ENGINEERS
AUSTRALIA

AUSTRALIAN
ENGINEERING
EXCELLENCE
AWARDS

ICONIC INNOVATION

Celebrating Extraordinary Engineering

AUSTRALIAN ENGINEERING EXCELLENCE AWARDS

WESTERN AUSTRALIA ENTRANTS 2018

AUSTRALIAN
ENGINEERING
EXCELLENCE
AWARDS

These awards recognise and promote new and innovative ideas that are brought to life in ways that bring fundamental change to our society.

WESTERN AUSTRALIA SPONSOR

WATER CORPORATION

OVERVIEW

Engineers Australia recognises outstanding achievement in engineering and the invaluable contribution engineering makes to the economy, community and the environment.

The Australian Engineering Excellence Awards (AEEA) inspire and encourage engineering distinction through teamwork, innovation, and technical excellence.

The AEEA is an integrated program resulting in awards at National level once local finalists are determined. To enter the AEEA, entrants are required to submit project nominations at the relevant local level, depending on the project's location.

Excellence, distinction, merit, perfection and quality are the characteristics that winning entries exhibit. View the 2018 entrants.

ENGINEERS
AUSTRALIA

Western Australia

712 Murray Street
West Perth WA 6005
1300 653 113

WESTERN AUSTRALIA
PRESIDENT'S MESSAGE

We look forward to hosting you at the West Australian Engineering Excellence Awards for 2018! The WA winners announced this evening will be Finalists for the Australian Engineering Excellence Awards being hosted in Sydney on 18 September.

The WA Engineering Excellence Awards recognise engineering projects from a range of sizes across the various sectors of our industry. We are celebrating the engineering effort of our engineers and their teams who have achieved engineering excellence through their ingenuity and strengths in problem-solving.

We acknowledge the effort of all of the entrants in firstly delivering these outstanding projects but then taking the time to make a submission. We value your contributions as we seek, through hosting these awards, to profile the highest achievements in engineering excellence across Australia.

We give huge thanks to all of our judges, led by Chief Judge Menno Henneveld for working through the many submissions and determining our WA winners and AEEA finalists.

Whilst there will be a number of winners announced tonight, all of our entrants demonstrated the high calibre of engineering that is being delivered in this state – we congratulate you all for your endeavours, passion and commitment as you strive for engineering excellence in all that you do.

James Westcott
FIEAust CPEng EngExec
NER APEC Engineer IntPE(Aus)
Western Australia President

CHIEF JUDGE'S MESSAGE

Welcome to the AEEA 2018 WA Division

It is with great pleasure that I welcome you to the Australian Engineering Excellence Awards for 2018. The AEEA Recognise and promote engineering inspired innovation that brings fundamental change to our lives, the entries this year fulfil this inspirational objective.

The judges were impressed with the wide range of entries and the world class innovations that were presented. Projects ranged from the creation of amazing technological advances, often by small Western Australian enterprises, to major, iconic infrastructure projects offering a range of public services. And a diverse spread of projects within this wide range.

Throughout the judging process Australian Engineering excellence was clearly present. It was pleasing to see a strong focus on sustainability, with most entries identifying the social, environment and economic impacts of the projects that were submitted. Many were able to demonstrate the improved sustainability outcomes arising from their projects.

Thank you for your interest in these Engineering Excellence Awards, and I know you will join with me in congratulating all the entrants for the quality and creativeness they have brought to these Awards.

Menno Henneveld
AM Hon FIEA, FATSE, FAICD
Chief Judge, Western Australian Judging Panel

JUDGING
CRITERIA

Actual or potential contribution of the work to the economy

Contributes to the local, regional or national economy by reducing whole of life costs or adding to the efficient use of existing engineering construction, manufacture, maintenance or application.

Impact of the work on the quality of life of the relevant communities

Contributes positively to the communities using it in respect of cost, time, environment or general amenity of the community.

Significance of work as a benchmark of Australian Engineering

Sets new benchmarks or continues current high standards thereby raising the standard and standing of Australian Engineering.

Extent to which the work represents world best practice

Can be matched against similar engineering achievements to represent world best practice.

Other considerations

The environmental impact of the work, the sustainability of the project and the work health and safety consideration. These must outline the effect on those directly or indirectly involved and members of the community in general.

JUDGES
2018

Andrea Sutton
FIEAust CPEng EngExec NER APEC Engineer IntPE(Aus)
Head of Safety and Security
Rio Tinto

Bernadette Cullinane
Partner, Consulting, Strategy & Operations Australian Oil & Gas Leader and Global LNG Leader
Deloitte Consulting

Brian Haggerty
FIEAust, CPEng, NER
VP innovation Capability
Woodside Energy

Matthew Cavedon
MIEAust, CPEng, NER
IPT-Lead WA Amphibious & Afloat Support
Department of Defence - Capability Acquisiton and Sustainment Group

Thank you to our panel of judges who generously volunteered their time and effort to review all entrants and select our finalists.

PROJECT ENTRIES

ADVANCED SUBSTRUCTURAL DESIGN AND CONSTRUCTION MENTORING OF CHURCH HOUSE

Advanced Substructures

Advanced engineering techniques enabled the completion of this award-winning project in the heart of Perth despite several unique site and design challenges having some deem the project "impossible" to build.

These challenges included iconic heritage listed buildings on two sides of the site, the need for continued access on the adjacent lane during construction, and a design calling for the two-level substructure to extend three and a half metres below the water table. The improved 'top-down' construction methodology – building atop and beneath a slab upon a diaphragm wall system – achieved all aspects of risk minimisation, cost effectiveness, community integration and design elegance while setting a benchmark for engineering excellence at a national level.

The substructure waterproofing (achieved without an external membrane) and distance of the diaphragm wall to the bordering heritage buildings also set new international standards for excellence and precision in this landmark construction.

AUBIN GROVE TRAIN STATION AND RUSSELL ROAD UPGRADE

Georgiou Group

Public Transport Authority

Main Roads WA

Officially opened in April 2017, the Aubin Grove Station was the first island rail platform to be built within a "live rail" environment in Western Australia. Scope of works involved construction of a new train/bus station, 2,000-bay carpark, upgrade of the Russell Road bridge and associated road works. The multi-modal interchange station involved:

- two 150-metre long island platforms;
- island platforms 10-metre wide;
- station entry buildings on both sides of the Kwinana Freeway; and
- footbridges from either side of the freeway linked to the station concourse located above the island platform between the tracks in the freeway median.

With a high level of complexity due to the challenging working environment, fast and relentless programme and complex stakeholder interfaces, the project was delivered within budget and to a high standard of quality.

BALCONI SMART TORCH - GLOBAL LIVE

Balconi Telecommunications

The Balconi Smart Torch (BST)- Global Live, is a portable in-field telehealth office with global coverage. It provides connectivity by internet, smartphone and two-way video conferencing. It is fully contained in a small case that can be checked in as carryon luggage and powered by its own included solar panels.

This newly developed technology provides remote and disadvantaged communities access to medical specialists globally, now for the first time the healthcare comes to the remote community.

Primarily developed for:

- Emergency Trauma First Responders
- Remote Face to Face Consultation General or Mental Health
- Remote Nursing Station Connecting to Hospital

It connects over Satellite, 3G, 4G and Wi-Fi.

The BST technical breakthrough is its ability to send and receive good quality video and audio over very small bandwidths with global coverage in a portable low-cost package.

These new abilities deliver unique operational and business advantages.

CARNARVON ENERGY STORAGE TRIAL

Horizon Power

GHD Pty Ltd

The Carnarvon Energy Storage Trial is the installation of a 2MW/2MWh Battery Energy Storage System (BESS) at Horizon Power's Mungullah Power Station in Carnarvon.

The primary objective of the battery is to provide spinning reserve for the Carnarvon microgrid to reduce fuel consumption and maintenance costs. Other benefits include delayed generation expansion and renewable energy smoothing.

The BESS has operated at up to a 90% reduction in fossil-fuel based spinning reserve, believed to be the highest microgrid reliance on a BESS for spinning reserve in the Southern Hemisphere at commissioning time. GHD undertook project EPCM services on Horizon Power's behalf.

DARUL HANA (HARMONY) BRIDGE

Fozdar Pty Ltd

KTA(Sarawak) Sdn Bhd

The form of the iconic Darul Hana (Harmony) Bridge was developed by Architect Ng Chun Chien and Australian Structural Engineer Kamal Fozdar.

In 2013 the Sarawak Economic Development Corporation awarded the bridge to a PPES/Naim JV with KTA(Sarawak) responsible for construction documentation.

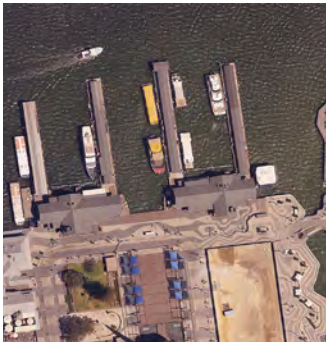
The two towers angled steeply away from each other, the cable network and the curved walkway all work together to create a structure that is dramatic and very economical. Even though the towers pull in opposite directions, by fine-tuning the walkway curvature and tower inclinations, the engineers were able to balance all forces and produce a structure where all elements are in harmony.

This form symbolises Sarawak – where wise leaders have brought balance and harmony to people of diverse races and enabled them to pull together to form a dynamic and prosperous society.

From afar the towers are reminiscent of hornbills, Sarawak's symbol of good fortune.

DEVELOPMENT, US CERTIFICATION, MANUFACTURE AND EXPORT OF THE SPOOKFISH 'BIGEYE' AERIAL CAMERA SYSTEM

InnovAero Pty Ltd



InnovAero and Spookfish have developed the Spookfish *BigEye* Camera System which is now in commercial service with one of the largest aerial imagery companies in the world based in Rochester, New York, USA. Deliveries to just the end of 2017 have a combined capture capacity exceeding 25,000sqkm per day at extreme resolution and world-beating accuracy. The *BigEye* system is manufactured in Perth using a world-class CASA-approved Quality Management System.

Systems are exported to the US, fitted to aircraft and commence revenue service with a combined CASA and FAA approval. This dual Australian and US approval was performed in accordance with the Bilateral Aviation Safety Agreement between the two countries. This product makes a significant contribution to Australian export earnings with significant opportunity for not only further sales of this and advanced derivative products throughout Asia, Africa and Europe, but also long-term royalty revenues flowing to Australia.

FREMANTLE TRAFFIC BRIDGE PILE ENCAPSULATION

Advanteering Civil Engineers

Advanteering Civil Engineers (ACE) was engaged by Main Roads WA (MRWA) to complete pile encapsulation of the piles supporting the four main piers of the Fremantle Traffic bridge with reinforced concrete – 113 piles in total.

Unique challenges and the nature of the project meant that each aspect and work process had to be carefully planned, implemented and improved to ensure the project could be completed successfully, on time and without safety or environmental impacts. Each of these challenges were overcome and the success of the project can be attributed to Engineering Excellence.

ISOPLAN - A DIGITAL ISOLATION PLAN SYSTEM

Momentum Engineering Pty Ltd

Mineral Blue Ltd

iSOL8 Pty Ltd

Sentient Computing Pty Ltd

isoPlan® is a digital process which enables users to generate "Lock Out Tag Out" task specific isolation plans directly from Computer Aided Drawings(CAD) and to store, update and publish isolation plans in a repository in the Cloud or behind users' firewall systems.

NEWMAN BATTERY STORAGE PROJECT

Alinta Energy

The project encompasses development, design, construction, commissioning and testing of a 30MW / 11.4MWh Battery Energy Storage System at Alinta's Newman Power Station in the Pilbara region of Western Australia.

One of the world's largest battery energy storage system projects, its innovation is that it is the first, as far as can be determined, utility-scale battery energy storage systems to provide grid-forming services on a high voltage network.

This capability makes it not only the largest, but the first battery energy storage system globally with the capability to support a high voltage network on its own – using no other sources of generation to support the network. Representing a significant milestone in electrical engineering, until this project, conventional thinking was that electrical networks must have thermal generators online and operating to provide the required inertia to support the network. This is no longer the case thanks to battery and inverter technologies.

NORTHLINK WA SOUTHERN SECTION: GUILDFORD ROAD TO REID HIGHWAY

John Holland
Main Roads WA
Aurecon

NorthLink WA Southern Section provides a freeway-standard, free-flowing link from Guildford Road to Reid Highway via the Tonkin Highway including:

- An upgraded Tonkin Highway with six-lanes between Guildford Road and Reid Highway.
- A new interchange at Collier Road.
- A new interchange at Morley Drive. This includes a roundabout at ground level that connects with a raised Tonkin Highway - the first interchange of this type in WA.
- A flyover at Benara Road over Tonkin Highway.
- A four-metre wide principal shared path alongside Tonkin Highway.
- Once all sections are completed, NorthLink WA will provide a vital, state of the art transport link between Morley and Muchea and will:
- Provide a non-stop transport route between Morley and Muchea.
- Increase road capacity to improve journey times and productivity.
- Improve amenity in local communities by reducing congestion on local roads.
- Save lives by eliminating four of the State's top 15 most dangerous intersections.

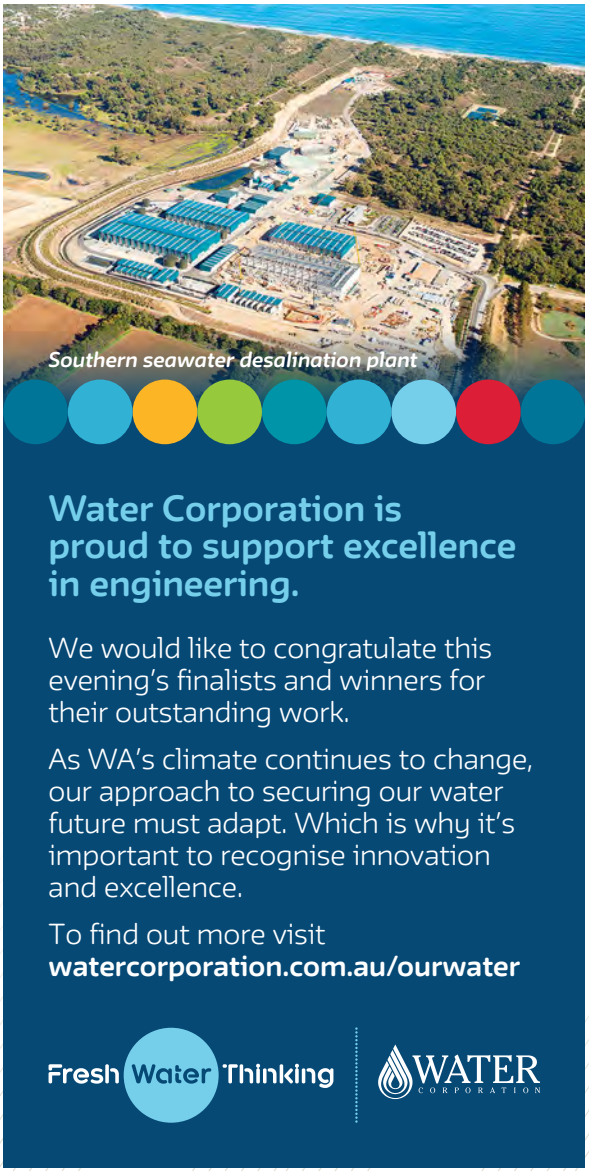
OFFSHORE WIND FARM STRUCTURAL RISK BASED INSPECTION PROJECT

Atteris

The number of offshore wind farms in the North Sea has increased exponentially. Prescriptive inspection strategies result in high operations expenditure that impact bottom-lines and economic and environmental sustainability.

Atteris used our engineering expertise from the oil and gas industry to develop a custom risk-based inspection methodology and software tool for offshore wind infrastructure. Whilst papers have been published on the topic, ours is the first to be implemented. The North Sea operator Ørsted, had sought our technical expertise when they were unable to source a regional solution in Europe.

The benefits of the RBI program include an increased focus on proactive risk management, reduced asset life-cycle costs and maximum economic recovery. This project demonstrates Australian engineering ingenuity and capability in an emerging energy industry. The project was executed remotely from Perth and succeeded because a collaborative engineering approach was adopted that bridged distance, cultures, industries and time zones.



OLD MANDURAH TRAFFIC BRIDGE REPLACEMENT PROJECT

BG&E Pty Limited

Georgiou Group

City of Mandurah

Main Roads Western Australia

The Old Mandurah Traffic Bridge was deteriorating rapidly and needed replacing. The crossing bridges the narrowest section of the Mandurah Estuary, a major recreational resource that connects the Indian Ocean to the Peel Inlet, in a prominent location, creating an iconic landmark for the City of Mandurah, Western Australia.

The primary project objective, articulated in consultation with the community, was to provide a high quality new bridge that celebrates the historic and cultural significance of the site, via a contemporary structure that delivers efficient traffic connections and creates an active, welcoming place. A unique curved soffit cross section was developed for 243 m long incrementally launched bridge over Mandurah Estuary, resulting in a cost-effective landmark structure with a strong aesthetic appeal. Additional features include 5 m wide lower level shared path that allows improved pedestrian experience and desired connection with water, fishing platforms, enhanced lighting, public art and landscaping

OPTUS STADIUM

MakMax Australia

Optus Stadium is a world-class five-tiered stadium that boasts a custom tensile membrane canopy roof. MakMax Australia delivered a distinctive roof design structure that incorporates a lightweight tensile membrane which has been installed to the underside of the trusses which cantilever towards the centre of the bowl and provides a clean soffit to the roof plane. This arrangement, gives the appearance of the roof 'floating' above the façade and seating bowl which with the light reflective qualities of the roof material, when artificially lit at night, is suggestive of a "halo".

OPTUS STADIUM AND STADIUM PARK

Arup

Arup delivered engineering and technical services including civil, geotechnical, structural, façade and traffic engineering, pedestrian modelling and pitch design for the development of the Optus Stadium and Stadium Park.

PERTH CITY LINK BUS PROJECT

BG&E Pty Limited for the City Busport Alliance

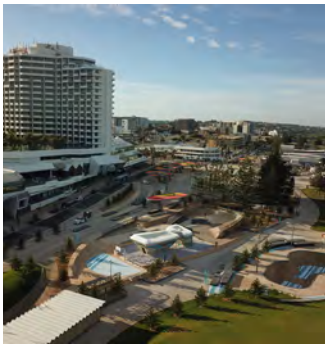
The new state-of-the-art Perth Busport, which has been delivered as part of the Perth City Link Bus Project, was constructed as a second stage of the Perth City Link Project.

The underground Busport with a footprint of approximately 10,000 square metres with three above ground entry portals facilitates uninterrupted traffic and passenger access from the ground level. In addition, the project includes construction of a 250 metre long Wellington Street bus second entry tunnel, connecting the Busport to Wellington Street and fitout of the first Milligan Street bus tunnel. The new bus station has delivered an Australian first dynamic stand allocation system providing a user experience more akin to an airport departure lounge than a traditional bus station.

BG&E and Brookfield Multiplex are non-owner participant members of the City Busport Alliance (CBA), which also includes asset owner Public Transport Authority WA.

SCARBOROUGH REDEVELOPMENT

Georgiou Group



In January 2017, Georgiou was awarded the Scarborough Beach Redevelopment Project, valued at circa $50M. The project team redeveloped a 980-metre stretch of public domain area within the iconic Scarborough Beach in Western Australia, overcoming staging challenges and community backlash to revitalise the area.

This project has built on its unique identity to create a diverse destination that complements the beachfront and broadens its appeal to visitors, residents, workers and commercial investors alike. Now a contemporary beachside destination, alive with restaurants, cafés, shopping, entertainment and programmed activities, Scarborough now lives up to its potential as one of WA's top tourist destinations.

SMART ENERGY LABORATORY

School of Engineering, Edith Cowan University

The Smart Energy Laboratory in the School of Engineering at Edith Cowan University demonstrates a new way of providing facilities for teaching, research and industry engagement into renewable energy technologies. It offers a cost effective approach to facilitating a wide range of experiments, demonstrations and opportunities for research projects that can be effectively shared across multiple concurrent users.

The Executive Dean of Engineering, Professor Daryoush Habibi explained that "The flexibility of the Smart Energy Laboratory allows the School to offer a cost effective solution to providing exposure to industrial strength laboratory facilities for both undergraduate teaching and more advanced industry-based research and development projects. It represents a further commitment by the School to provide industrial strength teaching and research facilities".

SUBSEA ROCK CUTTING TOOL

in2Dredging Pty Ltd

The Subsea Rock Cutting (SRC) tool estimates cutting production for dredging or mining equipment that mechanically cuts rock in a subsea environment. The program uses a finite difference model, which accurately simulates the cutting equipment's three-dimensional teeth trajectories and their interaction with the rock face.

At the heart of SRC there is a unique empirical rock cutting model that has been developed using decades of literature and physical and numerical modelling, and has been validated with field measurements.

SRC calculates the resultant force on equipment thus allowing the identification of all production limitations. For example, the production of a cutter suction dredger is usually limited by its cutter power. However, in rock, often the ladder weight, spud pole or side winch may also limit the production due to the resultant cutting force. To design high performance cutting equipment it is essential to calculate the resultant force reliably, so that any additional components added to the cutting equipment can counteract the resultant cutting force and achieve the production rates foreseen in feasibility studies.

Cutting rock is a complicated physical process and many physical cutting models exist that describe the cutting processes for various applications. With SRC, only the most significant rock properties are used as input parameters, which provides a more accurate production estimate.

THE COMPOSITE COLLECTION 2016-2018

Capital House Australasia

Fibre Reinforced Polymer composites structures in art, architecture and infrastructure. A body of work completed during the past two years has significantly advanced the effective application of composites technologies and set new benchmarks for Australian and global engineering excellence in this field.

State-of-art outcomes have been achieved in the following iconic works;

- Major Pavilion
- Convergence Sculpture
- Large Golf Club Canopy,
- Patented Universal Pedestrian Bridges
- Sydney 'Cloud Arch'

A variety of framing, manufacturing methods and material specifications have been employed to unique and innovative effect to produce commercially competitive solutions that open the way for new engineering and manufacturing export opportunities.

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