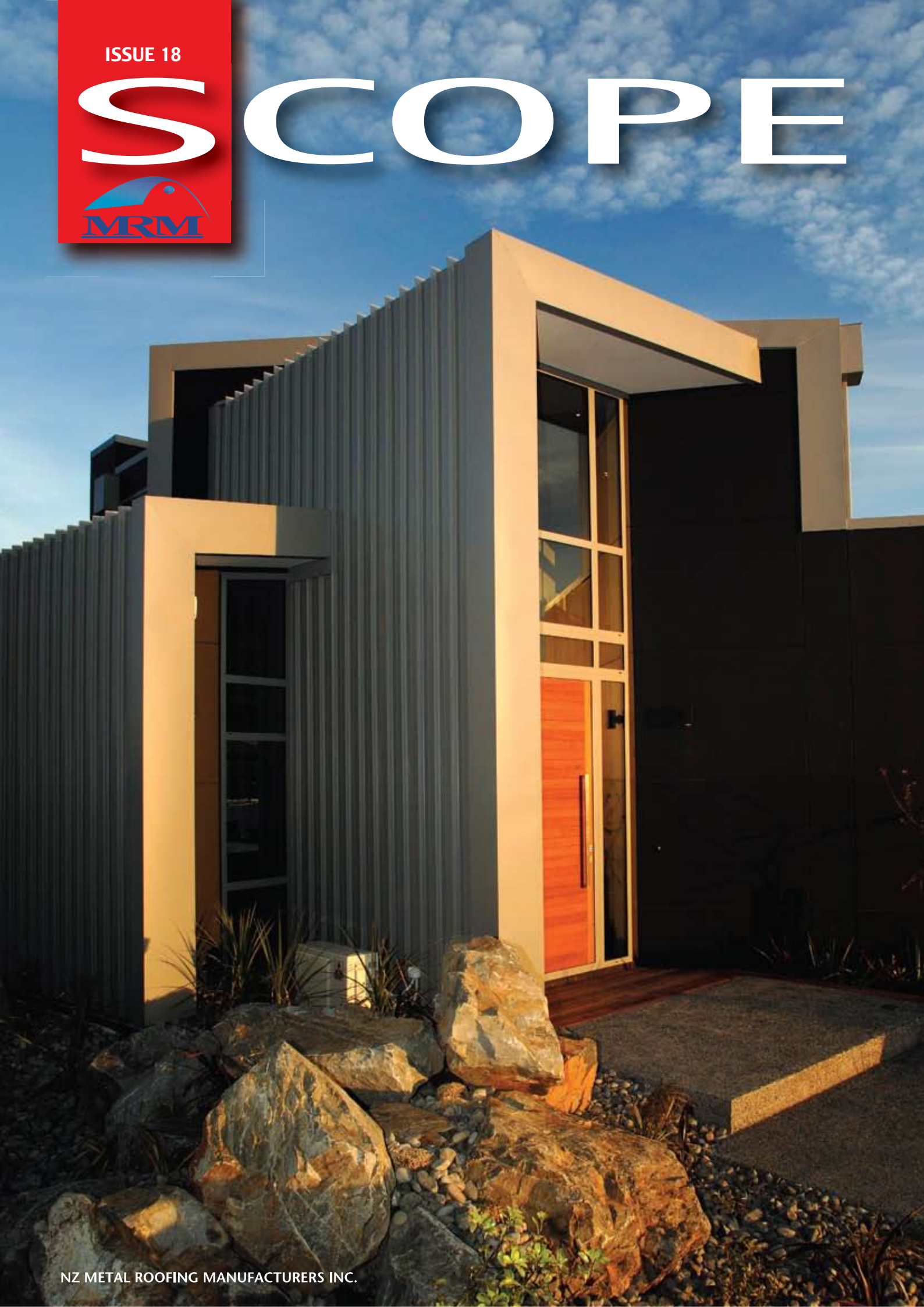
ISSUE 18

SCOPE

MRM



NZ METAL ROOFING MANUFACTURERS INC.

Below is a brief introduction to the 2008 executive of The NZ Metal Roofing Manufacturers Inc.
It is intended that Scope be representative of the industry and therefore material of interest is welcomed from all sectors of the building industry be it design, research, manufacture or construction.

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NZ Metal Roofing Manufacturers Inc.
Managing Director of the Steelform Group of Companies.

Gregg Somerville: Vice President
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Stuart Hayman: Technical Development Manager AHI Roofing Ltd.

Philip Meyers: Marketing Manager of Roofing Industries Limited.

Warren Oliver: Managing Director of Franklin Long Roofing.

Gregg Somerville: Marketing Manager for Dimond.

Mark Winnard: Executive General Manager Manufacturing.
Steel and Tube Holdings Limited

If you would like to submit material please contact any member of the executive or the publisher.

Visit our website at:

www.metalroofing.org.nz

SCOPE

CONTENT ISSUE 18

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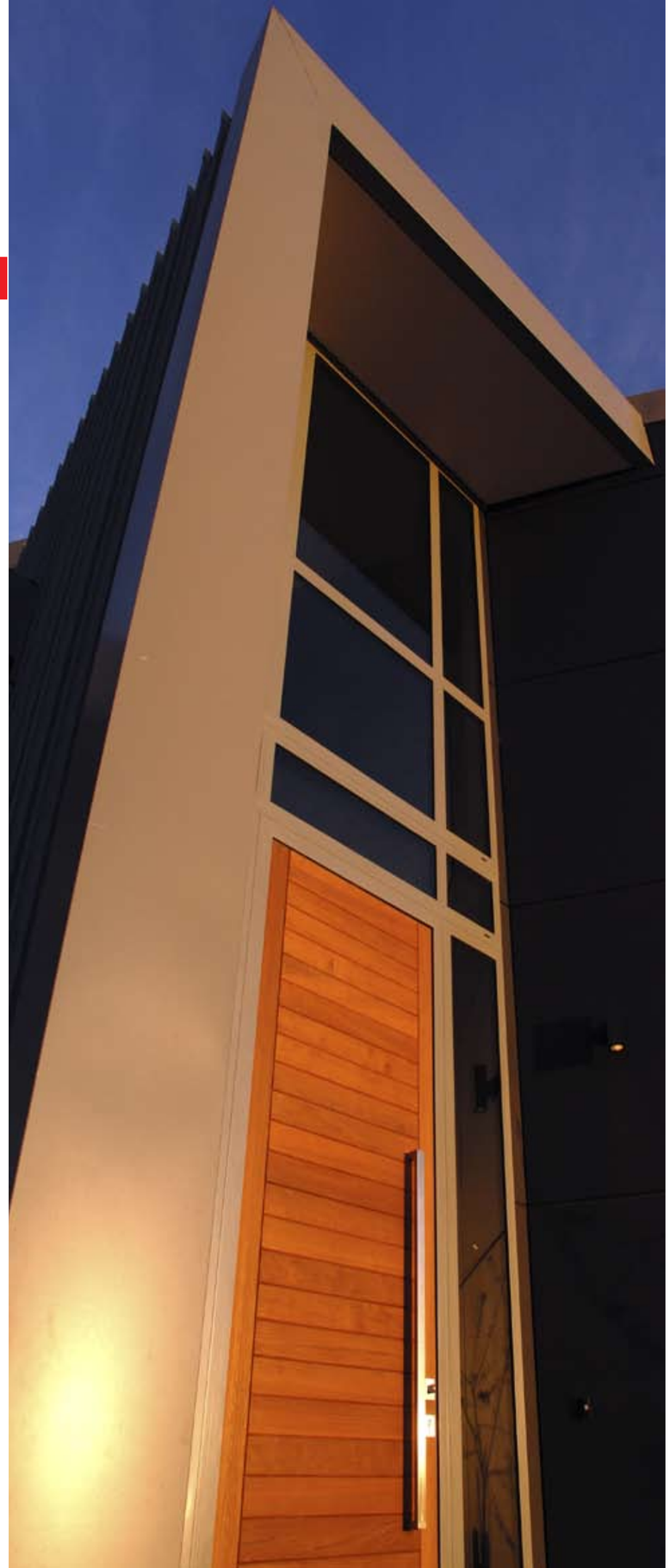
NZ METAL ROOFING MANUFACTURERS INC.



A WORK OF ART

Architect Davor Mikulcic showcases a recent project which illustrates the results that can be achieved by time, hard work and an inspired creative design team.

The Pendrous home is situated in the Seagrove subdivision which is a typical Wellington site of just over 500 square meters. The flat area forming the building platform is approx. 250 square meters the balance of the site slopes away at 35 to 40 degrees at the rear.

The site offers spectacular panoramic views. From the South east to north east are visas from Petone to Wellington central and the harbour. The south is bounded by an existing dwelling which to a degree influenced the positioning of a blind side to create privacy for both the client and his new neighbour. The over all objective was to capitalise on the fantastic views and capture as much sun as possible without losing privacy.

Steve Pendrous, the client, provided a simple but detailed brief and wish list for the new home. Capturing the view and maximising the sun was a given. On the practical side Steve wanted a double garage with plenty of storage and internal access to the home. The master bedroom was to have a separate ensuite with a walk in wardrobe. Two further bedrooms were to share the facilities of the second bathroom. A separate laundry which could be compact and contained within a closing cupboard door. In the living area was to be a third toilet/bathroonm for guest to use. In the family area the Pendrous's wanted an open plan kitchen/ living and dinning area which would enjoy the views and open onto a sheltered outdoor living area protected from the Wellington southerly wind.

A separate formal living area was required for entertaining. This was to have easy and direct access from the entry and entry hall. A studio area as a work space was to be included.

The exterior was to be as maintenance free as is possible. This included the building materials and the landscaping. The landscaping was to reflect the architectural aspects of the building and to maximise the somewhat challenging aspects of a steep site.

The initial site appraisal and subsequent topographical site survey indicated that the best solution towards achieving the client's objectives was to consider a three story building. Architect Davor Mikulcic says, " this complicated aspects of the structural design however the three stories gave me an excellent opportunity to divide the function of spaces into logical areas."

Having reached the conclusion that 3 stories was the most practical solution the design then had to conform to the Wellington Council's district front, side and rear set back and height control plan requirements. Given the slope and size of the site this presented a considerable challenge. To add to this the design team, lead by Davor, are adamant that their designs be seen as sculpture rather than structure. "We strive to produce unique architecture which pushes the boundaries of creative design and solutions" says Davor, " To achieve this we involve the entire design team and our clients. Like many of out projects we have to challenge ourselves and clients to work outside of the square. It is a challenge, it is exciting and frustrating at times, but the results are always very rewarding."

The Pendrose residence is an example of architecture in its wider context which explores all aspects of the design in relation to the site. The key element of the design, the central steps, is the focal point which connects the three levels and visually binds the composition of the building.

Davor describes the result as a "Game of angles" which captures the views and sun creating

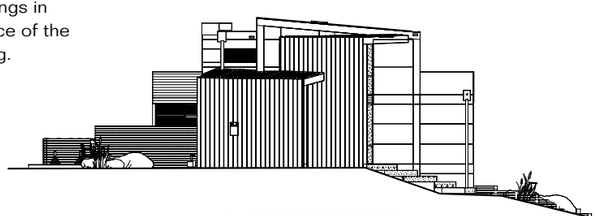
interesting spaces for reading or services within the home. This was only possible because of the freedom allowed by the client who essentially gave a free hand in the total design. This included every possible aspect of the design; Kitchen, ensuite, bathroom, laundry, internal and external finishes, landscaping and lighting. In fact every detail including the choice of fittings. This freedom of design and expression results in a building which is in total empathy within the landscape and the relationship of spaces within the design. The freedom to express the "idea driven" design as a complete project is where MWA Studio believe they can and do excel. It is a combination of interior and exterior design skills working together which make the point of difference.

Davor is quick to point out that this level of result can only be achieved with time and a client who is prepared to make the journey with the design team. Some clients believe that somehow excellence in architecture is achieved by waving a magic wand... it is not. It does take time. It is hard work. Davor makes a point of reminding his clients that internationally leading architects utilise many sketches and models prior to achieving the best design. A practice he endorses. In this instance the client utilized the time to truly consider the detail, to change aspects of the design, furnishings, and fittings in harmony with the appearance of the spaciousness of the building.

The concept that the "first design is the best" is not part of MWA's culture. Mediocrity is not acceptable in creative architectural design. Excellence can only be achieved by exploring and examining every possible option.

To achieve this MWA utilize every design tool available from sketches and scale models to computer generated 3D models. They are the first to acknowledge that without these tools and the collaboration of architect, consultants, trades people on site and the client co-operation their designs could become just another unrealised project that did not achieve it's potential.

On the structural level the residence has a concrete floor on the lower ground floor and first floor. The third floor structure is a combination of timber and steel. Concrete block walls extending to the first floor and concrete slab. The concrete on these levels is designed as a heat reservoir for passive solar heating which is enhanced by the use of tiled flooring and the double glazed windows. Glazed areas extend into wall dividers on two of the floor levels giving a modem spacial feel and allowing sunlight to penetrate the heat sump which collects passive solar heat which is of particular benefit during winter months.



The choice of exterior materials grew with the form of the design as it progressed. Budget was a factor however the choices were made with the overall objectives clearly defined, to achieve sculptured architecture. Dimondeck 400 was the preferred cladding and chosen for its simple and elegant line and the concealed fixing benefits. The combination of flashing and fixing ensured a water tight finish and complied with the Wellington design specification of “above very high wind zoning”.

The roof line was at minimal pitch to comply with the height control plane carefully avoiding a flat or classical roof pitch.

The Dimondeck 400 was complemented with the use of James Hardie Lineaboard’s emphasising the horizontal lines associated with traditional weatherboards and Titan Board. The joinery was from the Fairview aluminium architectural series with grey tinted double glazing. The over all colour scheme was deliberately monochromatic to accentuate the sculptured appearance, avoid trends and fit comfortably into the landscape.

The interior colour choices are muted whites and earthen colours to avoid colours which might otherwise detract from the clients choices in art. furnishings and the view.

The true test of the success of the design is best described by Steve Pondrose who says,” The view from every room is amazing...I do not know where else in the world we could enjoy such views so close to the city. My favourite space is the studio on the top level with its adjoining roof terrace is a place to go to relax. It is light, airy and the view from the roof terrace makes me feel as if I am a million miles away from everything.”

As with other clients Davor takes great pride in the relationship with his clients and gets great satisfaction in achieving the clients dream while fulfilling his own expectations of architectural design excellence.

While the list of people involved in contributing to the success of this project Davor gives special credit to his colleague, Michael Maddern, the interior designer from Studio MWA for his input into the interior design, documentation and construction supervision. Tararua Roofing who did an exceptional job with the Colorsteel on the cladding and roofing. Steve Brakembury, the main builder and his team who turned the design plan into a reality. Hadrian Noble from Noble kitchen. “This guy is a craftsman” says Davor. He made an exception job of the kitchen and bathroom joinery.

Architect

Studio MWA Ltd, is a newly formed, award winning architectural practice and partnership between Principal Architect Davor Mikulcic and Practice Manager Jonathan Wilson.
Included in the team are Michael Maddern as interior designer and David Thompson as architectural designer.

The team is concentrating on high end residential and commercial projects including Urban Design. The accent is on design orientated architecture.

Davor has an established working association with Thompson Adsett Architects Brisbane office and their Studio 39. Davor forms part of a design management team working on Australasian and International projects. Most of these are on a very large scale and include commercial complexes, Public Buildings, Age Care Developments and others. His time is divided each month between the Australian and New Zealand offices which offers a great variety of work which he enjoys giving him the opportunity to apply his creative design skills in achieving excellence in architecture at both ends of the scale.

Client: Steve Pendrous

Architect: Davor Mikulcic
Studio MWA Ltd
Wellington
Telephone: +64 4 801 9141
Email: davor@studiomwa.co.nz

Metal Claddiing and roof
Manufacturer: Dimond
Profile: Roofing and cladding
Dimondek 400
Colorsteel Maxx 0.55BMT
Flashings: Colorsteel Maxx 0.55BMT
Colour: Sandstone Grey

Roof and cladding installer:
Tararua Roofing
Wellington
Telephone: 04 569 3074

Builder: Steve Brakembury
Telephone: 021 840963

Kitchen and interior design:
Studio MWA Ltd.

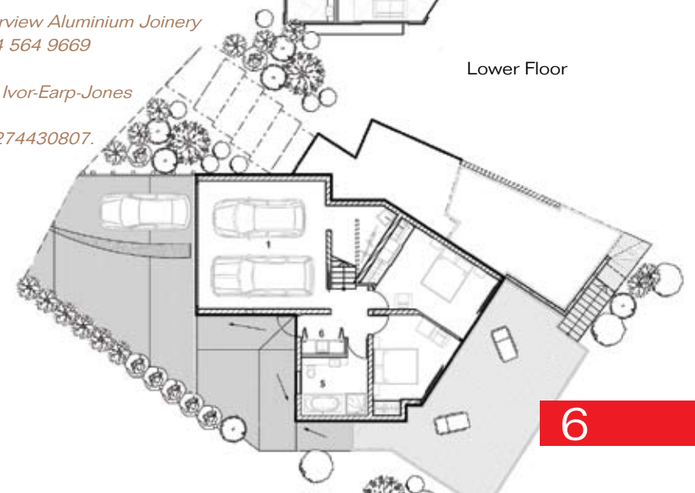
Kitchen Joinery: Noble Kitchen
Hadrian Noble
Telephone: 04 528 3965

Windows: Fairview Aluminium Joinery
Telephone: 04 564 9669

Photography: Ivor-Earp-Jones
Wellington
Telephone: 0274430807.

First Floor

Ground Floor



Lower Floor

RECYCLABILITY & RECYCLING OF METAL CLADDING

New Zealand Metal Roofing Manufacturers (NZMRM), as does every industry that wants to survive, is looking at the sustainability of their products and member companies. We have been operating a Sustainability Sub committee for the last two years, and this was a topic at the Adelaide conference. We are now planning to publish in Scope a series of articles about various aspects of sustainability to inform our members and customers and to help designers make appropriate choices in a society that is placing increasing value in being "Green". A sustainable building industry consists of sustainable products and sustainable industry making them.

While some aspects of the sustainability of metal cladding products are still under consideration by the industry and the NZMRM, you will soon become aware of the sustainable manufacturing process used by New Zealand Steel at the front end of the life of steel cladding, and this is a story worth telling and one to be proud of.

What is not in dispute but also not well known is the other end of the life of steel and indeed all metal cladding – its ability to be recycled and its actual level of recycling. In fact the metal used in cladding (and elsewhere of course) is both able to be recycled with no loss of quality, and actually is recycled to a very high degree.

In this article, we have collated information from world sources and specifically New Zealand sources to discuss the generic recyclability and recycling of metal, in particular steel, and about the unique system and cycle operating in New Zealand, which works well for all parties. What follows has been taken from a number of sources and all data, volumes, numbers etc. are derived from published information so are only as accurate as the sources. The comment and conclusions are the author's. We deal primarily with steel, which is by far the main material used for metal building cladding, but many of the comments also apply to aluminium, certainly at world level.

Recyclability vs recycling

It is important to separate these two similar sounding operations. Steel is the ultimately recyclable material. It is unaffected by recycling and recycled steel is as good as new, but has much less embodied energy. All steel products have the ability to be recycled, but the degree to which they are recycled does depend on how much they are mixed with other materials and the difficulty of recovery. Reuse of material similarly depends on its quality at the end of the life of whatever contains it. Structural steel is very reusable and quite easily recycled. Steel cladding can be reused depending on its condition (and may end up on a lower quality building) but is very easily recycled (and is easier to melt than structural steel). Steel used as reinforcing in concrete is easy to recycle but difficult to recover. Steel used in motor car bodies is highly contaminated with other materials. In spite of this variability steel for recycling is a valuable resource and 85-90% of steel used in construction is recycled globally. Over 60% of all steel used globally is subsequently recycled.

The ability to be recycled

A number of common materials can be recycled in the sense of being removed from a form which is no longer needed and then converted into something else. A number of products themselves are able to be reused once the item into which they are incorporated is no longer required.
Metals in various forms, glass, plastics, paper, timber, fabrics and others are able to be reused in some way, and we are all familiar with the recycling programmes of local councils – unheard of 10 years ago but now common – in which various materials are left outside to be "recycled". We have the idea that they are reused in some way without being very aware of what this might be.
In fact, to varying degrees nearly all these – apart from metals – are either not actually reused in a recognisable way or are degraded during reprocessing from the original form or quality (often referred to as "down cycling"). Nearly all non-metals even if reused as part of a new or similar product are in a product of lower quality or value with reduced physical or aesthetic properties.

Metal and specifically steel cladding (which after all is what we make and sell) can both be reused in its same form and more importantly it can be recycled into product

indistinguishable from the original, totally undegraded and capable of being recycled indefinitely.
Steel cladding which is generally unmixed with anything other than metal coating and paint and has thin sections is easy to recycle, compared with e.g. reinforcing steel buried in concrete.

Throughout its history steel has always been recycled and all steel contains a proportion of recycled material from 10 – 100%, so that any steel currently in use actually has some content that may have been used many times and be 100's of years old.

Recycling levels

Because of the factors discussed above and below – (no loss of quality, scrap required for efficient function of steel mills, much lower energy content), steel has a very high level of recycling – typically up to 90% of all steel embodied in buildings and in artefacts which have ended their useful life ends up being recycled into fresh steel ready to start as good as new, into a long new useful life.
In the case of building cladding, quite a lot does actually get reused (rather than recycled as material) although generally in a lower value role – e.g. steel roofing from an office might end up as a fence or a farm shed. The actual percentage of steel which is recycled obviously depends on the application, so that steel which can be reused when a building is taken down is different to steel in a crushed motorcar body or an old fridge, but overall it is very high. Some global figures are appended.

Steel manufacture and recycling
Today, steel is nearly all made by one of two processes world-wide. The Basic Oxygen Furnace (BOF) is the main method for converting iron metal made from iron ore into steel. It needs to use some recycled steel for efficient running and will use from 10-25% of recycled material. This may be in-plant scrap ("pre-consumer recycle") or bought-in scrap metal that is derived from steel items past their usefulness ("post-consumer recycle").
Typically a BOF unit will use all its own in-house scrap and some bought-in material.
The Electric Arc Furnace (EAF) can also convert iron into steel but is the main way of consuming scrap steel materials (post-consumer), and the process requires a minimum level of at least 30% scrap to function. EAF units run from 30 to 100% scrap. A number of mills with EAF only use scrap steel as a raw material.

Because steel is a durable material and is used mainly in quite long-life products (unlike packaging materials) and is also in increasing demand, the amount of scrap available (even at very high recycling rates) is not sufficient to feed the demand and so virgin steel continues to be made from iron ore. Many global steel companies have both types of furnace and are able to take in and reuse large amounts of scrap steel – typically as much as they can get, because reprocessing scrap steel requires less energy than making new steel.

It is worthy of note that the embodied energy aspect of Life Cycle Assessment of steel requires that both new manufacture and reuse are considered, so that all steel has a multi-level energy cost reflecting the fact that any new steel made will almost certainly be recycled many times way into the future and so the energy required to make it progressively decreases as it is successively recycled.

The New Zealand scene

Globally then, steel mills making all sorts of steel products use both recycled (pre- and post-consumer scrap) and virgin iron made from iron ore. The proportion varies from mill to mill; some only use scrap and others use smaller amounts of it in their mix. Overall a very high level of recycling is achieved.

New Zealand (of course) is different. We only have two steel mills and they have effectively split functions. Pacific Steel Group (part of Fletcher Building) started operation at Otahuhu in the late 50s to process New Zealand's scrap metal, and now uses an EAF to do only this. Scrap metal including steel is collected around the country by collection agencies (coordinated by Sims Metal) and as much steel as Pacific Steel can handle is used here and the rest exported to other mills overseas for recycling. Pacific Steel converts this scrap into high quality reinforcing steel for use in reinforced concrete and into wire, and uses 100% post-consumer scrap in their EAF.

New Zealand Steel (now part of Bluescope Steel, an Australian manufacturer also operating throughout Asia) started manufacturing steel at Glenbrook in 1963. After many decades of research, a process had been developed to process the local ironsand in a unique-to-NZ process, which has a small 'ecological footprint', and the Glenbrook plant was built to use this process.
After various changes in technology (and ownership) New Zealand Steel now uses a BOF and makes all new steel from iron with only about 12% in-plant waste (pre-consumer scrap) added.

New Zealand Steel manufactures coil and sheet for use in building cladding and other industries. The coil may be metal-coated with zinc (galvanised steel) or aluminium/zinc (Zincalume ®), and may be painted on a coil-coating line or unpainted. The steel cladding materials NZMRM members use and supply primarily come from NZ Steel, with a small amount imported from Asian mills.

For New Zealand this is a very neat system and ensures that steel used in buildings, both for reinforcing and cladding, is made with maximum efficiency and minimum transportation. Both plants have a high level of "sustainability" which they strive to improve as an ongoing process.

Thus in purchasing steel made in New Zealand you can be sure it has been made with maximum recycled content for reinforcing steel and maximum recyclability for cladding. New Zealand has a high level of recovery of steel products either for reuse or recycling at Pacific Steel.

All good, you might think, but there is one problem with this very neat system.

Energy rating systems

For a number of years there has been an increasing global demand for energy efficient buildings. Typically this starts with office buildings and then extends to institutions like schools, and finally to domestic dwellings. The methods of rating buildings is (of course) different in different countries but generally the system looks at the derivations of the raw materials used, the transportation of materials and of people to the building, the energy used during construction and during life, the water used and processed, and finally the ability to be reused or recycled at the end of the building's life.
This is only a summary, and you can find more details easily on the internet. There are some well-known rating systems including BREEAM (early 1990's) in the UK, Casbee in Japan, and LEED (2000) in the United States. These are of varying ages and levels of development and New Zealand is a rather late starter in this area.

Australia developed a system called the Green Star Rating (so far for new office buildings only, but rating systems for other buildings exist, and the intention is that all new buildings will eventually be covered by this system - sooner rather than later). New Zealand has chosen to follow suit with a very similar Green Star NZ rating system. Unfortunately both of these are somewhat different to either BREEAM or LEED in their regard for the recycled content of steel.

Without going into the somewhat complicated details – BREEAM gives points for "responsibly sourced" products (which you have to prove); LEED gives points for two levels of recycled content (not recyclability), one low and one modest, and also gives points for fairly short distances from manufacture to use (500 miles/800 kms – which is not that short!)
To achieve points with either Green Star system requires the steel used in a building to have a high recycled content - "Up to two points are awarded where it can be demonstrated that the percentage of all steel used in the design has a post-consumer recycled content greater than x % as follows - 1 point = 60% by mass and 2 points = 90% by mass". Exactly what this means (read it again) is not clear to me, but it is clear that steel manufactured by New Zealand Steel will contribute no points to the total. Neither is there any recognition of distance travelled, either way (i.e. no penalty for long distance and no benefit for short distance).
What this means for NZ is that reinforcing steel and wire receive 2 points while cladding made in NZ receives none. Imported cladding from 10,000 kms away, painted with paint of unknown quality, and sourced from a plant or country with no known sustainability credentials, can get two points if it is made in an EAF.

It is recognised elsewhere that both systems complement each other and should not be regarded differently. If there was no BOF process there would be no new steel to be recycled.

The NZ Green Building Council which operates the NZ Green Star rating system invited submissions to be incorporated into the new version and the NZMRM (and New Zealand Steel) did make a submission pointing out this issue, but the latest version (June 2008) is unchanged.

Conclusion

Regardless of the Green Star rating system issue, steel is the most highly recycled building material in the world. You can use it or design for its use in buildings knowing that this in some way contributes to the sustainability of New Zealand as a whole.

Appendix – useful snippets of data

In 2005 globally approximate ratio of BOF to EAF was 2:1.

280,000 tonnes recycled pa in NZ. Produced 620,000 tonnes. Recycled content thus 45% of new. In Australia 65%.

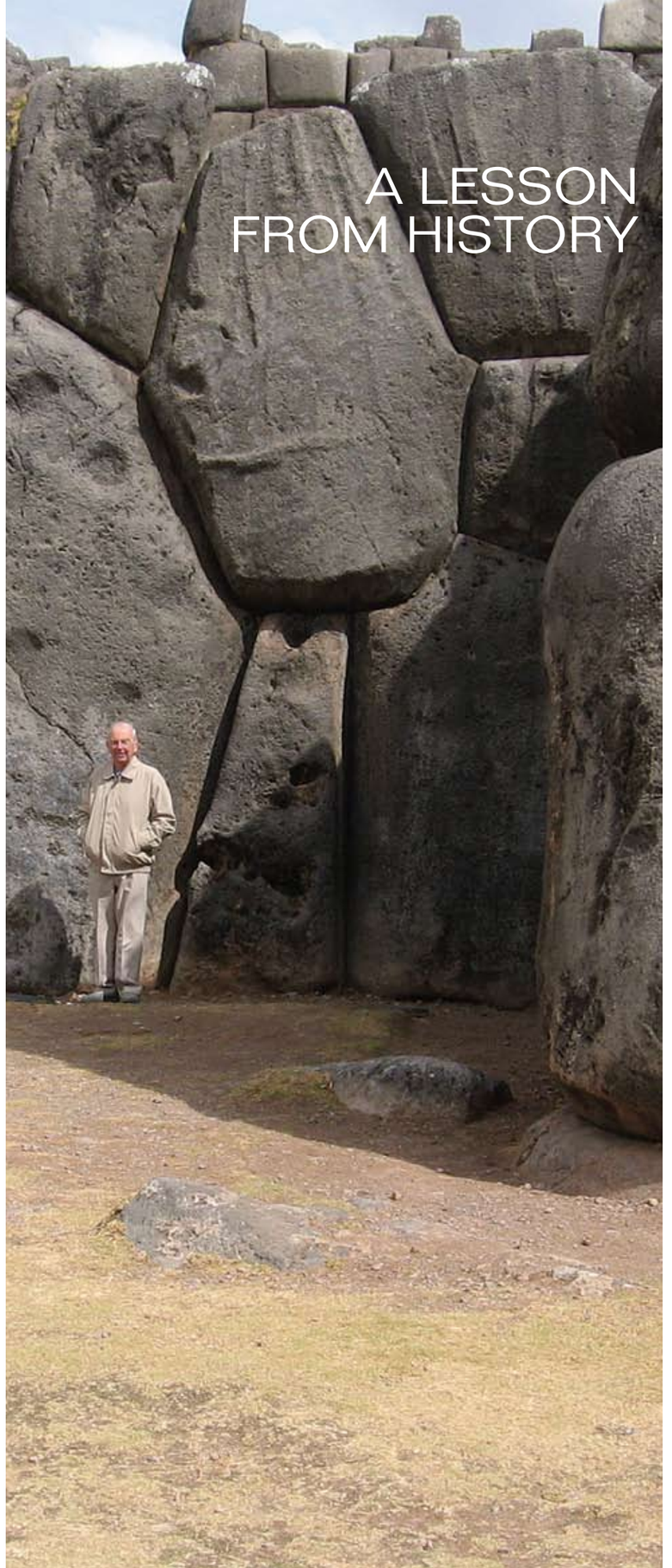
Recycle rate of steel from buildings 85%

In the USA 29% of steel made by BOF is recycled content. For EAF it is 83%.

Recycle rates of structural steel 98%. Reinforcing steel 65% (more difficult to recover from concrete).

Steel made from recycle may use only 25% of the energy used to make new steel.

Sources (and for further reading) NZ Steel; Pacific Steel Group; Bluescope Australia; SCNZ seminar; Metal Construction Association US; Steel Recycling Institute US; Australian Steel Institute; City of Sydney; BREEAM; LEED USA; LEED Canada; NZ Green Building Council



A LESSON FROM HISTORY

Wrinkly Tin is not just an Australasian phenomenon, it is to be often seen in South America as Stuart Thomson found out. In comparison with our past and looking to the future there are some important parallels which we could benefit from. In particular the tragic results of earthquakes when known skills in structural design are ignored. A message NZMRM has been trying to communicate for many years.

Always with one eye looking above the gutter line Stuart has this to say.

During the research that was done for Wrinkly Tin, South America came up quite often so it was no surprise to feel at home with all the corrugated iron spotted on my recent trip to South America.

The reasons why it is used extensively over there are the same reasons that this material was used when New Zealand was colonised 150 years ago. It is such a pragmatic material – light, easily fixed and so easily transported that it provided an ideal material for most of the South American countries. These countries have rich mineral reserves, that have contributed to some of the political unrest that these countries are infamous for. Argentine, Chile, Columbia, Uruguay, Peru, Venezuela, Bolivia and even Ecuador have already established or are planning steel mills and it is logical that they also have their own roll formers on their doorsteps.

Buenos Aires has a region called La Boca that is famous (or infamous) as the birth place of the Tango (the prostitutes dance). Italian immigrants from Genoa were part of the huge population explosion at the turn of the 20th century and were the first settlers of La Boca, the working class neighbourhood of Buenos Aires' first port. They built Conventillos which were tenement houses with small rooms that opened out onto a central outdoor common patio and used materials found or discarded in the shipyard. They used scrap corrugated metal and wood from old ships and painted them with leftovers ? from their jobs on the docks in whatever hues were available.
The pleasing mishmash of paint colours and corrugated metal has proven a popular sight for those who travel to see it.

La Boca Coloursteel

An adventure to the 'southern Tibet' is not complete without seeing Lake Titicaca and its floating Islands situated at 12,500 feet between Peru and Bolivia. The lake is the world's highest navigable lake and is 196 km long with an average width of 56 km. For centuries locals have cut and dried the Totora reeds that surround the edge of the lake and they are used not only to make up their floating Islands but for building and roofing their huts as well. What was a surprise though was to see corrugated iron under the reeds placed there as a second line of defence against the day the reeds rot and leak.
Those people travelling the world over the last few years will have noticed even the remotest places on earth the Galapagos and Machu Picchu are no longer isolated
The PVA (photo voltaic array) on the roof is proof of globalization, as it seems nowhere is safe from the 'need' for television!

As Spain conquered and colonized most South America countries over 500 years ago, they brought their architecture with them so not surprisingly the most common roofs seen in urban South America, are Spanish Tiles. They obviously do not encounter NZ wind loads!

In the high country and on the islands it is not uncommon to see corrugated iron roofs but many in a rusty state of repair. It appears that to keep the cost down, not only is the thickness of the steel reduced but so is the amount of zinc.
A judicial use of 'finger force' on a corner of an accessible roof in Aquas Calientes allowed a corrugated sample to be smuggled back home to confirm what the photo shows 0.17mm after coating!

Thin tin.

As you will realize that is less than half of the minimum thickness used in New Zealand which we think @ 0.40mm is not really trafficable anyway. Their roofers obviously must be lightweight pussy cats.

Titicaca T.V.

Plumbing South American style

Their roofing skills though were evident if a little different to ours. Galvanised steel can of course be soldered and a unique spouting sump and half round spouting was important to the inhabitants of the island of Tequil, in Lake Titicaca, as there was no water - only rainwater! The ridging probably worked OK as the extremes of weather we experience in New Zealand (rain and wind together) is just never heard of.
I have no doubt the DBH would not approve of this design!

South America is earthquake country and it was interesting that there have been two serious earthquakes Richter 7.9 .& 6.8 in the last six months.

The straw is for insulation

one of the main reasons being the heavy tile roofs compared with the light thatch used by the Inca's.
For years the NZMRM have been saying the same thing. New Zealand is also on a known earthquake fault. Heavy roofs should be avoided !

Apart from the famous Machu Picchu two of the most remarkable Inca ruins are Ollantaytambo and Sacsahuaman.
Sacsahuaman (pronounced 'sexywoman') is on a hill behind Cusco the ancient Inca capital and here huge stone blocks towering eight metres high, and weighing over 100 tons, have been transported high up to the site and shaped, fitted and erected with such accuracy that a business card could not be fitted between them. The workmanship on this huge fortress is all the more remarkable because it was built (without any building consent or regulations) by people whose inherent skills and cooperative actions has never been matched. Historians and scientists have been baffled by the mysteries that surround the Inca's and there are numerous theories as to how

The Inca's had considerable knowledge about earthquake potential and designed and built accordingly. Trapezoids and other shaped nested stones and buttress construction without any mortar which has withstood recorded earthquakes of up to 9 on the Richter Scale. As this scale is logarithmic that is more that ten times the one which killed 66,000 in Ancash, Peru, in 1970!

By comparison much of the Spanish architecture using mortar and the current mud brick buildings have succumbed to these earthquakes,

this was achieved in a civilisation without steel tools, a written language or even the wheel. They used 'keystones' and grooves filled with molten bronze or copper to lock two adjacent stones together as the Greeks did. The enormity of this structure makes the Pyramids look like a weekends work! Some of the original buildings were dismantled' by the conquering Spaniards who stole the smaller stones to make their own buildings which have long since been destroyed by earthquakes.

Ollantaytambo is an unfinished fortress-temple further down

the Inca's sacred valley which is breathtaking in scale, skill and concept. Aligned to the winter solstice and overlooking the valley and Urubamba river over which the huge pink granite stones have been transported 20 km, the same precision skills are evident where even the thought of mortar is a dirty word.

Machu Picchu clearly shows how these people understood earthquakes and how to hold their roofs on. The protrusions included in the gable end walls were an embedded anchor to hold down the light timber roof structure and the thatch that covered it as well. Unfortunately this knowledge has been lost and the now common unreinforced mud brick walls with a heavy clay tile roof perched on top of them is potential disaster waiting to happen and has been the cause of thousands of deaths. What becomes clear when viewing the magnificence of many of these historic structures is the skill and knowledge that was used to create them. They have withstood all that nature can throw at them for centuries. It is equally clear that when known technology is ignored mother nature, in the end, has the final say. History does repeat itself unless we learn from past mistakes.

Sacsahuaman spectackle

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V2 AVAILABLE NOW!

What can it do for you?

The COP enables designers to confidently produce designs using Lightweight metal roof and wall cladding in a more efficient way. The saving in costs is significant with less structure, less materials and less labour. While compliance costs keep rising, we believe unjustifiably, this is an easy way to reduce costs.

By reading the new version 2 section 3 a designer can not only get a step ahead of the opposition but be able to produce exciting new designs using up to date performance information in the knowledge that this information is produced conservatively by an Industry organization that prides itself on service to the design profession.
It can be a challenge to designers to think laterally about a lightweight material that has been around for a long time but it is not only possible, but with sustainability upon us, it is almost an obligation to think outside of the square.

When the NZMRM first published their Code of Practice five years ago it was regarded as a living document, and because of this in 2007 a review was undertaken to:

- better explain some areas
- make amendments in the light of changes to standards and other legislation
- clarify the Industry position compared with E2/AS1 (which is only one non-mandatory means of compliance with the NZBC)
- learn from the past, listen to the present and look to the future

The result?

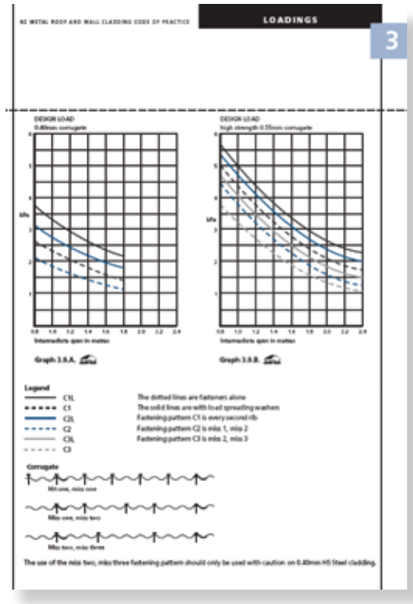
V2 of the NZMRM Code of Practice. This article is the first in a series to inform designers and others about some of the changes that have been made, the reasons why, and how it can benefit them.
This article is entitled 'The performance of metal roof and wall cladding'.

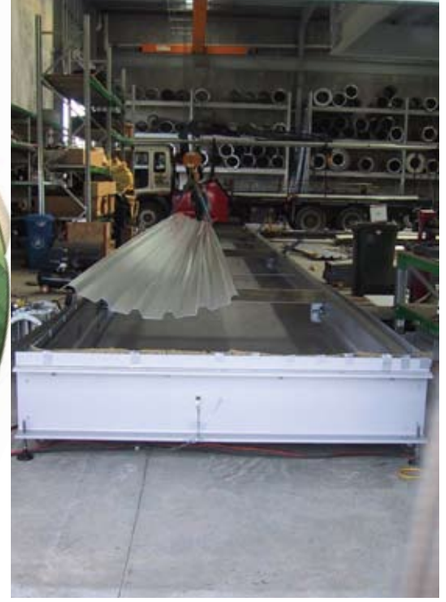
The original COP contained three load/span graphs providing performance data on wind load (UDL Uniformly Distributed Load) for the three common profiles which are considered to be generic, – corrugate, 5 rib, and 6 rib low trapezoidal all with approximately 760mm cover.
This data was based on many tests that had been carried out previously on these profiles over a number of years, most of which were performed on an air-bag test rig owned by New Zealand Steel.
This rig has now been decommissioned and another one built using the 'air-box' system, which has now internationally superseded the air bag as the preferred test method. This test rig was purchased by the NZMRM in 2005 for the use of its members and many companies have used this rig to not only test but to improve their profiles.

Example: Section 3.9 provides graphs detailing test results from the New Zealand test rig

Recently the technical committee of the NZMRM, which consists of representatives from the major roof and wall cladding manufacturers in New Zealand, decided to re test all the generic profiles using the new rig and a new test regime, developed as part of the new AS/NZS 1562 and AS/NZS 4040 standards. (After 10 years of negotiations with Standards Australia, no agreement could be reached regarding a common testing regime for the two countries. As a consequence, NZMRM has adopted the New Zealand testing regime for its tests. This has been published in V2 as Section 15 Testing.)

The testing programme took several years and many thousands of dollars and the results of this very extensive programme are new load span graphs now produced in section 3.9. These are included with this article.





Test rig: In the shot with a sheet on, at the near end left side is a big fan blowing into a duct into the box. Between the fan and the box is a large exhaust valve. For static testing the fan is run and the pressure in the box builds up either until failure of the sheet or the fixings, or to a predetermined level. For cyclic testing the exhaust valve opens and closes rapidly while the fan is running which raises and lowers the pressure alternately - again to failure or the predetermined level you need to achieve

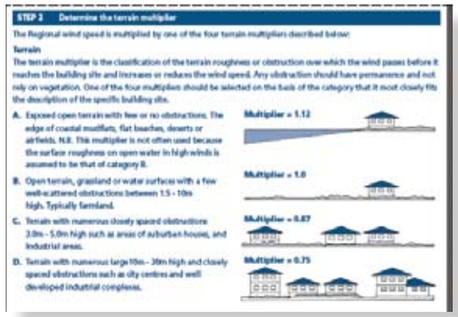
Testing is always an interesting exercise because it is a learning experience. What you see (and hear) tells you a lot of things that otherwise would be conjecture, and the correlation of test failure with real world failure is heartening.
It is always easy to be wise after the event (and probably we did know, but did not take proper notice of it),

but what we did find out was that metal cladding performance is very much affected by the number of fasteners per square metre, or what we now term the 'tributary area'.

Another feature that we were aware of, but perhaps did not fully realize the significance of, was the propensity of high-strength steel to suffer from fatigue cracking. This property of higher yield strength metals was more noticeable in Australia because they do not universally use load- spreading washers. They are called 'cyclone washers' across the ditch and the Australian view is that they are only needed in cyclone areas, which they define as only occurring north of 28 degrees! That, area of course, does not include New Zealand!

We on the other hand recognise that New Zealand has numerous gales which sometimes have a greater wind speed and force than Aussie cyclones and therefore it is logical to improve our cladding performance by using metal profiled load spreading washers. This is clearly evident when looking at the increased performance on the graphs.

What is not generally known is that the wind design loads in NZS 3604 called 'low, medium, high and very high' are not calculated in the same manner as the New Zealand's loadings code which is AS/NZS 1170, not NZS 4203.
The DBH have only recently cited AS/NZS 1170, notwithstanding that it was used in the original NZMRM Code of Practice in 2003!
This means that a lot of NZ Standards must now be revised and that includes NZS 3604. The difference is that there is now a greater emphasis on terrain and topography as opposed to the 'wind zone' philosophy. This means that the wind load on a building is site-specific and it is possible to have a building in a 'low' wind zone but having a high wind design load. This was explained in the original COP and probably was a little before its time. It remains unchanged in V2 section 3.4 and now becomes much more relevant and important for designers to understand.



Example: Section 3.4 provides clear information on terrain and topography and the tools to make the correct calculations.

Because of the local pressure coefficient around the periphery of any building the increase in wind design load is considerable and it also needs to be taken into account that the load varies with the square of the wind velocity.
The best way to design for these additional loads is to use the same fastening pattern but to use a metal load spreading washer under the fastener. Additional fasteners can be used but this is usually a more expensive option.

The load span graphs have only the intermediate span quoted and it is assumed that the designer is aware of the 2:3 ratio of end/intermediate spans required for the load span graphs to be valid.
It is important to maintain the end span reduction both for walking on the roof, and because of the

Table 3.6. gives withdrawal values required for purlins fixed on their flat for the main body of the roof. At the periphery where the purlin/truss load connection is higher, these values must be increased by a minimum of 50% and consideration must be given to using wind or cyclone straps or to reduce the truss, rafter or purlin spacings.

Timber purlin size	Maximum span	Spacing	Design load 0.61kPa	Spacing	Design load 0.82 kPa	Spacing	Design load 1.16 kPa	Spacing	Design load 1.50 kPa
	mm	mm	kN	mm	kN	mm	kN	mm	kN
70 x 45	900	900	0.59	900	0.80	900	1.13	900	1.46
70 x 45	900	1200	0.79	1200	1.06	1200	1.51	1200	1.94
70 x 45	900	1400	0.92	1400	1.24	1400	1.75	1400	2.27
70 x 45	900	1800	1.18	1800	1.59	1800*	2.25	1500	2.43
70 x 45	1200	1200	1.05	1200*	1.41	1000*	1.67	900*	1.94
70 x 45	1200	1400*	1.23	1400*	1.66	1200*	2.01	1000*	2.16
90 x 45	1200	1800*	1.58	1800*	2.12	1400*	2.34	1100*	2.38

Table 3.6.

When using timber grade MSG 8 at the spans and spacing shown on table 3.6., those spacings marked with an asterisk must be reduced by 10% or timber grade MSG 10 purlins must be used.

increased uplift in this area.
What sometimes causes concern when installing roof cladding is using (or even knowing) the correct fastening pattern required. This is left in a rather ad hoc way to either the roofer on the job or the Building Inspector, neither of whom have the actual wind design load for the site. An engineered design should state what the site kPa loading would be and this should be included in the specification or noted on the plans. However architects are not always knowledgeable in this area and tend to follow the pattern they have specified in the past.

To design metal roof and wall cladding efficiently the purlin spacing and the kPa loading (or fastening pattern) should be site specific and not just stay with the old 900mm centres, or divide the rafter equally over its length.

The load span graphs are valid for metal cladding whether the framing is timber or steel and for anywhere in New Zealand.
There is an irony related to the improvement in the fastening of metal roof and wall cladding that has occurred in our industry over the last few years and that is that now about half the roofs that 'blow off' in severe gales do so with the purlins attached! This is because the purlin/ rafter or top chord connection is inadequate for the design load of the building. The problem is to be addressed in the new NZS 3604 as it was originally highlighted in the COP Table 3.6. This has been amended in the light of changes to NZS 3603 which requires MSG 8 (machine stress graded) to be downgraded.

The tables 10.1.5. a, b,& c have gone a step further and classified the requirement for fixing metal tile battens according to different internal pressure coefficients. If a building is not lined then the internal pressure can be greater, and in very high wind areas tile battens have to be screwed not nailed.

Wind load is only one of the loads that metal roof and wall cladding must be designed for. Point load is another. Because metal is strong in tension and weak in compression it is important to understand that most roof cladding can be walked on in the pan without damage.

Some considerable work has been done in educating air-conditioning contractors on where and how this should happen as well as showing them the unnecessary damage they can cause. What has come out of these sessions is that the air conditioning contractors have told us that the designer is the one who places their air-con units in the wrong position and often does not allow for the additional support required. This support must be designed into the roof structure (and should be on the consent drawings) before any alteration is made to the roof cladding. The old 'plant room' design had a lot going for it, with all roof penetrations in one place. The idea of the roof cladding as a convenient place to attach a condenser or a solar collector has got to change, and will when the LBP scheme gets underway and consents are required for the installation of air-conditioning units.

This is a whole new subject and was discussed in a previous issue (13) of Scope. The performance of metal cladding is greatly influenced by what somebody else does to it after it is installed!

The new V2 emphasises the responsibility of the designer in attaching anything to metal roof cladding and also for planning maintenance for air-con or solar units by the use of metal walkways. V2 (2.7.3.) says no more timber! Because all exposed timbers are required to be H3 treated and because these timbers are not coloured for easy recognition, no timber must be used where it provides runoff from or contact with metal roof and wall cladding.

Any queries concerning the availability or content of the NZMRM COP should be addressed to Peter Atkinson - peter.atkinson@ema.co.nz or 09 367 094.

tens must be:
H1.1 boric treated when used in attic roof construction
H1.2 treated when used in skillion roof construction
Douglas fir of moisture content <20%
KD Pinus Radiata of moisture content <18%
not less than 50 x 40mm for 900mm rafter spacing
50 x 50mm for 1200mm spacing

reservative timbers must not be used with Zincalume coated tiles. Battens required for rafter spacings hen 1200mm must be specifically designed and be spaced to suit the tile module.

t 370mm centres must be fixed to the rafters or trusses over the underlay using fasteners to comply with .1.5.A, B and C.

ens at different centres may require different values.

1.5.A. for buildings with ceilings and 370mm batten spacing
), cpi = 0, cp = 0.9

Pullout resistance in kN required for battens for buildings with ceilings

Purlin/ batten size	Max span	Wind Zone 0.61kPa	Wind Zone 0.61kPa	Wind Zone 0.82kPa	Wind Zone 0.82kPa	Wind Zone 1.16kPa	Wind Zone 1.16kPa	Wind Zone 1.50kPa	Wind Zone 1.50kPa
mm x mm	mm	Low 32m/s	Low 32m/s	Medium 37m/s	Medium 37m/s	High 44m/s	High 44m/s	Very High 50m/s	Very High 50m/s
		M	P	M	P	M	P	M	P
50 x 40	900	0.2	0.3	0.3	0.4	0.3	0.5	0.5	0.7
50 x 50	1200	0.2	0.4	0.3	0.5	0.5	0.7	0.6	0.9

M – main body of the roof P – periphery as described in drawing 3.3.2.A.
Table 10.1.5.A.

Example: 10.1.5 a

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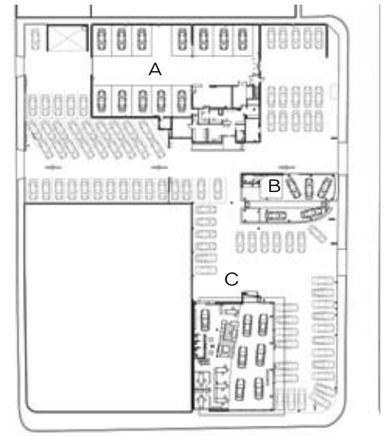
EUROPEAN EXCELLENCE

Continued from issue 17

The challenge for Archaus Architects Ltd. was to position two of the worlds most prestigious motor car brands on one site. This was anything but a simple task given the international controls and design standards in place for both brands. The architecture was required to reflect the qualities of each brand as separate, distinctive and apart from each other and their competitors.

The showrooms are separated but a central sloping canopy connects both buildings visually and provides a protected area which was a functional client requirement. Site plan shows the relationship between the workshop (A) which is shared by both brands and the Porsche (B) and Audi (C) showrooms.



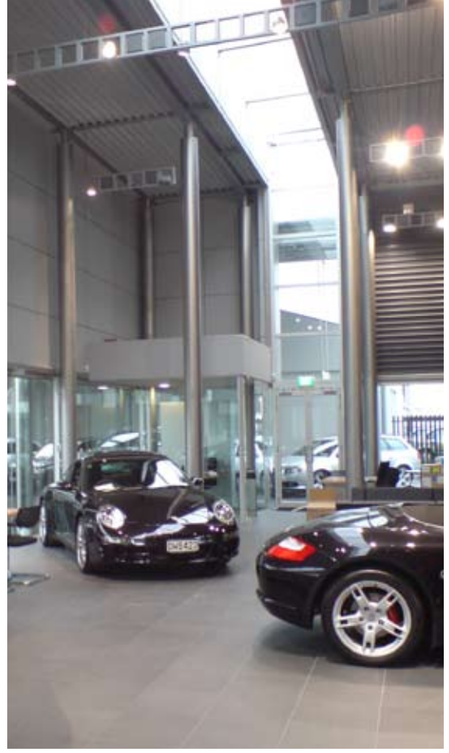
Both the Audi and Porsche showrooms have their own individual appearance and the consistency of high quality materials ensure that the two compliment each other. Simple in form and distinctive, due to the articulation of glazed and solid elements.

Porsche Showroom

The identity of the Porsche Marque not only manifests in the cars of unmistakable design, but also in Porsche's distinctive showrooms. The architectural design has a clearly defined appearance which, associated with the Marque, helps to position its products positively within the customer's perception and their environment.

All elements and materials are selected from an established framework, which serves as a basis for the project Architect to bring every aspect of the Porsche marquee to life.

A Porsche is always unmistakably a Porsche. This is why Porsche does not follow the frontage design trend



of mass marques that use a lot of glass for their frontages in order to be able to show as many of their products as possible. A Porsche centre presents itself in a discreet way, but with a definite high-quality appearance. Only the light slot in the lower frontage allows a selective view of the interior. This increases curiosity and focuses the attention of passers-by on the marquee core and the uniqueness of Porsche sports cars. The cars are presented like individual precious stones in a valuable "jewellery case".

The partially curved facade to the Porsche showroom is an extremely distinctive feature common throughout Porsche showrooms world wide. The glazed entrance "slot" is inviting and its continuation as a horizontal skylight extends the entrance to become a daylight passage in the sales area, creating a unique architectural ambience typical of Porsche. The double height volume presents a sense of space for what is a relatively small footprint. The primary supporting structure consists of visible steel construction.

The combination of the silver interior of the curved main frontage and the black-grey trapezium sheet metal, with perforated side surfaces and acoustically filled cavities, provides optimum soundproofing to the ceiling. The Grey Steel structure and white ceilings provide contrast creating an architecturally dynamic interior.

The Porsche image is defined by such characteristics as sportiness, performance and exclusivity. The very nature of the product means emotion plays a central role in the vision. This is not only expressed through the quality of design in the cars, but also in the design of the showrooms, which form the stage for displaying the brand.

Archaus Architects Limited was established in 1993 by Mike Cole and Dennis Burns.
The practice has matured to become one of New Zealand's leading architectural firms with offices in Wellington and Auckland with projects throughout the country.

Offering expertise in unique, specialised buildings and innovative solutions to site or brief specific problems, our team of 32 staff are experts in creating buildings and spaces that bring life and vitality to difficult planning exercises.

Archaus Architects have been involved in some notable projects of recent years ranging from retail, hospitality, commercial, low-rise, high-rise, recreation, multi-unit residential, housing, industrial, and interiors.

We are passionate about working together with our clients to create inspirational design.

Client: Giltrap Holdings Ltd.

Architect: Archaus Architects.
Wellington.
Telephone: +64 4 802 5630.
E-mail: davidm@archaus.co.nz
Website: www.archaus.co.nz

Engineer : Silvester Clark.
Contractor: Fletcher Construction.
Planning: Urban Perspectives.

Roofing Installer: Premier Roofing.
Telephone: 04 473 1552.

Roofing, Cladding & Ceiling.
Manufacturer:
Dimond.
Telephone: 0800 346 663.
Technical helpline: 0800 766 377.
Email: dimond@dimond.co.nz
Website: www.dimond.co.nz

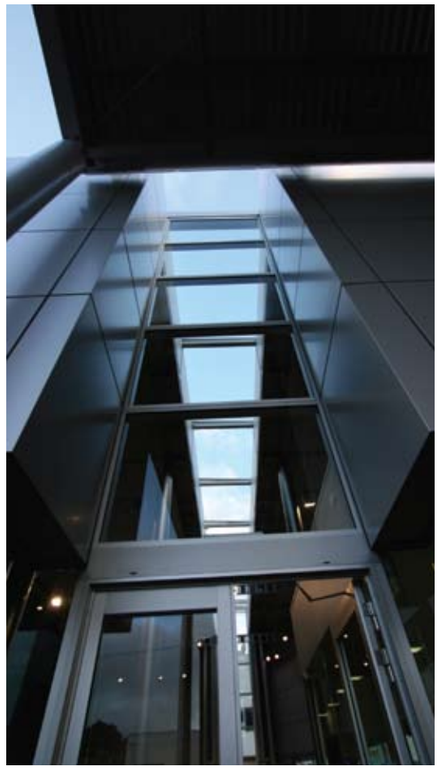
Customer Lounge Wall
LT7 Metal Profile Cladding - Colorcote 'Windsor Grey'

Kitchen & WC Lobby Front
LT7 Metal Profile Cladding - Colorcote 'Windsor Grey'

Perimeter Walls (above toilets)
LT7 Metal Profile Cladding - Colorcote 'Windsor Grey'

Showroom Ceiling (Internal Lining)
Core-A-Perf, BB900 (Colorcote Gold Grey), perforated with black felt behind for acoustic purposes.

Showroom Roof (External)
LT7 Metal Profile Cladding - Colorcote 'Gull Grey'



SCOPE NEWS AND VIEWS

New staff for the Pacific Coilcoaters NZ Sales Team.

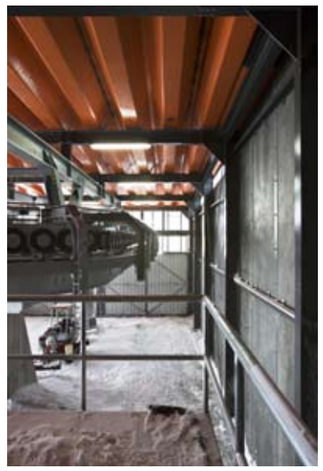
We are very pleased to introduce two new staff members of the NZ Sales Team.

Holly Leenen has started with us in Customer Services, alongside Kylie, and Greg Sager is our new Account Manager, taking over from Rob Armstrong (who is now doing Specifiers' work).

Please make them welcome as they settle in, and I'm sure you'll be talking to them shortly (if you haven't already).

Gerard extend their warranty from 15 to 20 years.

With the launch of the new Rockport Shingle Gerard announce their extended warranty on all Gerard Roofs textured profiles. The new 20 year warranty on surface coatings includes excessive fade. For full details of the warranty contact Gerard Roofs on 0800 104 868 or your local Gerard Certified installer.



New Zealand Steel roofing covers the highest building in Australasia

High on the ski slopes of Mount Ruapehu, the new state-of-the-art chair lift dubbed 'The High Noon Express' uses Weather Resistant Steel Plate (HW350) to roof its chair lift terminal.

Situated in the Turoa ski field, The High Noon Express is capable of transporting 3000 people per hour on the chairs, or 50 skiers and snow boarders a minute.

The chair lift spans a staggering 1.4kms and rises from 1920 metres above sea level at the base to 2320 metres, making the upper terminal the highest building in Australasia.

Extreme weather conditions and constant sandblasting in these high altitudes dictated that only the highest quality and durable materials were used in its construction.

Grant Harris of Ignite, the concept architect for the project, stated that it was obvious that they should use as much steel as possible and panalise as much as possible. "The mountain provided the cues for the design: the requirement to blend with the mountain over all seasons and withstand the extreme variations in climate and conditions made steel the optimum choice."

Construction of the 'mega lift' began before Christmas last year and took over five months to complete. As the largest lift anywhere in New Zealand or Australia, it was a monumental engineering feat in challenging weather conditions, with temperatures sometimes at -5°.

The upper terminal, a steel portal building, was a particular challenge as all of the building materials had to be flown in by helicopter. Because of the thin air at this altitude, load lift was 4.6 tonne max.

The steel fabricators Jensen Steel Fabricators Limited were constantly planning and looking for smarter solutions to allow for speedier construction.

The deep trough roof profile was fabricated from 50 tonne of Weather Resistant Steel Plate (HW350) – an excellent design solution which had not only to allow for the snow load but also had to be thick enough not to be punctured by the spikes on the seven tonne snow cat tracks.

With the High Noon Express up and running for the 2007 ski season, skiers and snow boarders alike can enjoy Australasia's biggest, longest, fastest ski lift.

Pacific Coilcoaters test for potable water, fire and smoke. Its all good news for specifiers

Testing Potable Water.

With the growing concern amongst the community over water shortages and increasing prices for water, there is a trend toward harvesting rain for use around the home and in factories.

Pacific Coilcoaters', in response to this trend, has had its products assessed under AS/NZS 4020:2005 for their suitability for drinking water.

We are pleased to advise that all our products meet the requirements of this standard, and so are suitable for use on roofs that are used for rainwater collection. This means they can be confidently specified and supplied for use in these applications.

Testing Fire, Spread of Flame and Smoke generated.

Pacific Coilcoaters have also had their products rated under AS/NZS 1530.3:1999 for ignitability, flame propagation, heat release and smoke release.

Our products have met the requirements of the standard with indices of 0 for ignitability, flame propagation and heat release, and for smoke release an index for ZRXTM of 1, and for ZR8TM between 1 and 2 (All tests are on a scale of 1-10).

New Literature.

Pacific Coilcoaters has now released its 'new-look' literature.

We have taken the opportunity to update all the literature, including the AS/NZS 2728:2007 charts, and have included additional information on maintenance, fastenings, etc., for each product.

This new range is being phased in currently, and by now you should have all received a copy of each of the new brochures. If you haven't then contact your Account Manager who'll organise them for you.

ColorCote® Roofing Guide.

Pacific Coilcoaters has also released a Roofing and Cladding Guide to the market in general.

It is targeted at the public and Specifiers, and tries to address some of the common issues we as an industry face, such as the use of the correct product, fastenings, maintenance issues, and much more.

Copies of all literature is available from your Account Manager. If you would like further information or copies sent to you please contact us on pccwebsales@fcsp.co.nz

Pacific Coilcoaters ZM8TM and ZMXTM ZAM® based products are up and running

As we have previously advised, our range of ZAM® based products, ZM8TM and ZMXTM, is now up and running.

We have the technical brochure available for distribution, and have sent out the price lists to the rollformers. At present we are stocking the following sizes:

1200 x 0.55 G300
938 x 0.55 G300
380 x 0.55 G300
290 x 0.55 G300
227 x 0.55 G300
273 x 0.55 G300
940 x 0.40 G550.

Going forward, we have ordered some 0.50 BMT material from the suppliers, and will have this available for rainwater goods (we estimate receiving the first shipment of material around September, and then it will be 'in-stock' from then on). Note that prices could vary quarterly, and are subject to review.

ZM8TM and ZMXTM carry similar warranties to our ZR8TM and ZRXTM (respectively) products, and are NOT intended to replace our ARXTM aluminium products, especially in very severe marine applications.

For further information, or if you have any questions on ZM8TM and ZMXTM, contact your Account Manager or call Tim Rutt on 09-5711226, email timru@fcsp.co.nz .

ARXTM testing on the MRM Test Rig.

We are in the process our ARXTM products rated on the MRM test rig. While this is still very much a 'work in progress', initial results are very positive and show that 0.70 H36 ARXTM has similar performance to 0.40 G550 steel products. Details will be circulated once the testing is completed.

THE FLIGHT OF THE BIRD

By Graham Hepburn

to refine his ideas

When Johann Bernhardt was seeking inspiration for a sustainable home he was designing on the slopes of the Hunua Ranges, he didn't have to look far.

"The clients took me to the section and I was looking down at the plains going out to the Manukau Harbour when this big bird appeared and started to float down the slope with its wings spread and that's when the idea came to me for 'the flight of the bird'," he says.

Johann, a Berlin-trained architect, went away to refine his ideas for a home with a wing-shaped roof that would incorporate the passive solar design principles he has championed with Bernhardt Architecture and in his role running the Auckland office of the Building Biology and Ecology Institute.

Johann had been approached by Pam Dormer and Gerry Swift to build the house after Pam had met him at an eco show.

Pam had previously owned a home that used passive solar design so when she and Gerry decided to build a home together, "that was the natural way to go", says Gerry.

The couple also wanted a home with a high standard of sustainability and resilience on a 1 ha site that enjoys wide views over the plains and the Manukau Harbour. They also stipulated no water and wastewater reticulation, energy efficiency, and a healthy indoor environment – all wrapped into a stylish package.

The home stretches east to west and is low to the south to protect against cold winds but opens up to the north to capture the sun's energy in its concrete floors, which warm up during the day and release the heat at night. Johann also placed the garage on the southern side of

the house to provide a barrier to cold winds although there is a gap between it and the house to allow for cross-ventilation of the home during the warmer summer months. A larger roof overhang on the northern and western sides also helps to keep the sun out and the home cool during summer.

In combination with beefed up insulation and double glazing on the east, west and south sides, the indoor temperature can be maintained at a comfortable level throughout winter. Even the expanded polystyrene sheets used as underfloor insulation have been recycled from a building that was being demolished.

"The solar gains are considerable but not like a heater so in order to keep that heat in the house you

need better insulation and double glazing," says Johann. "I always ask my clients after winter if they have started the heater and my aim is that they should hardly ever need it."

Gerry reports that they occasionally use their high-efficiency woodburner for heat and sometimes so its wetback can help raise the temperature of the hot water system if poor weather has meant the solar panels aren't doing their work.
Using COLORSTEEL® for the cladding and roofing was an easy choice for Johann.
"It's low maintenance, looks good, keeps the colour and it's good for wind and weather,"
says Johann. "I also liked having part of the house in flat materials and to contrast that with three dimensional materials like the corrugated iron."

Rather than carve out a flat building site, Gerry and Pam decided to build their home into the slope. Not only does this make it easier on the eye, but it also means the home is more sheltered. The master bedroom occupies the lower level, with the rest of the home on the upper level.

Johann also included a central conservatory on the upper level and this has a concrete wall that collects and redistributes heat. This heat can be vented into the house in winter or outside in summer.
Energy efficiency wasn't Pam and Gerry's only concern - they also wanted a home that collected its own water and dealt with all its occupants' waste. Rainwater for drinking and irrigation is stored in in-ground tanks, while wastewater is treated on site. Toilet and kitchen wastewater goes through a worm composting system that treats the water before it joins the "grey water' from the rest of the house in a siphon tank that slowly releases into a soakage field planted with flaxes and grasses. The forces of gravity power the process, and the castings produced by the worms in the composting system are used to fertilise the gardens.
Using pine for the decking and environmentally friendly paints were other sustainable choices in a home so striking that Johann used it on the cover of his recently launched book, 'A Deeper Shade of Green'. He spent a year editing the book, which has contributions from experts in every field relevant to sustainable housing.

Johann, who admits he's been "at the fringe struggling hard to get the word out" about sustainable housing, hopes the book will point law-makers, councils, manufacturers, architects and builders down the right path at a time when global warming and soaring energy prices are becoming huge concerns.
"A sustainable home beats a conventional home hands-down in terms of costs during the life cycle of the home," he says.
"Unfortunately, the problem for New Zealand is that people here sell very often and move very often so they tend not to plan for the long term."
He says this short-sightedness is one of his major frustrations.
"Whenever I talk to people about solar panels the first thing they ask me is what is the payback time but the same people will spend a lot of money on a granite bench trying to keep up with the Joneses but won't ask about a payback time on that – it's crazy.
"The comfort of living in a well-designed house should count for a lot more than money."

Johann Bernhardt

The director of Bernhardt Architecture, Johann Bernhardt is passionate about creating healthy, warm homes that are energy efficient and environmentally friendly. His firm has been designing these sorts of homes for many years, and he has also been running the Auckland office of the Building Biology and Ecology Institute, which researches, compiles and disseminates information on healthy and environmentally friendly building and living. Johann has an architect's degree from Technical University Berlin, a PhD in urban development from Paris University VIII, and a lifelong interest in sustainability. He recently took a year off his design practice to edit his newly released book, A Deeper Shade of Green, which looks at very facet of sustainable building. He says, "Hopefully, with this book people will have more information and be able to make better decisions."

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Colour: Mist Green
Cladding: COLORSTEEL®
Custom Orb
Colour: Pacific Blue

Roofing and cladding installer: TCB Roofing
Telephone: 07 846 6390

COUNTRY STYLE

When Christy and Steve Harvey set about designing their new home they had a collective advantage. Christy's design flare combined with the benefits of Steve's "know how", as a qualified builder, ensured the success of the project. As a builder Steve is very aware that some things on the drawing board are not always easy to create. Working closely together on numerous projects for clients of Harvey building has given them both an appreciation of products available, design concepts and aesthetic appeal. This combination of design and build works well for them as each has an appreciation of the need for appealing design that is functional.

The site for the new home was chosen for its close location to amenities and it suited their desire to have a quiet and rural aspect. The site, in the Pukekohe subdivision of Newsham Park, achieves this goal as it is surrounded by farmland and native bush. There is a gentle incline from the street which provided an opportunity to lower the garage giving additional height to the space above the garage.

"We both have an appreciation of homestead style homes... they offer a welcoming character which we believe has considerable street appeal. We wanted the new home to fit within its surroundings but have a certain distinction from the neighbouring homes," says Christy. While Steve agrees on the style he was adamant that their new home would take advantage of every innovative advance in technology. High maintenance materials often associated with villa style homes was not an option. "We both work long hours and the idea of low maintenance was essential. I have spent considerable time in the past restoring and fixing homes. It is time consuming, expensive, unnecessary and avoidable," says Steve.

The exterior cladding is Craneboard which is a vinyl board which does not need painting and is very durable. "Essentially it gives the look and feel we want without the associated problems, "say Steve.

The roof, which has a 35 degree pitch, is the new Rockport Single profile from Gerard Roofs. The look of the shingle profile and texture adds considerable character to the home and offers the benefits of lightweight, durable construction. Steve has long been an advocate of Gerard Roofs and, as a builder, has an appreciation of the skills required to fix a roof properly. "This is where Gerard excel, " says Steve," They have the expertise and on top of this they provide a warranty on their work and now a 20 year warranty on the textured coating. They had the roof on in a few days which was a great relief to me with unsettled weather."

The distinctive new Gerard Roofs Rockport Shingle has a well defined profile which adds character in the changing light conditions.

The interior design of the home reflects the homestead values of the exterior. Colonial skirting boards,

scotia and architraves. Claw footed baths and pedestal basins and a truly country kitchen with granite work surfaces and a large free standing oven.

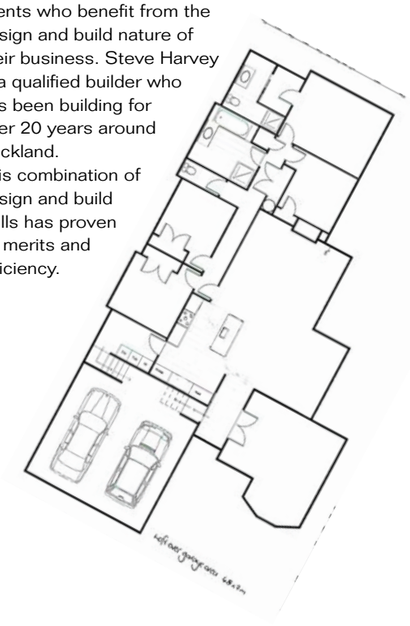
The home is very spacious, warm and friendly, From the entrance guest can be shown to a separate formal lounge without intruding on the family area. Steve is a musican and has his guitar collection, 10 of them, housed above the garage in the rumpus room. Whilst built in a loft style the ceiling and head room is not restricted because the garage floor was able to excavated and dropped 1200mm below the main house floor level. This has created a great space complete with its own mini kitchen. A great asset as Steve and his mates can jam away without disturbing family life.

From the entry the house opens to the living area where French doors open to the large quila deck. The family room, dinning room and kitchen are connected providing an openness which flows to the exterior for indoor/outdoor living. With 4 bedrooms the house has versatility of space and plenty of room to accommodate family as well as house guests.

The master bedroom has a walk through wardrobe and ensuite. Steve calls it an ensuite but is actually bigger than most bathrooms
Christy and Steve have created the home they wanted. It achieves the objectives they set which was to be distinctive, have great street appeal, have character. be warm, friendly and functional.

Harvey Design and Build

Christy and Steve Harvey have a passion for the character of homestead family style homes. They offer a unique service to clients who benefit from the design and build nature of their business. Steve Harvey is a qualified builder who has been building for over 20 years around Auckland.
This combination of design and build skills has proven its merits and efficiency.



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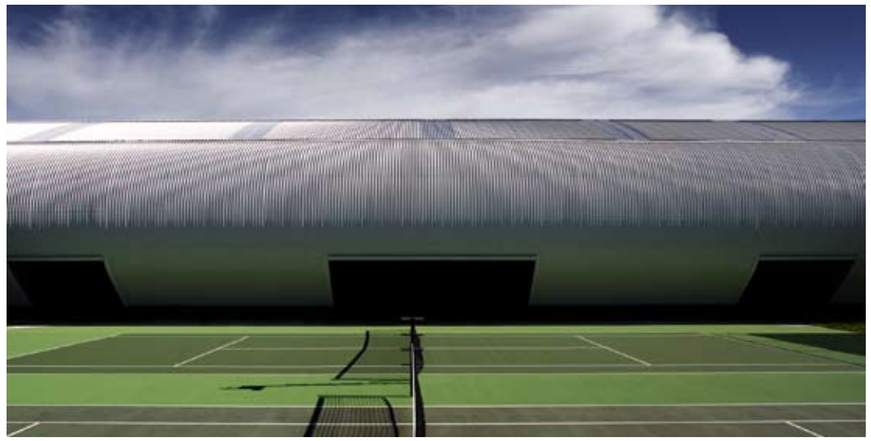
Profile: Gerard Rockport Shingles
Colour: Eclipse

PERRY ARENA, DEY STREET, HAMILTON.



By Graham Hepburn

When Waikato Tennis decided to build an international-standard indoor tennis centre, it soon became apparent an 'off the shelf' building was not going to work. After rejecting a shed-like proposal from a design and build company that came in over budget, Waikato Tennis approached SEKTA Architects & Project Managers. "I think they realised that they wanted to create something that sets the scene for the development and catches the eye," says Stan Kingma, director of SEKTA. "So they approached me and Holmes Consulting engineers to come up with something that was better looking and within budget." The design needed to provide the most economical way of enclosing three tennis courts while maintaining a modern, stylish aesthetic on the site adjacent to the Waikato Tennis' outdoor courts at Lugton Park. The complex also had to be of a standard that would allow Waikato Tennis to bid for and host major tournaments.

Specifications included meeting Davis Cup standards for the ceiling height, distance to the wall from the end of the court, and eliminating interior framed walls and junctions of differing materials. Stan also had to ensure good viewing angles for television cameras.
The building also had to be multi-functional, so that it could be used for other events, displays or conventions. And it had to be future-proofed to allow for expansion at a later date.

"I designed the shape so that the walls are just a continuation of the roof as it curves around and encloses it," says Stan. "Everyone loved the shape. Visually, it floats above the ground."

The bays of tilt-up panel doors down either side serve a dual purpose: providing cross ventilation for the building when in use and allowing vehicle access for loading and unloading equipment, displays and seating. Cladding both ends with translucent Alsynite and putting strips of it in the roof allows natural light to flood in, saving huge amounts of money on lighting and electricity. The ends of the building also have louvres high up to aid ventilation. The curved steel frames - or portals, as Stan calls them – that support the COLORSTEEL® cladding not only look elegant but also allow the building to be extended more easily. "The portals we came up with were the most efficient way of allowing them to add more courts so that it was relatively easy to extend without having to partially demolish it," says Stan. "It's also designed so they can connect into it at stage two when they might add a clubrooms and administration centre."

While Stan describes the project as "not overly complex because it was so budget-driven", the New Zealand Institute of Architects liked what it saw. Last year, the Institute honoured the arena with a local award in the Community and Cultural category. The judges said: "'Iconic building' and 'budget-driven' are two terms that seldom appear together, yet SEKTA Architects have created a landmark with this community-funded project and provided real value for money. The building showcases the architect's confidence and proves the client's confidence in the architect!"

Having made a statement with the building, Waikato Tennis didn't want taggers sullying its smooth, sweeping lines so they installed a graffiti deterrent system. Anyone approaching the walls of the building will trigger motion sensors that activate a sprinkler system that not only washes down the walls making them impossible to paint on, but also gives any would-be tagger a good soaking.

In March last year, the first game of tennis was played at the new $2.5 million complex that now forms part of the Waikato Tennis Centre, which has 25 outdoor courts as well as a pavilion with three squash courts.
Waikato Tennis has a long-term strategy of developing a multi-sports centre that can host events and tournaments for a variety of sports. The completion of the Perry Arena is just the first step in that process.

SEKTA Architects & Project Managers are a small, highly motivated architecture, interior design and project management consultancy whose work is primarily in the commercial, interiors, retail, industrial and sports facility sectors. They are focused on producing architecture of enduring quality that suits the needs of the end user. They are not bound by a set style or a particular aesthetic, as each building is a result of many variables such as site conditions, urban context and, of course, budget. Architects, though, cannot help but be influenced by their architectural exposure and experiences, and director Stan Kingma says the 11 years he spent in Australia has definitely influenced his work. Stan started his career as an architectural draughtsman in Hamilton before completing an architecture degree at University of Auckland. While in Australia he also completed a project management degree before returning to New Zealand.

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