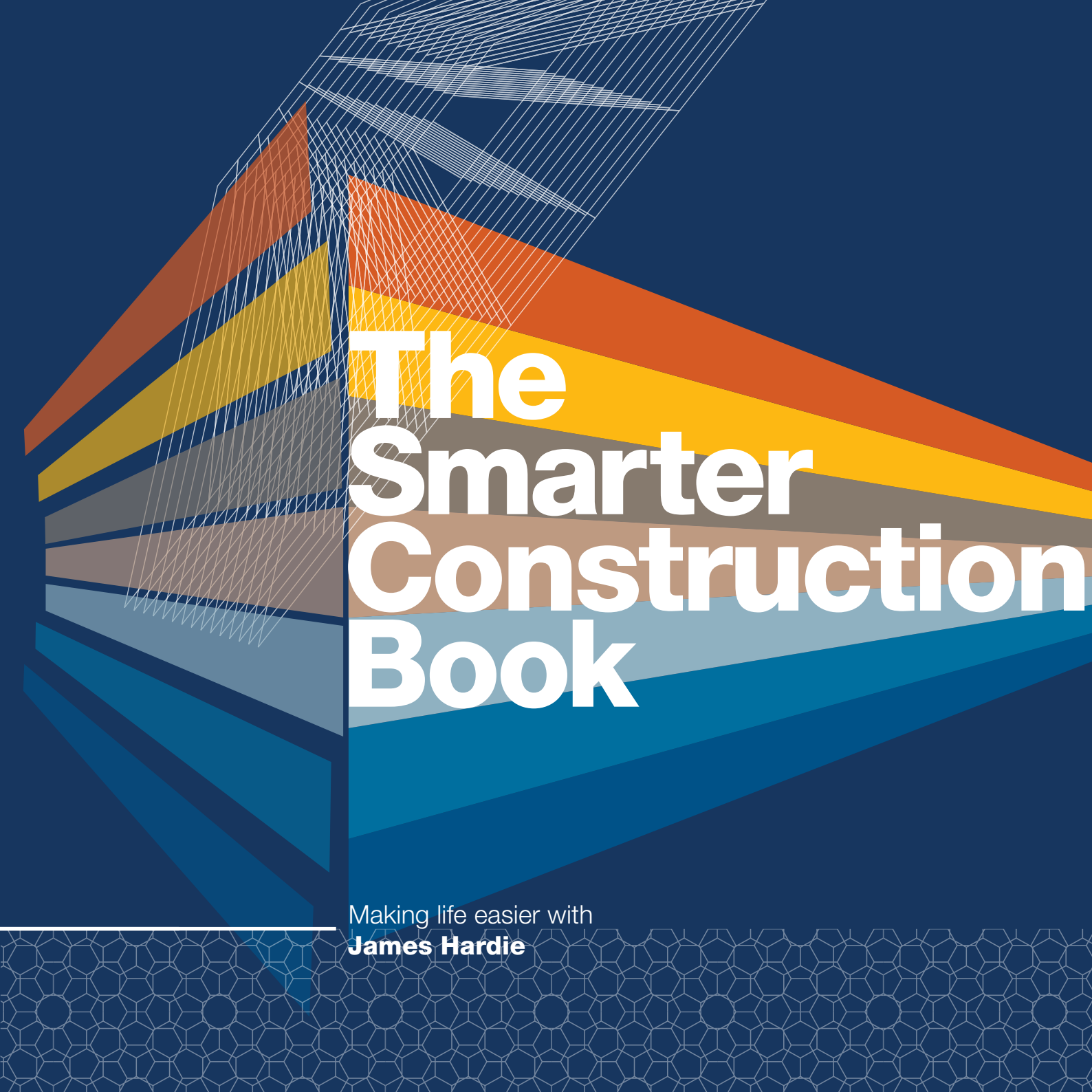


The Smarter Construction Book

Making life easier with
James Hardie

The Smarter Construction Book

Making life easier with **James Hardie**

Contents

Cover illustration features palette colours from *The Smarter Design Book*.

Inside the book

Smarter construction.
It's about easy and cost-effective building through the smart combination of products, systems and processes. It's a balancing act – and it can be achieved without sacrificing aesthetics or sustainability. This book gives you insights into the right approach for the job and, at the same time, questions a few "accepted" myths.

Many mainstream builders are concerned about minimising costs. That's understandable given that many volume building companies are run on lean margins and housing affordability is an escalating concern.

When you analyse the cost of construction, though, it's easy to focus only on the cost of materials and the cost of labour. But what about the cost of downtime? There are costs associated with waiting to start the next stage in the process because something still needs to be fixed from the last stage.

Recognising this, many builders drive towards reducing the number of trades on-site. Some builders also work to continuously improve production processes. As we embrace the latest fashions, and planning and sustainable building trends, the industry continues to move away from the cheapest and simplest form of construction – brick boxes on slabs on the ground. As a result, it's essential to revise production processes, particularly to address designs that use a range of different facade materials. It's also important if builders want to save time.

This book addresses the cost impacts of both materials and processes. It shows that when you build using lightweight materials, it's far more cost competitive than some people might think.

The first section explores each of the key building elements.
What's on the outside? roofs, external walls, openings and clip-ons.
Challenges of nature: building on sloping sites and in bushfire-prone areas.
What's on the inside? wet areas and internal walls.
To help you, we look at the typical way to build an external wall and the costs associated with that. We then look at some smarter options. Along the way, we give you insights from those who are already using smarter construction methods – builders just like you.

The second section focuses on processes.
From design, through to estimating, site preparation and construction, this book provides you with a guide to streamlined and easy building.

By applying practical innovation to real-world building challenges, with a relentless commitment to increasing the value and character of architecture, James Hardie enables you to design and build in a smarter way. See more about how James Hardie enables good-looking, sustainable, cost-effective, construction-easy design and building, at **www.jameshardie.com.au**.

Architect: Conrad & Gargett

What's on the outside?

There's a smarter way to build external walls, openings and clip-ons. We explore key building elements that will save you time and money – and achieve a stylish, sustainable result.

External walls

What's conventional?

Brick veneer

Brick veneer cladding on a timber frame has been the most common way to build external residential walls in Australia. One of the main reasons is that brick veneer is regarded as pretty cost-effective. People often say that "brick costs around $65 a square metre to install". But is that the true cost?

In the study *What's the Cost of Your Wall?*[1] you can see a cost comparison of a range of external walling materials for two typical single-storey and double-storey homes.

When you look at the "real" cost of an external brick veneer wall, it's a lot higher than the frequently quoted average of $65 per square metre. In fact, as the *What's the Cost of Your Wall?* study shows, at about $120 (for single storey), it's almost double.

Aside from the costs noted here, there are other factors that impact on the cost of a whole building (rather than just the wall). This includes the fact that building in brick also involves wet trades which leads to mess on-site. Furthermore, scaffolding is often needed for a longer period.

The single-storey house used in the study *What's the Cost of Your Wall?*

Double brick

Most buildings in Australia use the construction method of timber frames with cladding. However, buildings in metropolitan Perth are different. The walls are typically built in double brick. This also differs from the rest of Western Australia, where construction methods are similar to the rest of the country.

However, a booming Perth market has increased the pressure for faster, more affordable construction methods. Therefore, some Perth metropolitan builders are actively exploring ways to build that don't involve double brick. Some builders, like Summit Homes' Construction General Manager Brett Garrett, believe they can save about three months on the typical construction period for a double-storey home when they build with frame and cladding (see page 14).

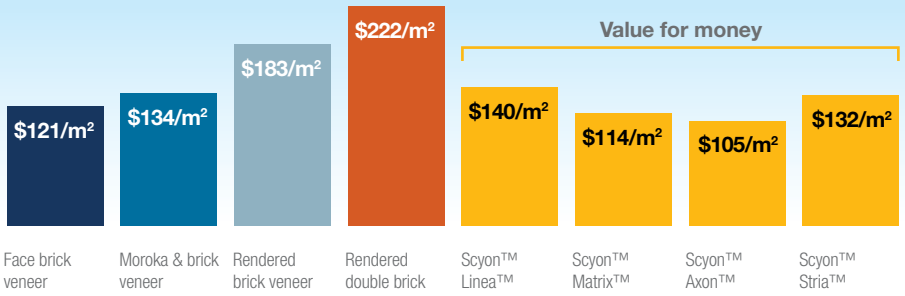
The double-storey dwelling used in the study *What's the Cost of Your Wall?*

What's the Cost of Your Wall?

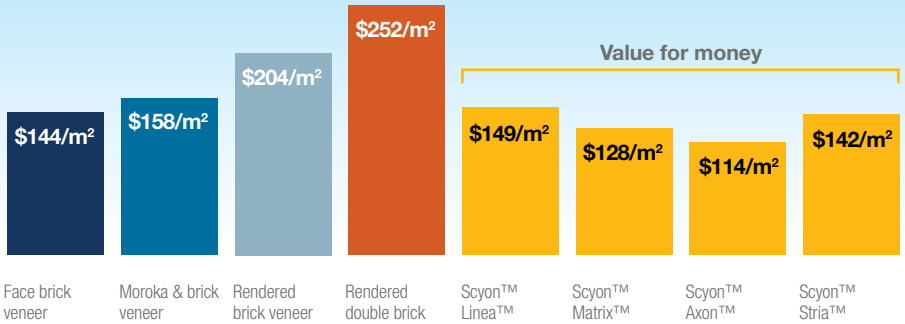
Cost Comparisons

Single storey, full wrap

Figures in both graphs indicate dollars per square metre exclusive of GST.



Double storey, full wrap



1 The detached dwelling costing analysis has been prepared by estimators currently working in a New South Wales-based production building company, using actual single- and double-storey house plans. A simple elevation of each home used for the costing is pictured left and top right. While typical building costs have been incorporated in this study, this has been done on a conservative basis but without allowing for any regional differences. The items costed in this study are detailed overleaf.

Costed items are as follows:

Construction process components	
Brick	**Cladding**
Pest control: Granitgard – including penetrations	Reduction on concrete supply for rebate
Veneer frame where appropriate: allowance for perimeter 90mm	Veneer frame where appropriate: allowance for perimeter 90mm
Structural steel to support brickwork where appropriate	Pest control: perimeter reticulation system – including penetrations
Brick supply – face or commons where appropriate	Cladding
Yellow or white bricklayers' sand	Corner and window accessories where appropriate
Allowance for bricklayers' hardware	James Hardie Joint Sealant – 300g (note 20/box)
Render bars where appropriate	Vapour permeable membrane
Ultra-lintel concrete bars or gal lintels where appropriate	Pryda Foil Fix 20mm – strip of 10
Bricklayers' labour	Fibre cement nails – 40 x 2.8mm – 2kg
Brick cleaner with E/O neutraliser for light brickwork where appropriate	Alcore Dampcourse - 230mm x 30m
Expansion joints: chalking compound – up to 30m per house	Carpenter labour: cladding, trims, eaves
Render or applied finish where appropriate	Carpenter to install window and door trim
Painter where appropriate: eaves and brickwork	Painter where appropriate: eaves, seal edges, sand and paint external cladding
Allowance for eave material	Allowance for eave material
Allowance for eave labour	Allowance for eave labour
Scaffold hire	Scaffold hire

What's smarter?

Using James Hardie cladding or weatherboards may be a smarter approach. Not only do they give you flexible design options but they have a host of other benefits. Let's look more closely at cost with the charts on the opposite page.

The *What's the Cost of Your Wall?* study reveals that fully clad lightweight homes are generally just as cost competitive as the brick veneer ones. They are particularly competitive when we compare them to applied finishes or look at double-storey houses. It's important to take an integrated approach to assessing cost, and to look at the impact on costs over the building.

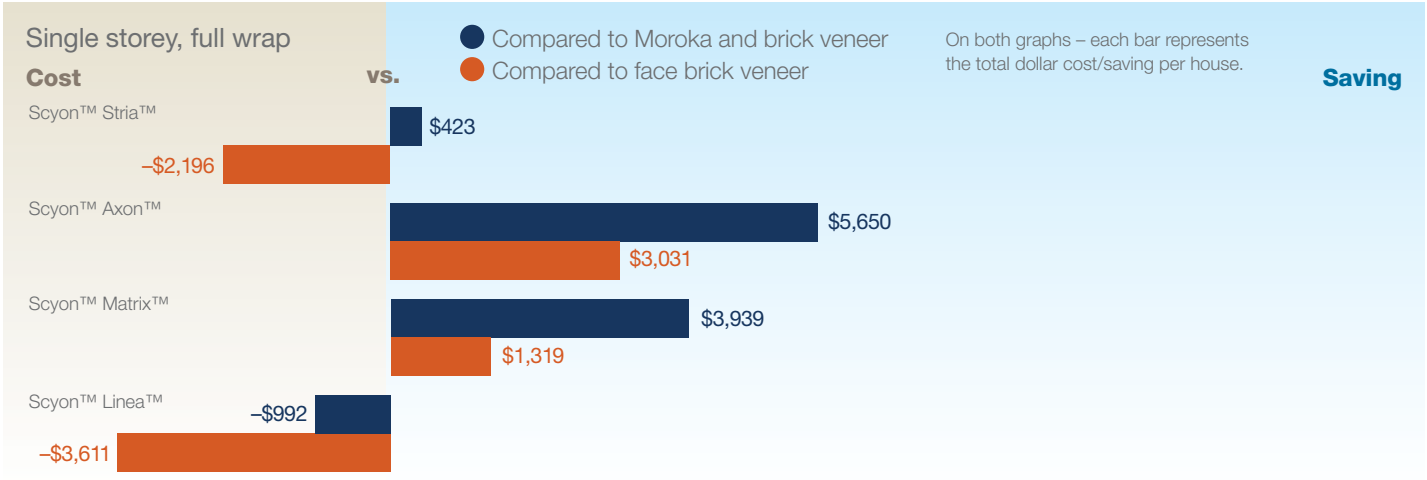
You don't get a true picture if you look at just one element in isolation. For example, using heavyweight materials in set-back upper storeys usually means using more structural steel than if the upper storey was built using lightweight materials. Using lightweight cladding materials can potentially reduce structural steel, lintels, scaffolding and therefore painting costs.

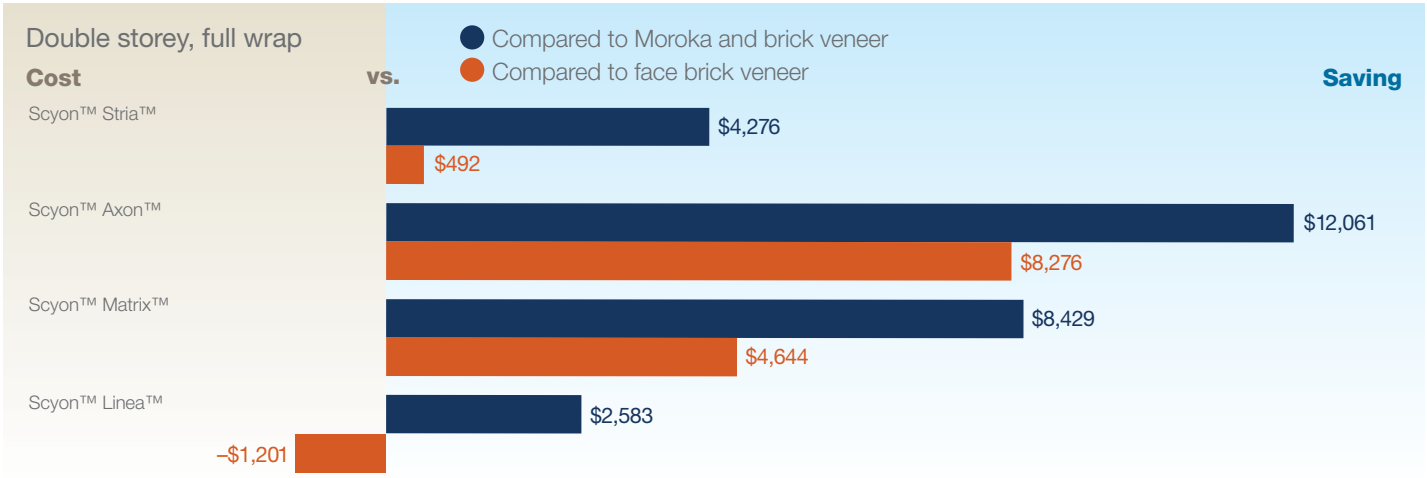
Fewer tradies on-site

In addition, fewer trades are required. When building with most James Hardie cladding and weatherboard products, the only people you need are the carpenter and the painter. This should make the building process simpler and faster than construction that needs bricklayers, cleaners, renderers and painters. The potential downtime between each trade needs to be managed to avoid lost time and cost hikes.

The upshot of this is that while face brick is a cost-effective way to build, it's not the only cost-effective construction method around. It's also rather dated. You can use other more stylish, cost-effective alternatives.

Cost variance (cost vs. saving)





Face brick is not the fashion

Did you know that rendered masonry had risen from a low of 3% in 1995 to more than 32% of the external cladding market by 2005[1]? Research also shows that this look tends to appeal to consumers who like a minimalist, understated and smart look for their homes.[2]

According to the *What's the Cost of Your Wall?* study, painted and rendered brick walls cost about 150% of the cost of face brick for a single-storey home. However, using texture-coated and painted HardiTex® base sheet is 80% of the cost of face brick.

Of course, painted render isn't the only look that appeals to people who like an understated look. Scyon™ Stria™ cladding takes the look of decorative render and transforms it into a contemporary classic exterior.

It's a product that takes the hassle out of pleasing consumers. Based on the *What's the Cost of Your Wall?* study, using Stria cladding instead of render on the double-storey home can save you about $17,000. When Stria cladding is used instead of an applied finish, the saving would be about $4,000. Now that's a smarter way to build.

Scyon™ – a whole suite of fashionable products

If you want other fashionable looks, then the Scyon™ range provides a number of cost-effective options. Scyon™ Axon™ and Matrix™ cladding typically cost similar or slightly less than face brick veneer. This is because they both speed construction due to their panel-like construction and smooth paint-ready surfaces.

Melbourne-based Metricon Homes recognises the cost-effectiveness of Scyon™ Matrix cladding, for example, having used the product in a new display home in Melbourne's Mernda estate. Metricon builds about 2,300 homes a year – 1,700 in Victoria and 600 in Queensland.

General Manager of Project Housing Will Lamb says while there's no denying that Metricon's a volume business, its approach is to "try and figure out what the market's interested in and deliver that".

Designer: Metricon Homes

A Metricon display home in Melbourne's Mernda Villages features Scyon™ Matrix™ cladding.

On its Laguna display home, Lamb says: "The Matrix is there because it's all part of the look. It's also a viable alternative to face brickwork because the cost is within reasonable reach."

1 'Building Materials and Fittings, External Walls, New Homes', BIS Shrapnel, 2004/05.
2 'If These Walls Could Talk: quantitative study for James Hardie', TNS Research, Nov 2006.

The results have been fantastic. People are specifically asking for that product.

Scyon™ Stria™ cladding achieves an urban industrial look at Plantation Homes' display home in Queensland.

Scyon™ Stria™ cladding speeds construction with style

Some builders are firm fans of Scyon™. Queensland-based builders Plantation Homes wanted to create a look that appeals to consumers, but was also cost-effective and easy to construct. Plantation Homes' General Manager Paul Roots says that its research and development department explored building elements that related to the Queensland environment.

Roots says: "[We] decided to call James Hardie in and have a chat to create a look of what I call 'urban industrial'."

The aim was not just to create the right urban industrial appearance, but the solution also had to be cost-effective, easy to install, and time-efficient to construct.

Armed with the series of sketches, Roots and his design manager, Shane Rogers, worked closely with the James Hardie Research and Product Development team to create a product that combined the classic features of traditional design with a strong, contemporary feel. In a production environment, however, the key was achieving this cost-competitively.

Simplified construction achieves simple elegance

One of the most distinctive features of Scyon™ Stria cladding is a 15mm horizontal joint that gives you the look of decorative render. This is classic "stepped" looked that has been used in construction since ancient times. However, fast forward to the 21st century, and Stria cladding enables designers and builders to incorporate this subtle timeless aesthetic by using a pre-primed, easy-to-install product.

Instead of laying bricks, rendering, scoring and painting – with all the associated mess and scheduling of different trades – Scyon™ Stria cladding achieves this look without the fuss. It has a simple, speedy installation method. Once the first board is fixed level, the shiplapped joint on the next extra wide, 4.2-metre long board is fixed to the top of the previous board and can be concealed or face fixed and joined on or off stud.

In addition, the range of corner finishing details – aluminium strip, mitred, or Scyon™ Axent™ trim – means that a number of different looks can be achieved. For example, easy-to-cut mitred corners mean that horizontal lines wrap the building seamlessly. Alternatively, Axent trim can provide a contrast. Plus, a vertical flashing stop provides a 15mm vertical groove to match the horizontal for a more geometric treatment.

The smarter looks wins consumers

While Scyon™ Stria cladding may be the new kid on the block in the building industry, it is already making inroads with consumers as well as being cost-effective, efficient construction for Plantation.

As Roots points out, consumers are quick to recognise the appeal. While the rule of thumb is that 70% of what it sold is based on what consumers see on display, Scyon™ Stria cladding is already breaking that rule.

"The results have been fantastic," Roots says. "People are asking specifically for that product on their homes, regardless of whether it was displayed … or not."

Above and opposite: These houses in Brisbane feature Scyon™ Linea™ weatherboard and HardiFlex® sheets.

Indigo builds on experience

Brisbane-based Indigo Homes was one of the earliest adopters of Scyon™ Linea™ weatherboard. It recently brought its experience of the product into play for a developer client, who had bought a tight DA-approved medium-density development in the old Brisbane suburb of Zillmere.

Originally, plain fibre cement cladding and Colorbond® were specified. Indigo Homes Construction Manager Chris La Franchi says he suggested the developer use Linea weatherboard instead. “I told him [Linea] will really lift the appearance of them, make them easier to rent out and more attractive to end users to purchase. And it shouldn’t cost you much more in terms of money out of your pocket,” La Franchi says.

About 80% of the development was constructed with lightweight material. La Franchi says that access was a real problem, as is often the case on these kind of sites. “What we were able to do with the Linea was get it delivered and store it on-site in the garages to the units and pull it out as we needed it. If we’d used bricks for the external cladding we would have had pallets of bricks everywhere on-site and we wouldn’t have been able to move,” he says.

La Franchi also comments that they wouldn’t have been able to store the bricks in the garages because the pallets need to be placed as close as possible to all the units. “It was that tight that the brickies would have had to hand-cart the bricks round the back of all the units,” he says.

Linea weatherboard had the edge

“From a cost point of view the Linea blew the brickwork out of the water basically, and it had a lot of other advantages like speed.” La Franchi claims that the finished product gave the developer the composite look they wanted to achieve. “Rendered brick would have been more sterile,” he says.

Paul Thynne from developer Melthorn agrees. “We wanted to develop an affordable product with an edge to it,” says Thynne.

Because of the site’s proximity to a local train station, council had also given them a reasonably high density. Thynne says it was important that the design of the product didn’t make it “look crammed”.

“There are a lot of old-style Queenslanders in that area, and so we wanted a contemporary Queenslander look without the high maintenance,” Thynne says.

“That’s where Linea was able to solve that problem. I knew that most of the people would be investors and we didn’t want to worry about issues with termites and timber cracking.”

Aad Designs

Double storeys, half the hassle

Of all new homes, double-storey houses account for 41%, according to research and consulting group BIS Shrapnel. While this proportion appears to have remained fairly constant over the past 10 years on a national level, the need to fit more houses on increasingly smaller lots seems likely to drive up the number of double-storey homes.

At the same time, many councils are demanding that designers and builders set back upper storeys to reduce overshadowing and privacy intrusion.

While a box on a box may be cheap to build, a set-back upper storey means that incorporating lightweight construction instead of masonry is now often the smarter alternative.

Many councils want builders to set back upper storeys to reduce overshadowing and privacy intrusion.

Western Australia builder APG has pioneered lightweight construction in upper storeys.

Lightweight no setback

Perth-based builder APG is a division of one of Australia's top five home building companies, the Alcock Brown-Neaves Group. APG began as a two-storey home specialist and is now also one of the state's most sought-after small-lot home builders.

In the double-brick anomaly that is metropolitan Perth's building market, APG pioneered lightweight construction in upper storeys. Currently about 95% of APG's homes are double storey and, of those, about 25% to 30% involve a framed upper storey instead of double brick.

Harris says that in most of their current designs, the top floor sits over the bottom floor. "However, when we set the upper walls inside, and especially if we're trying to use brickwork, the cost obviously goes up greatly because, all of a sudden, you have to support those brick walls with a lot more steel," Harris says. "If we keep it lightweight then obviously we don't need the steel – you can use the truss itself to support any spans over the brickwork, which keeps the costs down. If you do have to set back, with brick veneer versus lightweight cladding, the cost is probably anywhere just on steel alone $5,000 to $10,000 worse off."

Lot sizes and planning regulations can dramatically affect the equation. Harris says that there are currently many 10-metre blocks hitting the market. Smaller lots typically means setting back the upper storey because of privacy and overshadowing concerns. "Block sizes are definitely reducing," he says. "That's when cladding around the entire upper floor becomes a much more viable option because we don't have to worry about all that steel for the brickwork."

Avoiding creaks and twists

As a small-lot specialist, APG recently released a new range of 10-, 12- and 15-metre homes to give consumers more options. Scyon™ Matrix™ cladding is used as a feature in a number of them. APG has also trialled Scyon™ Secura™ wet area flooring in a new display.

"The flooring has worked out a treat," says Harris. "It's very, very good. It's a lot more solid, we get a lot less movement in it. Underfoot, the floor just feels like a much more solid floor." Harris also comments that the product "went down well" and that "the guys were happy working with it".

This home at Brookwater golfing estate features Scyon™ Linea™ weatherboard, HardiPanel® compressed sheets and HardiTex® system.

Harris says that APG Building Manager Peter Parker is also very happy with Secura wet area flooring. “With particleboard flooring, the two issues we’ve got are movement – squeaking in the floors – and the fact that if you try to build over here in winter, you always get swelling on the edges,” he says. That’s because the walls go up first and the roof goes on later.

In contrast, Harris says that the Secura wet area flooring is ideal. “It doesn’t move, it doesn’t twist, it doesn’t warp,” he says. “It’s such an inert material we haven’t had an issue with it whatever.”

Avoiding maintenance problems

Finally, in an effort to address another regular maintenance cost, APG is trialling a prototype Scyon™ barge product. APG currently uses timber barges. In some cases, particularly coastal areas, these have had to be removed and repaired twice because of deteriorating timber.

Harris says this problem generally occurs on two-storey houses. “So you have to get a cherry picker in there, a carpenter, a painter, and a maintenance guy to put the flashings back in,” he says. “Then you dent them when you try and pull them out so you end up replacing them too.” The problems tend to happen between 12 months and two years after building.

Harris says it cost APG “a lot of money – between $800 and $1,200 a house”. Harris continues: “Give it two winters and that’s when we start getting the cracking and splitting in the timber.”

Upper-storey renos easier in lightweight

Perth-based builder Summit Homes is one of the only Australian top 100 builders to have a division specialising in renovations. Summit Home Improvement does about 120 extensions a year.

Summit Homes Construction General Manager Brett Garrett says that of the 60 upper-storey additions it does, almost 100% of them are constructed using frame and lightweight cladding. “To give you an idea, of the 60 jobs we did last year, only one was brick veneer. The rest were composite,” says Garrett. The bulk of these currently uses the HardiTex® system as it gives a rendered look that’s the same as the typically rendered double brick on the original house below.

Garrett says that the time saved is a prime reason why they build light upstairs. “When you open a person’s roof up you need to get the place locked and sealed up as quickly as possible and it’s very, very difficult when you’re doing brick veneer to make a place completely watertight. Bricklayers are having to work down into roof spaces and you’ve got problems with scaffolds – it creates a lot of headaches,” Garrett says.

Then there are the cost savings. “We save between 25% and 30% in time and the cost is roughly about 20% more for building it in brick veneer. This is a system we’ve used since 1983.”

Now that Scyon™ has emerged, Garrett says Perth consumers are likely to embrace the trends that have been seen elsewhere, and that’s to build the upper-storey extension in a different material instead of trying to blend it in. “I think Linea has a good application there,” Garrett says.

Secura wet area flooring is ideal. “It doesn’t move, it doesn’t twist, it doesn’t warp.”

Double-storey innovation also on new homes

Summit Homes has also built five new homes at the coastal estate of Yanchep. They have taken the innovative step in the Perth market of building the homes completely in frame and Scyon™ products – Scyon™ Matrix™, Axon™ and Stria™ cladding, Linea™ weatherboard and, internally, Secura™ wet area flooring.

Garrett says that building these homes in brick would have taken about 35% to 40% longer. “Generally a two-storey [house] takes anywhere from 10 to 12 months, and I believe we can knock these out – now that we’ve got a better understanding of the technical details – in seven months,” Garrett claims.

Site and frame preparation were key considerations. “The major thing is the actual slab set out. It’s imperative that they’re accurate,” Garrett says. “You don’t have that tolerance of a 50mm cavity to work with. The slab set out and the installation is one of the most critical parts of the whole operation. You get that right and you get your framing right, then the rest of it will just fall into place.”

Garrett believes framed construction and lightweight cladding also makes it easier to achieve the necessary thermal ratings for the Perth climate. “I think from the point of view of the thermal qualities, it’s much easier to get a framed house to meet that [star ratings] than to get a cavity brick home to meet it,” says Garrett.

Upper-storey pop-up easy in Scyon™

Builder John Bicanic and designer Jay Baker met an interesting challenge when the new owners of a large lot in Brisbane’s Shailer Park wanted to redesign the existing unfinished house.

The previous owner had stopped construction after the slab had been poured. While the slab was originally designed for a rendered brick 600-square-metre home, Baker and Bicanic were asked to create a home that used the slab footprint to the maximum, but actually created a far smaller house.

The driveway to the block was extremely steep so bricks weren’t really an option. In addition, the pavilion-style pop-up in the middle of the home couldn’t have been cost-effectively built with brick. “A massive steel beam would have needed to go through the middle,” says Bicanic.

Instead, Bicanic and building designer Jay Baker designed the upper storey using Scyon™ Matrix cladding. They were pleased with the commercially styled facade in materials suited to an extreme bushfire risk location.

However, it was the first time they’d used Matrix cladding. “It was a little bit difficult to start with because we didn’t quite fit the design to the sheet sizes,” says Bicanic. “We got the hang of it though, and the carpenters are fine with it.”

Smart design, like this home at Shailer Park, Brisbane, featuring Scyon™ Matrix™ cladding, can help to shape an energy efficient home.

Pace Developments; Architect: Shelton Finnis

This medium-density development at Melbourne's Bonbeach relied on the practical and easy-to-store characteristics of Scyon™ Axent trim, Matrix™ and Axon™ cladding, and Linea™ weatherboard.

Construction that is fast and focuses on minimising the footprint of the wall is preferred.

Tight sites: the challenges of medium density

In any given year, roughly 160,000 dwellings are built in Australia. Of that number, "other dwellings" – anything other than detached single dwellings – have been about a third. According to industry research firm BIS Shrapnel, while the proportion of other dwellings may have been relatively constant, the proportion of them that are medium density has risen from around 37% in 2003 to around 50% in 2008. Medium-density dwellings are those that are less than three storeys high and are usually attached.

This trend is particularly noticeable in all three of the eastern states, with the proportion as high as 55% in Victoria and in the low 40s in New South Wales.

BIS Shrapnel Managing Director Robert Mellor says that there is also an estimated 20,000 demolitions nationally and that about half are likely to be smoothing the way for medium density.

Mellor says a significant increase in demolitions was noticed after the 1996 census. "The market basically doubled between the early to mid 1990s and the late 1990s. The really big markets are Sydney and Melbourne, and probably even Adelaide and Perth have increased in recent times," he says.

Because medium-density sites tend to be small, a number of construction challenges arise. Builders need to deal with site access and tricky material handling, and designers are trying to maximise yield. Typically, construction that is fast and focuses on minimising the footprint of the wall is preferred.

Matt Bridgman: "[Using Scyon™ products] would save at least half the cost ... The list of advantages go on and on."

Fast construction and fast sales with Scyon™

Melbourne architect firm Shelton Finnis was given a challenging brief by developer Pace Development Group for its mixed use project on the Nepean Highway at Bonbeach. The goal was to get the maximum yield out of the tight 900-square metre lot, while also meeting local town planning requirements. The result was 20 two-storey units with a basement carpark.

The original industrial building had been removed but, as the site was on one of Melbourne's busiest coastal thoroughfares, site access would be an issue. And space was at a premium. Pace Development Group Project Manager Matt Bridgman says they actually had no access or storage. "Pretty much everything had to be stored on-site".

A key part of the solution was a mix of Scyon™ products – Matrix and Axon cladding, Linea weatherboard, and Axent trim. "What's so much easier than having 80 pallets of blocks is four piles of Linea weatherboard or Axon all stacked up and covering exactly the same square metres," Bridgman says. "They're taking up less than a quarter of the space."

The fact that materials don't have to be shuffled around the site also means that construction goes much faster. "Overall, we saved at least four weeks," Bridgman says. "It was locked up so much faster [than we expected]."

Fewer trades drives savings

The streamlined construction process and fewer trades are a big speed driver. Bridgman says: "If you look at block or brickwork, you've got sand, cement, scaffold, waste. Just the logistics of getting the sand to the bricklayers if you're on a second lift – which means pretty much on a first floor scenario." On cost, Bridgman feels that using block or brickwork doesn't even compare. "[Using Scyon™ products] would save at least half the cost," he says.

Pace Development Group is currently constructing another medium-density project nearby. When it was only at frame stage, Bridgman says the upstairs would be locked up in just one more week, because they used Scyon™. "But if we were going up with blockwork, you'd be looking at three to three-and-a-half weeks before it was even getting close. Then you'd have to render it."

Space was at a premium at Pace Development's Bonbeach site. The use of Scyon™ products made it easy for builders to work on a tight site.

Bridgman also claims that painters prefer painting Scyon™ substrates to painting render. "The painters love it because it's a primed surface already – it's just a blank wall they've got to work with," he says. "Two coats and it covers really, really well. It's 10 times easier than running a roller over render. With render you go up to a bigger roller and you use more paint because the actual render sucks the paint in."

When it's on, you can move on

Bridgman points to other construction efficiencies. "When it's on, it's finished," he says. "It's just a matter of sweeping up the residue and you're away to the next wall rather than having to get the cleaners and renderers. The list of advantages just goes on and on."

Pace Development Group builds all of its medium-density developments for itself. 90% of their stock is sold off the plan. This means that any construction time that's saved really does equal dollars saved. "Construction time is critical to settlement dates," says Bridgman. "If we can realise a finishing date, our sales and marketing people can have a lot clearer idea on when they can settle the properties."

Finally, there's the look. On this subject Bridgman is emphatic. "The look's just fantastic," he says. "You look around and render's just not what people want anymore. It's just overdone and these [Scyon™] products may be in their infancy but people haven't realised the advantages of them yet. If you follow the specifications and you put it on correctly we can't foresee any problems whatsoever. We're simply rapt in the finished product."

Fast and easy

Western Australia-based Rural Building Company Construction Manager Kevin Drayper is an experienced medium-density builder and prefers to build with timber frame and cladding. "The advantages of the cladding are that you don't have issues with wet weather and brickies not working in the wet weather," says Drayper. "It [takes] longer to do the brickwork compared to standing the timber frame and putting the cladding straight onto the wall."

In addition, Drayper says when they are building in brick, they still have to put a concrete footing in the ground for the brickwork to sit on. "Whereas if we're doing a timber frame, we just do a raft slab and basically the wall frame's just on top of a slab and you've eliminated all that [extra] footing," he says.

He estimates that the cost saving associated with the change in slab and cladding could be between $3,000 and $5,000.

At the Amaroo Retirement Village, Drayper worked with James Hardie to change the design from brick veneer to frame and cladding. "We eliminated all the brick and by doing that the wall frame moved out to where the brickwork was, which made all the rooms a bit bigger also," Drayper says. Three to four weeks was also shaved from the construction period.

"The advantage of frame and cladding is that you can stand your frame up, put your roof trusses up and your roofing on and everyone else can now work under cover," Drayper says. "The disadvantage with brick veneer is that you stand your timber frame, you do all the brickwork then we put the roof on."

At a recent job on 12 attached dwellings in Albany, Drayper also used Secura wet area flooring. "If you get any wet weather it's not going to affect it," he says. "We actually seal all the joints as well, so with this product we don't have any issues with swelling and having to sand all the joints. It can withstand the weather for a lot longer periods of time."

ExoTec® facade panel and fixing system used on Queensland University of Technology, Brisbane.

Commercial claddings are also cost competitive

While much of this book focuses on detached dwelling construction, lightweight construction can also be a cost-effective alternative to masonry and concrete construction in some multi-residential and commercial buildings.

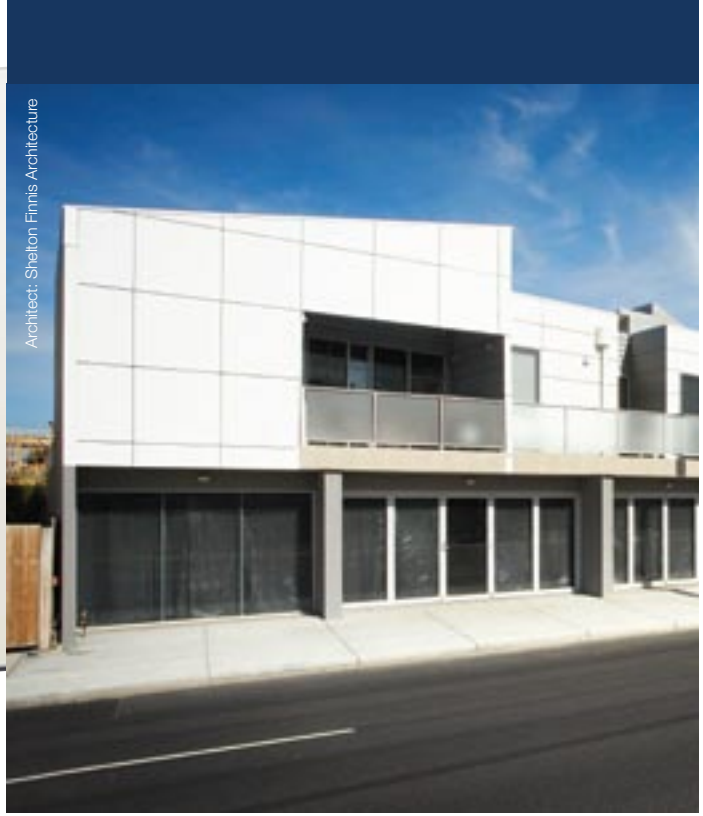
To help demonstrate this, BMT and Associates Quantity Surveyors prepared a Material Pricing Review for James Hardie[1] on a range of walling systems as well as a typical multi-residential apartment building with 10 units.

BMT estimated that the cost to build the apartment building as designed – with a ground, first, second and attic floor built from face and rendered brick with some accents in other materials – would be about $1.522 million. The cost to build it incorporating Scyon™ Axon™ and Matrix™ cladding as well as the ComTex® facade panel and fixing system would be about $1.487 million, or about 2% less.

A comparison of broad wall rates for typical walling construction used in commercial and multi-residential construction shows that using Scyon™ cladding is extremely cost-effective.

1 BMT Material Pricing Review, March 2008.

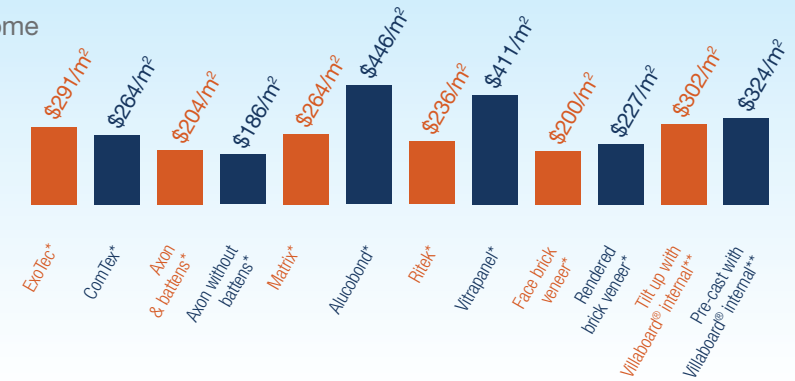
Comparisons of various walls used ... show that Scyon™ cladding can be extremely cost-effective.



Scyon™ Axent trim, Matrix™ and Axon™ cladding, and Linea™ weatherboard feature in this development in Melbourne.

Cost comparisons

Complete walls used in multi-residential and some commercial buildings



***with:**
- 94mm thick steel frame installed
- R2 bulk insulation installed
- vapour permeable membrane
- internal paint
- external paint where appropriate
- Villaboard® lining internally
- cladding systems which include top hats where appropriate

****with:**
- top hat
- R2 foil board
- internal and external paint

Note: Scyon™ Matrix™ and Axon™ cladding can only be used for dwellings or buildings two storeys and under. Above two storeys, the specifier needs to undertake specific design and detailing to ensure that the construction complies with all relevant codes, regulations and James Hardie installation instructions.

ExoTec® facade and panel fixing system played an integral role in transforming the Royal Children's Hospital's/Murdoch Children's Research Institute.

Smart design within a budget

Creating the new home for one of Melbourne's premier research facilities was an exercise in innovation, smart design and clever use of an existing site.

Apart from being responsible for this major project, architect firm Billard Leece Partnership also had the responsibility of creating a public face for the Royal Children's Hospital/Murdoch Children's Research Institute.

According to Billard Leece's Practice Manager Grant Roberts, there was an additional eight storeys built over an existing two-storey wing of the hospital. We aimed to give "the building a visually engaging envelope. It's a highly modelled and articulated facade; we worked with the whole of the facade with a sculptural strategy rather than floor-by-floor."

Cost-effective complexity

To achieve this Roberts says they selected James Hardie's ExoTec® facade panel and fixing system. "We always assumed we were going to use a lightweight material," says Roberts. "Apart from being cost-effective, it allowed us to create this highly modelled facade with volumetric modelling that's complex and wrought."

Cost efficiencies and flexible application and construction were appealing aspects of ExoTec facade panel and fixing system. So was ease of construction.

"When you are building walls with lightweight material, it can be easily manhandled off scaffolding or hoisting equipment. You can't do the same with masonry."

Apart from being lightweight, it's also robust and there is little maintenance required.

Lightweight materials help achieve design vision

Transforming a school still housed in buildings from the 1950s into a modern educational facility was the challenge for architect firm Henderson & Lodge. The buildings had to complement the two buildings also previously designed by Henderson & Lodge: the middle school and a sports/aquatic centre.

Henderson & Lodge's Managing Director Robert Mehegan says, "We wanted to maintain the integrity of the materials used in the other buildings we had designed on the site, so that the whole campus could be unified through materials and colours."

A key part of the design was the distinctive geometric pattern created on the upper part of the school's buildings. This was made possible by using a Vitrapanel® finish on the ExoTec facade panel and fixing system.

Lightweight, low cost and low maintenance

Mehegan says they wanted a lightweight material that allowed insulation to be included into the wall frame, increasing the thermal qualities of the wall. The ExoTec facade panel and fixing system was a cost-effective solution that also enabled Henderson & Lodge to achieve its design vision.

The jigsaw-like result was achieved by creating a mould of the shape required. The ExoTec facade panel was then cut and pre-finished in three different colours before arriving at the site.

"Apart from being lightweight, it's also robust and there is little maintenance required. It's also moisture resistant and impact resistant," Mehegan said. "So really we have used a quality product that requires minimal ongoing maintenance."

Right: A Vitrapanel finish on an ExoTec facade panel and fixing system enabled the creation of this striking geometric look at at this Melbourne school.

Architect: Henderson & Lodge

Close-up on composite

Scyon™ Matrix™ cladding features in this Metricon home at Stockland's Mernda Villages with a variety of other materials on its facade.

Look at any set of design guidelines from leading developers and you'll see an emphasis on composite construction – where a number of wall elements are blended to add texture and diversity to a streetscape.

Of course, building in composite construction takes a little more thought than a broad wall in one material. It may sometimes cost incrementally more, but this does need to be traded off against greater street appeal.

Let's look at two typical homes to see how the costs compare when we spice up the exterior. First, the single-storey home used earlier in the *What's the Cost of Your Wall?* study has been costed with four claddings that start at the dado height and extend from there for about two-thirds of the wall. The bottom third has been costed with face brick veneer, brick veneer with Moroka and rendered brick veneer.

It's clear that composite construction, particularly using products like Scyon™ Matrix™ and Scyon™ Axon™ cladding does not add significant cost to construction. In some cases, particularly when applied finishes and render are used, it's actually cheaper to add variety to the facade with a mix of materials than to build with an applied finish to the whole wall.

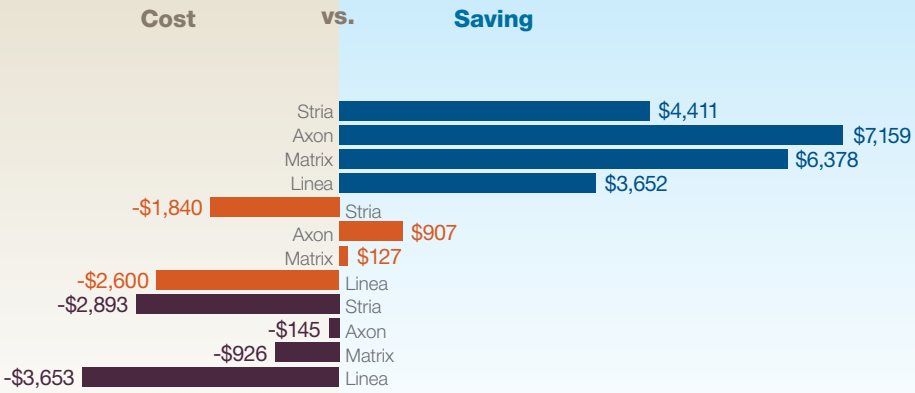
Double-storey homes are even more cost competitive in composite construction. For this study, the upper storey of our home was clad in Scyon™ Linea™ weatherboard; and Matrix, Axon and Stria™ cladding. The ground floor scenarios were brick veneer, brick veneer with Moroka, rendered brick veneer and rendered double brick.

It's clear that using Scyon™ cladding for the upper storey can be extremely cost competitive, particularly in designs where the upper storey is set back from the ground floor. In this instance, using cladding and frame for the upper storey instead of double brick is even cheaper, saving anywhere from 25% to 30% in cost. It's about 15% cheaper than rendered brick veneer.

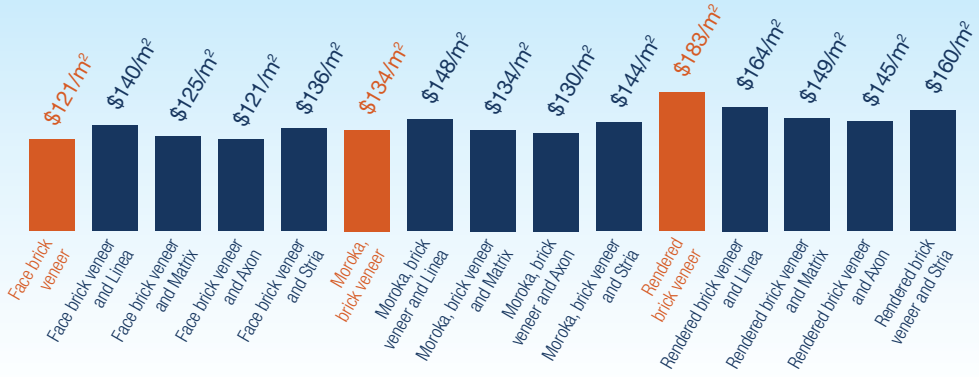
Cost variance
Single storey, composite

Each bar represents the total dollar cost/saving per house when using the products below coupled with the corresponding James Hardie® product at right. (Based on figures in the *What's the Cost of Your Wall?* study.)

- Rendered brick veneer
- Moroka, brick veneer
- Face brick veneer



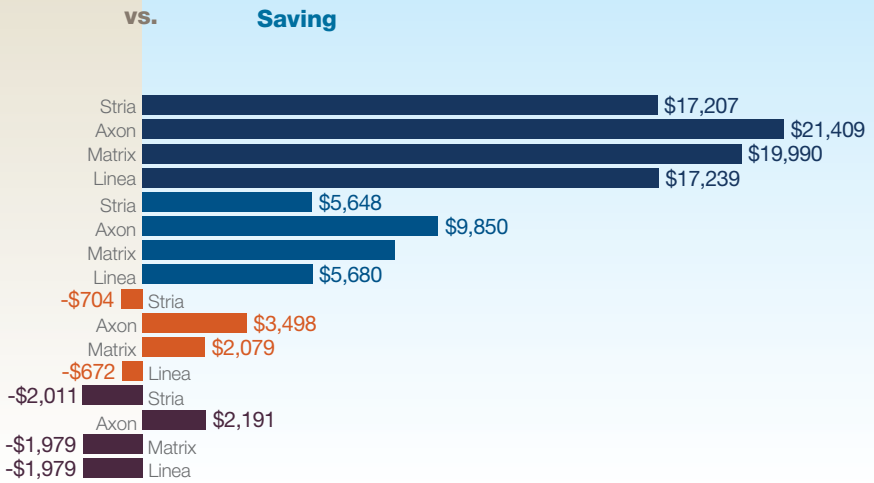
Cost comparisons
Single storey, composite



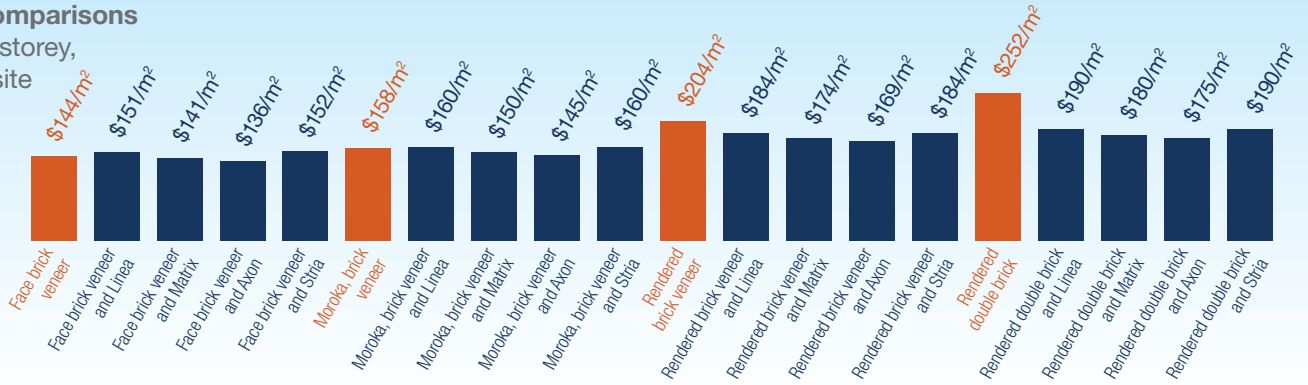
Cost variance
Double storey, composite

Each bar represents the total dollar cost/saving per house when using the products below coupled with the corresponding James Hardie® product at right. (Based on figures in the *What's the Cost of Your Wall?* study.)

- Rendered double brick
- Rendered brick veneer
- Moroka, brick veneer
- Face brick veneer



Cost comparisons
Double storey, composite



Designer: Advantage Building Design,
Builder: Rawson Homes

This home at Murrays Beach in New South Wales uses Linea weatherboard, Axon cladding and HardiFlex® eaves lining.

Cosmopolitan Homes

This home at Murrays Beach features Axon™ cladding.

Benchmark design guidelines

The vision for Stockland's Murrays Beach development is that it will be "a community where the lifestyle of the people and the health of the environment share sustainable outcomes."[1] The guidelines for home design are a key aspect of delivering this vision and some of the key elements are:

- Mainly elevated construction
- Mainly lightweight external building materials
- Articulated building facades with a variety of building elements including decks and eaves, verandas, colours and materials
- No face brickwork or tiled roofs
- Roof shapes integrated with the building form and mass
- External building materials are mainly lightweight to reinforce the lakeside and bushland character. Rendered, bagged or painted masonry is only allowed for a maximum of 20% of the area of each building facade.

It's the variety in the building facades that is the key to creating harmonious streetscapes and smart home designs.

Delivering a vision of community with articulated building facades and a variety of building elements including decks and eaves, verandas, colours and materials.

Cosmopolitan Homes, Murrays Beach in New South Wales. Using Linea weatherboard and Matrix cladding.

Composite materials the key to higher density harmony

Within its Harbourside project in Melbourne's Edgewater Estate, leading developer Delfin was challenged by a site that was a narrow strip of land but had good exposure to the lake and the park. The Delfin team decided to create a lane fronted by deep attached terraces and compact studio houses.

"The idea was to increase the density of that site and to build more compact houses which give the residents complete privacy and the amenity of their usable private open space," says Victorian Design Director for Lend Lease Residential David Morrison. "You also get a nice connection internally and externally with adjacent parkland and water, and various pedestrian and car pathways."

Morrison says that Harbourside's architectural style is contemporary, defined by architectural detailing and proportions. "The application of different materials to different parts of the home reinforced the formal relationships," he says. "Masonry or other rusticated finishes are applied to the lower levels of the home to ground them and the floating upper levels tend to be clad in lightweight panels and in which we've used different textures."

Composite complications

Because of the range of materials involved, the 36 townhouses involved some complicated composite design. Morrison says the construction required a lot of cooperation between trades. It also required finding unique solutions to tricky detailing issues.

"Whenever you butt materials up against each other, you have to finish the junctions," he says. "So I guess there's the treatment of junctions and the alignment of junctions. There are also different details with window sills and jambs."

The original design was quite sculptural, Morrison says, and as construction progressed they decided they wanted to reduce the number of materials. "In some cases we changed from timber to Scyon™, and we did change from a metal to Scyon™ Matrix for the edge of the skillion roofs. The installation of the metal was a bit problematic and hard to control, and the Matrix cladding was a much more reliable and even surface," he says.

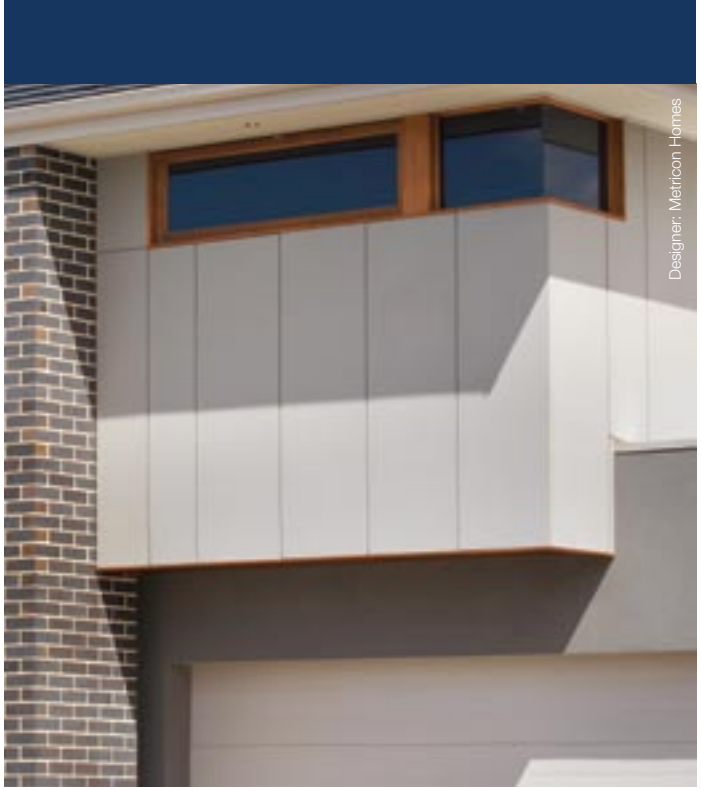
Smarter simplicity with Scyon™

Daniel Verrico was a construction manager at the time with Lend Lease Residential. He agrees that rationalising the number of products improved "buildability".

"In the original design the sheer number of materials making up the facade was basically not buildable – you couldn't achieve the junction details to keep it weatherproof," Verrico says. "The whole process was too complicated and too hard to do. It also couldn't be warrantied or weatherproofed to any level of confidence." Added to that, the cost to build was "extravagant" he says.

Verrico points out that the homes were all designed with timber windows that often had one type of cladding starting on one side of the window and another one starting over the window. This meant differences in depths and flashing details, and different trades. Following the rationalisation, Matrix cladding replaced a number of the metal sheet finishes, and Linea weatherboard was used to a greater extent.

"The speed of application definitely increased and weatherproofing and maintenance issues were dramatically reduced," Verrico says. "[The products also help] achieve a high-level architectural look with maintenance in mind."



Scyon™ Matrix™ cladding butts up to brickwork in Metricon's new display home.

Seamless match-up

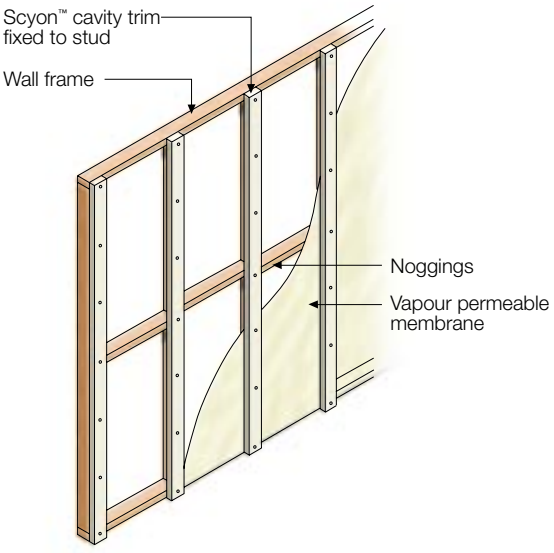
On Metricon's new display home – Laguna – in the Melbourne estate of Mernda Villages, the design team has teamed Scyon™ Matrix™ cladding on the upper storey with face brick on the lower. General Manager Project Housing Will Lamb said the choice of the product was not solely construction-driven. "The design team would say they like the way the cladding comes down over the brickwork," he says. "Because the gap's not as big, they see that as having an aesthetic purpose."

However, the fact that the Matrix cladding is installed using the Scyon™ cavity trim means that Metricon can continue to use windows sized to suit a brick veneer reveal.

Frames typically come to site suited to brick veneer, which means that the lightweight claddings will be packed out off the frame, on horizontal timber and vertically installed Scyon™ cavity trim battens, to suit this reveal depth. In addition, because Scyon™ cavity trim can be installed off stud and can span a maximum of 800mm centres, no extra studs are needed.

This type of lightweight cavity construction (which can be used not only with Matrix cladding but also with Stria cladding) delivers improved energy efficiency.

Not only can bulk insulation be added inside the wall frame, but an air gap is created to insulate the building. Reflective vapour permeable membrane can also be used to further improve the insulating benefits of the external wall. The air gap also helps improve the wall system's acoustic performance and is considered good moisture management practice.



Recommended cavity construction installation.

Makeover the box

“Everyone knows that the box is the cheapest thing to build,” says Bill Giannikos, New Product Range Design Manager for Simonds Homes. “But how you make that box look and feel through the materials you use is the key ingredient to how many you sell.”

Giannikos sees the trend is away from brick and definitely toward composite construction. “Brickwork on its own has been done to death as a look but being able to mix and match lightweight and brickwork is absolutely king,” he claims. “This trend is going to be with us for at least the next 10 years, and so how we amalgamate the two together – from an architectural point of view and a sustainable point of view is critical.”

The key is making connections between materials easy

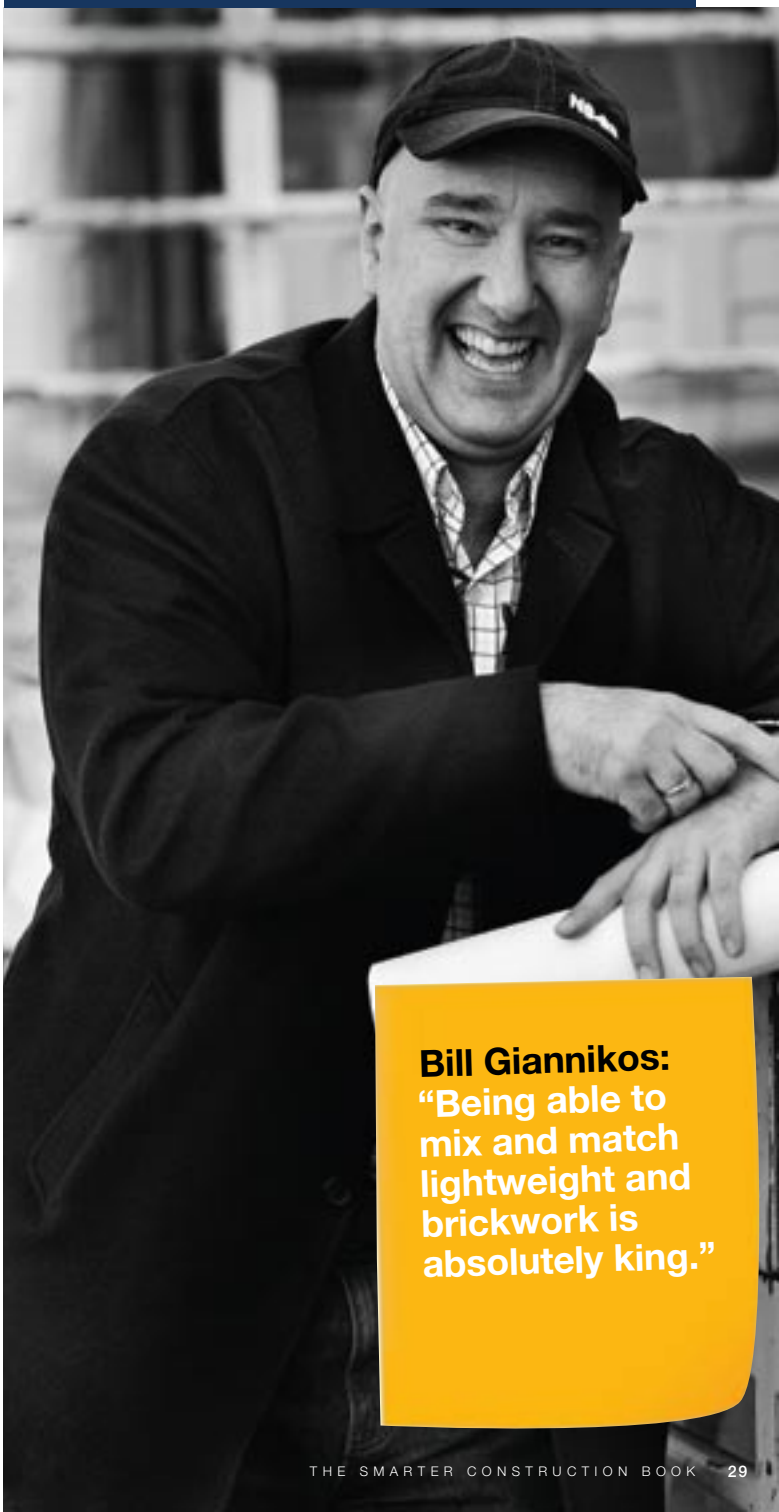
The challenge is getting every department – design, estimating, purchasing and construction – to understand the benefits of lightweight construction.

At the design stage, it’s also about making the connection details between brickwork and lightweight “idiot-proof”.

“When you amalgamate brickwork and lightweight, it requires a connection and then also a flashing of some description. All construction’s going to say is ‘Look I need to get a plumber in, I need to flash this, I need to do that’. So to make it cost-effective, it’s really about education and how clever the designer can make that connection detail,” Giannikos says.

Some details are worth the cost – because they drive sales

Finishing around windows and connecting to brickwork is an area where a balance is needed between cost and the aesthetics which drive sales. The look of a “caravan window” – where the window is flush at the front – does not paint lightweight construction in a good light. “You have your tiers,” says Giannikos. “On a standard house we put Scyon™ Axent™ trim around the window, whack in some HardiFlex®, and we can get a really good look around the window at very small cost. The next tier is putting in batten walls and a thicker rebate. It looks hot and it’s also added to the thermal rating.” The battened walls create a cavity which improves energy efficiency.



Scyon™ Axent™ Trim around windows, and walls featuring Scyon™ Matrix cladding.

Smarter options for windows

Experienced builders know that it's simply best practice to have mechanical flashings over the heads of all windows and doors. The window – and, in particular, the junction between the window and cladding system – is a weak point when it comes to water ingress into a building.

Flashings force water away from the wall cavity, keeping the building dry inside. Relying on silicon or polyurethane sealants isn't the best option because of their limited service life.

Because window details tend to vary from brand to brand, James Hardie has worked with a number of window manufacturers around Australia to develop standard sill, jamb and head details for their windows and their cladding systems.

For example Victoria-based A&L Windows has a weatherboard window adaptor that conveniently slides down the side of the window to either increase or decrease the distance from the frame to the outside of the window. They are supplied in the same colour as the windows.

Trend Windows has also worked closely with James Hardie to develop its Scyon™ Linea™ window adaptor. It simply clips onto the side of the window, opening up the side groove wide enough to accommodate Linea™ weatherboard. The Linea window adaptors are delivered cut to length and in the same colour as the window.

This beautiful home with a boathouse feel uses Scyon™ Linea™ weatherboard with Scyon™ Axent trim.

Scyon™ Axent™ trim challenges conventional approaches with one size fits all

An alternative to using adaptors to work with special windows and particular claddings is to use Scyon™ Axent trim. Because the junction between window and door openings can be problematic depending upon the cladding and the window type, simply installing Axent trim prior to the cladding works with all types of domestic windows and James Hardie cladding systems.

If you want to use Axent trim around windows and doors there are just a few things to consider:

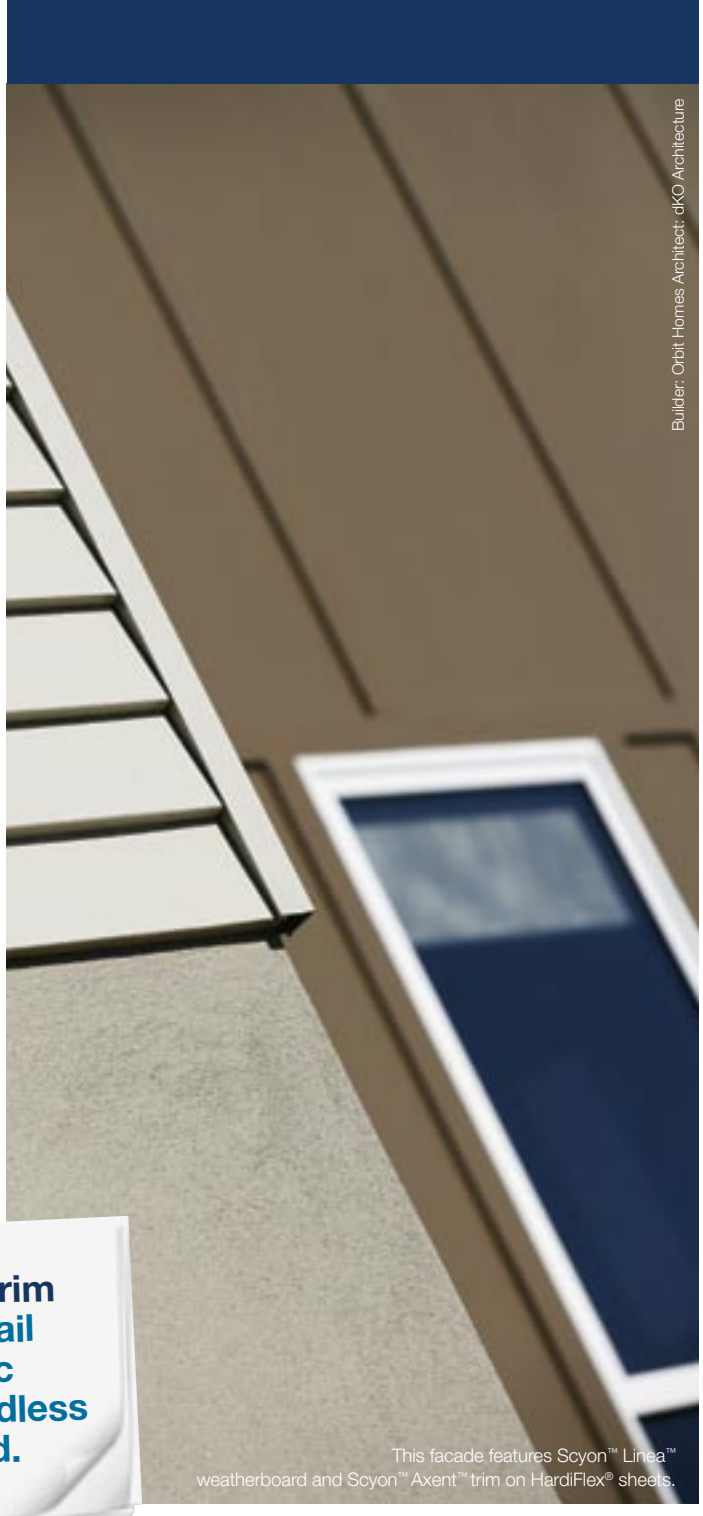
- Double or triple studs are required beside all door and window openings, one stud for the trim to fix to and the other for the cladding system.
- Triple studs are used if you trim using the 84 by 38mm trim.

While installing the Axent trim may take a carpenter an extra 15 minutes or so to install – versus installing a window that fits the cladding exactly – there are other advantages to consider. For builders who may supply different windows to different parts of the business, managing different details can mean room for error. Using Axent trim means the one detail fits all domestic windows regardless of size or brand. There will never be junction issues to solve.

One important tip is that when building composite construction, with, for example, brick veneer on the ground floor and lightweight cladding on the upper floor, it's important to order windows with different reveal depths. If you don't, then the upper floor walls need to be battened out to fit the windows with a brick-sized reveal depth, adding cost.

For more information on using Axent trim, check out the Scyon™ Axent trim installation instructions at: **www.scyon.com.au**.

Scyon™ Axent trim means one detail fits all domestic windows regardless of size or brand.



Builder: Orbit Homes Architect: dKO Architecture

This facade features Scyon™ Linea™ weatherboard and Scyon™ Axent™ trim on HardiFlex® sheets.

Designer: Mirvac

Some homes at Waterline in Bulimba featured very large expanses of eaves, lined with fibre cement and textured with expressed joints.

Close-up on eaves and soffits

For a while, homes without eaves were fashionable. And there's no question that building a house with eaves tends to cost more than one without. However, the cost is typically incremental – and doesn't take into account the energy savings for the occupant over time, (although savings may vary depending on climate).

In addition, problems like the recent spate of insurance claims in New South Wales as a result of water damage linked to high-front gutters, would be unlikely to occur on homes with eaves. In heavy rain high-front gutters seem to push excess water back into the roof instead of overflowing away from the house.[1]

An independent costing of the additional commitments required to achieve compliance with the New South Wales Government's Building Sustainability Index, undertaken by quantity surveyors BMT and Associates[2], indicates that the inclusion of eaves added between only 0.5% and 1.6% to the total cost of the project.

Eaves: a smarter way to build

Thankfully eaves are back in fashion. "In New South Wales we were concerned that more and more buildings were being designed without eaves," says Bruce Taper, Director of the New South Wales Department of Planning's Sustainability Unit.

"Obviously, being part of the Government, we are conscious of limiting greenhouse emissions and doing what we can to limit how much power is consumed. So we developed BASIX to address those things. Eaves are an integral part of the solution.

"Ventilation, insulation and adequate shading are all essential for good, sustainable design, and obviously, eaves fall under the shading category. But, apart from being good for the environment, people like to live in comfortable homes, and eaves are also an essential part of achieving that."

While the standard is HardiFlex® eaves lining, there is a range of options for eaves that add texture and interest.

1 'Gremlin Behind the Walls', Kelly Burke, *The Sydney Morning Herald*, February 23, 2008.
2 `Indicative Elemental Estimate for Residential Development Alterations & Additions, BASIX Analysis', prepared for Sustainability Unit, Department of Planning by BMT & Associates Quantity Surveyors, April 2006.

HardiFlex® sheets offer a smooth panelled look that can be used for walls and eave or soffit linings in just about any application.

Villaboard® lining is a smooth-sanded sheet ideal for lining eaves. With recessed edges it allows a seamless flush-jointed finish without the need for PVC joining strips.

HardiGroove® lining creates an authentic tongue and groove look that can be used externally on soffits and under eaves and veranda roofs.

Versilux® lining is a premium square-edged sheet that butts together to achieve a smooth, blemish-free finish ideal for use in exposed beam ceilings and soffits.

PrimeLine® and HardiPlank® weatherboard offer a highly textured look for flat eaves and soffits, while Scyon™ Axon™ and Stria™ cladding offer a more subtle texture.

ExoTec® facade panel and fixing system and Scyon™ Matrix™ cladding offer an expressed joint look.

The ultimate outdoor room, using Scyon™ Linea™ weatherboard on the main house, with Villaboard® lining on ceilings.

Eaves with expressed joints add texture to Waterline

When Mirvac was developing designs for its Waterline development in the Brisbane suburb of Bulimba, it knew that lightweight and masonry was very much the language of the area and in Queensland generally. According to design architect Amelia Kelly, one important objective was to ensure the development melded with the existing architecture of the suburb. Kelly worked on Waterline and is part of HPA, Mirvac's in-house architectural and interior design practice.

"This was fundamental, especially on the fringes of the development where the Waterline homes are set within the vicinity of traditional Queenslander houses which characterise the current Bulimba streetscape," says Kelly.

"We've seen that the 1960s style of coastal vernacular had come back in, but whilst we didn't want it to look exactly like that, we wanted to reflect that kind of patterning and texture," she adds.

The opportunity of eaves

The challenge was to create uniqueness and individuality without overcomplicating the construction. Most homes incorporate a sala, or outdoor room, ensuring the homes efficiently maximise the enjoyment of their internal and external spaces.

"One of the simple things we did to avoid blandness and create textural interest was to use expressed jointed fibre cement in all of the soffits," says Kelly. "In some cases there are some very large expanses of eaves – particularly in the salas [outdoor rooms], so the expressed joints add patterning and detail."

Eaves with expressed joints add patterning and detail.

Architect: Robyn Bilkey Architect

Smarter options for balconies and decks

This home features Scyon™ Linea™ weatherboard.

The quality of waterproofing – or lack of it – in the building industry has been a longstanding issue. The Master Builders Association of New South Wales recognised this and established the Waterproofing Council to address it.

Steve Peluso, a director of Master Menders, one of Victoria's largest building insurance rectifiers says that fixing defects in new homes accounts for about 40% of his business. Of that, water ingress, usually over balconies, accounts for 20%. On the renovation side, balcony failures account for 40% of the defects. Peluso says the average time to failure is typically about 18 months.

"About 20% of the defects fixed by insurers on new homes are related to water ingress from balconies, at an average cost of between $12,000 and $15,000 each time," he says. "That doesn't include the ones that are fixed by builders that don't go to insurers." Costs tend to be higher on renovation rectifications with balconies costing between $15,000 and $17,000 to fix.

The most common reason for balcony failures is because some builders cut corners or use the wrong materials.

Cutting corners and poor design

"The most common reason you see and hear about why these things fail comes back to the costs that the builder has quoted," says Peluso. "The builder hasn't allowed enough for [the project] so he's had to cut corners. As a result, he may then do his own waterproofing, which is fine if he knows what he's doing. But it's not if he doesn't know what to do or uses the wrong materials."

Poor design is another factor, Peluso says. "Sometimes a designer has recommended a chipboard flooring for an external use with no threshold below doorways or windows, so you can't create an up-stand with the membrane. Add to that very little fall on the balcony for water to run away and you've got a design issue that the poor builder cops the blame for."

Apartment residents not so jolly after balcony failure

Almost within earshot of crowds next door at the Melbourne Cricket Ground are the balconies of an upmarket apartment complex. Partying might seem inevitable in this location. However, now that the balconies in the complex need to be replaced because of building defects, owners are no longer in a jolly mood.

Master Menders has been called in by the insurer. According to Peluso, it is required to "make safe the existing balconies which are in danger of collapsing because of the material that was used."

Built with a chipboard substrate with tiles direct stuck, water has penetrated and there's no sign of any waterproofing. "They are dangerous and the owners know not to go on them," says Peluso. "There are a couple of spots where the tiles have caved in and what's happened is that the water's gone through to the soffit lining on the other side and caused that to collapse."

All 40 balconies will need to be replaced. Peluso says that the problem comes just after their completion of another apartment balcony rectification in Collingwood. Poor waterproofing was the issue in that four-storey complex. "We had to demolish all 15 balconies and reconstruct them using James Hardie compressed sheet," Peluso says.

HardiFlex® sheets with battens for walls and ExoTec® facade panel and fixing system for ceilings are used in the sala of this home at Waterline at Bulimba in Queensland.

Scyon™ shifts the benchmark

While James Hardie compressed sheeting for decks is regarded as the benchmark product for tiled balconies built with joists, it does involve some special techniques. The compressed sheet is relatively heavy and is hard to handle and work with.

All Scyon™ products are designed to challenge performance and ease-of-use conventions. It's about delivering a smarter way to build. In developing Scyon™ Secura™ exterior flooring, the James Hardie research and product development team focused on creating a balcony flooring product that had a workability similar to timber with extremely high moisture resistance.

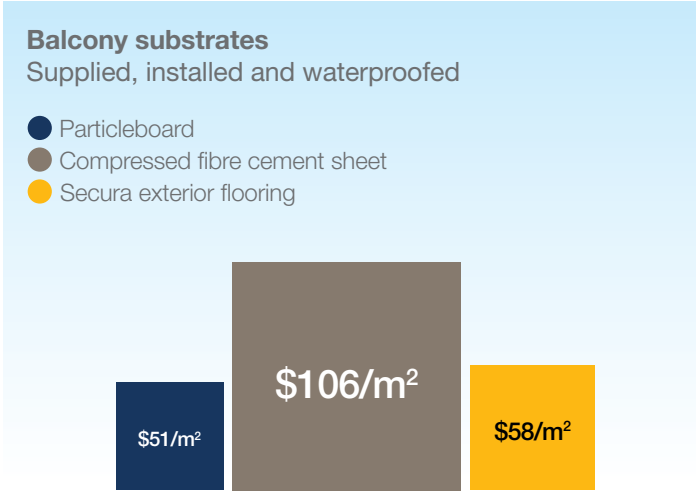
To be released in mid 2008, Secura exterior flooring is the simplest way to help protect tiled balconies against moisture damage, and that's definitely smarter construction.

At around 40kg and 2,700mm long by 600mm wide, Secura exterior flooring is about 20% lighter than compressed sheet (per square metre) and can be carried by two people, tucked under the arm like a large surfboard. It's also tongue and grooved which delivers engineered joints and eliminates the need for timber trimmers under these joints.

Secura exterior flooring is sealed on all sides with an advanced polymer coating that helps protect the board from moisture-related problems. A topcoat on the surface of the board provides good adhesion. The mesh reinforcement on the underside enhances the heavy-duty performance of the Scyon™ material, adding extra strength and impact resistance to deliver a suitable external residential flooring substrate.

For balconies that aren't over habitable rooms – such as verandas – no additional waterproofing membrane is needed once Secura exterior flooring is installed. For balconies over habitable rooms, a waterproofing system needs to be applied; but waterproofing *and* Secura exterior flooring give you peace of mind the easy way.

The *What's the Cost of Your Wall?* study shows that it typically costs only about $7 per square metre more to have peace of mind using Secura exterior flooring than it does to install the low-cost particleboard alternative. Also, the installation cost of Secura exterior flooring is only about 55% that of compressed fibre cement.



Above and opposite: This Orbit display home in Melbourne's Aurora estate features Scyon™ Linea™ weatherboard and HardiFlex® sheets with Scyon™ Axent™ trim..

Scyon™ is ideal for balconies

As part of the development of Secura™ exterior flooring, leading production builders Orbit Homes was asked to participate in trials of the product. Building Manager Ralph Ganino has been with Orbit Homes for eight years, but in the building game for 30. “When I first started, [the main building] failures were balcony, balcony, balcony,” says Ganino. “We used to use the chipboard flooring on balconies and because of movements and what-have-you, we had leaks and problems.”

The fact that the maintenance team report to Ganino gives him an accurate view on defects. “Previously, probably 80% of the balconies would fail,” he says. “Each fortnight we go through a workflow and the balconies were always coming up.” Defects became apparent within anything from six months to two years.

When Secura wet area flooring was released, Ganino thought they’d found a product that would also deal with balcony problems. However, more research and product development was needed to take the interior wet area flooring and modify it to create a product truly suitable for external use.

Following trials of prototypes during James Hardie’ s research and product development cycle, Ganino says that while the total installation cost of using Secura exterior flooring is slightly more than using chipboard, it’s a much more purpose-designed product. “In the end it pays for itself,” Ganino says. “It just flows through. It’s a better product for that use.”

Ralph Ganino: “In the end it pays for itself ... It’s a better product for that use.”

Architect: dKO Architecture

Architect: Jon King; Photography: Brett Boardman

Challenges of nature

Sloping sites, bushfire-prone areas and the vagaries of nature can pose a challenge to builders who want to achieve an aesthetic yet cost-effective result. The good news is there are smart construction methods that can do just that.

Homes at Murrays Beach in New South Wales using Scyon™ Linea™ weatherboard, Scyon™ Matrix™ cladding, Scyon™ Axent™ trim and HardiFlex® eaves lining.

Architect: (left and middle) Advantage Building Design; (right) Schreiber Hamilton

Close-up on sloping sites

Talk to most large production builders and they'll tell you building on sloping sites is something they'd often like to avoid. However in some key areas like south-east Queensland, northern New South Wales and the outskirts of Sydney, sloping sites are an increasing proportion of developer land banks.

Even in Perth, known for its flat sandy sites, there's a growing focus – at least from developers and planners – on construction methods that are more sensitive to sandy dune locations and cost-effective where there are (increasingly) reactive soils.

A senior project designer with Land and Housing Development in the Western Australian Department of Housing and Works advises that more difficult sites are now over-represented relative to the flat sites traditionally developed.

As a result, site costs for fill and retaining of anywhere from $15,000 to $20,000 per lot "will play an increasing part in the future," he says. That's unless builders can embrace more site-responsive construction approaches.

Unfortunately, many builders are entrenched in convention – building typically with slab on ground and brick veneer construction. Or in metropolitan Perth, builders typically build with slab on ground and double brick. When forced to build on slopes, many builders simply use split-level slab construction without fully exploring the other cost-effective options.

The challenges posed by sloping sites can be overcome with smart design ideas and the use of lightweight materials.

Building on slopes – cost comparison

In an analysis of different construction approaches used to build on slope[1], coupled with construction and site costs, the conclusion was that the split-level slab approach is cost-effective for slight slopes but steel options come into their own as site conditions 'worsen'. This is summarised in the table below and detailed over the page.

Range	Split-level slab	Brick piers with timber bearers/ joints	Steel posts with steel bearers/ joints
Base	$24,000	$28,000	$20,000
Worst case	$54,000	$40,000	$28,000

Higher grade slabs, earthworks, and the need for retaining walls drive significant cost increases when building with slabs and brick piers as site conditions become steeper or more reactive. However, steel options have the least degree of cost variation relating to changes in site conditions.

The cost-effectiveness of lightweight steel options begs the question of why they haven't been more readily embraced. Perhaps this has more to do with inertia and perceived difficulties rather than actual ones. Interviews with a range of builders shed some light on perceptions which have been incorporated in the following tables.

1 Assorted actual plans, bills of quantities and costs were collated in mid-2007 and used to reach an average square metre cost applied to a 400-square-metre lot and 240-square-metre home.

Designer: Greystone Homes

This home at Murrays Beach was built by working with the sloping site. The result is a stylish split-level home featuring Scyon™ Linea™ weatherboard, Matrix™ and Axon™ cladding.

Above and below: Houses at Brookwater golfing estate in Queensland were built using the slope of the ground and lightweight construction methods.

Split-level slab

Cut and fill with split-level slabs is a cost-effective method in low-slope contexts, but steeper site conditions can raise costs enormously.

Where slopes involve less than a two-metre fall, costs seem to be typically about $24,000:

- about $1,000 for benching,
- on average $2,000 for soil removal,
- on average about $16,000 for the waffle slab
- about $5,000 for the drop-edge beam and waterproofing.

However, when the slope increases to a fall of more than two metres across the home, costs increase to take account of:

- retaining about $10,000
- extra fill removal $6,000
- higher grade slab $5,000
- slab piers $7,000
- frame impact $2,000

Builders and planners report the following advantages and disadvantages of using a split-level slab to solve the challenge of difficult sites.

Advantages	Disadvantages
Slab is termite resistant	A split-level slab is not suited to all sites
Slab is quicker, cleaner and easier	Significantly more expensive for slopes with more than two-metre height variation
Consumers like it	If the lot slopes away from the road, homes built with a split-level slab often have a poor streetscape aspect because only the roof is visible from the street
Scaffolding for working at heights	Impedes storm water run-off
No bounce or deflection	Cannot use this method in high vegetation zones

Brick piers with timber bearers and joists

Brick piers with timber bearer and joists is a sloping site solution particularly in New South Wales, but it's not necessarily cost-effective.

Where slopes involve less than a two-metre fall. costs seem to be typically about $28,000:

- strip footing about $7,000
- brick perimeter wall about $6,000
- bearers and joists about $9,000
- particleboard floor about $3,000
- labour about $3,000

However, when the slope increases to a fall of more than two metres across the home, costs increase to take account of:

- benching $1,000
- extra bricks and labour on perimeter wall $4,000
- extra bricks and labour on piers $2,000
- extra thermal insulation $5,000

Builders and planners report the following advantages and disadvantages of the brick piers and timber bearer and joist solution.

Advantages	Disadvantages
Brick perimeter alleviates security issues and provides enclosed space	Many piers reduce storage space
Some consumers like brick for sub-floor, which allows brick for cladding	Multiple trades are needed
High durability of brick construction	Timber requires long lead times and can be susceptible to shrinkage and termites
Carpenters prefer to work with timber bearers and joists	Long construction process
–	Scaffolding is needed for working at heights

Steel piers and bearer and joists

Competitive steel systems are cost-effective, and new products like LiteSteel Beam are also more suited to carpentry trades and therefore the production home environment.

Where slopes involve less than a two-metre fall, costs seem to be typically about $20,000:

- supply and install steel system (posts, bearers and joists) $15,000
- particleboard $3,000
- consumables $2,000

However, when the slope increases to a fall of more than two metres across the home, costs increase to take account of:

- extras – height related steel components $4,000
- extra thermal insulation $5,000
- benching $1,000

Builders and planners report the following advantages and disadvantages of the brick piers and timber bearer and joist solution.

Advantages	Disadvantages
Quick	Can mean less flexibility on-site depending on system
Bushfire and termite resistant	Can mean difficult fixings, different tooling and components and consumables depending on site
More space/head height from reduced light beam	Stricter engineering requirements
–	Levelling can be more difficult depending on system

Steel options

Lysaght Quika-Floor® is a fully engineered and certified steel sub-floor system. Quika-Floor is the steel alternative to conventional timber bearers and joists and is suitable for both brick veneer and freestanding houses with a maximum fall of land of four metres. Find out more at: http://www.bluescopesteel.com.au/go/product/lysaght-quika-floor.

Spantec Boxspan® beams allow builders to substitute timber in many structural applications – bearers, joists, rafters and lintels. They can be used with EziPier®, an adjustable steel pier used in place of brick piers and timber stumps. Find out more at: http://www.spantec.com.au/.

DuraGal® hollow steel sections are used in the DuraGal Flooring System®, a lightweight, high-strength steel flooring system. The system is easily assembled with a Tek® screw gun and metal cut-off saw. No site welding is required. A full range of accessories is available including the adjustable top connector. Find out more at: http://www.onesteel.com/productspecs.asp?specID=170.

LiteSteel® beam (LSB) was developed in response to demand for a light structural beam with the strength of steel and the ease of use afforded by timber. According to information on the LSB website, LSB is on average 40% lighter than traditional hot-rolled structural steel beams of equivalent performance. The same galvanised steel brackets used for structural timber can be used for connections to LSB. Find out more at: http://www.litesteelbeam.com.au.

The information provided above was obtained from the relevant websites in March 2008. Readers should conduct their own independent enquiries as to the suitability of these products for their projects. These inclusions should not be taken, of themselves, as a product endorsement by or for James Hardie.

One Queensland developer and builder says that working with the natural terrain of a sloping site is the best way to achieve a cost-effective and valuable outcome.

Although some builders tell developers that building on slope adds about $30,000 to costs, this industry veteran says that's "only if you want to make the lot flat!"

He cites a recent example of two blocks of land available in a Brisbane estate. "To bench both lots would cost me about $16,000," he says. "Then I've got to do some retaining at around $22,000, so before you know it, both lots have cost almost $40,000 in total, or about $20,000 each to flatten and retain.

"In contrast, if I work with the site, and use a steel elevated floor system, then building 'site responsively' has only added about $10,000 to each lot."

The developer says that to construct a floor frame/substrate in plane C section steel covered with particleboard costs him about $85 per square metre. This compares to the cost of a slab at about $80 per square metre. Therefore the additional costs of about $10,000 come from the $5 per square metre extra compared to a slab, as well as decks because of the elevation, steps at about $2,000, and a sub-floor perimeter treatment.

"It's worth it," the developer says, "And clients love it."

Embers can ignite timber decks, eaves, gutters and window frames.

Close-up on bushfire zones

Who hasn't turned on summer television news to see pictures of raging bushfires in danger of destroying homes and communities? From the time of white settlement to the 1939 'Black Friday' fires, the destruction of buildings in bushfires was seen as inevitable, with surviving buildings viewed as 'miraculous escapes', wrote CSIRO scientists Justin Leonard and Neville McArthur in a 1999 research paper. "The first scientific house-by-house study of bushfire building damage took place after a fire at Beaumaris (Victoria) in 1944, in which 66 houses were destroyed," they wrote.[1]

Since then, however, a lot of research has been undertaken to prevent the destruction of homes and lives by bushfires. For a paper on Bushfire Risk prepared in 2006[2], the results from a number of post bushfire surveys were analysed to provide an interesting profile of the most susceptible aspects of external building elements, in other words, the weak point of a house.

1 'A History of Research into Building Performance in Australian Bushfires', Justin E. Leonard and Neville A. McArthur, Australian Bushfire Conference, Albury, July 1999, pp.219–225.

2 'Bushfire risk at the rural/urban interface', Raphaele Blanchi, Justin Leonard, Dr Robert Leicester (CSIRO – MIT), Australasian Bushfire Conference 2006.

Timber decks (19%) were the most prominent feature involved in direct ignition by embers, followed by eaves and gutters (17%), and window frames (10%).

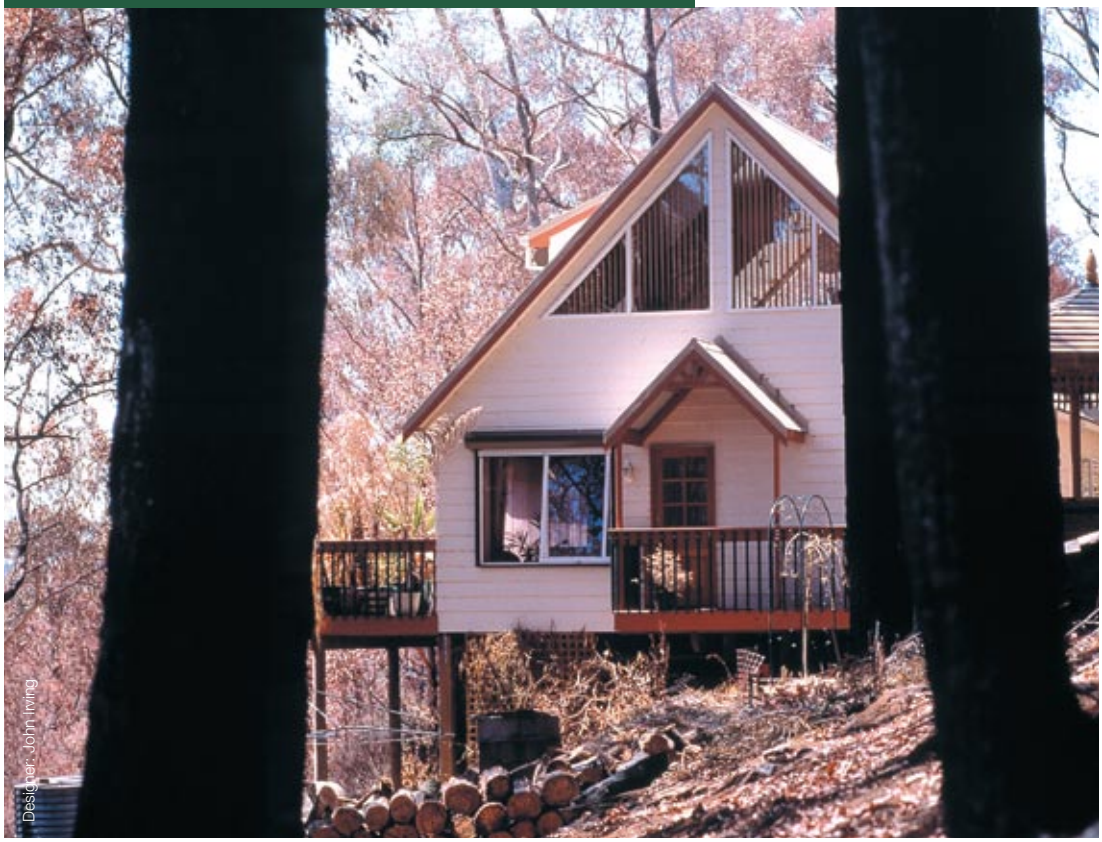
James Hardie® products are resistant to fire

Scyon™ and James Hardie® fibre cement building products are 'deemed non-combustible' in accordance with the Building Code of Australia.

Non-combustibility requirements are specified for certain key elements of buildings to ensure that the materials of construction do not contribute to the heat load in the case of a fire.

Throughout the BCA, reference is made to Fire Protective Coverings (Definition Clause A1.1). These are materials which limit the spread of fire and smoke, delaying fire spread to other compartments, although in isolation they do not provide a Fire Resistance Rating (FRR).

Because of its fire resistance properties, James Hardie's products are deemed to be Fire Protective in accordance with the BCA.



In Victoria, charred vegetation surrounds this home, which survived a bushfire intact. It was clad in HardiPlank® from James Hardie.

Bushfire construction

Most states in Australia now have some form of planning provisions relating to bushfire-prone areas. Guidelines have been prepared which help local governments establish fire hazard ratings for particular local areas.

The BCA also covers bushfire protection in AS3959 – 'Construction of buildings in bushfire-prone areas'. The standard involves the assessment of bushfire attack risk for sites deemed to be situated within a bushfire-prone area.

James Hardie® products can be used for all levels of bushfire risk – extreme, high, medium – as defined by the standard.

Find out more in the Bushfire Construction Design Manual at: **http://www.jameshardie.com.au/SmarterConstruction/DesignManuals/BushfireConstruction/** or in the Technical Bulletin on the fire performance of James Hardie fibre cement at: **http://www.jameshardie.com.au/SmarterPartners/TechnicalBulletins/**.

No matter where your site is located, Scyon™ products provide you with flexibility and peace of mind.

Designer: Shane Denman

What's on the inside?

Internal walls and wet areas, such as bathrooms and laundries, need just as much attention as the exterior. Discover smarter construction methods that will save time and money, and reduce the incidence of future repairs.

Designer: Metricon Homes

Wet areas

One of the most common defects builders and insurers are called on to rectify are wet areas. So while we know there's much more inside a house than just the wet areas, we figure it makes sense to focus on it.

What's conventional?

In most cases, a builder constructs a bathroom with a frame, and then uses either Villaboard® lining or water-resistant plasterboard for the lining. They also use particleboard flooring (if on an upper storey), waterproofing membrane and then tiles on top.

The *What's the Cost of Your Wall?* study shows that when using particleboard and wet area plasterboard, costs look like this: about $28 per square metre for walls and about $65 per square metre for floors. (Both the main and ensuite bathrooms were costed using various substrates and waterproofing where appropriate to arrive at square metre rates).

Wet area linings
Supplied, installed and waterproofed

- Water-resistant plasterboard
- Villaboard lining

What's smarter?

Using Scyon™ Secura™ wet area flooring with Villaboard lining may be a smarter approach. Not only does Secura wet area flooring mean that you only need to waterproof the junctions rather than the whole floor (except in the shower area where the whole base and junctions needs to be waterproofed), but it also means that you can install it before the roof goes on.

Both Villaboard lining and Secura wet area flooring are resistant to damage from moisture[1] so if rain holds you up during construction and the roof's not yet on, the products won't need replacing[2]. There are other benefits too, but first let's look at a cost comparison. While using Villaboard lining is about $3 per square metre more expensive than water-resistant plasterboard, using Secura wet area flooring can be even cheaper than using particleboard. It's clear that having peace of mind needn't cost the earth.

1 When installed and maintained correctly, to the extent set out in James Hardie's published literature at the time of installation.
2 Exposure to the elements should not be longer than three months.

Wet area floor substrates
Supplied, installed and waterproofed

- Particleboard
- Compressed fibre cement
- Secura wet area flooring

Measuring the risk factor

According to rectification expert Steve Peluso, a failing bathroom is one of Master Mender's most common call-back areas. Problems come about because of a combination of poor workmanship and poor materials – or at least, not using the best materials for the job. There are two key components: the waterproofing and the linings.

"We see WR [water-resistant] board fail so many times," says Peluso. "Any moisture that gets in capillarates through any little hole that's there in the waterproofing. This then actually escalates the problems that people have."

It's not true that all water-resistant plasterboard is doomed to fail. Typically, water-resistant plasterboard has a water-resistant seal. However, James Hardie® fibre cement and Scyon™ products are homogenously resistant to moisture damage which means that even if the material does get wet, it won't deform or lose its structural integrity, like many other materials.

Master Menders uses a solid fibre cement lining when rectifying or building bathrooms, like James Hardie's Villaboard lining. It does that because they know that fixing a wet area can be really expensive, particularly if not only linings, but waterproofing and tiles need to be replaced. Furthermore, Peluso says using Villaboard lining is "easier for tilers," Peluso says. "They prefer it," he says.

To fix a typical bathroom of an average size of about 2.2 metres by 2 metres, with wall tiles and tiled base, will cost between $12,000 and $15,000. "People are shocked," says Peluso.

Save money with a more expensive product – how does that work?

James Hardie's National Business Development Manager for Commercial and Internal Linings Dan McMillan says that Peluso's experience is backed by the evidence he sees daily.

"For the average domestic bathroom (such as Peluso describes), the rough increase in cost to use Villaboard over plasterboard would be about $50," he says. "This means that if a builder has to rectify more than one bathroom in every 240 in their seven year warranty period, they would have saved money by paying the extra cost for Villaboard up-front. For your average house with two bathrooms, $100 would seem a small price to pay to help avoid what could be a costly call back."

Architect: Shane Denman Designs

Avoid costly repairs: if you don't get the materials right from the start, the beautiful bathroom you build could turn into a disaster.

Hang tiles on paper – are you crazy?

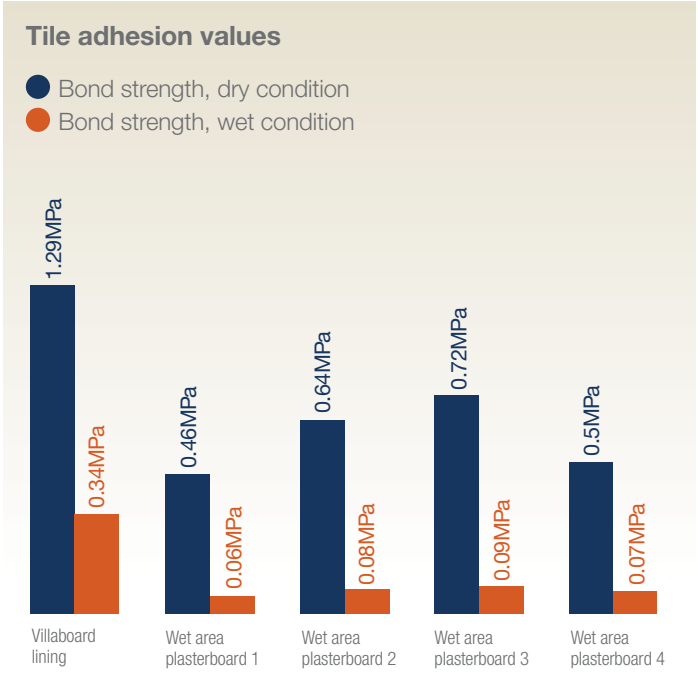
The key requirement of linings used in wet areas is superior resistance to moisture damage in the event that the material does get wet. Reduced tile adhesion is one of the main problems moisture penetration causes.

Villaboard lining also has much greater tile adhesion than wet area plasterboard. Its tensile bond strength is 75% greater than wet area plasterboard when dry, and 300% greater when wet. Based on the tests performed in April 2005 using a number of different plasterboards still available today, only Villaboard lining meets the requirements for ceramic tile adhesives if the substrate is wet.

The uniform composition of Villaboard lining is part of what gives it its improved tensile bond strength over plasterboard. Plasterboard is essentially paper bonded to gypsum. Tiles weigh approximately 10kg per square metre and can be very expensive. If

plasterboard gets wet, testing shows that the tiles will have a bond strength far below the tensile bond strength requirement for ceramic tile adhesives of 0.15MPa (tested in the dry condition).

Another important factor is the quality of the tiler's work. Even if the tiler makes a mistake, the homogenous nature of Villaboard lining means they can chip the back of the tile off without damaging the substrate.



Technical Bulletin, April 2005. The tile adhesion values of suitable wet area substrates were tested in wet and dry conditions.

It's not just the wall, but the floor as well

While the choice of the right wall lining is important, the floor material is just as important, if not more so. Moisture that's capillarating through the wall tends to spread to the floor as well, escalating the problem.

Master Menders' Steve Peluso says: "What happens from there is that if the builder hasn't used a compressed fibre cement sheet (or Secura wet area flooring) on the floor and the shower has been leaking, then they'll start having swelling problems with the chipboard they've used."

Peluso continues: "Once the waterproofing has failed, it doesn't matter how far you've gone with it originally, it will actually capillarate through and go into the substrate and cause tiles to crack, lift, bulge and pop." This often results in increased water penetration, which just makes the problem worse. "Then the builder or the owner has to redo the entire bathroom," says Peluso.

James Hardie® fibre cement and Scyon™ products are homogenously resistant to moisture damage.

Ralph Ganino: "On any job that has a double storey or single storey with strip footing, we use Secura wet area flooring."

Be sure from the floor up

Since its launch in 2006, many builders have switched to using Secura wet area flooring. Secura wet area flooring is an internal structural flooring substrate used in domestic wet area applications for ceramic tile finishes over timber or lightweight steel floor joists.

Made from Scyon™, an advanced cement composite, Secura wet area flooring is about 20% lighter per square metre than 15mm HardiPanel® compressed sheets – which means that it's a lot easier to handle. Its long edges also have a tongue and groove for easy jointing, and like all the Scyon™ products, Secura wet area flooring is easy to cut and can be gun nailed or nailed by hand.

Secura wet area flooring also conforms to AS 3740-2004 (waterproofing of wet areas within residential buildings) which means that excluding the wall to floor junction, full floor waterproofing outside the enclosed shower area isn't needed.

Melbourne-based Orbit Homes is one leading production builder that has embraced the product. Part of the appeal comes from the memory of the roughly 20% of bathroom failures they used to have in the past. Building Manager Ralph Ganino says it uses Secura wet area flooring on every job. "We wouldn't go past it," says Ganino. "Any job that has a double storey or a single storey with a strip footing, we use Secura wet area flooring."

For more information, refer to Wet Area Construction Design Manual at: **http://www.jameshardie.com.au/SmarterConstruction/DesignManuals/WetAreaConstruction**.

PineRidge® lining can be used instead of plasterboard to line garage walls.

Close-up on internal walls

Walls ain't walls, to paraphrase a well-known ad. These days it's worth thinking a little more about the purpose of the wall, before you reach for the nearest sheet of bog-standard plasterboard.

The garage: home of bikes, mowers, surfboards and other pointy objects!

For builders interested in differentiating their homes with quality features, products like PineRidge® lining can be used instead of plasterboard to line garage walls.

Leading Coffs Harbour builder Hopwood Homes includes PineRidge lining as part of the standard specification. PineRidge lining is an impact-resistant internal wall lining that has a timber panelled finish.

Director Brian Hopwood says that PineRidge lining is a better product specific to garages. "It's stronger than [standard 10mm] plasterboard and you can hose out the garage and you don't have to worry about it rotting. It also presents well," he says. "It looks good." He adds that he can "lock up a little bit easier because the carpenters can install it when the roof mightn't be fully finished".

Other builders feel that PineRidge lining is suited to the trend of garages being converted to home offices, workshops and playrooms, after the home is finished.

They also like the fact their carpenters can quickly install the product because of the PVC joining system. They're not waiting for joints to be set and sanded before being able to paint it, as they are with plasterboard.

PineRidge lining can also be used instead of plasterboard to line home offices, playrooms and workshops.

Gran can be tougher on the walls than the kids

Impact resistance is often a key requirement for walls in nursing homes. The strength and robustness of James Hardie Villaboard lining allows it to be used in high impact areas such as hospital and nursing home corridors, as well as school walls.

Villaboard lining can support direct fixing of handrails and other items without extra studs or noggins. Depending on the thickness of the Villaboard lining, a handrail with four screws per end can hold up to 160kg.

The dense Villaboard lining sheets enable higher sound insulation to be achieved with a slimmer wall.

Ready to party? If you use the right materials – such as dense Villaboard lining sheets – you can minimise party noise through a party wall.

When they're having a party you don't want to hear it!

James Hardie walling systems minimise the width of the wall by maintaining the cavity between the timber studs. This means that James Hardie party walls can be as narrow as 102mm. At 128mm, they can achieve an FRL of 60/60/60 and at 134mm an FRL of 90/90/90.

However when walls are thinner, how do you stop the party noise through the party wall? Villaboard lining together with fire rated plasterboards can provide acoustic ratings of up to 59(Rw+Ctr) and fire ratings of up to two hours.

The dense Villaboard lining sheets enable higher sound insulation to be achieved with a slimmer wall than is typically the case using traditional plasterboard panels. These thinner walls have advantages in hotels, motels and other accommodation, where increased floor area is a bonus.

Speed of construction is an additional bonus

In addition, party walls using James Hardie® products can help speed construction. The Villaboard lining can be installed before the roof goes on without having to worry about the walls deteriorating if it rains. The plasterboard layer can be installed at a later stage when the building is weather tight.

James Hardie party walls have uniform wall thickness in both wet and dry areas. Install the Villaboard lining layer on the outside when impact or water resistance is required, and install the plasterboard on the outer layer when it isn't.

Find out more in the Fire and Acoustic Wall Construction Design Manual at: **http://jameshardie.com.au/SmarterConstruction/DesignManuals/FireAcousticWalling/**.


Designer: Simonds Homes

Smarter construction in action

Simonds Homes

This house built by Simonds' Homes in Melbourne's Aurora estate features Scyon™ Linea™ weatherboard, Scyon™ Axon™ cladding and Scyon™ Axent™ trim.

An expert's guide to smarter construction

Lightweight has come a "massive way" in reducing costs, time, as well as being able to deliver "a decent looking product", says Bill Giannikos, the New Product Range Design Manager of Victorian builder Simonds Homes.

"Where your [Scyon™] products give us the edge is in speed and greater articulation in the built form," he says. "[As a designer] you're designing a product and if you draw it you've also got to give the builder or supervisor on-site an idea of how to build it. You've got to show them it's cost-effective, and if it's cost-effective it has got to be good for business."

A disciplined approach to the construction program is essential

Identifying cost-effectiveness in two ways – speed and material cost – Giannikos says that speed is something that's hard to factor in. "But if it's quicker to build, then the quicker the progress payments are to come in," he says.

"As you guys [James Hardie] pre-prime your boards, it's fantastic. There's very little pre-prep before finishing them," Giannikos noted. "Bog up the nails[1] and paint over them. Also the warranties, particularly if you use Taubmans – you can't go wrong. [Scyon™ is] a stable product; doesn't shrink or expand like other things; it's a winner. So you paint it and walk away. Set and forget."

Double storeys are a type of construction where lightweight products really come into their own. Giannikos says: "If you've got scaffolds up there for four weeks while you're doing a double-storey brick veneer house, and you've only got scaffolds up there for two weeks while you do a lightweight upper storey, then you've saved four or five grand."

Giannikos adds that it's also about discipline. "If the building business doesn't discipline themselves to keep the scaffold out there for two weeks but keeps it out there for four, then you've lost it," he says. "Now this is where education comes in. The construction program is often done as if it's a brick veneer house, so if the time savings aren't programmed in then it's not rigorously measured."

1 James Hardie recommends flush nailing and painting.

The smarter construction tool kit

We're not giving you a nail bag, so it's not that kind of tool kit! (Although if you're part of our Business Builder™ program then a Makita power saw could be on offer.) What we're talking about here is the process of building – and organising your construction program to make building with lightweight cladding as cost-effective as possible.

The simple checklists, insights and tips that follow have been garnered from our own installer managers – typically, smart ex-carpenters and builders themselves – as well as our top partners. They are designed to be a guide, used in conjunction with the relevant codes, regulations and James Hardie installation instructions.

The key stages

The smarter construction process involves focusing on three key stages:

- Design
- Estimating and purchasing
- Frame and site preparation, and construction.

Let's take a look at each one. Remember, these things aren't mandatory – but they'll help you discover a smarter way to build.

Design

At this early stage, getting the design details compiled, checked and provided is essential. We've developed a simple checklist to help with this: the Smarter Design checklist.

Smarter Design checklist

1. Compiling the details – things to consider

- ☐ **What's the framing size and type?**
- ☐ **How can you optimise sheet sizes with window and wall heights and lengths?**
- ☐ **What will the sheet layouts be?**
  (Some configurations lead to wastage and therefore higher costs.)
- ☐ **How will you detail the windows – head flashing and reveal depths?**

  The key question is do you want to create a look that uses architraves or run the cladding straight into the window? Also, consider if the window is configured for the specific cladding or will you use a standard window and butt the cladding up to Scyon™ Axent™ trim? Either way, you'll still need a hardened head flashing – like Colorbond®. Alcore can be used but is not recommended by James Hardie as it's not as durable, it's harder to install and it can't be colour matched to windows.

  Colorbond can be colour matched and is easy to install, but it does need to be designed in. The designer should draw the zed flashing on the plans but the installer should be responsible for measuring and supplying the flashing. It's also critical to design the reveal depth accurately when your construction method depends on sliding the cladding under the window flange.

- ☐ **How will you detail the flashing for doors? You'll need a running head and stile flashing and cladding installed up to the door jamb.**
- ☐ **How will you detail corners – internal and external?**

  Depending on the product, basic options are a slimline box corner made from aluminium, which can be painted, or Scyon™ Axent trim. It's essential to accurately create the 2mm gap that's required with these types of corners as this is needed for movement management. An alternative corner detail with some products is the aluminium snap-on corner. This is more forgiving in relation to measurement and any gap is hidden.

- ☐ **How will you detail control joint positions – horizontally the wall junction between the ground and first floor as well as vertical control joints where needed?**

  All products aside from weatherboards need a horizontal control joint between ground and first floor. At this junction, the options are either an expressed joint or a moulding. Some products also need vertical control joints, like HardiTex® base sheet. James Hardie recommends joints with polyurethane filling. Control joints should always be marked on the plan particularly if they are to be correctly located but well disguised.

- ☐ **How will you detail the wall to eave junction? Some options are an expressed joint depending on the type of cladding or a timber quad moulding or equivalent.**
- ☐ **How will you detail the slab edge and finish?**
- ☐ **How will you detail the junction with other products?**
- ☐ **What's the colour and coating schedule?**
- ☐ **If it's medium density, have you considered your fire ratings and acoustic walls? Note the total wall thickness and fire and acoustic rating required. Have you considered wet area details?**

2. Drawing the details – use ours as a basis

We have specification brochures and various details in DWG cad file format on our websites.

Go to **www.scyon.com.au** to view or download information about all Scyon™ products. Check out **www.jameshardie.com.au** for the rest.

3. Best practice – creating a manual with your standard construction details

Based on our partnerships with production builders who are benchmark users of James Hardie® products, we know that what often works best is to distribute a manual of standard construction details to all your carpenters and supervisors (which should also include James Hardie installation instructions). That way, everyone knows that "this is the way it's done here".

Estimating and purchasing

Now that the design is complete, the product moves to the estimating and purchasing department. In addition to all the details that have been compiled and should now be part of the construction drawings, an installer needs to also know these key things to provide a quote:

Estimating checklist

- ☐ **Are the most current drawings being issued for quoting?**
- ☐ **When is the quote required? Has this date been noted?**
- ☐ **Is the site topography described?**
- ☐ **Are the delivery restrictions noted?**
- ☐ **Will scaffolding be provided?**
- ☐ **Are there other builder agreements to be honoured, for example, covering plaster, paint, render?**
- ☐ **Do powerlines need to be tiger tagged or the power disconnected?** (Note the distance between the powerlines and the scaffolding that's required under safety standards.)
- ☐ **Is there a variations process established to handle who does things that are needed at the pre-installation stage but may have been overlooked when the pre-work site audit is done?** For example, there might not be enough trimmers or the frame may have been installed crooked. For the cladding to go on as specified and warrantied, these things will need to be added or fixed. Who will do them? The builder's carpenters or the installer? If it's the installer, at what rate will the oversight be addressed?

When completed, plans and details need to be sent out for quoting. To get an accurate quote, make sure the right people are quoting it. An installer who's already familiar with Scyon™ and other James Hardie® products is better able to generate a realistic price, without a buffer for unfamiliarity, than an installer who hasn't been trained.

Pro installer makes the difference

On Metricon's new Laguna display home in the Melbourne estate Mernda Villages, General Manager Will Lamb says that arranging a supply and install agreement with cladding firm Cruise Pro Group has "made it a lot easier for us". Cruise has worked with James Hardie to understand the product better and James Hardie is working with Cruise to inspect its work.

"Now that we've gone through the exercise with them, presumably there'll be some repeatability for the various homes that use the product," Lamb says. This means that Metricon doesn't have to train its carpenters every time, which Lamb says has helped them be more confident about the process.

Lamb also says that initially on the Laguna, there was some discussion to resolve flashings and other details. "Now that we've had that then presumably we don't have to revisit the same points every time," he says. "Given that we've got it supplied and installed for a comparable rate to brick, it's given us another option in lightweight cladding, which has benefits over the brick – particularly in terms of scaffolding in double storey – that's really the key to it in my mind."

Frame and site preparation and construction

To avoid problems when cladding is being installed, there are a number of key things that should have been completed before the installer even arrives. Firstly, there's ordering. We've provided you with a simple checklist to help with this.

After that, there's preparing the frame and site, which is where the pre-work checklist may come in handy. This can be used by you or your construction supervisor *or* your cladding installer, to make sure that the site and frames are ready for cladding installation.

We see the completion of this form as a very useful transitional stage – maybe use it for 12 months versus the rest of your life. You might like to use it just long enough to get everyone involved in the process focused on the key success factors.

Ordering checklist

- ☐ **Has the installer team been trained, if they're new to installing these products or if the product itself is new?**
- ☐ **Has a framing requirement sheet been sent with the frame order?**
- ☐ **If you are supplying parts, have you included the cladding or weatherboards (allow 10% wastage), and accessories (starter strip, battens, nails, trims)?**
- ☐ **Have you ordered the vapour permeable membrane?**

Supervisor/installer pre-work checklist for James Hardie® building products

BUILDER: _____ Date: _____

CONTACT: _____ Mob: _____

SITE ADDRESS: _____

INSTALLER: _____ Mob: _____

CONTACT: _____ Fax: _____

	YES	NO	N/A	Date to be completed	Completion confirmed
Is work site clean?					
Has power been connected and is it active?					
Is the meter box fixed securely in place?					
Is the roof on?					
Are all windows installed?					
Do windows have the correct reveal depths to suit the cladding?					
Are flashings in place above roofs, parapets, bricks, windows and doors					
Has electrician finished rough-in?					
Has plumber finished rough-in?					
Is scaffolding erected, safe and tagged?					
Is scaffold 150–200mm off the face of the wall?					
Does scaffolding provide access to the entire working space (multi-levels if necessary)?					
Does the scaffold have ladder access?					
Is the work surface free from scaffolding anchors?					
Do the contractors have correct tools and fasteners?					
Is vapour permeable sarking installed?					

Notes: _____

FRAMES	YES	NO	N/A	Date to be completed	Completion confirmed
Does the frame comply with frame requirement sheets?					
Does the slab/floor line up with the frame? (Note that slabs/floors should not protrude past the frame, but they may overhang slightly.)					
Does the ground level align with the upper level?					
Are studs, plates and noggings flush and straight?					
Is frame straightness tolerance 3–4mm over 3,000mm?					
Are all studs at a maximum of 600mm centres?					
Do studs line up with sheet layout where required?					
Do floor joists have trimmers at the ends?					
Do gable ends have trimmers in place?					
Are walls with bracing ply packed out?					
Is the gap between facia and frame adequate for the wall cladding (10mm for sheets and 20mm for weatherboards)?					
Is the sub-floor framed out and aligned to the frame?					
Are all of the required studs in the following areas:					
• Internal corners					
• External corners					
Control joint:					
• Vertical					
• Horizontal					

Notes: _____

Supervisor's name: _____

Supervisor's signature

Pre-work check: _____ Site ready: _____

Date: _____ Date: _____

Above: HardiBlade® Saw Blade is designed specifically for fibre cement and produces less respirable dust than traditional masonry blades.

Construction shortcuts

Are you using nails?

The 304 stainless steel brad nail has a smaller head size compared to the traditional fibre cement nail. This means the nail heads are less noticeable once painted over. Many James Hardie Scyon™ products include recommendations on using these fasteners. Refer to the current product technical literature for correct installation.

What about sealants?

The use of James Hardie Joint Sealant in a tube is specified for use with many James Hardie® products. However, did you know that a more economical alternative is available in a larger economical sausage form? Bostik Seal 'N' Flex 1 (sausage) may be used where James Hardie Joint Sealant is specified for use.

Construction best practice

Are you cutting anything?

Our work with Hitachi Power Tools produced the durable HardiBlade® Saw Blade. With only four PCD teeth, the HardiBlade® Saw Blade is designed specifically for fibre cement and produces less respirable dust than traditional masonry blades.

It also generates larger dust particles than a carbide framing blade or continuous rim diamond blade which reduces the risk of respirable silica. The 185mm diamond tip HardiBlade® Saw Blade fits a dust-reducing 185mm circular saw and the Makita LS0714 190mm dual slide compound mitre saw.

Want to work safely?

James Hardie® products contain sand, a source of respirable crystalline silica, which is considered by some international authorities to be a cause of cancer from some occupational sources. Breathing excessive amounts of respirable silica dust can also cause a disabling and potentially fatal lung disease called silicosis, and has been linked with other diseases. Some studies suggest smoking may increase these risks.

During installation or handling:

(1) Work in outdoor areas with ample ventilation.

(2) Minimise dust when cutting by using either a 'Score and Snap' knife, fibre cement shears or, where this is not feasible, use a HardiBlade® Saw Blade and dust-reducing circular saw attached to a HEPA vacuum.

(3) Warn others in the immediate area to avoid breathing dust.

(4) Wear a properly fitted, approved dust mask or respirator (for example, P1 or P2) in accordance with applicable government regulations and manufacturer instructions to further limit respirable silica exposures. When cleaning up, use HEPA vacuums or wet clean-up methods. Never dry sweep.

For further information, refer to our installation instructions, Material Safety Data Sheets and our guide to safe handling at: **http://www.jameshardie.com.au/SmarterConstruction/Safe+Handling/**.

Painting

Scyon™ is an advanced cement composite that will maintain its integrity and general appearance significantly longer than timber. Some timber is susceptible to cracking in exterior applications which in turn can lead to shrinking or warping. Cladding made from Scyon™ will resist shrinking, swelling and cracking* to hold paint longer than wood. It can also be painted dark as well as light colours.

Wattyl® Australia Pty Ltd feels so confident about Scyon™ Stria™ cladding, that it's given a 15-year paint warranty on Wattyl Solagard® when used on Stria cladding. Taubmans has given a 15-year paint warranty when Sun Proof Max® and All Weather® are used on Linea™ weatherboard.

Tooling up

The key tools on the following page are the result of industry best practice in minimising dust risk and exposure.

*When installed and maintained correctly.

MAKITA 5057KB
185MM CIRCULAR SAW

- Easily attaches to tool start vacuum with HEPA filter to further reduce dust exposure
- Remote guard lever allows for plunge cutting
- Fully enclosed upper guard
- Rigid aluminium base provides greater stability and accuracy
- 60mm cutting depth capacity
- 90° to 45° base

HITACHI C7YA
185MM CIRCULAR SAW

- Easily attaches to tool start vacuum with HEPA filter to further reduce dust exposure
- Dust reducing operation for user comfort and safety
- Powerful industrial 1,400W motor
- Lightweight and well balanced
- Specifically built for cutting fibre cement sheet
- Dust deflector directs dust away from operator

MAKITA LSO714
190MM DUAL SLIDE COMPOUND MITRE SAW

- Easily attaches to tool start vacuum with HEPA filter to further reduce dust exposure
- Double slide action
- Huge 300mm width of cut
- Geared drive system
- Depth stop adjustments for trenching
- Removable lock off button for safety and security
- Large stable base

HITACHI RP307Y
TOOL START VACUUM
WITH HEPA FILTER

- Wet and dry operation
- Durable stainless steel casing
- Heavy-duty 1,200W motor
- Automatic switch outlet for ease of use

MAKITA 446L
TOOL START VACUUM
WITH HEPA FILTER

- Unique impulse filter cleaning system allows filter to be cleaned efficiently without stopping, increasing productivity and filter life
- Capable of both wet and dry applications
- Easily converts from dust extraction to a powerful industrial vacuum cleaner
- Automatic on/off system allows the unit to be switched on and off automatically from your connected power tool
- Solid, robust and compact design suited for job site requirements

James Hardie recommends the use of a tool start vacuum fitted with a paper dust bag and HEPA filter for efficient dust collection and performance.

HITACHI DUT-10
FIBRESHEAR CUTTING TOOL

- Heavy-duty cutting tool is a quick and efficient way to cut a range of James Hardie® building products
- Effortlessly cuts in straight or curved lines
- For effective cutting of fibre cement up to 9mm thickness

HITACHI EASYBEVEL 797006/8912
125MM ANGLE GRINDER

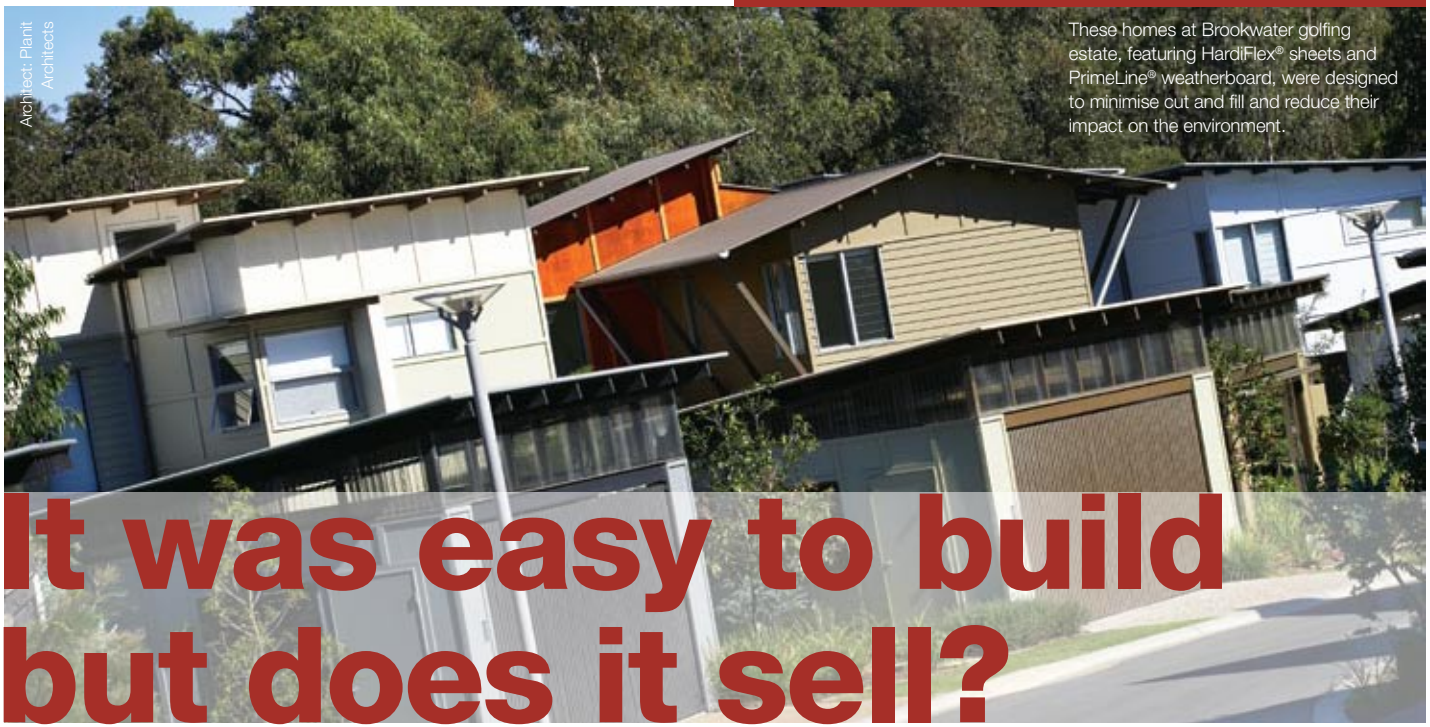
- An efficient tool for rebating the cut edges of Villaboard® lining sheets and HardiTex® base sheets
- Dust is collected via the dust port and must connect to a vacuum with HEPA filter
- Wear P1 or P2 respirator or appropriate respirator when using Easybevel

GUILLOTINE

- For effective cutting of fibre cement up to 9mm thickness

SCORE AND SNAP KNIFE

- A tungsten-tipped knife for scoring cement sheets



Architect: Planit Architects

These homes at Brookwater golfing estate, featuring HardiFlex® sheets and PrimeLine® weatherboard, were designed to minimise cut and fill and reduce their impact on the environment.

It was easy to build but does it sell?

As the name suggests, this book is all about construction. The first book in this series – *The Smarter Design Book* – showcased a design framework and inspirational examples. The second book – *The Smarter Green Book* – showed just how sustainable James Hardie® products are and the ways they can be used in design to create sustainable buildings. But while we do need to design and build sustainably, we also need to balance cost, and construction ease: both of which drive affordability. *The Smarter Construction Book* blasts some myths about cost and provides some insights into best practice approaches to the lightweight construction process.

However, there is one very important stakeholder in the building "supply chain" – the consumer. We've been able to create a great design, that's sustainable, easy to construct and also cost effective. But does it have street appeal? According to designer Bill Giannikos, with the right design, the answer is a resounding "yes".

Frank Newnham Constructions
Designer: ML Design

Right: This stunning Queenslander, featuring Scyon™ Linea™ weatherboard, was built using the slope of the land.

Frank Newnham Constructions
Designer: ML Design

This stunning Queenslander, featuring Scyon™ Linea™ weatherboard, was built using the slope of the land.

“Once you see these products in the field, it’s good night Irene.”

Designer Bill Giannikos says that building in lightweight products is so cost-effective, and represents so well in the built form that people say, “‘You know what, I know it’s lightweight, but I don’t perceive this as a fibro shack anymore. I perceive this as an architectural home that I could live in, because it’s warm and inviting’.”

Giannikos believes: “Sales people will always sell it if you make it look good and you have a good design philosophy behind what you’re doing.”

As the guest of a James Hardie’s Business Builder™ design tour to Queensland, Giannikos says that he saw $1.4 million houses with 98% of their cladding built out of lightweight. “I really saw how lightweight could function,” he says. “They looked absolutely hot. You might argue, though, that lightweight construction and Queensland go hand in hand. OK, fair call. But once you see these products in the field, it’s ‘good night Irene’. It’s conditioning consumers to accept them. They need to go into display villages and see lightweight, lightweight, lightweight. If they do, brickwork keeps dropping, from half height, to quarter height to none.”

It’s all in the design

Acknowledging that a lot of Melburnians perceive brick to be as “safe as houses”, Giannikos says that if you’re trying to sell a house with “soul” to it, people will accept lightweight materials as part of the design philosophy.

“Now that’s the key,” he says. “A very fine line, but that’s the key. If you set it up with a quarter height brick, to give it that solid foundation feel, and then you have three-quarters lightweight, just a little sprinkling of brickwork is enough for the psyche to say ‘you know what? That’s a good solid house’. And they won’t tap on the wall.

“But if you make your house look like a fibro shack, then that’s going to paint the product in a very poor light. And that screws things for everybody. Some of those builders have a tendency to blame the product, but if they only stood back they’d see it was the design and the way they’ve allowed the product to interact with the design,” he says.

Designer: Vivo Design

This home in Hobart features Scyon™ Matrix™ cladding.

What now?

In 2004, James Hardie conducted market research with consumers and builders to investigate their preferences for materials used in their home. When asked "What kind of home would you like?" they frequently replied: "A brick one". However, when shown images of homes built from other materials – including composite homes and those fully wrapped in James Hardie® products – many changed their mind about what they wanted.

We know from that research – and research that's followed since then – when consumers are presented with homes like those in our *Smarter Design Book* (visit **http://www.jameshardie.com.au/SmarterGreenDesign/SmarterDesignBook/** if you don't have a copy), they tend to like them and want them. This is where you, the builder, come in.

When we talk smarter design, some builders say: "We'd like to build homes like that, but doesn't it cost more?" This book is intended to shed light on the real costs of building with James Hardie® products in a streamlined, efficient way. But a book can only do so much. If you're part of our BusinessBuilder™ program and would like to find out more about how we can work with you on smarter construction, call your account manager today.

If you're part of our new special Scyon™ club (or would like to be) go to www.scyon.com.au/club.

Important notes and clarifying statements:

1. In some of the images and case studies in this book, James Hardie® products have been used outside the scope of James Hardie's technical literature. It is the designer/specifier's responsibility to identify whether the intended use of products is outside the scope of such literature and if so, to undertake specific design and detailing and to ensure the construction complies with all relevant codes and regulations.

2. The cost comparisons taken from the *What's the Cost of Your Wall?* study are based on the typical costs at March 2008, borne by production builders, as advised by the estimators at the New South Wales-based volume housing company that prepared the study. They are primarily intended to illustrate in broad terms relative costs between different construction methods. Actual costs will be dependant on many factors, including individual building firms' designs, locations and supply agreements.

3. Costs referred to by individuals throughout this book are based on that individual's own opinions. Readers should form their own views on the applicability and relevance of such information to them based on their own experience, construction practices and location.

4. Readers should always refer to current James Hardie literature for installation instructions.

If you've enjoyed reading *The Smarter Construction Book*, you might be interested in the other books in this series. *The Smarter Green Book* and *The Smarter Design Book* are available at: **www.jameshardie.com.au**.

Or call **13 11 03** and we'll send your a complimentary copy.

Ask James Hardie™
Call 13 11 03
www.jameshardie.com.au

James Hardie®
A smarter way to build