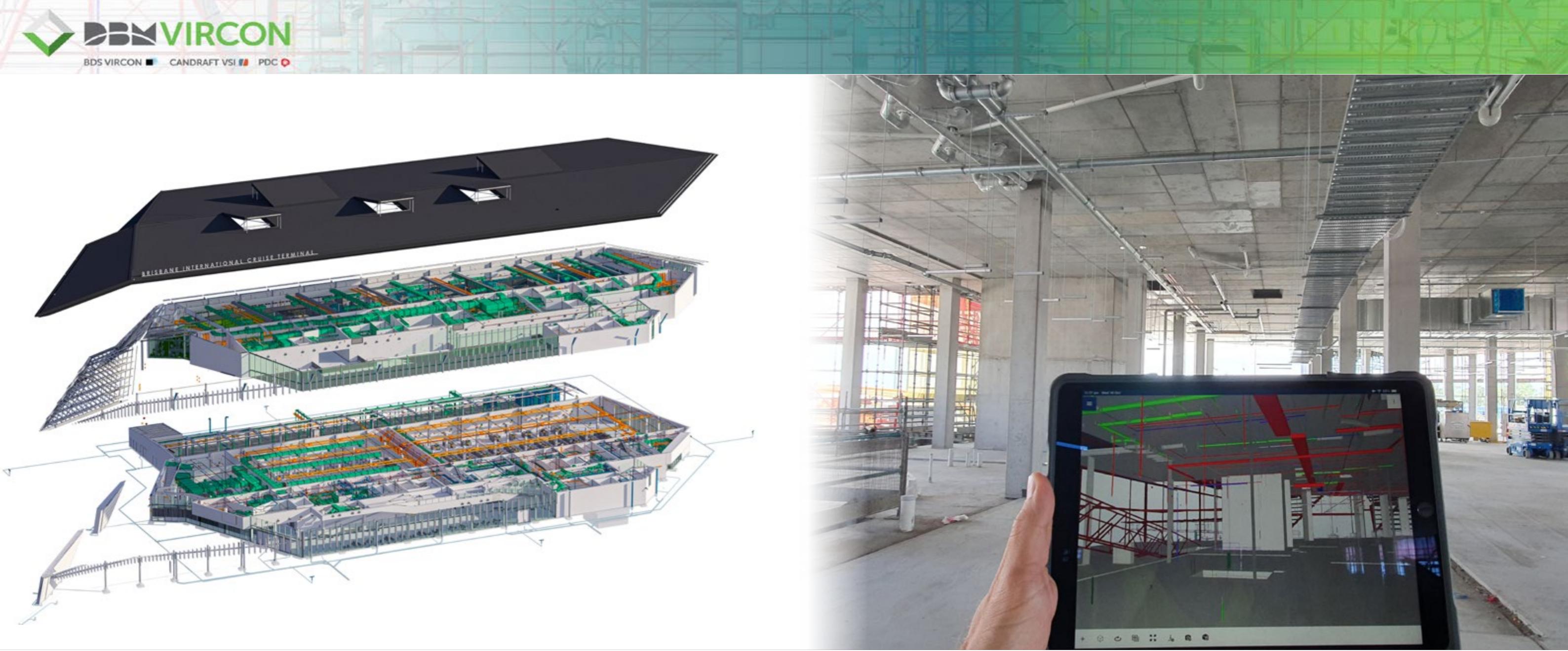
analysis is integral in creating a world-class experience for passengers. On average, the project has supported almost 250 jobs during every year of construction with over 450,000 man hours spent on the project, but more importantly, zero lost time injuries. "We've also delivered a number of project innovations including the installation of a 800kW solar shaded car park at the new cruise terminal. It will generate around 1,300MWh of power each year, the equivalent of powering approximately 106 homes," Roy said.

Within 20 years, the new cruise terminal will potentially triple Brisbane's cruise industry to support 3,750 jobs; bring over 760,000 visitors annually; and contribute \$1.3 billion in net expenditure into the Brisbane economy.

"We're building a piece of national tourism infrastructure that will be vital in helping the cruise industry to grow, playing a particularly important role in its post-COVID recovery here in Queensland."

For more information contact Port of Brisbane, 3 Port Central Avenue, Port of Brisbane QLD 4178, email info@portbris.com.au, website www.portbris.com.au





MAKING DESIGN CONSTRUCTIBLE

The new Brisbane International Cruise Terminal incorporates world class passenger facilities, and as the newest gateway to South East Queensland, will deliver a major long term economic boost to the region's growing cruise industry.

To aid the construction of the terminal, DBM Vircon were engaged to manage digital engineering on the project. Model production commenced in May 2019 and was originally focused on coordinating the work of different trades during the construction phase.

"We started by drafting a management plan to set the rules for the subcontractor models," said Gabor Gulyas, Operations Manager.

"The models we received from the subcontractors were then federated into a single model. We also provided some models to fill in the gaps of elements not modelled by the subcontractors, such as piling, subsurface utilities and topography."

DBM Vircon structured the models to enable automated federation and quality auditing, streamlining the model production and review process. The completed models were used to identify potential clashes and coordination issues on the project.

"We utilised a platform to identify issues, assign them to specific individuals and track them to completion. Results were represented in smart dashboards for ease of communication," said Gabor. "By collaborating to find potential issues before they occur we avoid the lost productivity associated with onsite decision making, demolition and rework."

During the project, DBM Vircon identified approximately 500 potential issues and 75,000 clashes which were resolved prior to construction, preventing potentially costly rework and avoiding the delays and indirect costs which would have otherwise resulted.

George Green, Services Manager of Hindmarsh, said "Thanks to the efforts of DBM Vircon the construction process was made much more efficient and we did not see any significant issues during construction."

As-built verification processes proved that the building was constructed within tolerance of the coordinated design, proving that conflict checking processes were efficient. This process ensured that the model can be used as an as-built digital representation of the terminal.

The digital model was also used to engage with Australian Border Force (ABF) during construction. "We created model views for every CCTV camera in the terminal," said Gabor. "ABF reviewed and commented on the camera positions so the design could be adjusted accordingly."

"The additional clarity and insights afforded to us by DBM Vircon's digital model gave us total confidence that the BICT project would meet our operational requirements," said a representative of ABF.

Other benefits of the digital model produced by DBM Vircon included:

- Views of the main passenger routes through the terminal were produced to improve wayfinding and make signage more intuitive;
- Installed elements were checked against the model using photo comparisons and laser point cloud surveys to confirm the construction was in accordance with the design intent;
- Maintainable asset information was stored in the model to enable future use of the model during the operational phase of the facility;
- 360 degree panoramic renders were produced from the model for marketing, stakeholder and public engagement.

With the successful completion of the terminal construction, the many benefits of digital model production became clear. "The production of the digital model by DBM Vircon helped us achieve a better and more efficient project with benefits not just during the construction phase but also moving forward into asset operation," said Peter Cane, Project Manager from Port of Brisbane.

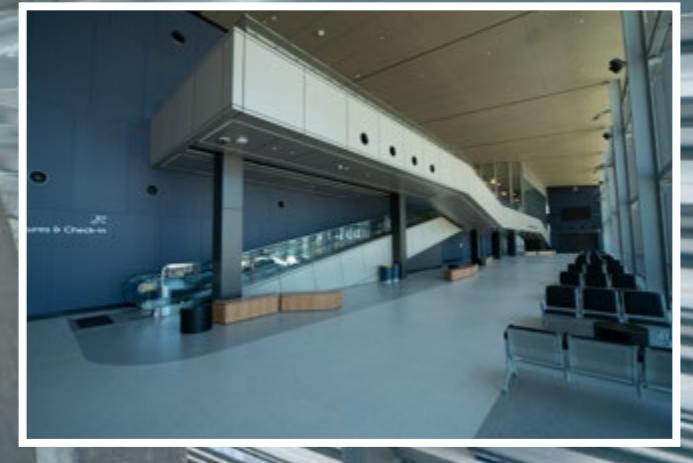
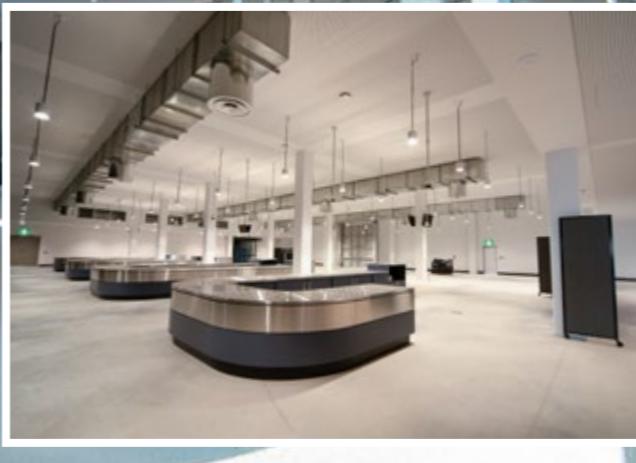
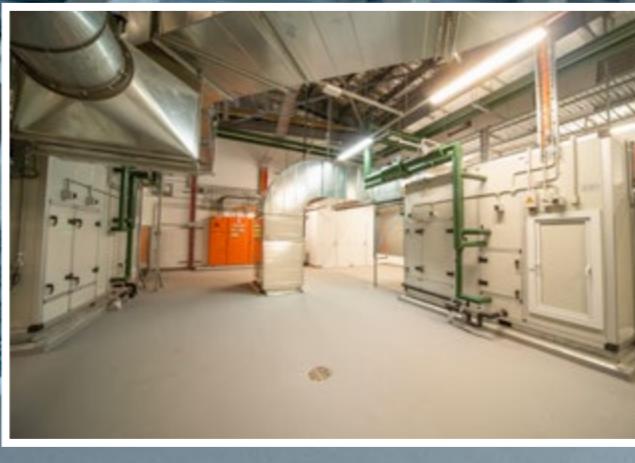
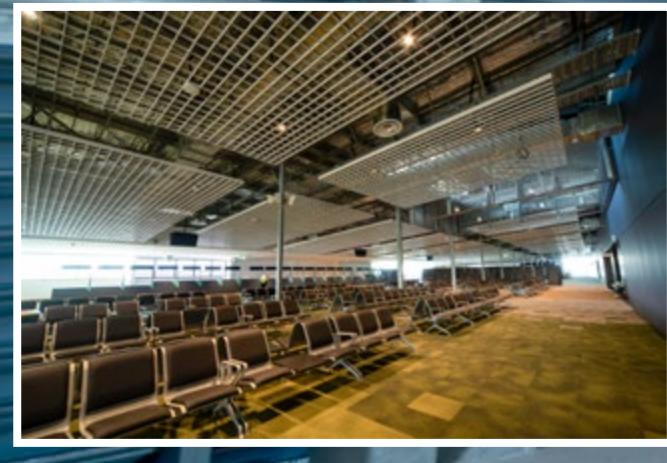
DBM Vircon is a premier construction modelling, detailing and digital engineering company. With 850 professionals in multiple locations worldwide, they offer an unparalleled blend of highly skilled experts and low cost resources. They excel at delivering projects across all industry sectors, producing value for deliverables in any format.

For more information contact DBM Vircon,
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Below BNE Air completed the HVAC systems for the building including building automation and the control system.

Below Flagstaff Consulting Group completed independent mandatory certification for the port including the Achievement of Practical Completion.



Specialising in the design and implementation of heating, ventilation and air conditioning, BNE Air have brought more than 100 years combined experience to the new state-of-the-art Brisbane International Cruise Terminal project. Providing the design and construction of the associated mechanical services for the development, they began in April 2019 by creating a system solution using the latest technology and efficiencies.

"The mechanical services undertaken included heating, ventilation and air conditioning (HVAC) systems for the building including building automation," said Construction Manager, Paul McTigue. "We have used the latest technology in energy efficiency for a building of this type. There is an energy metering system installed in the building to provide real time energy usage data to the end user."

Work commenced onsite in September 2019 with a trade qualified site team of 16 and was finished within 12 months. Holding numerous affiliations and accreditations on top of their expertise helped BNE Air to create some of the unique features of this world class international travel facility. "We had to work very closely with all stakeholders in developing the Australian Border Force fitout component of the project, which has a significant security component to it."

With a portfolio of work from high rise residential buildings, through to large scale commercial developments, and specialised government facilities, BNE Air have successfully completed projects in the education, defence, aged care, residential, commercial and accommodation sectors.

"We are currently undertaking another project with our valued client Hindmarsh called 14 Stratton Street, which is a 12-level commercial building located in Newstead. The development targets a >5 Star NABERs rating and in addition to the design and construction of the mechanical services, BNE have been engaged to model the energy performance of the building to ensure a minimum 5 Star NABERs rating for this development," Paul said.

As well as new builds, BNE Air's sister entity BNE Service, offers preventative and responsive services to maximise the life of existing HVAC assets, to complement and complete their capabilities.

For more information contact BNE Air, Unit 24, Burnside Road, Ormeau QLD 4208, phone 07 5563 2245, website www.bne-air.com

Flagstaff Consulting Group provides specialist project delivery and advisory services to the transport, marine, resources, water, health, education, building, finance, insurance and utilities sectors. They were tasked with completing independent certification for the Brisbane International Cruise Terminal development.

"The role of the Independent Certifier (IC) requires the validation of the developer's obligations," said Principal, Steve Abson. "For this project, those obligations originated from the Port of Brisbane's market led proposal and were documented into a Development Agreement. The key certification elements were the attainment of surcharge completion, the wharf structure, roads and carparks, and the terminal building designed to meet the required passenger flows."

"A key obligation of the Development Agreement was for Flagstaff to certify that Practical Completion had been reached, in accordance with a set of conditions precedent pre-agreed between the State of Queensland and the Port of Brisbane." Steve and his co-certifier Ben White commenced their engagement on the project in late 2018 under the tripartite agreement with the State of Queensland, the Port of Brisbane, and Flagstaff, maintaining open communication from the outset.

"The role provides a critical assurance function for both the State and Port of Brisbane and we adopted a collaborative approach from the outset." Steve said. "The Port of Brisbane provided regular progress and milestone updates to help Flagstaff prepare for certification, including on key elements such as the passenger boarder bridges (PBB's) that were sourced from Spain."

"There are many unique aspects of this new asset for the Port of Brisbane, which will cater for 300m length cruise liners holding some 4,400 passengers processed through a world class passenger terminal. The completed facility provides a terrific first impression to international visitors arriving in Queensland and the quality of the asset is testament to all involved," Steve said. "Our deep experience in major project delivery and renowned independence provided a strong platform for completing this important project role to both Port of Brisbane and the State's satisfaction."

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