CarterHoltHarvey
Woodproducts Australia

Panelised Building System

NT Case Study

MARRARA CHRISTIAN COLLEGE

FABRICATION AND CONSTRUCTION TRADE TRAINING CENTRE

CRT building products

The Quick Build Home

Over three days in early October, students from the Marrara Christian College's Fabrication and Construction Trade Training Centre built the revolutionary flat-pack wooden house using a unique building system by Carter Holt Harvey.

The students were under the supervision of qualified tradesmen but the simplicity of the system allows them to do most of the work themselves.

The quick build home allows a home to be constructed on site by trainee construction workers under supervision and is perfect for remote communities where labour and accommodation costs can be high.

The new building system enhances the capacity of the training centre to offer real jobs to young construction trainees.

The time and skills required to construct residential homes using conventional building systems is one of the most important challenges facing the housing market today, particularly in remote communities.

Traditional on-site construction methods are constrained by the availability of trades, coordination of the delivery of products and services to the house site and weather related delays.

With this new wood panelised building system, a house can be built from the ground to lock-up in just three to five days using construction trainees under the supervision of qualified tradesmen.

The Marrara Christian College Fabrication and Construction Trade Training Centre trains students still attending school to receive a vocational certificate in construction, building and metal fabrication industry, while earning money at the same time.

The business opened a new training centre in Darwin in June this year to provide training for up to 50 students each week in the metal building and fabrication industry. There are 32 trainees and three apprentices completing their competency training with up to 20 qualified tradesmen and trade assistants.

The trainees are Year 11 and 12 students drawn from all senior schools in Darwin, along with others from as far as Arnhem Land and the Kimberley region in Western Australia. Around 65 per cent of students are Indigenous.

The new panelised building system will enable the training centre to offer building solutions across northern Australia while at the same time training young Territorians for a career in the construction industry.

Frequently Asked Questions

Why was this system developed?

The excessive time taken to construct residential homes in Australia using conventional building systems such as brick veneer is one of the most important challenges facing the housing market today. Time costs money and delays associated with conventional on site construction methods where progress is constrained by the availability of trades, coordination of the delivery of products and services to the house site and weather related delays are major impediments to improving housing affordability.

In association with CRT Building Products, Carter Holt Harvey, has developed the Prefabricated Building Systems (PBS), which are cost competitive lightweight and strong building elements. The PBS systems are ideally suited for construction in remote areas but they also form the basis for building high performance floor systems for residential two storey houses. The building system is the first step in a journey to improve housing affordability.

What is the CHH PBS?

PBS is a construction system which allows for faster, easier on-site construction. This is achieved by building with a number of standard prefabricated panels components which can be quickly and efficiently locked together on-site. PBS components are manufactured at CRT Building Products according to tight specifications that ensure the building system comes together at the construction site with minimum delays and waste.

How long does it take to build?

A number of builders and quantity surveyors have reviewed the PBS system and been asked to compare construction times against a conventional build. Feedback suggests a 2 bed (50sqm) house will get to lock up within 5 days, although in this demonstration we are working to complete the home in just three. This includes foundations and installation of floors, walls and timber roof trusses. In remote areas where skilled workers can cost upwards of $1500/day, this is a significant and valuable advantage.

Does PBS restrict the flexibility of housing design?

As with conventional building construction, with PBS, the design and construct process is also a consultative one between the client,

building designer or builder and the suppliers. PBS panels are typically 1200x2400/2700mm in size to allow a build to occur with two people however in practice there is endless flexibility in panel size if lifting equipment is available.

Design specifications can be modified to cater for the needs of the individual owner, with the base floor level raised or lowered as required to suit site specific requirements such as the Queenslander style residence.

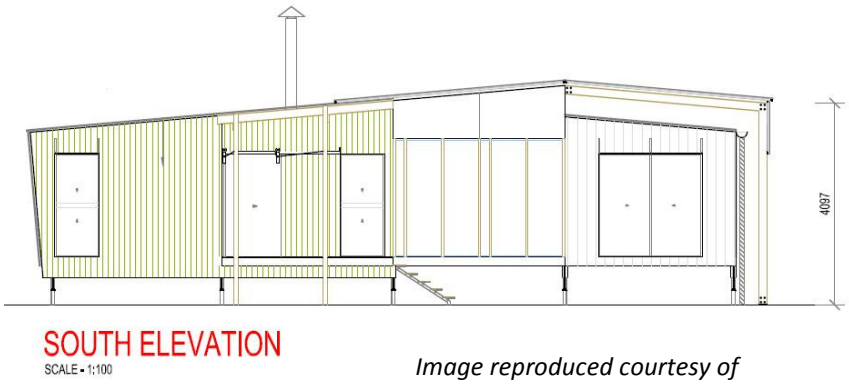

Image reproduced courtesy of bléuscape design.

What are the components of PBS?

The main components are prefabricated panels for the floors and walls. Floor panels have bearers, joists and flooring preinstalled in lightweight panels which are put on site foundations and screwed into place. The wall panels are DD ECOply bracing, BD ECOply lining enclosing a panel core which is framed with 90x35mm timber and insulated. Windows and doors can also be factory fitted, saving considerable on-site time. Pre-fitting the window and doors also ensures a weatherproof seal around openings and improves the quality of the home. The DD ECOply can be replaced with with SHADOWclad, which is an external cladding system ready for painting. Alternate finishes include Colourbond sheeting or other cladding systems.

How do I build with PBS?

Once the foundations and bearers are installed to site-specific conditions and builder preferences, the floor panels are lifted into place and screwed to the foundations. A timber plate is then secured to the floor where the walls are located. Wall panels slot over this plate and are screwed or nailed into position. The choice of screws or nails is dependant on whether the customer wishes to disassemble the structure at a later date. The ceiling diaphragm completes the main structure, after which the roof is assembled as a conventional truss system.

How does the roof system work with PBS?

The roof is a conventional truss system which is by far the quickest and simplest covering for the structure. The plywood ceiling sheets are not cut into the rooms but run through the complete building which forms a diaphragm to brace the building.

What about the level of finish?

Internal lining specifications depend on the client and level of finish required. BD ECOply provides a high grade paint finish. For a typical standard finish the panels can be supplied as an open system and plasterboard installed on site as required.

How does PBS works as a structural building system?

Unlike conventional buildings systems which utilize components such as brick, wall frames and beams to achieve structural and design requirements, PBS is a full building system from the roof sheeting down to the foundations in the ground. This ensures the most effective use of materials and cost efficient design. An example of this is the internal/external walls linings being used for tie-down and bracing of the structure. The 'whole of house' design also means that the system can be used in all areas of Australia, even those in Northern Australia prone to cyclones.

As the panels are wall and floor panels are prefinished what are the implications for plumbing and electrics service installation?

Electrical wiring is handled through predrilled holes for power points and switches with 'chaser wires' leading to the ends of the panels. The electrician just tapes his cable to the chaser and pulls the cable through. This also means a single visit can occur with the electrician roughing in and finishing in the same day. Plumbing is similar with cut-outs in the panels so they can be removed as required to install pipes through the wall.

What about termites and rot?

All wood elements in the house can be protected to the required levels against termites and rot. Hazard levels for timber of H2-S (or H2F) protect against termites south of the Tropic of Capricorn. H2 timber protects against termites across the whole of Australia (including the more ferocious *mastotermes darwiniensis* up north), and H3 timber is protected against fungus and rot. All treated wood products from CHH including treated PBS systems come with a minimum 25 year guarantee.

How are the panels transported?

Consistent with the objective of providing a building system that is suitable for construction in remote areas, the PBS panels have been designed to fit into 20 foot containers. The panels are loaded in to the containers at CRT and transported to the construction site. Depending on building size, roof trusses can be supplied as half trusses which fit lengthways in the container. Delivery takes an estimated 10 days to a distribution centre in NT where on forwarding to the prearranged construction site.

What is the cost of PBS systems?

We anticipate that at least a 30 per cent total construction cost saving is possible versus conventional building methods in remote areas. CRT quotes must take into account the number of panels to be manufactured, cladding and lining options, building layout and construction site location. Carter Holt Harvey will assist by providing advice on engineering and design solution to effectively incorporate PBS.

What should I do if I am interested in considering PBS systems for construction?

To obtain the full benefit of PBS, it is important to involve Carter Holt Harvey technical development team in the early design stage. Together with architect or draftsman, our technical experts can advise on material selection, suppliers of panelised systems and other cost saving measures.

Where can I go for more information?

Carter Holt Harvey:
Ronald.Green@chhwoodproducts.com.au or George.dolezal@chhwoodproducts.com.au or call our technical assistance line on 1800 808 131.

For an F&T company testimonial:
CRT Building Products: Tim Wilson, Tim@crtproducts.com.au 02 6242 2211.

For a builder testimonial:
Marrara Christian College, Fabrication Construction Trade Training: Richard Hart, richard.hart@ntschools.net 0417 851 353.

This project is supported by funding from the Australian Government Department of Agriculture, Fisheries and Forestry under its Forestry Industries Development Fund program.

PBS design example - Modular POD building, reproduced courtesy of podtrading.