

THE *Fleetwood*
Challenge Cup

in association with



The Challenge Cup 2021 Awards

Presented by

FLEETWOOD
AUSTRALIA



Welcome



As the peak body for Australia's off-site construction industry, we are delighted to partner with Fleetwood Australia once again in creating and delivering the 2021 Challenge Cup. We are passionate about the growth of prefabrication and that the broader construction industry is now embracing off-site manufacturing technology and design, that is clearly the future of the industry.

In partnership with Fleetwood Australia, we had the ambition to create an event of significance. To do that, we had to make sure we had an eminent Judging Panel. For the second year running we have attracted some of Australia's leading professionals from the architectural, engineering, science and innovation sectors and I thank them for their professionalism, commitment and passion in supporting the Fleetwood Challenge Cup in 2021.

The Challenge Cup a wonderful opportunity to encourage emerging talent and this is our way of supporting a new generation of young AEC design professionals. We have no doubt this cohort will play an important role in the future of the industry.

We congratulate all of this year's entrants for their hard work and dedication. I would like to add our thanks to the participating Universities. Your involvement has helped us to create a design competition of the highest standard and we were overwhelmed by the calibre of entries submitted this year.

In closing, my thanks also to the team at prefabAUS and Fleetwood for bringing the Challenge Cup to life. We look forward to many more years of partnership to further develop the Australian construction industry.

Damien Crough
Executive Chair,
prefabAUS



Fleetwood Australia is very proud to be the naming rights sponsor and joint co-founder of the Fleetwood Challenge Cup in association partnership with prefabAUS.

The 26 amazing entries in the 2021 Fleetwood Challenge Cup are the culmination of a second successful year's planning and organisation to deliver an inter-University challenge that is fostering the talents of our next generation of built environment professionals.

At Fleetwood Australia, we believe innovative design and offsite manufacturing is the future of our construction industry. We are excited to be playing a leading role in encouraging emerging design, engineering and construction professionals to not only embrace pre-fabrication, but to use it in a creative and practical way to address the challenges our industry faces.

We would like to thank our leading Australian Universities for participating in the 2021 Challenge. To the students themselves, thank you for your hard work, creativity and ingenuity. It has been a wonderful experience to witness first-hand the extremely high standard of entries and I feel reassured that in the years to come, the industry will be in very safe hands.

My congratulations to all the entrants for completing the Challenge, which is no easy task, you are all winners for reaching the finish line!

On behalf of Fleetwood Australia, I hope you found the experience worthwhile and I wish you all the very best with your future careers.

Bruce Nicholson
Chief Executive Officer,
Fleetwood Australia

Our thanks

University Partners



Judging Panel



Laurence Robinson
Director
Brand Architects



John Lucchetti
Principal
Stantec Australia Pty Ltd



James Murray-Parkes
Engineering consultant



Martin Luoni,
Senior Structural Engineer,
Arup

Curtin University – Finalist

Fremantle Springs

Project

Fremantle Springs

Submission Extract

The project seeks to respond to the neglected abandonment of the Fremantle heritage by proposing a small-scale mixed-use development that establishes a connective core between Fremantle's forgotten heritage and the principles of natural living. The concept of connecting the core envisions architectural design strategies as a means of activating a common shared space, revitalising the lost spirit of Fremantle through flexible living, communal playgrounds and organic retails. The three storey mixed use development named Fremantle Springs adapts to flexible modular design that utilises a steel framework construction methodology followed by the adaptive reuse of on-site existing materials such as bricks and timber. The effective use of these light-weight materials promotes sustainability factors that contribute to providing the economy with portable and affordable units for all demographics. As most modularity typologies come in forms of linearity, Fremantle Springs aims to challenge design norms by providing residents with organic forms of communal and balcony spaces that increase natural biodiversity and biophilic principles. The modular design approach in connecting the core through heritage and organic ideologies is self-sustainable and adapts to future design by gaining flexibility in terms of attachment and detachment of lightweight cladding and structural steel framework.



Curtin University





Deakin University – Finalist

Think Tank

Project

Think Tank

Submission Extract

This design purposely demonstrates insights into constructing a mixed-use, prefabricated space displaying unique educational & experimental dimensions. Designed, in part, as a modular residential apartment, the structure transforms an existing warehouse at the Geelong CBD into student focused single and double-bedroom units, coupled with a ‘Think Tank’ for development of marketable products and ideas. In the residential structure, CLT modular units are stacked one upon the other and bound by a strikingly visual tectonic architecture design of steel columns and beams. The facade feature introduces a contextually relevant kinetic and modular glass structure alongside a green wall that not only defines the aesthetics of the building, but enhances its sustainability and energy efficiency. Through intuitive use of materials and structure, an existing warehouse is thus transformed into a space carefully zoned to include a publicly accessible discussion café, a production area where new ideas may be shaped through 3D printing, soldering stations, software support, sculptures, paintings and a range of presentation and meeting rooms. The Think Tank zones push through to profitability and social uptake goals via a retail space, where ideas are brought to life and the workshops may be marketed and trialled through exhibition, a space operationally concurrent with a University Name.





Curtin University – Finalist

Asian Persuasion

Submission Extract

The development of prefabrication has ensured safety and low cost in increasingly overcrowded cities. Over the past five years there has been an attempt at spreading the use of recyclable and environmentally-friendly, low cost and rational houses, apartments and offices, which doesn't need to limit the space of these pre-fabricated buildings as they seemingly integrate into the urban fabric. The use of recyclable materials, unit construction and environmentally safe equipment is slowly taking over, which means that it's time to adapt to global changes and ensure resiliency in the built and natural environment. Testing and implementing innovations in building techniques ensures that pre-fabrication is safe and environmentally friendly and allows for a diversity of demographic.

The project's modular apartments are designed to accommodate a broad demographic. The ground floor is activated by the diversity of land use, combining commercial and residential areas. This includes a Heritage Market space, click and collect and a 24-hour mini mart. Having a 24-hour retail store open, people are aware that somebody is always awake and watching, acting as natural surveillance. The feeling of "safety" in your own home or neighbourhood is vital for creating communities. The second floor and third floor are a mixture of one- and two-bedroom apartments and the fourth floor accommodates 4 x one-bedroom apartments and a shared garden space; a meeting place or a place just to relax.

As a team we asked ourselves, "how modular can we go?" as we wanted to test the boundaries to make modular buildings even more convenient so they can adapt easily to the space or stored and used in times of emergency. We designed one single module, of which there are two formations. When the module is closed it's 14000mm wide x 5000mm depth x 3900mm height, as a rectangular box. When the module is open the elongated side wings extend out, supported by a hinge column on both sides that allow for the wing to be expanded and folded. There are four hinge columns in the four corners of the rectangle supporting the main timber frame. Both CLT and GLT are used. The module was designed as per truck dimensions, so it can easily be transported to and from the site. The hinge column and retractable wing allows for convenient transfer between construction sites. The module is constructed with circular economy materials like CLT beams and GLT columns that are connected using bolted plates.





Curtin University – Finalist

Curtin Team 15

Project

Shipping House

Submission Extract

The prefabrication module for housing is greatly popular in Australian design strategies for the adaptive reuse and extensions to modular housing. However, there are two main issues with the current designs - size limitation and the transportation of modular housing to the inner city. In addition, the constant need for upgrading and improving waste in home construction projects is also critical. With the high impression of the industrial urban space of Fremantle, especially the existing warehouses, the reuse of existing frames of heritage buildings for housing demand should be considered as one of the core concepts of the project as it will maintain the cultural integrity of the city and the industrial design heritage as well as promote economic value to future development in Fremantle. This research focuses on design solutions for re-using the envelope of the existing building to reduce the cost to the client and the benefits of modular construction, including compact design, ease of storage, transportation and re-use.



Curtin University





Curtin University

Team 8

Project

Inside Out

Submission Extract

Inside out (adverb)

1: *in such a manner that the inner surface becomes the outer*

A sustainable response towards an adaptive reuse of an abandoned warehouse into a residential and mixed-use area by bringing the outdoors in & taking the indoors out. Defining its spaces to foster environmental, economic and social sustainability, this project aims to focus on passive design principles, the circular economy, biophilia and constructability in its design and construction.

It aspires to retain the warehouse's original structure and heritage facade to preserve its historical connection while it paves the way for a new build of modular apartments and student accommodation to adapt to its changing need. Nestled in a vast industrial setting of warehouses, the design aims to incorporate an enriching sense of nature to soften its industrial environment and at the same time foster a sense of community for its residents. Hence, bringing the outdoors or nature inside and encouraging community interaction by taking the inside outside. Striving for user comfort and value for money over time, it applies constructability in its modular construction which can function either collectively or separately, bringing together a sense of being one with nature and the community in its form and function.





Curtin University

Team 6

Project

Prefabricated Mixed-Use Development

Submission Extract

This project explores the potential of combining offsite manufactured solutions with adapted existing structures to deliver a mixed-use development that improves long-term asset performance.

The proposed stackable modular system is merged with an existing brown-field warehouse structure to achieve a design that celebrates the heritage of the site whilst creating a development that is affordable, adaptable, and transportable. The concept acknowledges the clear benefits of design for manufacture and assembly (DfMA), with a prefabricated modular system that works alongside several additional prefabricated components to achieve a development that can be disassembled piece by piece.

The team employed a hybrid steel and timber structural system for the project, which combines a stronger steel framework with in-fill timber CLT panels that allow for a simpler design with minimal bracing requirements. Steel-timber composites increase efficiency of moving, lifting and placing modules and can significantly increase the speed of construction. The modular apartments further focus on effective layouts that allow for ease of vertical expansion and stacking flexibility to ensure future developments can meet any site restrictions.

Overall, the project pulls away from the classic compact building mass and achieves a prefabricated development that supports circular economy, passive design, everyday engagement and pleasant environments.





Curtin University

AMS Designs

Project

Modular High Rise Apartment

Submission Extract

This project is intended to deliver a mixed-use innovative, affordable and transportable housing design for a brown-field site, somewhere in Australia, currently being used as a storage facility by a demolition contractor. The core principles driving this design are adaptability, sustainability and transparency in design.

Adaptability is achieved through the adaptive-reuse of an existing warehouse on site, that is to be transformed into a self-contained 6-bedroom student apartment set with a shared kitchen, laundry, communal lounge and maker-space. Sustainability is achieved through the use of eco-friendly building materials such as cross laminated timber (CLT), structural insulated timber panels (SIPs), pre-cast concrete panels using earth friendly concrete (EFC™) and cold formed steel (CFS) beams and columns. In addition, the innovative design takes advantage of the prevailing winds to serve as passive cooling through cross-ventilation and using the building itself as a 'self-shading' device to protect adjacent floors from the harsh sun. Transparency in design is exhibited through materiality, with the use of exposed materials such as timber trusses, exposed footings, bricks, un-clad walls and polished concrete. The design also incorporates the use of recycled bricks and trusses, available on site to validate the sustainable design principles.

This proposal endeavours to express the benefits of modular, pre-fabricated dry-wall construction techniques which involve off-site construction of modules and delivery to site as a complete-built unit (CBU) or flat-packed systems, fabricated off-site and assembled on location, using the bolt-down construction technique. Modular prefabrication has been documented to improve the efficiency, predictability of construction and worker safety whilst reducing construction costs incurred through disruption and material waste, making the project more economical than traditional building methods.





University of Queensland

Carp

Project

O-Hub

Submission Extract

The O-Hub is an adaptive reuse project of the warehouse, based on the fundamental value of circular economy and the response to sustainable theories. Four design principles with design PH analysis have been applied to this project, enhancing the design of each stage. A courtyard is designed in the centre of the project that aligns with the existing structure, filtering in natural light and better ventilation to the programs based in the centre as well. Other than the courtyard, roof gardens have also been designed for residents to chill out. Innovative ideas such as the reused bottle pergola is integrated into the roof garden shading. Residential units are located on the south side of the building, with facilities including a gymnasium and bike storage on the ground level. On the north side of the project, commercial retails and 3D print workshop are placed facing the main street, with the perspective view from the roads and neighbourhood.

The project includes innovation in the form of a water collection system and water tanks for water recycle and reuse, contributing significantly to the circular economy. Solar panels have also been included for the regeneration of electric power from natural resources and integrated 3D-printing technology for interior wall cladding and partition. All the design considerations are aimed at making the O-Hub a destination for creative and residential community gatherings in the district.





Curtin University

Group 5

Project

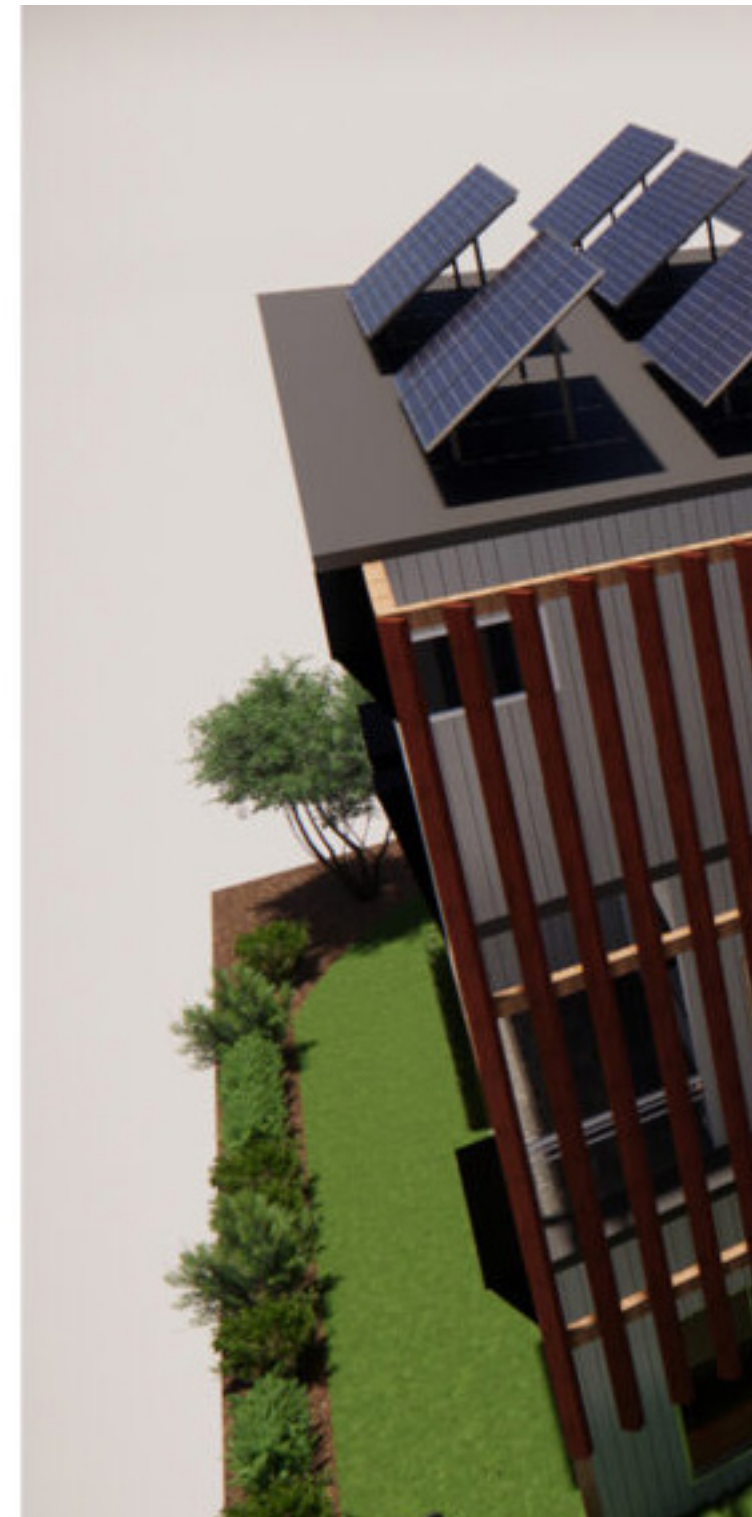
The Interchange

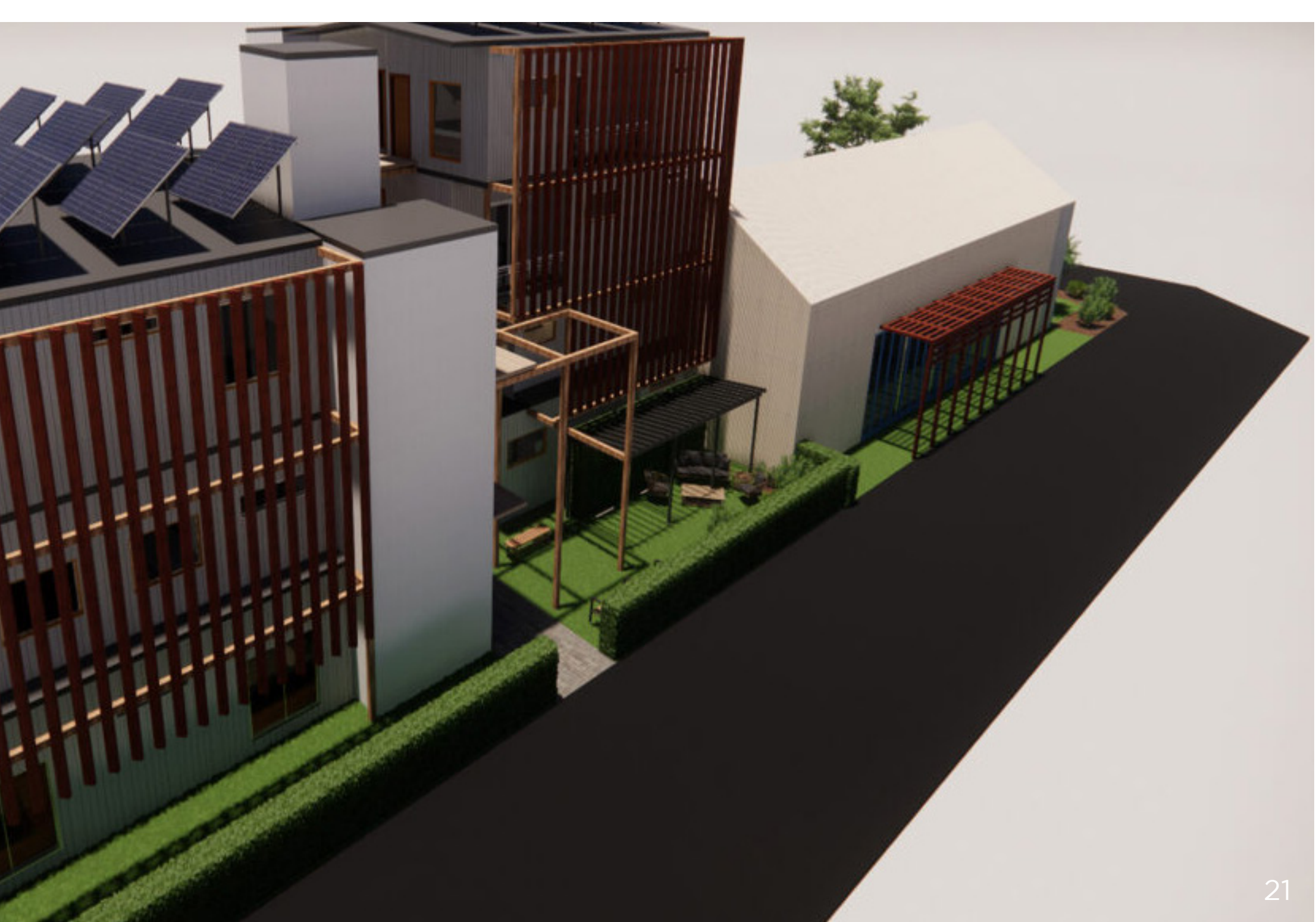
Submission Extract

The interchange is an approach to modular housing where the apartment complex can adapt to any site through a kit of part design, that also interjects the site with a new atmosphere to improve client and community value. The proposed site is a flattened 1,384 sqm site that is currently devoid of vegetation and contains a heritage building that captures Fremantle's identity and character. In this proposal, the modular design has been arranged to wrap and connect the modular mixed-use housing to the heritage building. By re-purposing the warehouse into a communal space and convenience store, the site begins to integrate the established community of Fremantle to the public aspects of the site, providing a space for residents and the broader community to come together. In addition, as you transition into the private aspect of the mixed-use development, occupants are exposed to the re-established West Australian native landscaping, to create a more natural atmosphere that was lost in the development of the city. Contained within this landscaping are the modular apartments that are designed as a modular frame that has an adaptable layout. The modules create small yet comfortable liveable apartments, that mixes the apartment typology to give an equitable living situation to all residents.



Curtin University





Curtin University

Team 9

Project Connect

Submission Extract

Occupant wellbeing, community value, as well as circular economies are fundamental concepts of our project. The design aims to focus on community engagement as well as privacy when required. The heart of Fremantle and its heritage are captured on site through the integration and play of materials as well as residential occupancy. Through the wrapping of the design in an open grid, vegetation grows freely through the site, acting as a way-finder and creating peaceful community spaces. The construction of the apartments being modular and robust as well as focusing on adaptive re-use, the speed of construction and the ability to scale the designs to fit on any site. As the modules have clip on - clip off facades, they are able to be adjusted despite the location of the site. The site's approach begins with a large open cafe with the warehouse being stripped back to an open skeleton. The design also provides features such as study spaces, click and collect and the utilisation of fresh cafe produce to transform the space into a community market. The modular apartments aim to be as environmentally sustainable as possible, focusing on the lifecycle of materials. The modules are produced out of CLT timber frames and weathertex cladding. The red brick on site, together with the timber are used to renew the warehouse as well as to create timber facades and flooring. The plates of the terraces are modular, allowing the terraces and outdoor spaces to be moved around if need be. This project was designed to ensure the site stays true to the context of Fremantle retaining its heritage and whilst enhancing materials near the site through the use of modern materials.





Curtin University

InterDesign Studio

Project

Mixed Use Residential Hub

Submission Extract

The core concept of this project is to explore self-sustaining adaptive reuse by reimagining the design of a mixed-use residential space. Through the creative design process, we endeavour to discover routes of community engagement to encourage interaction. To provide better living, working, learning and health outcomes, certain strategies have been implemented derived from the site analysis.

The existing warehouse structure and heritage element are considered as an opportunity and therefore, most of it is maintained and repurposed for a community-led and high stimulus space consisting of a cafe and restaurant, convenience store and a click and collect proposal to be an expansion for Stackwood to operate. In addition, the existing boat half-built on-site is modified to serve as an outdoor cafe / restaurant as well as a communal space. Utilising the boat on site, beside being a unique design proposal, contributes to the heritage character of the site, which was originally used for boat construction and mechanical services. The proposed residential development is privatised. However, it provides spaces for interconnectivity and interaction with the broader community. The project is developed in a way that considers circular economy, modular and mobile construction to allow for greater flexibility in the future whilst retaining the extraordinary heritage characteristics of the site.



Curtin University





Curtin University

Stack Team

Project

Affordable Modular Housing

Submission Extract

This design's vision is to provide spaces that unite the community and enhance the resident's quality of life, with minimal environmental disruption over the project's lifespan. All apartments have been designed with a connection to nature by maximising natural light and passive ventilation, to improve residents overall mental and physical wellbeing. The principles of the circular economy have been embraced, with an existing warehouse being converted into a commercial space and surplus materials such as bricks and timber that are already on site, being re-used to construct paths and other facilities. A communal vegetable garden has been provided to allow social interaction between residents, whilst teaching the principles of sustainability. Innovative modular construction techniques reduce the project's overall cost whilst respecting the environment.

The residential spaces are constructed with Glulam beams and columns, cross-laminated timber (CLT) flooring and a combination of CLT walls and stud-framed walls, to provide a sustainable alternative to traditional building materials. Surefoot footings were also chosen to minimise the physical and environmental footprint. The use of adhesives has been avoided to ensure modules can be disassembled and materials reused at the end of the project's lifespan. North-facing solar panels reduce energy consumption over the building's lifecycle.



Curtin University





Curtin University

Team 14

Project

Communal Interaction

Submission Extract

The project explores the opportunity of activating the place “12 Stack Street, Fremantle” through social and communal interaction. The vision of our project focuses on creating a platform for people to interact. ‘Connectivity and Liveability’ are at the heart of the design. The design follows the concept of “Designing from inside out by bringing the outside in” (Duffy 2019). The existing warehouse has been transformed into public zoned spaces including boutique restaurants, click and collect retail and grocery stores. The liveability aspect is captured by integrating open space within the built environment, attracting people to achieve social cohesion and the green courtyard spaces will create a communal area. With this in mind, the student accommodation is zoned on the ground floor of the accommodation block, giving them more access to the communal area. The built-to-rent two-bedroom apartments consist of a great balcony space facing the communal area. On the other hand, the private balcony spaces for in-house residents are zoned towards the northern edges, which will provide them with ample sunlight and privacy in the accommodation block. The connectivity aspect can be seen in the communal and first floor levels while the first floor of the built space is also connected with walkways. The roof level of the warehouse is transformed into a community farming area that will provide the community with strong communal activity.



Curtin University





Western Sydney University

Go Western Developers

Project

Kamballa Village

Submission Extract

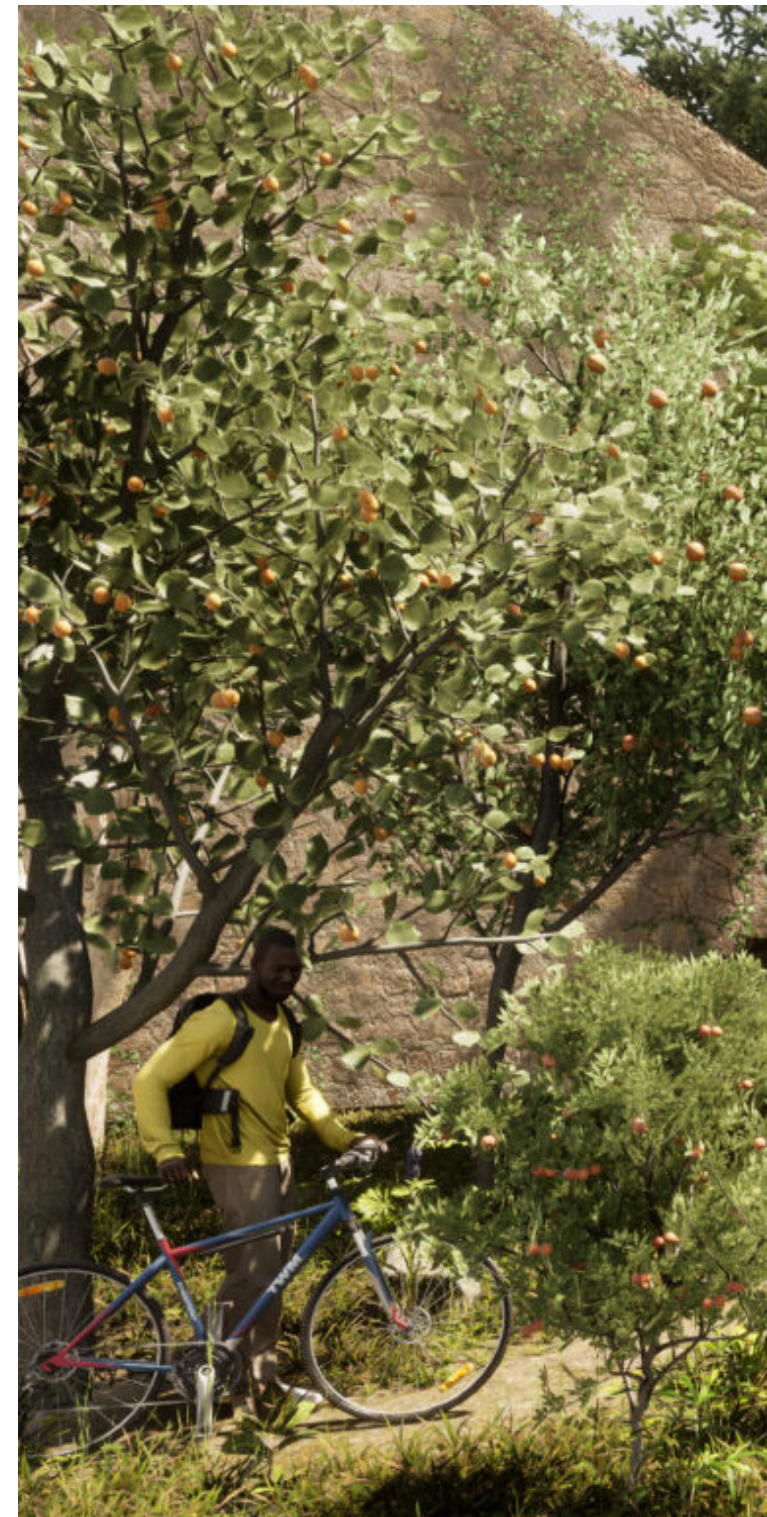
The Challenge Cup brief required adaptive re-use of a brownfield site with 14 units. A heritage precinct with granted land chosen was the Norma Parker Centre/Kamballa in Parramatta, NSW, to achieve affordable urban density living close to transport. The project development went along with the following incentives to achieve the design aim that is a combination of affordability and maximised joy.

Incentive Programs

1. 'The Plant and Harvest Program' and a common kitchen for the tenants to socialise while preparing the collected food.
2. A modular design lego piece placed together on top of each other brings a merge of villages and a community/neighbourhood atmosphere to the proposed site.
3. A bespoke cafe facing the Great Parramatta River, offering a panoramic view.
4. Ground-level retail tenancy program, which includes 'click and collect' convenience store.

The outcome from the multidisciplinary team, the Kamballa village concept is an all-encompassing building system that's economic to build, offers affordable rent and most importantly, community focused. Bringing the community together, to create a village atmosphere where people can meet and socialise while collecting their fruit and vegetables.

This is achieved by using prefabricated construction, lean management using Design Manufacture & Assembly (DfMA), panel-up modular construction prefabricating fast and affordable 8+ star energy rated, and the teams use of sustainable design/technology





Queensland University of Technology

Team 1

Project

The Commons

Submission Extract

The Commons is a proposal for John Dalton's former Student Residences. It utilises modern technologies in the application of a modular Cross Laminated Timber (CLT) prefabrication construction method. With cost as a driving factor, the Residual Land Valuation report indicated that CLT saves 18% in construction costs and land interest rates as compared with traditional building methods. The architectural intent was driven by the values reflected in Dalton's original design coupled with findings in economic analysis of the surrounding context of Kelvin Grove, to provide a program that directly serves the needs of the wider community. The resulting proposal is a mixed-use, loose fit residential lot, catering to a wide demographic of possible tenancies, both commercial and residential. All apartment layouts are repeatable to optimise modular construction. In terms of fabrication, adaptive reuse of the site has been approached using an entirely prefabricated Cross Laminated Timber solution. This approach meets the conservation guidelines for the heritage-listed property. A complete construction program has been presented in addition to a manufacturing, methodology and material handling plan. In all, the transdisciplinary approach across architecture, construction management and property economics allowed for a unilateral approach to synthesising design solutions



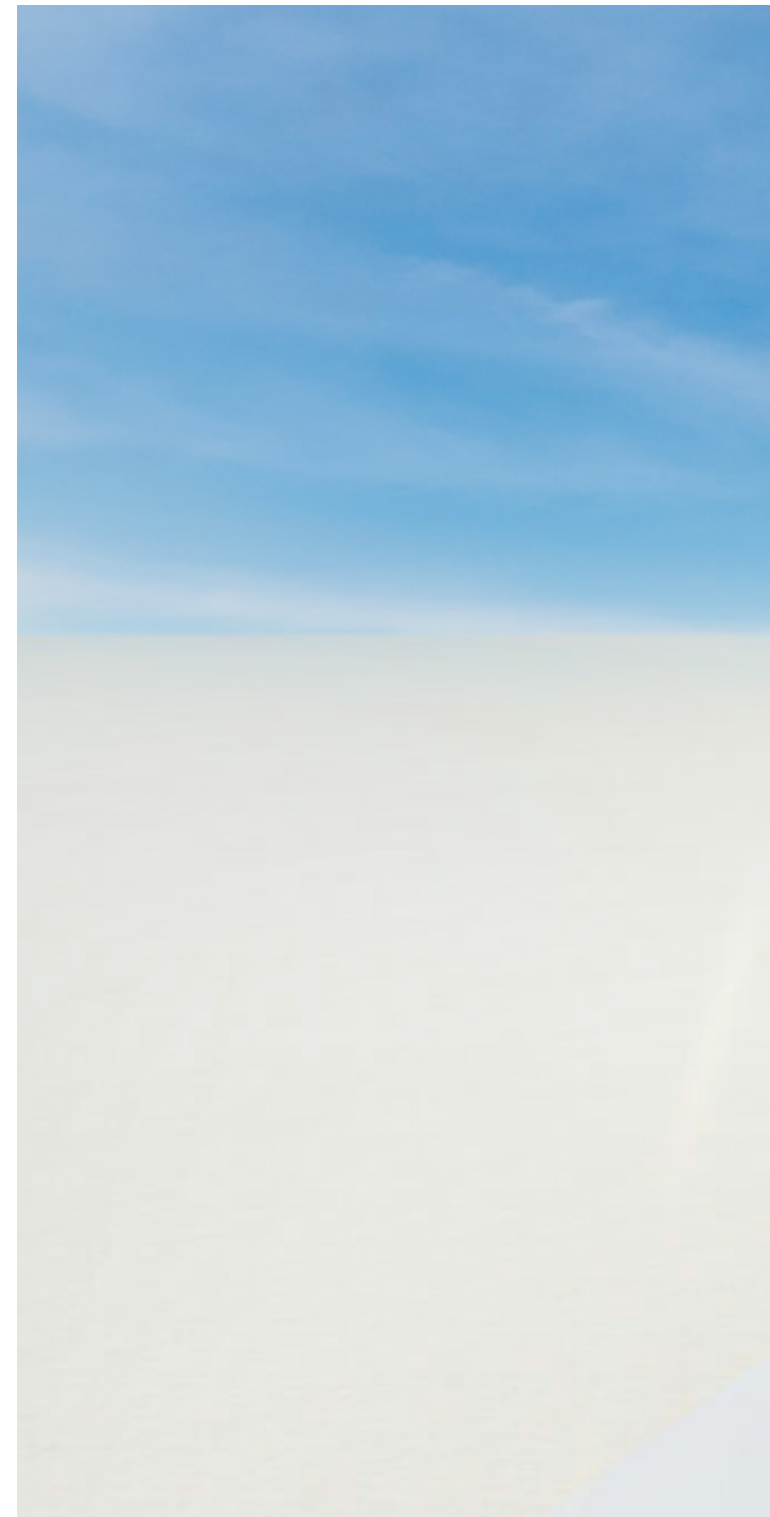


Project

The Cube Apartments

Submission Extract

The cube is a mix use development which emphasises timber usage as the main material in the middle of an industrial site to provide a sense of warmth and to reconnect the environment with nature. This four-storey timber building is located at 12 Stack Street, Fremantle. The old warehouse is reused as the convenience store in order to maintain the heritage value of the building. Whereas the boat skeleton from the existing site is reused as an outdoor sitting area. Both can potentially become community icons. Commercial tenancies on the ground floor include a click and collect shop, which supports local business and improves the amenities for the community. This apartment consists of six units of student accommodation on the ground floor, four one-bedroom units on the first floor, and four two-bedroom units on the second and third floor. The design of the building promotes community living with the creation of open space. The apartments use modular prefabrication construction methods and specific connectors which significantly saves construction time. This type of construction offers the flexibility to reconfigure, assemble and disassemble to be moved to another site when necessary. As a result, efficiency of time relative to the construction process is optimised as one of the most significant benefits to adopt this construction method. Glulam timber and SIP are the main materials used in this building. This timber is proven to be strong enough to support the building compared to concrete with the added benefits of high durability and sustainability, allowing it to be reused and recycled. In addition, SIP is lightweight and a low carbon emission material.





Curtin University

Group 3

Project

V-Farm Modular Apartment

Submission Extract

In response to the growing global population and pandemic issues, this project proposes a vertical farm in each unit balcony, where the user can produce fruit and vegetables. The commercial building also has a vertical farm that can also grow fresh produce sold through a small on-site grocery store and neighbouring retail outlets within the local community. These vertical farms help integrate the building with the local community and creates an ecosystem within innovative and healthy urban agriculture spaces. Glue Laminated Timber (GLT) is the main structural material which has a superior fire-resistant rating, great acoustics and is easy to erect and install. The walls will be constructed with eco-friendly cardboard panels as they are 100% recyclable and can be easily assembled and disassembled. With waterproof timber claddings, the facade is durable, boasts optimal insulation and a highly aesthetic appearance. The floor and internal panels use cross-laminated timber (CLT) which is a prefabricated wood panel and provides dimensional stability. Utilising an acoustic engineered ceiling for each module provides a comfortable easy living space. We propose installing a retractable roof to maximise natural light onto the balcony and indoor living areas and minimises energy cost. Installing a renewable sources solar tracking system on the top of the building offers a sustainable power generating solution and helps minimise energy consumption. Finally, to maintain the vertical farm value and reduce water cost, a rainwater tank will be installed on site to collect rain and supply a stable water resource for each unit's vertical farm, creating a fully sustainable community environment.



Curtin University





University of Queensland

Bailey Gradine

Project

Bailey Gradine

Submission Extract

The design proposal of Bailey Gradine explores the potential of circular design for the adaptive reuse of a warehouse. This proposal aims to acquire profound knowledge from circular economy's principles, while instigating the applicable actions from the RESOLVE framework to inform sustainable design strategies. In addition, this proposal will provide knowledge of the construction process, that is, the process of "design - prefabrication/assembly - transport - installation", by designing and modelling the building components and then handing it over to the factory for processing. According to the transportation size requirements, components can be assembled in the factory into volume and hybrid forms and then transported on-site for assembly. Finally, as a completed component, it will be hoisted to the designed position by a crane. This proposal begins with an overview of the broader concept behind the project, thereafter, expanding and connecting the idea to the context of the proposal, including social and cultural considerations. This proposal further examines certain prospects of the site that align to the axis of environment and transportation access to provide additional parameters for design outcomes. The research part of this proposal investigates several design disciplines that pertain to the intentions of circular economy, namely adaptive reuse, modular treatments, prefabrication methodology and environmental performance.



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA





University of Queensland

wareHAUS

Project

wareHAUS

Submission Extract

The project wareHAUS is the transformation of an existing warehouse into a habitable social and living space that accommodates three residential unit typologies for students and retail spaces for the public. The main strategy of wareHAUS is to deliver a hassle-free, staged construction process. The first stage will re-use the existing materials and the structure of the original site and introduce retail spaces within the existing envelope of the warehouse. The second stage will reinstate the existing roof to act as a floor structure that anchors the residential units placed above. The third stage develops the heart of the concept for the project, using off-site prefabricated volumetric construction for the residential modules that will significantly reduce disruption such as noise and dust pollution caused by placing the units in their respective positions. The novel idea of the project is the use of a barge to transport the prefabricated units from the manufacturing factory to the site. The proximity of the site to the river has been taken advantage of to employ such transportation techniques with careful consideration of the under-bridge height clearance and the load. Thus, the project wareHAUS has eliminated most of the traditional construction techniques that significantly impact the final cost and timeframe of the project.



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA





University of Queensland

Team 3

Project

Eco Modular

Submission Extract

Eco Modular is an adaptive reuse design proposed for a warehouse in an inner city suburb, aiming to provide a sustainable, healthy quality of living and cost efficient design method for the original one-storey warehouse. The proposal also demonstrates how the concept of circular economy can achieve sustainable goals through innovative construction methods. This proposal transforms the warehouse into a small mixed-use community with important local features including commercial, residential and public gardens, that can contribute to local cultural activities and economic development. The main strategy of the proposed design is to minimise demolition of the existing structure to reduce the generation of construction waste. Renewable and reusable resources will be selected for the new materials needed in the construction to reduce resource depletion. The design of the residential area is to stack the wooden modular housing units as a four-storey tower, which addresses the housing shortage and the need for social infrastructure through vertical development. Eco-Modular design provides a solution for resource scarcity, sustainability and climate emergencies, while delivering thermal comfort, occupant well-being and affordability to the end user.





Queensland University of Technology

Team 2

Project

Dalton Village

Submission Extract

In 2020, COVID struck the construction sector in Australia and globally with challenges such as housing shortages, low productivity, tight labour markets, reduced number of workers, price inflations and high demand for social infrastructure space. As a result, these socio-economic disruptions have impacted the construction industry and new operational methods have emerged as solutions, including offsite manufacturing, prefabrication, DfMA and LEAN manufacturing.

The Dalton Village, situated in Kelvin Grove's Urban Village, explores and demonstrates these innovative methods with the use of ILP (Interlocking Panels) durable and lightweight prefabricated panels. Using a smart interlocking system to connect panels together, ILPs can be installed on site easily and rapidly, saving time and cost. The Dalton Village, previously known as the TAFE Hall of Residence, displays adaptive re-use of heritage buildings by renowned Queensland architect, John Dalton. With the practice of adaptive re-use of the heritage buildings, a sense of community and a village like atmosphere that was once active within the site will be resurrected with new student accommodation apartments and build-to-rent programs along with a vibrant greengrocer and study café.





Curtin University

Team Groot

Project

GROOT Apartments and Warehouse

Submission Extract

At GROOT apartments, leisure is a strong driver in encouraging neighbourhood interaction and enabling a strong sense of community. Within their apartment block, tenants can interact while watering the plants at the verge garden or cooking with friends and family in the communal ground floor area. The Groot warehouse actively aims to welcome the larger Fremantle community by directly connecting to the frequent markets that occur at the Stackwood, parallel to the akin warehouse. It hosts a vibrant cafe space, a grocery store and a click and collect space for upcoming artists to sell their products. The private balconies have also been designed to connect to the vibrant street life where residents can enjoy watching the hive of activity while enjoying their morning and evening tea or coffee. Hyper flexibility is also a key driving force at Groot apartments; each apartment is made from three CLT primary modules that can be mirrored across x and y-axis; this allows akin apartments to easily be configured onto any site. All the modules are optimised to fit onto a standard truck and each level can be stacked onto a site in seven days!



Curtin University





University of Queensland

Team 5

Project

The Folding Village

Submission Extract

This project utilises sustainable modular design to create a set of small residences within a re-purposed industrial warehouse. A site was selected to match the specified scale of the project, which was then populated by modular housing, a public cafe, convenience store and resident utilities. The Folding Village is a response that stems from a folding pop-up module. This construction technology allowed for a response to the brief which maximises spacial efficiency whilst not compromising the structural framework of the existing building. By using the ARUP Resolve Framework as a guide, the Folding Village demonstrates a sustainable response which uses Circular Design principles to establish a renewable solution to small scale and co-living housing.





University of Newcastle

Green Lungs

Project

The Green Lung

Submission Extract

The Green Lung facilitates a new and improved multi-use design concept, inspired by the niche market of DfMA (Design for Manufacture and Assembly) design, consisting of both Volumetric and Kit-Of-Part (KOP) elements. The development is designed to accommodate a broad demographic, by contributing to its surrounding environment, ultimately cleansing the polluted air of Newcastle. After a long history of coal mining, the imperative of the design behind Green Lung has focused on the indoor environmental quality of air by constructing a green oasis. Nestled into the industrial area of Mayfield, the Green Lung will work away pumping clean air amongst its residents and the surrounding environment. The central lift itself will act as the lung; as residents utilise the internal area, the lift will pump polluted air through an array of filtering systems to produce clean air. The multi-residential development will provide accommodation to students, individuals, and small families, built above a bustling assortment of commercial and retail spaces open to the public. The materials and variety of plant will reflect the history of coal within the area, through natives and locally sourced materials. The Green Lung has taken inspiration from both the natural and industrial world to provide a sustainable solution that will be self-sufficient whilst providing its direct environment with healthy air quality.





Deakin University

Plug and Play

Project

Plug and Play

Submission Extract

Our design - 'Plug & Play' - explores the opportunity of using prefabricated modules on a macro scale that includes the building layout and construction all the way down to its micro scale, which looks at the potential of using prefabricated modules as movable plug-ins within units. The site we have chosen is a 50 x 20m rectangular site located on Brougham Street, next door to the Geelong train station in Victoria. The proposed residential building will be constructed over the former "Winter and Taylor" automotive service centre. The proposed building design tries to retain as much of the existing facade and roof as possible. Using a 3D volumetric method of prefabrication, the building will be created as modules that will be manufactured off-site and then transported to site for assembly. This project is created as a starting point for entrepreneurs and acts as a business incubator. It will be a place where they work on their independent projects and even use the spaces on the ground floor for a commercial start. This building is primarily built of CLT (Cross Laminated Timber), concrete and steel with a facade created using solar glass. This skin aims to shade the building against sharp solar glare that can be expected so close to the beach. The proposed building uses a number of solar panels that make up 9% of the building's energy demands while also using water recycling and rainwater harvesting systems to reduce the building's water usage by 20-25%. The building is designed to stand out, to be unique in the face of other prefabricated buildings.





University of Queensland

Team 4

Project

Co-Nest student living

Submission Extract

In 2021, many of us are facing challenges from COVID-19, especially the construction sector which continues to face significant challenges not only in Australia but all over the globe. Building owners are now seeking solutions through adaptive re-use and re-development of a building or warehouse to revise and asset their performance for the longer term. Co-Nest student living is a design proposal for the adaptive reuse of a warehouse, proposing new commercial and retail activities. The concept, similar to how a bird builds a nest by gathering twigs, utilises prefabricated modular timber members to build pods that will accommodate students. It is also a co-working space which acts as a community centre connecting retail and residential activities. This project explores the idea of using timber as the main Design for Assembly and Disassembly (DfAD) material, after reviewing the existing timber prefabrication plans, understanding timber structure, designing disassembly sequence, summarising the advantages of prefabricated buildings in the entire life cycle and the potential DfAD design innovation in the future. As architects and engineers, we have an important role to play towards a transition to a Circular Economy. Co-Nest adheres to the circular design principles. This is achieved by using a modular approach and prefabricated construction technology. It also adapts to ARUP's ReSOLVE framework. The proposal also investigates analysing thermal performance as well as energy efficiency of new residential modular pods.







Contact us for more details:

Brendan Pope
Head of Design and Innovation
Fleetwood Building Solutions
0498 010 261
BrendanP@fleetwood.com.au

Brooke Adams
National Events Executive
prefabAUS
0466 247 724
brooke.adams@prefabaus.org.au

Presented by

FLEETWOOD
AUSTRALIA

