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The revolution will be modular



The house is camouflaged by the Hawkesbury bush and (inset) Liam Flood.

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Standard panel sizes allow a quick fit for house construction, writes Jane Burton Taylor.

Architect Sue Harper's most recent house is well camouflaged by the giant gums that crowd the upper reaches of the Hawkesbury River at Dangar Island. A lightweight structure, its three pavilions step up the slope.

It is a house that simultaneously opens to, and shelters from, its bush setting. And it is not just elegantly designed, it uses an innovative, arguably revolutionary, building system.

Harper and her environmental engineer husband, Andy Irvine, are passionate about finding better ways to build and they realised their vision in this house. It is a prototype of a prefabricated building system Harper developed in her work in remote communities in the Northern Territory. Harper and Irvine plan to apply the system to any house design, making it easier and more economical to build.

"[I wanted] to have fun with it ... not to take building so seriously," Harper says. The system uses steel modules or "picture frames", as Harper calls them. These modules have a small braced upper area and a larger lower section that is equal in dimension to a standard panel of building material. "They are all designed around the building material size of 1200mm x 2400mm," Irvine says.

The steel frames are bolted together in a skeleton structure. Then, as these frames are of standard dimensions, building materials such as plywood or fibre cement sheets, glass louvres, canvas or even a roller door, are slotted or screwed into the skeleton.

"You can put a solid panel or flyscreen panels in it," Irvin says. "If you wanted to, you could build in anything, even palm leaves. Most buildings you need to have a minimum 1200mm of solid walls

that brace. This system, because it's self-bracing, doesn't need any structural walls."

Theoretically you could design a simple house, using the modules to decide size and location of rooms, then work out which panels would be solid and which would be windows or doors. The house could then be put together by laypeople with building savvy. Each frame weighs 80 kilograms so can be carried by two, Harper says.

The system delivers big cost and time benefits. As it works on a standard grid and is fairly simple to construct, there are minimal waste of materials and reduced labour costs. Depending on wall finish, the system can eliminate the need for expensive "wet trades", such as rendering - another potential saving.

Budget and time were definite motivations for choosing the system in the Dangar Island house.

The original clients, a couple with two children, wanted to build for \$1400 a square metre. Access to the site was unusually difficult. The site is on the top of a hill with no vehicular access - all materials had to come in via barge.

"Normally building anything on the island takes years, literally," Harper says. "The advantage of a steel frame was that the structure could be put up quickly."

The modular system suited the way the clients hoped the house would feel, too.

"They wanted a house that let them enjoy living with the climate of the island; [to make the most of] indoor-outdoor living," Harper says. "They wanted a separate studio that could be used as their bedroom or as their work studio. They asked for bedrooms underneath [the living area]. They wanted spaces in which all of them could enjoy living on the island."

Harper designed a pavilion house to fit their brief. The largest pavilion contained the children's bedrooms below and an open-plan living space and kitchen opening to a deck above. A timber walkway linked this building to a small central pavilion housing the bathroom and a private upper domain that served as the main bedroom.

A switch in client midway through the project precipitated some changes. The new client, Liam Flood, came on as owner-builder. He loved the design and the innovative modular construction, but needed more space.

This was achieved comparatively easily by adding "pop-outs". A variation of the module system, a pop-out is a prefabricated bay of the same 2400mm x 1200mm size. Harper developed the system so that small rooms, such as laundries or guest toilets, could be included in new houses or added to existing ones. Harper added several to Dangar Island II: one as kitchen, another on the middle level as a laundry and two to the upper pavilion for a wardrobe and home office.

Harper says she envisages an "Ikea idea" catalogue from which owners order frames or pop-outs. "We are trying to do a house of the future," she says. "We're not aiming at the 5 per cent but at the 95 per cent [of the market]."

Irvine says the system is well suited to indigenous housing needs, too. "They want flexible buildings," he says. "They need, for example, to be able to quickly add another two bedrooms. Bedrooms are [typically] 3.6-by-3.6 metre grid size at the moment."

Harper and Irvine have built their own weekender using the system and it fits their lifestyle and budget. "As with many of their friends, Irvine says, "we can't afford to do it all at once". The couple started with one large room with mainly plywood walls -now they are adding a pop-out and exchanging some solid panels for glass doors onto a deck.

With Irvine doing the building, their 50 square metre home has worked out economically, costing about \$30,000 to date. And the system is innovative, durable and adaptable enough to shake up the building industry for the better.

Sue Harper's house is a finalist in this year's RAIA awards.

THE AIM

To design an economical, environmentally sustainable house on a difficult site using a prefabricated steel system

TIME FRAME

Three-and-a-half months.

GREEN POINTS

- * A heat pump is used to warm water.
- * Roofs catch water for a tank that feeds toilets and the garden.
- * All waste water is treated and used on gardens.
- * There is an Aqua Clarus toilet, which breaks down waste on site.
- * The house and skillion roofs face north.
- * All walls, floors and roofs are insulated.
- * Timber is used sparingly and is plantation grown.
- * Breezeways set up cross-ventilation.

OWNERS' FAVOURITE FEATURES

The indoor-outdoor approach; the feel of being in the bush.

INSIDERS' TIP

Keep on good terms with the ferry and barge driver.

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