ISSUE 36

SCOPE

Below is a brief introduction to the 2014 executive of The Metal Roofing Manufacturers Inc.
It is intended that Scope be representative of the Metal Roofing and Cladding Industry in both commercial and residential sectors. Your submission of material you consider is of interest is welcomed be it design, research, manufacture or construction.

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SCOPE

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COLORSTEEL® BOUNCE® SPECIFIED FOR CAMBRIDGE'S AVANTIDROME

Ten years ago white roofs were hailed as the built environment's simple answer to global warming. White bounces a large percentage of the sun's rays away from the roofs of houses and commercial buildings, keeping them cooler in summer and therefore using less energy to maintain a comfortable temperature inside.
Because white reflects both light and heat, surface temperatures build up more slowly and to a significantly lower level. This helps minimise heat transference into the building which means less need for air conditioning to maintain a comfortable temperature, and as a handy side effect the reduced stress on the coating extends its life.

Further challenges remained, however, and many companies including New Zealand Steel and BlueScope Australia continued research on the concept. Now, for the first time in this country COLORSTEEL® Bounce® roofing has been used in a major build.

The Avantidrome just north of Cambridge in the Waikato was officially opened by HRH's Prince William and Princess Catherine in April 2014. This Class One velodrome was a coup for the Waipa district, where high performance rowers are already centred south of Cambridge at Lake Karapiro. Every effort was made to ensure local designers and contractors were used, and New Zealand Steel was delighted when their new COLORSTEEL® Bounce® roofing was specified. "COLORSTEEL® Bounce® is a solar-reflecting steel roofing similar to COLORBOND® Coolmax from BlueScope Australia, and their research was used as a basis for our product," explains Kirsten Magnusson, Building & Construction Category Manager for New Zealand Steel. "It acts like an extra layer of insulation."

Its unique paint primer and top coat system is a bright white colour that delivers a 77 percent optimised solar reflectance – 10 percent higher than any other products in New Zealand Steel's range. It's able to do this using specially shaped molecules in the coating that deliver improved reflectance and solar absorption – which can mean lower air conditioning capital costs and significant energy savings for the client going forward.

Lee Roofing of Hamilton was contracted to install COLORSTEEL® Bounce® on the Avantidrome roof. Director Robbie Lee worked on site for the duration of the project, with his two crews.

The major challenge for Steel and Tube was both manufacture and transport to site of the 27 metre long sheets required for the main roof, each weighing nearly 100kg. The sheets required five installers to place them, said Robbie Lee.

The Avantidrome is a tilt support structure where structural steel supports the concrete panels. Outside walls are concrete block with a glass curtain wall featured on the administration block.

The structural design provided "enormous" challenges - the velodrome arena alone is 120 metres long by 77 metres wide, with no internal supporting columns. Instead, a series of ten degree-angled perimeter frames support six-metre high, curved steel space frames, all suspended 20 metres above the track.

This design allows for clear views everywhere in the main arena, but also means the main structure has to be supported from the exterior circumference with no internal supporting columns. The toroid roof shape curves in all four directions, so design parameters were extremely tight to ensure watertightness and architects, engineers and contractors all worked closely together to ensure optimal results.

Bill Muirson, Contracts Manager of Jensen Steel Fabricators who made the steel roof frame, explained that every truss was different. "There was a three degree change for each truss in order to achieve the necessary width and bi-directional curves. The roof alone has a bigger area than Waikato Stadium's playing surface," he said.

The skirt roof has a 5 degree pitch and itself took two weeks to lay, said Robbie Lee. Specially-designed flashings overcame the problem of draping sheets intersecting, and waterfall flashings were installed before the main roof could be erected.

Designers also had to consider the impact of heat generated by

high-lumen lighting on the rows of almost-clear fibreglass sheeting installed across the highest points of the roof. This was resolved by using Alsynite's twin skin technology, in which two separate high-strength fibreglass sheets are laid over each other with a gap between (much like double-glazing on windows) giving condensation the chance to evaporate before building up.

"This was a complex and challenging journey, but we now have a much expanded design and build skill set!" says Dominic Buckell, Director of Chibnall Buckell Marovic Team Architects in Hamilton, who were the project architects.

Nobody in New Zealand had personal experience of constructing a velodrome to a Class One (top international level) standard and there was little help from competitive overseas specialist builders, which meant most solutions were worked out independently.

Client the Home of Cycling Charitable Trust employed three independent structural engineers who met with the construction team and consultants every second week. It was therefore important to be very open at all times said Neville Davy, the Avantidrome Project Manager for Livingstone Building NZ of Te Awamutu who were the lead contractors. The system worked well throughout the build, with more than 30 staff and 80 contractors involved.

Unlike other sports stadia, velodrome tracks are not symmetrical. Each "corner" requires different seating arrangements for the 1,500 spectators, which created unique challenges for the design team who had to take into account sight lines that would allow everyone to see the entire track.

"No two tracks in the world are the same," explained Dominic Buckell. "Designs are very specialised as well - there are only two velodrome designers in the world and Ralph Schuermann, who designed the Avantidrome track, is a third-generation velodrome designer and builder." Herr Schuermann was also responsible for Invercargill's velodrome design in 2005, and more recently he designed both the Beijing and Rio de Janeiro Olympic tracks.

The Avantidrome track was designed and pre-assembled in Germany, then shipped over in five-metre sections. Herr Schuermann provided a total of 6,000 co-ordinate points throughout the structure to ensure accurate positioning of the track and seating, 1,500 of which related specifically to the track positioning.

Construction choices have been as environmentally sensitive as possible. The COLORSTEEL® Bounce™ solar-reflective steel roofing will deliver a more stable ambient temperature for minimum air conditioning energy use, provision was made for as much natural light availability as possible, and the 356 high bay lamps provide optimal lighting for minimum cost. These also provide ideal lighting for high definition television coverage.

The $28.5M investment in the Avantidrome complex has clearly been worthwhile, with cyclists at the recent Commonwealth Games in Glasgow earning 15 medals for New Zealand and increased interest in the sport as well as in the Avantidrome displayed ever since. "Champions inspire the wider community," says Geoff Balme, Home of Cycling Charitable Trust's chief executive. With 80 percent of the track hours in the Avantidrome already logged by community groups not elite athletes, it seems the public agrees. Of course, 15 medals including six gold may have helped too.

Chibnall Buckell Marovic Team Architects

A Hamilton based architectural practice with an established track record of delivering successful, high quality, award winning projects.

Since its origins in the early 1980's the practice has taken great pride in forming enjoyable and enduring working relationships with clients and project teams, and in supporting them throughout the project delivery and beyond. The practice has a broad range of experience in sport and recreation, commercial, education and residential projects.

Chibnall Buckell Marovic Team Architects is the Hamilton office of Team Architects, the eight practice, nationwide architectural group.

Architects: Chibnall Buckell Marovic Team Architects Hamilton
Telephone: 07 838 9016

Builders:
Livingstone Builders Hamilton
Telephone: 07 849 0082

Roofers Lee Roofing Hamilton
Telephone: 07 849 1441

Roofing Supplier:
Steel&Tube Auckland
Telephone: 07 27 44056

Roof :COLORSTEEL® Bounce Profile ST963

Cladding:Hi Rib COLORSTEEL® Endura Grey Friars

LAKE HAYES

Responding to his clients' needs and the majesty of a site overlooking Lake Hayes were the main considerations for architect Noel Strez when designing this Central Otago home.

By Graham Hepburn

As Noel, of Noel Strez Architects, says, "To the forefront of our clients' brief on this stunning site was the ability for ease of access around and within the house. With a history of mobility issues primarily as a result of sporting injuries and subsequent operations, the desire for a single-storey house or one with ease of access within it was paramount."

He says that creating an elongated form was a natural response to the site.

"With the magnificent outlook to the northwest across Lake Hayes towards Coronet Peak, a fundamental decision was made early in the design process that all living spaces and five bedrooms should take advantage of this outlook and maximise the afternoon sun," Noel says. "This approach meant the building platform width for the site allocated in the subdivision plan was marginally exceeded resulting in the need for a Resource Consent application."

He adds, "To address all of these requirements, the design philosophy for the proposed house form was derived from the early gold miners cottages in the region where small simple rectangular structures with steep pitched roofs dominated the architectural landscape. To maintain this design simplicity the house has a symmetrical appearance to the northwest direction from which the house is predominantly viewed. The house roof form has been broken along its length axis to create a series of small pavilions that help reduce the lineal look.

These small roof pavilions are linked by flat roofs while still complying with the 20 per cent maximum flat roof component as required in the consent notice on the land title. All of this creates a scale more sympathetic to the heritage of the surrounding district."

The home is predominantly clad in a mixture of schist and cedar weatherboards – again to break up the look - with some plastered walls to the rear of the home, particularly on the garage. Electrically operated aluminium louvres flank the main living area, providing shelter to the tiled patio overlooking the lake.

Noel says the living spaces form the central pavilion and are positioned forward of the adjoining bedroom pavilions either side to allow 180-degree views of the lake and mountains. The dining area gable roof has been turned through 90 degrees and is positioned on the central axis to emphasise this symmetry with louvred flat roofs each side controlling sunlight.

To the south of the central pavilion, a bedroom wing to accommodate the family has been created housing three bedrooms with associated service rooms. On its southern side is a separate sauna house that also has lake and mountain views. To the north of the central pavilion, another bedroom wing mirrors the south pavilion and provides two further bedrooms and guest living for use by extended family and friends.

The garage pavilion has been centrally positioned on the eastern side – the rear of the home - maintaining the central axis theme although it is mostly concealed from view by the central living pavilion.

Noel says keeping the rooflines simple and traditional allows the house to sit easily in the landscape.

“To enhance these simple pitched roof forms, COLORSTEEL® Euroline Battenlok roofing was chosen, being a descendant of 18th Century standing seam roofing,” he says. “The ability for it to be produced in long lengths allowed it to be taken continuously up and over the ridge line from eave line to eave line with matching COLORSTEEL® ridge caps provided to each standing seam. This created a shape-crispness to the ridge line eliminating the need for a heavy looking continuous ridge flashing. The Euroline wide profile contrasts well with the texture of the predominance of natural Central Otago schist stone and charcoal stained cedar boarding used on the exterior walls. The Grey Friars COLORSTEEL® chosen conforms to the light reflectance levels required by Council and the wide eaves further enhance this colour palette by creating an abundance of varying shadowing.”

Yellow cedar timber soffit cladding has been used to provide contrast and a sense of lightness. The same timber has also been used in the sauna room.

The builders on the job were Wanaka-based CDL Building, and they have entered the project in this year’s Registered Master Builders’ House of the Year Awards.

Managing director Justin Carnie says the tight-stacked schist veneer cladding system seamlessly flows through from the exterior to the interior.

While the home might have the look of a miner's cottage, it certainly has a lot more comfort with in slab hydronic underfloor heating

A Living Flame gas fireplace is a centrepiece of the living area, and has been integrated within a schist, American white oak and granite surround.

A C-Bus home automation set-up controls audio-visual systems, window treatments, heating and cooling, security and lighting

purely with the clients' comfort and lifestyle in mind. To meet the exacting requirements of the design specifications and expectations of the clients, an extremely high level of attention was paid to every detail during each phase of the construction process. The floor area of 660sq m allows for seamless flow throughout the home whilst also

system throughout and electric under-tile heating systems to all the bathrooms. There are zoned thermostatic controllers in all areas for the underfloor heating as well as for the ducted air conditioning system throughout the home. To keep the heat in, thermally broken, Low E, argon-filled double glazing with aluminium joinery has been used, along with Pink Batts Ultra R2.8 insulation to exterior wall cavities and Pink Batts Ultra R 5.0 insulation to the roof space.

(interior and exterior), with the ability to connect to smart phones and tablets. The fit-out of the interior includes granite and marble benchtops and splashbacks to all vanity, cellar, bedroom and kitchen joinery, as well as custom-made timber veneered joinery to bedrooms, bathrooms and kitchens.

Justin Carnie says, "This refined, spacious and extensively detailed home was designed and built

highlighting the scale of detailing involved. The blend of the functional and the aesthetically pleasing has created an overall result, which is totally compatible with the owners and the surrounding environment."

Noel Strez Architects

Following an extensive period as a co-director of a larger architectural firm, Noel Strez established this practice based in Merivale, Christchurch in 2002. Since its inception the practice has undertaken a wide range of projects varying in size and complexity, gaining a reputation for producing projects on time and to budget. This has been achieved by providing first class tender documentation to back up detailed design. Short cuts are not taken and this philosophy ensures competitive tender pricing with minimal on site variations.

"The large number of repeat clients that we have demonstrate our ability to convert our clients expectations into successful, sustainable design solutions providing efficient space utilisation, low maintenance, energy efficiency and pleasant living and working environments without compromising aesthetic appeal. To achieve this requires the careful evolving of the clients' design brief and its close implementation through all design phases. At all times we have a strong focus that good client consultation is essential."

Architect:
Noel Strez Architects Limited
Telephone: 03-355 0989
Email: office@nsarchitects.co.nz
Web: http://nsarchitects.co.nz/

Roofing: COLORSTEEL® Endura 0.55. Euroline Battenlok in 'Grey Friars'

Roofing supplier: Roofing Solutions Dunedin,
Telephone: 03 456 2270

Roofing installer: Canterbury Long Run Roofing, Ashburton,
Telephone: 03 307 0593

Builder: CDL Building, Wanaka,
Telephone: 027 5444 154

Engineer: TM Consultants, Christchurch,
Telephone: 03 348 6066

POSITIVELY MAINSTREAM

It's less than a year since Mainstream added 3 Kiwi Street in Otahuhu to its national network. It was an advance in environmentally sustainable transportation infra-structure, a hub that integrates road and rail freight and provides an interchange between the two, as well as long-term on site storage.

Achieving this required co-operation between Mainstream, which has always been focused on speed and consistency of service, Goodman New Zealand, which had a site for sale that was difficult to access, and KiwiRail, which was keen on growing rail users. When Ki-wiRail gave a green light allowing a new road to access the site across existing track, the deal was struck and planning begun.

The main interchange of freight occurs in an open warehouse (3700m2) that accommodates both truck loading and unloading, a new rail siding from the adjacent KiwiRail yard, and access to a larger, main warehouse (6428m2). Entry is off Kiwi Street via a railway crossing, with a second access point off Savill Drive. The office, on the north western side of the side, is the pivotal point between the clockwise flow of trucks and the site car-parking off to the west. To the east is a large container yard (2806m2) with a canopy allowing covered access to the warehouse.

To the south is the exit route that includes a weigh station and allows drivers the option of turning left into Savill Drive or continuing back to Kiwi Street.

Tapered welded steel portals are used for the two warehouse structures. High capacity flooring is achieved by two-way post-tensioned slabs after piling. The large span roofs have been constructed without steps. This removes the overlap joint and the risk of corrosion.

The roof by Steel & Tube is ST963. The sheets are profiled with four specially designed ribs (46mm in height) Unique design

enhancements stiffen the rib shape to provide resistance to both wind uplift and point load distortion. As some of the long roof sheets exceeded 40 metres in length special provisions had to be made to accommodate thermal movement. The white roofing has the highest possible solar reflectance externally to reduce heat gain in the warehouse space. COLORSTEEL® cladding was painted on both sides – exterior in the company's signature 'Mainstream Green' - interior with a lighter paint to enhance internal reflectivity and Clear Glass Reinforced Polyester (GRP) sheets matching the ST963 profile, were added to each bay provide a high level of natural light thus reducing energy costs.

The Office is clearly differentiated from the warehouses to make for easy orientation of drivers as they arrive. It uses glass and charcoal coloured precast panels that have cast-in shelves to provide solar shading to the north. White painted undersides act as light shelves, which deflect indirect light into the office space.

The entrance is emphasised with full-height glass and a projecting portico. Inside wide shelves over the north-facing windows reduce the heat gain during summer months. All circulation and meeting rooms are located towards the western end of the building, and this creates an open plan area that is flexible for future planning. The eastern façade of the office is shielded from a lowered eastern sun by the warehouse, while a natural light well exists between the warehouse and the office. The double-height void separating the upper floor office reduces heat transfer. Heat can also

be thermostatically controlled by an extract to the atrium; automated blinds can be unfurled to cover all glazed areas. Meanwhile, the ground floor has been tiled to allow the thermal capture of solar radiation, while in the open plan office, spandrels to desk height ensure that there is 30% less heat gain than full height glazing.

Client Mainstream Warehouse
Archtitects:
JWA Architects Ltd. Auckland
Telephone: 09 368 1111

Builders: Federal Builders Ltd.

Roofers: Kiwi Roofing

Roofing Supplied by Steel&Tube
Telephone: 09 2733056

Roofing: ST963 COLORSTEEL® Endura Cloud

Cladding: ST963 COLORSTEEL® Mainstream Green

Jonathan Walker, of JWA Architects Ltd, was appointed as architect for this project, which he's pleased sets a good standard of design for its location. "It's a strongly industrial area," he says, "and I believe that we've set an improved level of quality for an industrial building in this domain. The Mainstream building and its site create a strong sense of identity that helps improve this neighbourhood. The sustainability features incorporated in the modern urban design principles that we applied make a significant contribution, which includes reducing the carbon footprint.

The project has taken considerable planning and many detailed discussions about maximising both transportation efficiency and storage capacity. It was at a time when the Christchurch rebuild urgently needed logistical support. We addressed that and Mainstream's general expansion needs by integrating a rail head with a road transport depot in the same building. There aren't many of those in New Zealand. And if there were to be spikes in the oil price, Mainstream has positioned itself to be able to mitigate rising diesel costs. In fact, it should come as no surprise that Mainstream is already seriously considering an extension, which it can make organically on the same site, without a major dislocating move."
This has been confirmed by Mainstream's National Supply Chain Manager, Neil Bell: "I'm happy to say that the next phase of expansion is currently being planned."

JWA Architects Ltd.

JWA is a well established architectural practice focused on strong design, smart workable solutions and exemplary project delivery. The practice has undertaken a wide range projects including industrial, health care, apartments, intensive housing and infra-structure projects.

There's a new colour on the exterior of the wall cladding: Mainstream Green. It's dark, in keeping with the company's main corporate colour. Inside, the cladding is painted white, in keeping with what Mainstream sees as its bright future. Yes, the company is implementing all sorts of green standards:

- LED office lighting
- Low – E glass for heat reduction
- High levels of internal wall and roof insulation
- Glazing on all three sides of the office
- Reduced lighting requirements
- Rainwater harvested from the Open Warehouse roof is stored in a 25,000 litre Re-use tank
- Waterproof internal roof for the server room, which has also has floor drainage protection
- Facilities for the disabled (car parks, toilets, access to patios)
- Mechanicals are located on the roof away from building edges
- Heat pumps on the roof for maximum heat ex-change performance

Mainstream's services include international freight, customs brokerage, 3rd party logistics, and full nationwide freight distribution. Expansion has been implemented: more is planned.

SOLAR ENERGY PANELS AND METAL ROOFING

NZMRM has been involved in discussions about solar water heating panels before and has contributed to the MBIE G12/AS2 and "Solar Water Heaters - Guidance for suppliers, installers and building consent authorities – December 2009". We have commented on the issues with these in at least one Scope article.

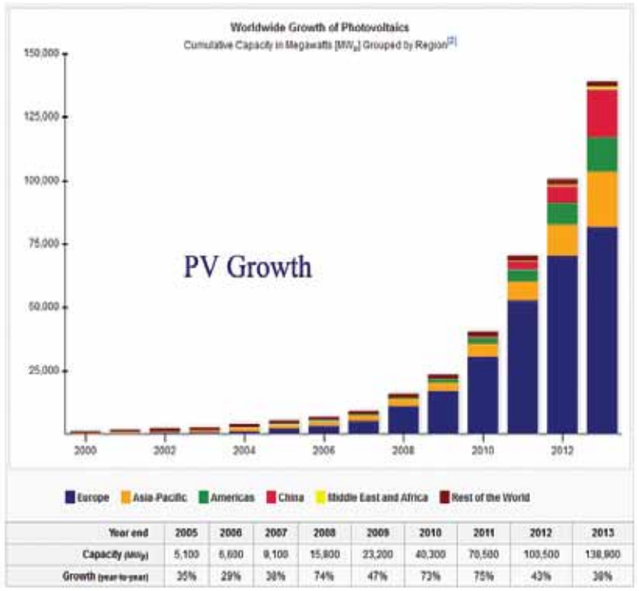
Our misgivings about the installation of solar water heating panels onto our roofing products are several – creation of unwashed areas under the panel; unplanned loading without adequate support; penetration quality; maintenance traffic; and not least that most installations parallel to the roofing (or the COP- preferred method of insertion similar to that of skylights) nearly always result in less than optimal orientation to the sun.

These issues have apparently seen some disillusion with solar water heating, but at the same time we have seen a significant increase in the use of photo-voltaic (PV) cells both on and off the roof. This article is to discuss the different issues that arise from the use of PV materials on the roof. Globally we have seen a steady increase in development of all forms of non-fossil-fuel energy generation ranging from wind farms and solar panels (both water and PV) through to tidal energy generators. Most of these have some sort of disadvantages, such as expense or energy not being available when you need it, or energy storage.

NZ of course relies heavily on renewable hydro-power to generate electricity and less dependent on fossil energy than many countries which use coal, gas or nuclear based energy generation. Reducing the cost of energy and avoiding creation of more energy infra-structure is still a desirable goal, both nationally and individually. Nationally, even if we do use hydro-power extensively, the transmission across quite long distances (e.g. lower South Island to Auckland) creates power losses which add to the cost of generation significantly. Individually the cost of solar power remains constant at the payback over the fixed period of 25 years (or whatever period is used for the payback calculation) and after this is free until the cells finally stop working.

Growth in photovoltaic electricity generation

One of the most significant increases in "alternative" energy generation has been in the use of photo-voltaic cells to directly generate electricity. In a rather chicken and egg fashion manufactured prices have tumbled as usage has gone up and the development of methods of using this generation method (which on



Year end	2005	2006	2007	2008	2009	2010	2011	2012	2013
Capacity (MWp)	5,100	6,600	9,100	15,800	23,200	40,300	70,500	100,500	138,900
Growth (year-to-year)	35%	29%	38%	74%	47%	73%	75%	43%	38%

the face of it only works during daylight hours) have also increased in availability and sophistication. Use of pv technology ranges from huge "solar farms" covering many hectares, observed in Greece, Australia and elsewhere and rumoured for the Sahara Desert, down to a few panels fitted on house-roofs to generate top-up energy for on-grid locations, or a lot of panels for total power off-grid in more remote locations, or specific non-grid applications e.g. motorway phones, or electric fences. The majority of these are rigid silicon micro-crystalline arrays protected by glass and mounted in flat rigid panels.

Solar farms covering many hectacres

On-roof installations

Looking at domestic (or limited application commercial) installations fitted onto the building, the same issues exist as apply to solar water heating panels but generally to a lesser extent. PV panels are generally lighter, can be oriented better to the sun, and are in fact less dependent on orientation anyway as they generate to an extent even in diffuse light. Penetrations are a cable rather than a pipe.

Obviously some issues remain. Fitting close to and parallel with the metal roof can still create an unwashed roofing situation. Some installations where the entire roof appears to be covered by panels would have to raise some questions about what happens to the roof, if there is one. Panels still need to be washed to remove dirt which otherwise reduces the efficiency (and this again raises questions about whole cover installations). Fortunately the relatively light weight means the panels can be mounted on rails leaving adequate clearance from the roof material, and also that properly braced they can be oriented better to the sun. They can be mounted on tracking devices to allow optimum exposure to the sun, although this is less important than for water heating, and is not very useful in New Zealand where the light is more diffuse. Design life of these panels is said to be 25 years, but of course as they improve in technology and output the cost-effectiveness increases and payback improves, or alternatively smaller panels can be used to provide the same output.

Laminated panels

Another, newer alternative is for amorphous silicon panels directly laminated to the roof cladding. This is less efficient and more expensive per kilowatt generated but virtually invisible on dark roofs and without the need for any rails or brackets, and is simply installed as the roof cladding (apart from the wiring). Several NZMRM companies in NZ are looking at this process, and at least one is producing roof panels of this type (see Dumpling Hut pictures). This obviously results in no unwashed areas but does have the disadvantage of not being able to be oriented for optimum generation (although this is apparently less important than it is for solar water heating panels). There are no penetrations (typically connections are under the ridge cap), and no wind uplift issues, as there are for any panel supported off the roof. The life span of these panels, unprotected by glass from sun and rain is not known but likely to be shorter than that of rigid panels, possible as little as 10 years. They will require washing as do the glass panels, and this would seem to risk foot traffic damage. How these will be processed at the end of life is not yet clear. So, a work in progress, but obviously one of importance to roofing manufacturers as they are an inherent part of the roof cladding, not an extra (although still needing to be installed by a registered – and experienced – electrician).

Dumpling hut: Self sufficient Power well off the grid

PV coatings

Finally, and still in the future, the ultimate metal cladding product may be photo-voltaic cells based on dye technology (Dyesol) which are claimed to have the possibility of being applied by factory coil-coating, like colour finishes. The basic cell technology exists (and has done for some years) but the application method is still coming, as is any possible installation method. Corus Steel (part of Tata) has been working on this in Wales (so far unsuccessfully). We have even seen a couple of claims that spray-on solar paint is being developed!

Orientation

As we understand it, pv panels are less susceptible to poor orientation reducing total annual output than are water heating panels. In addition the ability to raise or orient the rear of the panel, which is easier and safer with pv cells, makes this more likely to happen, although again, few of the installations seen seem to have taken advantage of this.

What to do with the power?

So, having got our roof generating electricity from one of these technologies in amounts depending on the number and type of panels and their orientation, and the amount of sunlight impinging on them at any time, what do we do with it?
There are basically two different strategies – for on-grid and off-grid. Both require the high voltage DC generated to be converted to 230 v AC for use in the house.
For both you need a conversion method and this in on-grid applications is normally an inverter which converts DC to AC. For off-grid you normally need and use battery storage to provide power during darkness, and this is a significant investment which also creates some safety hazards.
Looking at on-grid, your pv electricity is fed into your domestic power supply and is used to provide power for appliances used during sunlight hours (or water heating). Any excess of electricity generated over what is used may be fed into the grid through a meter. Any shortfall, and all power used during darkness, is drawn from the grid.
Depending on the country and the power supplier you can be paid more than you are charged for grid power, or less, or nothing, or a variable amount.

Major users

In Germany which has been probably the largest and most enthusiastic proponent of pv power this was seen as a way of avoiding building more (nuclear) power stations and a 2:1 payment was started (i.e. at the beginning you get paid twice for your pv power what the grid power is charged at, gradually reducing over the plan period). In 2013, 50% of all the power in one summer weekend was produced in this way; 24 GW was being produced; and $100 billion Euros was invested in private power generation. Whatever may happen in future all this generating capacity still exists and has made a permanent change in the power generation model in Germany.

Minor users

In small quantities such as we currently see in NZ, distributed photovoltaic power generation has little effect on the overall power generation sustainability because much of NZ's power is derived from renewable sources, not fossil or nuclear fuels. However distributed generation can reduce the power losses during distribution which are more significant in NZ because of the large distances and small customer base, in any case distorted by one third of the population living in Auckland, far from any generator.
The various NZ power companies have different payment strategies.

Payback considerations

The payback on panels is at its simplest based on what you generate at grid rates. This means the payback is how long it takes to save the capital cost at grid rate. When you put power into the grid the payback is longer because the return is at less than grid rate.. The Herald article suggests that an approach with optimum cost benefit is to determine your daytime power usage and create an installation for no more than this, or not much more. This will ensure you use all your generation to save money and don't invest capital into a worse payback. Of course once the payback period you allowed for in your calculations (typically 25years) is completed, your solar power is then free until the panels stop working.

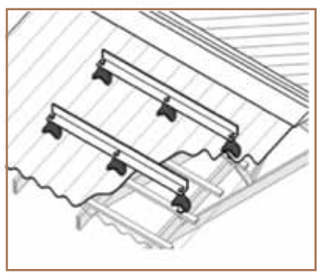
Roofing considerations

(Finally, you might think). The installation and maintenance considerations are similar to those we have previously published regarding solar water heaters mounted on the roof, but with some differences.

These comments cover separate rigid panels, not integrated laminated panels (or indeed paint), for which some of the issues are different.

Mounting

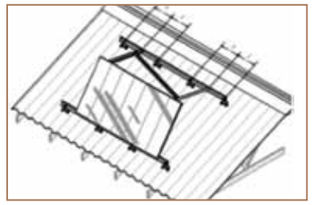
Even the relatively light weight of the pv panel should be still supported by the roof support and the fixing should go through the roof cladding into a purlin, or purlin/rafter, which can properly and rigidly support the weight of the panels, not just being fixed to the roof cladding itself.



Rail mounting onto purlin/rafter

What is equally important is withstanding wind uplift forces which will try to rip the panel off the roof. This will be more important for panels oriented off the roof plane for greater efficiency.

The not-uncommon method used for solar water heating panels, of just screwing a bracket into the roof with a leg at each corner, can damage the roof cladding in several ways, and if the panel has only one support at each corner this may well not coincide with the structural members underneath. For this reason the support rail is preferred, as shown in G12/AS2 etc.
This allows the support bolts/screws to be mounted over the support members underneath the roof.
Mounting the panel from support rails more easily creates the 100mm minimum manual washing clearance required between the roof and the panel for regular maintenance. How this is maintained in whole-of-roof coverage installations remains to be seen, but as suggested above, for on-grid operation this amount of power may not be economical anyway.



Orientation off roof

Rails and supporting members must be made of materials/finishes of good durability, but which will be compatible with the roof. For most metal roofs this means hot dip galvanised or zinc coated and painted.

Roof washing

NZMRM have always emphasised the importance for a metal roof that it is either rain-washed or can be manually washed to remove corrosive deposits, to extend its life. Corrosion failure caused by the roof cladding not being washed is not covered by the warranty. Experience shows that a minimum gap of 100 mm between panels and roof is necessary to allow manual washing (which can be done at the same time as panel maintenance, or more frequently if necessary). Panels raised to improve orientation will normally allow adequate rain-washing.

Orientation

The rail mounting also allows the rear of the panel to be elevated to provide better pitch orientation. In fact the horizontal orientation can also be improved from a rail, not just the pitch.

Method of support fixing

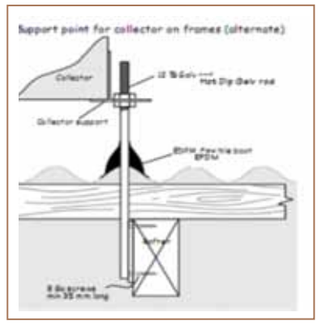
As mentioned above, the fixing should be into the purlin, or the side of the rafter.

G12/AS2 suggests several methods for this, of which this is one, which shows the use of a boot flashing on the crest of the roof cladding, so that the support bolt/stud is securely fixed and its penetration of the roof cladding is water-tight.

Metal tiles use small section battens and supports should always be fastened to the rafters not just to the battens.

Forces.

PV panels do weigh less and can be supported from a purlin not a rafter, if necessary.



Fixing as penetration

Penetration

Putting a pipes or cable through any type of roofs, when installed after the roof, is typically the point at which common sense and respect for other people's work seems to be abandoned. Penetrations for electric cables for pv panels is much simpler than that for water-pipes but still require doing properly through a boot penetration flashing (or as for laminated panels, under the ridge capping.) It is necessary to avoid damaging the roof coating and to remove any swarf created by drilling or cutting.

The method of putting a pipe or cable through a metal roof is well documented in E2/AS1, the NZMRM COP and elsewhere.

Laminated panels

As these cover most of the flat section of the roof profile and so much of the above installation detail for glass panels does not apply. The collection cables (which of course are one per roof pan) run under the ridge cap and are collated inside the roof.

This type of panel cannot be installed as a retrofit except by a total re-roof.

Industrial panels: Fixed and orientated toward the sun

Insertion into the roof

The Code of Practice in 2.6.9 shows a method of installing a panel by inserting it into the roof as a penetration in a similar manner to a skylight or powered ventilator, and this is also possible for rigid pv panels. This does of course prevent any other orientation than that of the roof and in this sense is similar to the laminated panel.

Maintenance

All pv materials require the removal of aerially deposited dirt in order to keep working efficiently. As for washing of roofs the frequency of this depends on how much air-borne dirt occurs, how often it rains and on the pitch of the panel. At some point though, access will be needed for cleaning, and in order to avoid damage to the panel or the roof some form of access way may be needed. The glass panels can apparently stand being walked on. Laminated panels may need more care to avoid damage than glass. However access is gained under current H & S regulations any access to the roof other than by the owner requires edge protection.

Safety.
Live power

At this point one might note that all of these products are generating electricity at apparently about 500v DC as soon as they see sunlight (or indeed any light).
This would seem to mean that they are permanently "live" as are the cables that come from them until they are fed into some switchgear.

This obviously poses some hazards during (and after) installation and only registered electricians experienced in this work should be employed. Damage during cleaning might also create problems.

The interface between roofer and electrician for laminated roof panels (and painted roofs if they come) will need to be managed with safety in mind.

Note also that lower voltage to power any sort of device, means higher current and for (typically off-grid) low voltage DC, installations need to be done with heavier cable than normal domestic installations to avoid overheating.

Off-grid panel

Final thought

This is obviously a coming thing and we need to be aware of all the issues in thinking about generating electricity from the roof. In my last article I asked why solar panels aren't mounted on the ground to avoid penetrations to the roof and easy access for cleaning. This actually related to solar water heating panels, but maybe the same applies to pv panels.

Sources
- *SEANZ (Sustainable Electricity Association NZ) presentation to NZMRM conference 2013*
- *Acceptable solution G12/AS2 (MBIE) and Guidance document*
- *NZMRM COP V 2.2*
- *NZ Herald "Elements" July 2014*
- *Sustainable Business News*

BRAE BARN, GLENBROOK

By Graham Hepburn

When Alison and Alan bought their 1ha Glenbrook property, they envisaged building a home in sympathy with the area's rural character.
"We didn't want a starkly modern house because it just wouldn't fit in," says Alison.
"Some of the neighbouring properties are made of corrugate or clad in black, so we wanted to fit in with them. We also took inspiration from the rusting old iron-clad, barn-like structures around Glenbrook, whose forms stand out against the landscape."

Alison says they initially planned to build three pavilions on the hilltop site because they liked the idea of their property looking as if it were a grouping of rural buildings and they also wanted separate quarters for their frequent visitors from the UK.

They had seen and liked the work of Pukekohe-based architect Jann Hurley so they brought her on board to realise their vision. They enjoyed her collaborative approach to design, and appreciated her ongoing support throughout the construction process, and afterwards.

"We had the idea of three shed-like pavilions but we didn't quite have the room on the site because we are on a hill with a flat bit on the top but then it slopes off quite steeply," says Alison.

Jann adds, "The three single-storey pavilions wouldn't have worked without putting in massive retaining walls or digging down into the site."

Neither of those options appealed aesthetically or economically so Jann came up with the idea of having one wing of the house one and half storeys and the other single-storey. The design involves two gable-roofed barn-like structures that sit side-by-side and are connected by a foyer beneath a lower pitched roof creating an H-shaped house. The roof at the middle of the H-shape extends to create a covered entrance between the 'barns' on the eastern side and a partially covered deck on the western side that then wraps around the rear of the home in front of the living area.

Alison says, "It was a eureka moment when we decided to go up another floor because it all started to come together then.

"We wanted the master bedroom to be separate from the other (guest) bedrooms, and in the end the best way to achieve this was to go up a level.

"This in turn allowed for the height and the open barn-like feeling to start to develop with the over-sized steel supports, the bridge, the huge window, all coming about due to the rise in building height. It also gives us amazing views from the master bedroom."

Alison says they were also adamant about building the home oriented to the west so they could make the most of the views, despite facing into the prevailing winds.

"It is such a beautiful site with amazing views across the countryside and down to Awhitu Peninsula," she says. "When we were planning the home all our friends were saying, 'Of course you will be building to the north', and we kept saying, 'No, we are building to the west'."

The two-level wing of the home features contrasting materials in stack-bonded blockwork and black-stained cedar, and houses the laundry, scullery, kitchen, dining room and living area on the ground floor. Exposed stairs rise past a double-height window to a bridge that spans a void between the master suite at the western end of the house and the mezzanine study at the eastern end.
The single-storey wing has a garage at the eastern end and beyond that a bathroom and two bedrooms, one of which has sliding doors opening to a patio with views to the west.

Instead of cedar and concrete block, this wing of the house has been clad in Zincalume® Corrugate, which has also been used to roof the whole home. Alison says, "Initially, we did this to save money, but we really loved the contrast the corrugate

provided with the other half of the house. It also fitted the agricultural-industrial look, instantly making it look more like a barn. The barn idea then came to influence a lot of other choices, such as the internal sliding barn door, the industrial look lighting, the flooring, the landscaping, even the name in the end."

Jann Hurley says cedar facing has been used on the Zincalume® cladding to soften it a bit.

Inside, the home has what Alison describes as a "slightly agricultural/industrial look to it – sort of raw."

Jann says, "Stack-bonded block and exposed steel were two of the main things that they wanted right from the start, and the steel portal frame has great lines."

And this was part of Jann's brief: to use "common, hard-wearing rural materials with design flair to create a unique home".

Jann says her colleague Damian Bell also had vital input on the project. "His attention to detail was critical in bringing to fruition the clean lines of intersection between the various materials."

Stainless steel and railway tiles feature in the kitchen, which shares a polished concrete floor with the dining area that gives way to bamboo flooring in the lounge. Bamboo is also used in the exposed treads of the steel staircase and the flooring on the steel bridge. The steelwork, including the portal frame, is painted black to emphasise its strong lines.

Another substantial feature that was a must have for Alan is the sliding barn door that can be used to shut the guest wing off from the main part of the house.

The sliding barn door, like the front door, the garage door and the cladding, is made of cedar and stained in Resene Sheer Black so that the grain of the wood is still visible.

A stainless steel post and wire balustrade on the stairs, bridge and mezzanine floor enhances the industrial look and, as Alison points out, "it allows the light from the window to filter through the staircase".

The industrial feel has been further emphasised by Alison stenciling "Brae Barn" in black on the Zincalume® cladding.
Alison explains that the name came around because Alan is Scottish and in his homeland a brae is a hill.
The Scottish theme extends to include West Highland terrier dogs and Galloway cattle on their property.

Having used Zincalume® for cladding and loving the look, the couple are now using it in fencing as they continue landscaping the property. The use of steel gabion baskets filled with local Mangatangi River rock helps completes the industrial/agricultural feel of the property.

Jann Hurley Architect

Established in 1993 in Ponsonby, Jann Hurley Architect relocated to Pukekohe in 1998. The company is committed to ongoing professional development and training to stay ahead of legislative changes. It uses the latest software so clients can see their new homes in 3D, inside and out. The firm is proud of its ongoing success of builders constructing its designs in the Registered Master Builders Awards. Their designs have won Gold in the years 2000, 2006, three Golds in 2009, 2012 and Silver in the years 2007, 2009 and 2011.

Jann graduated from the Auckland University School of Architecture with a Bachelor of Architecture with Honours, and became a registered architect in 1996. Jann is client-focused and strives to design refined, cleverly simple yet functional architecture. Projects cover a range of styles from contemporary minimalist to rustic country.

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Pukekohe
Telephone: 09 238 9459
jann@hurleyarchitect.co.nz
www.jannhurleyarchitect.co.nz

Roofing and cladding:
Zincalume® Corrugate 0.40mm

Roofing Installer: Smart Roofing,
Telephone: 0800 222274
Roofing and cladding supplier:
Franklin Long Roofing,
Telephone: 09 238 9249.

Steelwork: Allwin Steel Enterprises,
Telephone: 09 274 0464
Structural engineers: Dodd Civil,
Telephone: 09 296 5543

Stainless steel balustrade: Contab,
Telephone: 09 299 5535

Bamboo flooring and stair treads:
Ecodure,
Telephone: 09 489 3602

Landscaping: HEB Landscapes,
Telephone: 09 295 9000

Barn and front doors: Alitech,
Telephone: 07 863 9091

A NEW TRUE OAK ROOF FOR HERNE BAY VILLA

By Graham Hepburn

When the owners of a classic Herne Bay villa needed it re-roofed, they wanted a material in keeping with the historic nature of their home.

Corrugated iron was the logical, cost-effective choice that would complement the two-storey weatherboard home's other period features such as ornate fretwork and balustrades, with the property framed by a white picket fence. The only problem was an almost flat roof plane at the rear lower level of the home. The pitch of the lower roof was below the minimum Building Code requirement of eight degrees for standard corrugated roofing. Normally this would mean having to re-pitch the roof at considerable cost so standard corrugate could be used or staying with the original roof pitch and using a trapezoidal style of metal roofing, a modern look that would be totally out of character with the historic home.

Roofing installer Darryl Lowndes, of Lowndes Roofing, says, "The back part of the house had a lower pitched roof of about five degrees and the normal way to do the roofing would have been to use a non-symmetrical profile on it but you would have seen that when you looked out the back window upstairs and that would have looked strange."

Luckily for the owners of the Herne Bay home, Roofing Industries has a patented new product, True Oak® Corrugate, which provides the perfect solution to their problem. True Oak® Corrugate has a greater water carrying capacity and additional spanning capability, and can be installed to a pitch as low as four degrees over living areas. Roofing Industries' True Oak® Corrugate is a return to the original, deeper, rounder sinusoidal wave corrugate profile, and takes its name from and improves on the original Gospel Oak Corrugated Iron that was manufactured in the 1800s. The distinctive shadowlines and deeper curves transform the look and performance of corrugated roofing.

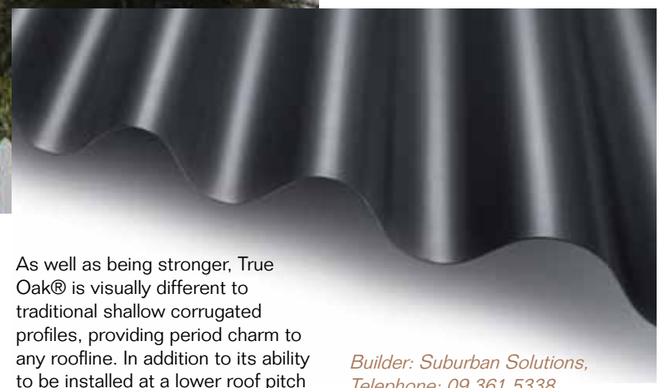
As well as being stronger, True Oak® is visually different to traditional shallow corrugated profiles, providing period charm to any roofline. In addition to its ability to be installed at a lower roof pitch than standard shallow corrugate, True Oak® can be down-gauged due to its profile strength. With warranties that meet New Zealand's Building Code, True Oak® is the strongest residential metal corrugated profile available and because it can be used at greater spans than standard corrugate it has the potential to reduce construction costs.

True Oak® is ideal for residential roofing and cladding, re-roofing of historic buildings with low pitch roofs and verandahs, including curved and bullnosed projects, and can be used for ceiling and walling in horizontal and vertical formats as well as fencing.

Darryl Lowndes says the Herne Bay villa with its mixture of roof levels and roof planes including gables and a bullnose veranda was "quite an involved job".

"There was a reasonable amount of planning involved but we often do projects like that," says Darryl. "We were one of the first installers to use True Oak® and I liked it and would definitely use it again. It looks good and it feels a lot firmer underfoot because of the deeper curves."

For the owners of the Herne Bay Villa, re-roofing their home in True Oak® has preserved its character and provided a simple, cost-effective solution.



Builder: Suburban Solutions, Telephone: 09 361 5338

Roofing: True Oak® Corrugate profile using ColorCote® ZR8 0.40 in 'Ironsand'

Roofing Installer: Lowndes Roofing, Telephone: 021 855 204

Roofing Supplier: Roofing Industries (Auckland), Telephone: 09 414 4585.

POWELL LANE HOME WINS RANZ INSTALLATION AWARD

By Graham Hepburn

Taking on a challenging roofing job has come up trumps for roofer Trevor Mason, who has won the RANZ Professionalism in Metal Tile Roof Installation Award 2014. It was a first-time win for Trevor, of Rotorua-based Mason Roofing.

Trevor has a lot of experience with metal tiles but admits that builder Gwyn Powell, of Powell Developments, threw him a few curve balls with the design of a home in Waiau Pa, South Auckland.

Gwyn was intent on entering the four-bedroom, two-bathroom home in his eight-section Powell Lane development in the Master Builders awards so he added in some "quite tricky" roof detailing in his design, which used Metrotile's 'Royal' profile metal tile.

"You could say he went out of his way to make it awkward for me," laughs Trevor, "but I'm glad he did it because it gives the home a bit of a wow factor, along with the way it was finished and with the landscaping."

He adds, "We would all like to do straight gables but no-one draws them that way these days."

In fact, Gwyn added "kick outs" to the gable ends as a design element. Trevor says the changing roof planes with four hips running into two hips then on into the ridge required precise detailing, as did the returns over the front entrance.

"With the entrance it was probably three tiles all up on those two different faces but by the time you had capped it, it took three quarters of an hour on each one but I didn't want to rush it and it came up really well in the end."

And the two RANZ judges - Stuart Thomson and Des Cowperthwaite – agreed.

Des says, "Trevor Mason's work was of the highest order – the accuracy of cutting, folding and bending was near-perfect. For example, the thing he has done really well is the roof over the front entry where there are all those returns, which are difficult to do and which he has detailed really well."

Des says the competition was very close though.

"In essence the problem that Stuart and I face now is that the entrants are of a very high standard so they are very difficult to separate, particularly the top two this year. In the end it got down to small matters of attention to detail, degrees of perfection you could say. It was also telling that the builder and the client were both singing Trevor's praises."

Des adds that while separating the entrants is tough, he and Stuart find the process rewarding.

"It is a nice change for us because as consultants we don't normally get invited to praise people's work so it is uplifting being involved in the awards."

Trevor, who has worked with metal roof tiles for years including Metrotile's 'Shake', 'Roman', 'Bond' and 'Classic' profiles, says it was the first time he had worked with the 'Royal' profile.

"There's a bit of a trick to it because a lot of tiles have right and left hand edges but with this one it only laps one way so it is a bit more involved."

Gwyn Powell says he has been using Metrotile's products for 15 years because of their looks and durability.

Having built up a solid reputation for lifestyle housing and developments, Gwyn believes in using proven materials and trusted techniques. Powell Developments have been involved in building houses and creating subdivisions for about 30 years.

They have developed lifestyle estates in the Franklin area such as Karaka Park, Village Fields, Church View Road (Stage 1) and are building further houses in the exclusive rural subdivision in Powell Lane, where sections are approximately 2500sqm.

He says metal tile has become his roofing of choice and he has built up a good relationship with Metrotile.

"We were the first to use Metrotile's 'Shake' design in Village Fields on our show home," he says.
Just as he added interest and softened the home's lines with his roof design, Gwyn says the 'Royal' profile has a texture and character that sits well with the brick cladding of the home and the rural nature of the environment.

Gwyn also offers his congratulations to Trevor Mason and his team for a job well done.

About Metrotile 'Royal'
Featuring a textured finish in a shingle-type design, Metrotile's 'Royal' profile adds interesting dimensions and shadow lines to a roof combined with all the benefits of steel: exceptional weather and fire resistance, and long life. Metrotile 'Royal' textured-finish tiles are available in a choice of colours from deep charcoals to earthy browns and greens, and the blended tones of weathered tiles. The tile profiles and roofing accessories are engineered to interlock and overlap to resist wind lifting and keep out the harsh elements. At less than 7kg/m2, a Metrotile roof is a 'Lightweight Roofing System', so considerable cost savings can be achieved during construction.

All of Metrotile's roofing products are fabricated from Zincalume® protected steel. Metrotile's textured finish provides added protection by embedding natural stone granules in an acrylic base-coat. A final clear acrylic over-glaze is applied before being oven cured. This extremely durable UV-resistant coating enables Metrotile roofing products to withstand the harshest environments around the world. Metrotile is ISO 9001 accredited. International tests reports, appraisals and field results confirm the products are 100 per cent waterproof, earthquake safe, fire resistant and able to withstand hurricane-force winds of up to 190kph (120mph).

Architectural designer
ProArch Design Ltd,
Telephone: 09 480 4315

Builder: Powell Developments
Telephone: 0274 950 902

Engineers: Mitchell Vranjes
Consulting Engineers Ltd,
Telephone: 09 307 2141

Roofing Installer: Mason Roofing,
Telephone: 0274 313 903

Roofing Manufacturer:
Metrotile (NZ) Ltd
www.metrotile.com
Telephone: 09 299 9498

Roof Profile:
Metrotile 'Royal' in Walnut

Photographer: Property Photos Ltd
Telephone: 09 576 7855

Roof photos courtesy of Lorraine Mills from RANZ

SCOPE NEWS AND VIEWS

Mark Tinning, RANZ President presenting Lorraine's Life Membership

New Life Member for RANZ

CEO of the Roofing Association of New Zealand, Lorraine Mills was made a Life Member at its 20th anniversary conference in Auckland in July.

Having served as CEO since the association was formed in 1994, Lorraine has played an instrumental part from the beginning in getting the organisation off the ground and over the 20 years since.

Lorraine's focus from Day 1 has been on professional achievement in the roofing industry and her ability across a wide range of disciplines is well known and is a major reason for RANZ earning the respect and recognition it now enjoys.

She says "Being honoured with life membership came as a complete surprise and a very special moment in my life".

Sean Wu joins Metrotile as Marketing Coordinator

Metrotile (NZ) Ltd has experienced rapid growth in their business in both domestic and international markets. In May 2014, Sean Wu was appointed in a new role as Marketing Coordinator responsible for the management of all Metrotile brands and marketing communications.

Prior to joining Metrotile, Sean worked at Vega Industries Ltd, in the marine industry for nearly 6 years. He recently relocated from Wellington to Auckland with his wife Nancy and their two young children. Sean's expertise and experience is in brand management, marketing campaigns, trade show management and visual communication design. No doubt Sean's appointment will bring great value to the team and the business. Sean has already hit the ground and is looking forward to working with some of you in the near future.

Metrotile (NZ) Ltd, owned by the Ross family with over 70 years of experience in the roofing industry, is an innovative manufacturer and supplier of affordable lightweight and high quality metal roofing tiles.

Expansion of Metrotile's new factory and office

Metrotile (NZ) Ltd, has added another 3500 m2 to a total of 7500 m2 of manufacturing and warehouse space to make room for their ever increasing production requirements. They are also in the process of designing and engineering a new automated coating line and oven and adopting 'lean manufacturing' to ensure they continue to offer quality and competitive roofing tiles to the New Zealand and International markets.

The sale of their European and USA JV manufacturing facilities back in 2010, coupled with the launch of their new brand 'Tilcor' for the African, Middle East, European and USA markets, has provided a positive increase for the Papakura based company. With 2 overseas based sales managers now in Dubai and Europe and over 70 employees in New Zealand Metrotile (NZ) Ltd are optimistic about their future.

"Stone-coated steel tiles are still a niche roofing product around the world however more markets are accepting of them and as the market segment grows so does the requirement for quality lightweight roofing materials" says Cameron Ross, Director of Sales.

Being a family owned company with strong values and a huge amount of experience allows Metrotile (NZ) Ltd. to expand through providing sustainable business models to their partners. Having solid NZ based sales, distribution and relationships is the foundation for Metrotile as they continue to explore new territories.

Proposed NZMRM Systems Warranty Initiative

In 2002 the New Zealand Metal Roofing Manufacturers launched SCOPE magazine, which promotes the benefits of steel roofing products to some 10,000 designers, builders and roofing companies throughout New Zealand.

In 2003 the NZMRM published the Code of Practice, which has become the Industry guidance document for the selection, design and installation of metal roofing and wall cladding systems.

In 2010 the NZMRM commenced work on an Industry Systems Warranty program. This work was undertaken in direct response to proposed amendments to the Building Act requiring Builders to offer "10 year regime" responsibilities for materials and workmanship. These proposed changes have created a "vacuum" opportunity in the market that are not covered by any of the existing Supplier component warranties. Furthermore, the proposed Systems Warranty product is complementary to the existing Builder Warranty & Guarantee products and its proposed cover extends beyond all of the existing guarantee products in the market.

During the last four years the New Zealand Metal Roofing Manufacturers has been actively working on an Industry Systems Warranty program for pre-painted longrun products used in new and re-roof residential applications. The development of the proposed NZMRM Systems Warranty program has been an organic journey involving Members, Suppliers and Industry Partners, including the Roofing Association of New Zealand.

The NZMRM expects to be able to provide its Members , Suppliers and Industry Partners with a "beta" version of the proposed Systems Warranty program for legal, peer and financial review by mid-November 2014. The NZMRM understands that the November circulation of the Systems Warranty management

company and product documents will essentially be the "starting point" in the development of a successful and sustainable Systems Warranty program and that there are still a number of unresolved issues including the ongoing compliance requirements for existing products and the testing and verification requirements for new products. However, subject to there being no "show stopping" issues and a favourable review of the proposed Systems Warranty management company structure and product options, the actual introduction of a NZMRM Systems Warranty program would then be dependent upon it being accepted by the NZMRM Members at the 2015 Annual General Meeting or a Special General Meeting.

Though the catalyst for the proposed Systems Warranty program has been proposed amendments to the Building Act requiring Builders to offer "10 year regime" responsibilities for materials and workmanship and for Warranty providers to prove that they are financially able to meet their long term liabilities, the proposed Systems Warranty program will also incorporate recent changes to the Fair Trading and Consumer Guarantees Act's.

The primary intention behind the proposed Systems Warranty program is to make it more attractive for Designers and Builders to specify Systems Warranty approved products and suppliers by providing them with a cost effective "minimum performance" backstop warranty program that reflects the "fit for purpose" regime requirements of the proposed Building Amendment Bill. To achieve this the NZMRM will be actively working with Industry Suppliers, including RANZ, to include a best practice design and performance requirements section within an updated version of the NZMRM Code of Practice, which will set the minimum standards required of the Systems Warranty.

Under the proposed program Roofing and Building companies and Homeowners would be able to choose from a "Warranty Continuum", ranging from the existing component Warranty options through to the proposed Product and Supply & Install Systems Warranty programs, as best suits the needs of their individual requirements and the project opportunity. It is also envisaged that NZMRM members would lodge the individual Systems Warranty applications from a published list of Accredited Suppliers and Code of Practice approved Products as a result of Builder or Homeowner specification.

Due to the "minimum performance" baseline requirements of the Systems Warranty program it is highly likely that, in many instances, the component warranties offered by Individual Suppliers will offer additional cover to that provided by the proposed Systems Warranty product options, and Suppliers will therefore be actively encouraged to promote their individual value propositions within the Systems Warranty program.

The proposed Systems Warranty program will also be run by a separate Warranty company in order to provide Builder and Homeowner customers with the protection of an independent platform to manage Warranty issues, which is of particular value if a Supplier was no longer around.

The NZMRM Systems Warranty sub-committee is composed of Darrell Back (Taranaki Steel Formers), Phil Prior (Roofing Industries), Warren Oliver (Franklin Longrun) and Gary McNamara (Consultant).
Please do not hesitate to contact Gary McNamara directly on 021 975 891 or gmacconsult@gmail.com if you would like any further information on the proposed NZMRM Systems Warranty program.

Tech snippets

NZMRM along with presumably many other users and suppliers of steel products have received a "heads-up" about possible radioactive content of steel from the National Centre for Radiation Science (section of ESR) in Christchurch. Extracts from this follow and the full document (which contains a number of links to informative sites) is available from NZMRM (or presumably from ESR) -

"The entry of major overseas construction companies to the Christchurch rebuild raises the need for awareness of the quality of imported construction materials, particularly steel. Steel production is increasingly based on recycled materials, and radioactivity enters its manufacturing processes through inappropriate disposal of industrial and medical radiation sources, whereby such materials enter waste streams going to metal recyclers."

and

"In 2008, a shipment of 30 tons of contaminated steel from China was seized in Italy. Incorporation of radioactivity into Chinese products seems to be widespread. The UN Economic Commission for Europe notes that up to 50 % of steel is produced from recycled sources, and radiation monitors are increasingly detecting radiation in scrap metal..."

ESR then asks –

"The question thus arises, that if steel is being imported for construction purposes, what level of monitoring is conducted to ensure radiological cleanliness? Costs associated with monitoring would be miniscule compared with costs of later remedial action". The document does not provide an answer – which almost certainly means that no monitoring is being done in NZ.

Now, light gauge steel such as is used for roof and wall cladding (and processed by NZMRM members and others), as made in New Zealand by NZ Steel is quite unusual in that it is made using a process (Blown Oxygen) that uses no external scrap metal. The majority of steel made globally is made by a process (Electric Arc) which actually requires over one-third of scrap metal input in order to run.

So we can absolutely guarantee that steel made in New Zealand contains no radioactivity, but steel made elsewhere and particularly in China can offer no such guarantee without all material being monitored for radioactivity. If you purchase product made with imported steel (of any sort) can you be sure it is free of radioactive material? What would be the implications for you if you on-sell radioactive product of any sort?

Deflection testing on the NZMRM wind uplift test rig

Many of our NZMRM members have tested their roof cladding products on our test rig (located at Huntly) for point load and static and cyclic wind uplift resistance testing. The NZMRM test procedure (Section 15 of the Code of Practice) does not require measuring deflection during wind uplift testing, and we have not had the capability to do this.

The Australian standard for roof and wall cladding (AS 1562.1) does require deflection measurement to assess serviceability, and although we have not been testing roof cladding to this standard, it does still cover wall cladding. More recently the Garage Door standard, AS/NZS 4505 has been seriously revised and now includes the need to type test garage doors for deflection under wind load (using AS 4040.2 and .3). This is because we have been seeing (across Australia and New Zealand) a number of failures of garage doors under wind pressure, which if the garage is attached to the house, has then led to failure of the roof cladding because it is suddenly exposed to internal pressure, as well as external. There was no test for checking the resistance of the door panels or the locks to severe wind pressure. Now there is.

While testing wall cladding will be straightforward as it can just be mounted like roof cladding, installing a garage door so as to test the locking mechanism as well as the panels will take a bit of ingenuity!

After some member requests, NZMRM has now modified the test rig so that it can measure deflection under wind uplift load along and across panels mounted in the rig. This will be available from September. We are also reviewing the management and running of the rig.

Ventilation of roof spaces

Regular readers of Scope, and members of NZMRM will be aware that we have mounted a campaign to modify E3/AS1 so as to allow (or not prevent) ventilation of the roof space above the ceiling. Clause 1.1.4b which said you can't ventilate insulated spaces has been taken for a number of years to mean that you can't ventilate the roof space. Unfortunately, it doesn't also say you should prevent access of moisture vapour into the roof space. As houses are increasingly becoming airtight and closed up, and we are not allowed (by BRANZ) to put a vapour barrier over the ceiling, the result has been a steadily increasing number of complaints about "leaking roofs" which are actually condensation of moisture which can't escape because the roof space is unventilated.

NZMRM has been agitating to have this rectified and after steering BRANZ to a number of "leaking roofs" which persuaded them that there is an issue, and then onto DBH (now MBIE). Finally in February a change was made to E3/AS1 and if you now download it you will find the clause 1.1.4 b has been deleted. On the same page (13) it is worth reading clause 1.01 and comments 2 and 3. Clause 1.2.1 if followed properly would also have reduced the severity of the moisture vapour issue. NZMRM and other interested parties is meeting with BRANZ and other parties to discuss the way forward with research into this subject.

Stuart Thomson has covered in a series of Scope articles practical means to provide ventilation without losing insulation value. Following these articles NZMRM has received a number of enquiries about sources of the items mentioned and other suitable products. While we do not want to be seen to be promoting any particular items there obviously is and will be a demand for ventilation products so we are going to provide links to several useful websites, here and on the NZMRM website.

- *TEVS as mentioned in the article (will be a website but currently a Google Document https://docs.google.com/file/d/0B4Q1KMlzka22MXdBWVUxX3BXQTA/edit*
- *Range of plastic ventilation products www.bluebuildingsolutions.co.nz/*
- *Cavity Battens for over purlin venting www.cavibat.co.nz*
- *Wind-powered rotary vents and other items www.edmondsventilation.co.nz/edmonds-products/ and Roofquip.co.nz land.roofquip.co.nz/roof-ventilation-systems*
- *Solar powered, controlled fan vents and rotary vents www.alsynite.co.nz/vents-and-hatches/*

Inclusion of these sites does not imply NZMRM approval of any of these products specifically, but these are all working systems, and we know people need this information. Contact between users and suppliers is up to you.

Zinc runoff and the Auckland Council's Proposed Auckland Unitary Plan (PAUP)
We covered this in great detail in Scope 35. Current situation is that Auckland Council has agreed after discussions with NZ Steel to postpone any implementation of the ban on unpainted metal roofs (other than those made from aluminium or stainless steel) until after the discussion, further submission and consultation period. This is likely to carry on until late 2016. NZMRM has expressed in its submission (#863-1 if you can find it) our opposition to this proposal, primarily on the grounds of increased cost both individually and nationally, and because if zinc runoff – from roofs - is really an issue (unproven in the PAUP) then there are more effective (if more difficult) ways to significantly reduce it. We believe NZ has better things to spend billions of dollars on. New Zealand Steel in its lengthy submission (#868-14 to 16) covers this topic with its technical objections. If you are roofing using zinc or copper we suggest you take a very good look at this.
We'll report further as anything happens.
Updated August 2014

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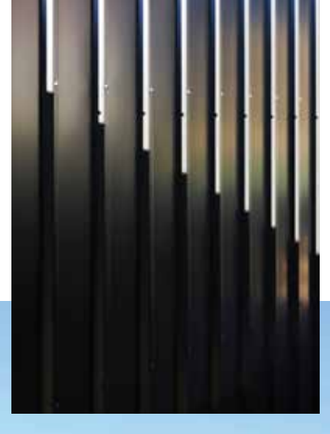

COMMUNITY TRUST PROJECT

In March this year, VisionWest Community Trust, a Waitakere based not-for-profit organisation that specialise in supported care within community housing, celebrated the opening of two new community dwellings. As this was an important milestone in the push towards the privatisation of social housing in New Zealand, attendees included Housing Minister Nick Smith, and Mayor of Auckland Len Brown. The project is a collaboration between sixteen architecture students from Unitec, and Epsom based architecture practice, Strachan Group Architects (SGA).

The two bedroom minor dwelling and four bedroom major dwelling were pre-fabricated as three volumetric units off-site, and then transported to Henderson where site works were completed and tenants selected to become part of VisionWest's growing supported community housing portfolio.

The Studio 19 project is currently in its sixth year. Registered Architects Dave Strachan and Pat de Pont of SGA and a team of qualified builders guide students through the project from conception to completion. The students learn relevant real world skills through the complete process of design, documentation and construction.

The houses were constructed using innovative and prefabricated technologies; including structurally insulated panel (SIP) walls from Rangiora, composite timber and concrete floor cartridges from West Auckland, and a Metalcraft Thermospan FR SIP roofing system also manufactured in West Auckland. The modular nature of these technologies allowed construction to be orchestrated with minimal material waste and a reduced construction timeframe.

Using Metalcrafts' Thermospan panels for the roof, and their skin only cladding on the southern climate-rejecting wall, allowed the team to achieve a coherent 'wrap around' effect, with the roof being installed in a day. As the Thermospan roofing panel consists of a continuous layer of polyphen insulation, no thermal bridging occurs, and an R-value of 4.45 has been achieved. Finished with custom folded Metalcraft gutter and barge flashings, this was a vital element to the design.

The dwellings honour cultural, social, educational, and lifestyle needs of future tenants. With sheltered outdoor living, dedicated built-in study spaces, passive solar design, transportable thermal mass and new material technologies, the homes provide a quality product 50% above code standard for insulation, and well above market standards for healthy homes.

For further information on Metal Roofing or Cladding or details of any of the articles which appear in this publication please contact any of the members listed below.

Members of the NZ Metal Roofing Manufacturers Inc.

A Ellery & Sons Ltd
PO Box 178
Greymouth
Telephone: 03 768 5029
Contact: Clark Ellery

AZKO Roofing Limited
41 Shakespeare Road
Christchurch
Telephone: 03 365 9808
Contact: Maurice O'Flaherty

B J Moss Ltd
PO Box 1007
Gisborne
Telephone: 06 867 1219
Contact: Roger Moss

B R Roofing & Walling Co Ltd
Ford Road
Onekawa, Napier
Telephone: 06 843 6968
Contact: Phillip Fendall

Calder Stewart Industries Limited
PO Box 1400
Invercargill
Telephone: 03 214 5544
Contact: John D'Arcy

Continuous New Zealand Ltd
PO Box 151
Takanini, Auckland
Telephone 09 268 1555
Contact: Richard Mabin

Contour Roofing Nelson Ltd
PO Box 9015
Annesbrook, Nelson
Telephone: 03 546 4260
Contact: Dave Freeman

Dimond
PO Box 13546
Otahuhu, Auckland 1643
Telephone: 09 622 4625
Contact: Darren O'Brien

Franklin Long Roofing Ltd
PO Box 151
Pukekohe, Auckland
Telephone: 09 238 9249
Contact: Warren Oliver

E.R. Freeman Ltd
Freeman Roofing, Nelson
Roofline Marlborough, Blenheim
Canterbury Long Run Roofing, Timaru
Canterbury Long Run Roofing, Ashburton
Roofing Solutions, Dunedin.
P.O. Box 2317
Stoke, Nelson
Telephone: 03 5443108
Contact: Shane Atherton

Gerard Roofs
PO Box 18071
Glen Innes, Auckland
Telephone: 09 978 9043

HB Longrun Ltd
PO Box 3056
Napier
Telephone: 06 843 6159
Contact: Chris Patheyjohns

Marshall Industries Ltd
PO Box 846
Invercargill
Telephone: 03 218 2579
Contact: Tom Marshall

Megami Metal Roofing Systems
PO Box 113
Takanini, Auckland 2245
Telephone: 09 268 8959
Contact: David Moselen

Metalcraft Roofing
PO Box 51286
Pakuranga, Auckland
Telephone: 09 274 0408
Contact: Tony Barbarich

Metal Design Solutions
PO Box 33
Drury, Auckland
Telephone: 09 294 9134
Contact: Jan Alberts

Metrotile (NZ) Ltd
PO Box 72-062
Takanini, Auckland
Telephone: 09 299 9498
Contact: Harry Boxall

Queenstown Roofing Ltd
PO Box 2418 Queenstown
Telephone: 03 442 3883
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Quin Roofing Ltd
PO Box 1087
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Telephone: 06 3679480
Contact: Bruce Love

Roof Manufacturers Limited
PO Box 319
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Telephone: 07 578 2650
Contact: Martin Smith

Roofing Industries Ltd
PO Box 302 385
North Harbour Post Centre 0751
Telephone: 09 414 4585
Contact: Paul Ross

Roofline Products Ltd
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Telephone: 03 349 8439
Contact: Colin Megaw

Silbery Long Run Ltd
69 Montgomery Crescent
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Steel and Tube Roofing Products
PO Box 204216 ,Highbrook,
Manukau 2162, Auckland
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Contact: Rod Newbold

Stratco (NZ) Ltd
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Taranaki Steelformers Ltd
Wanganui Steelformers
King Country Longrun
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