

SCOPE

NZ METAL ROOFING MANUFACTURERS INC.



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October 2023

Scope is the official publication of The NZ Metal Roofing Manufacturers Inc. Executive Officer: Garth Wyllie Private Bag 92 066, Victoria Street West, Auckland.1142 Ph: 09 367 0913 www.metalroofing.org.nz

Opinions expressed in Scope do not necessarily reflect the views of the NZ Metal Roofing Manufacturers Inc., its executive, committee members or publisher unless expressly stated.

Published by Swift Digital Limited. 5 Thatcher Crescent, Crofton Downs Wellington. Telephone: 021 043 5531. e-mail: publishing@swift.nz

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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



Below is a brief introduction to the 2021 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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Stuart Hayman: Co-opted consultant



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Pacific Coilcoaters and New Zealand Steel are proud to support the initiatives of the MRM and Scope Magazine





PLUMBDEK® BRINGS NEW LIFE TO AN OLD BACH

This 1950s Christchurch bach is ready for a new generation, reclad and reroofed with Plumbdek® by Steel & Tube for a playful seaside retreat.

When purchasing a dilapidated cottage on Christchurch's Marine Parade, directors of JD Homes Jesse and Marcella De Wys knew that refurbishment would have its challenges.

'We've done some major renovations over the years, and while this small bach was very dishevelled, we knew the structure was sound,' says Jesse. The couple's vision was to rework the small cottage into a classic Kiwi bach. Using a simple palette of local materials, bright colours and patterns, they have transformed a basic weatherboard home into a bright and playful seaside retreat.





The couple have replaced the rusted corrugated iron roof with Plumbdek® by Steel & Tube, providing a modern look without losing the building's essential character.

The couple have created a new, sustainable dwelling they have fondly named the 'Splash Hut'.



Celebrating the building's history

Inside, the design scheme plays with colour and pattern inspired by the original era of the bach. Fifties-styled wallpaper, a battened ceiling, light pendants and second-hand furniture all celebrate the original aesthetic, which lives on in the remodelled building.

Relining the structure using modern materials, the couple have created a new, sustainable dwelling they have fondly named the 'Splash Hut'. 'We've made a splash with the new materials and colours,' says Jesse. 'And while it's a small hut, it gives us everything we need for a modern-day dwelling.'

Reuse means waste reduction and lower carbon emissions

In deciding to rebuild what was a nearly ruined house, Jesse and Marcella were also making a statement about sustainability to support a low-emission industry. Extending the life of a structure enables more value to be extracted from the resources invested to build, operate and maintain it.

This made steel roofing an obvious choice. Steel is one of the world's most essential and sustainable building products – permanent, forever reusable and the most recycled substance on the planet, with up to 85% of steel from New Zealand demolition sites returned to steel mills for recycling.

Feature products

The roof and feature cladding is Plumbdek® Thunder Grey. Plumbdek is available in a wide selection of materials including translucent sheeting, and can be ordered online from Steel & Tube's Webshop for delivery nationwide.



Manufacturer:
Steel & Tube

Product:
Plumbdek®

Colour:
Thunder Grey

Material:
Colorsteel

Designer & Builder:
JD Homes

Photographer:
Karen Casey
Phone: 027 716 2390

Writer:
Folio

Locally made materials for character

Starting at the top, the couple have replaced the rusted corrugated iron roof with Plumbdek® by Steel & Tube, providing a modern look without losing the building's essential character.

This low rib, five-ribbed trapezoidal roofing addresses aesthetics, economy and performance. Finished in Thunder Grey, it has a minimum pitch of 3 degrees and is designed for residential and industrial roofing and cladding, as well as curving applications.

For the cladding we have a mix of Plumbdek, in the same profile and colour as the roof, combined with timber weatherboards selected to match the original profile,' says Jesse. 'The grey of the steel combines with the pop of the yellow boards picked out in Resene Sunkissed.'

Plumbdek was ideally suited to the existing roof's low pitch, and for cladding the feature box windows and rear lean-to. 'The ridged profile of Plumbdek gives depth and shadow to the body of the house,' notes Jesse.





GLENBROOK ELECTRIC ARC FURNACE

New Zealand Steel partners with Government in \$300M co-investment to shrink carbon footprint of Glenbrook steel mill

New Zealand Steel has been busy over the last 12 months, helping to secure a more sustainable future of steel making in New Zealand with an Electric Arc Furnace through a co-funded deal with the NZ Government.

New Zealand Steel will build a new \$300M Electric Arc Furnace at its steelworks at Glenbrook within the next three years as part of the move to lower carbon production.

Chief Executive Robin Davies says the significant investment will reduce Glenbrook's carbon footprint by 800,000 tonnes from day one – the same as taking approximately 300,000 cars off the road permanently.

“That’s a reduction of over 45% in New Zealand Steel’s emissions – or a total of 1% of New Zealand’s total annual emissions. It also sets the platform for further carbon reductions and is a significant step towards our goal of net zero by 2050.

“These reductions will come from replacing Glenbrook’s existing oxygen steelmaking furnace and two of the four coal fuelled kilns.

“An electric arc furnace makes sense when there’s enough affordable renewable energy and scrap steel available, a way to get that scrap steel to site, and the right policy settings. We’ll firm up the details of

the different aspects of the project over the coming months but crucially, New Zealand has all these essential enablers in place.

“A reliable supply of firmed renewable energy is critical to this initiative and we’re delighted by the pioneering and creative partnership with Contact Energy to provide a competitive and innovative supply agreement. The electric arc furnace provides New Zealand Steel with significantly more production flexibility which means we can scale down production at times of peak demand or supply shortages.

Mr Davies says New Zealand Steel and the Government will jointly invest total capital and transition costs of around \$300M in this landmark partnership to shrink Glenbrook’s carbon footprint.

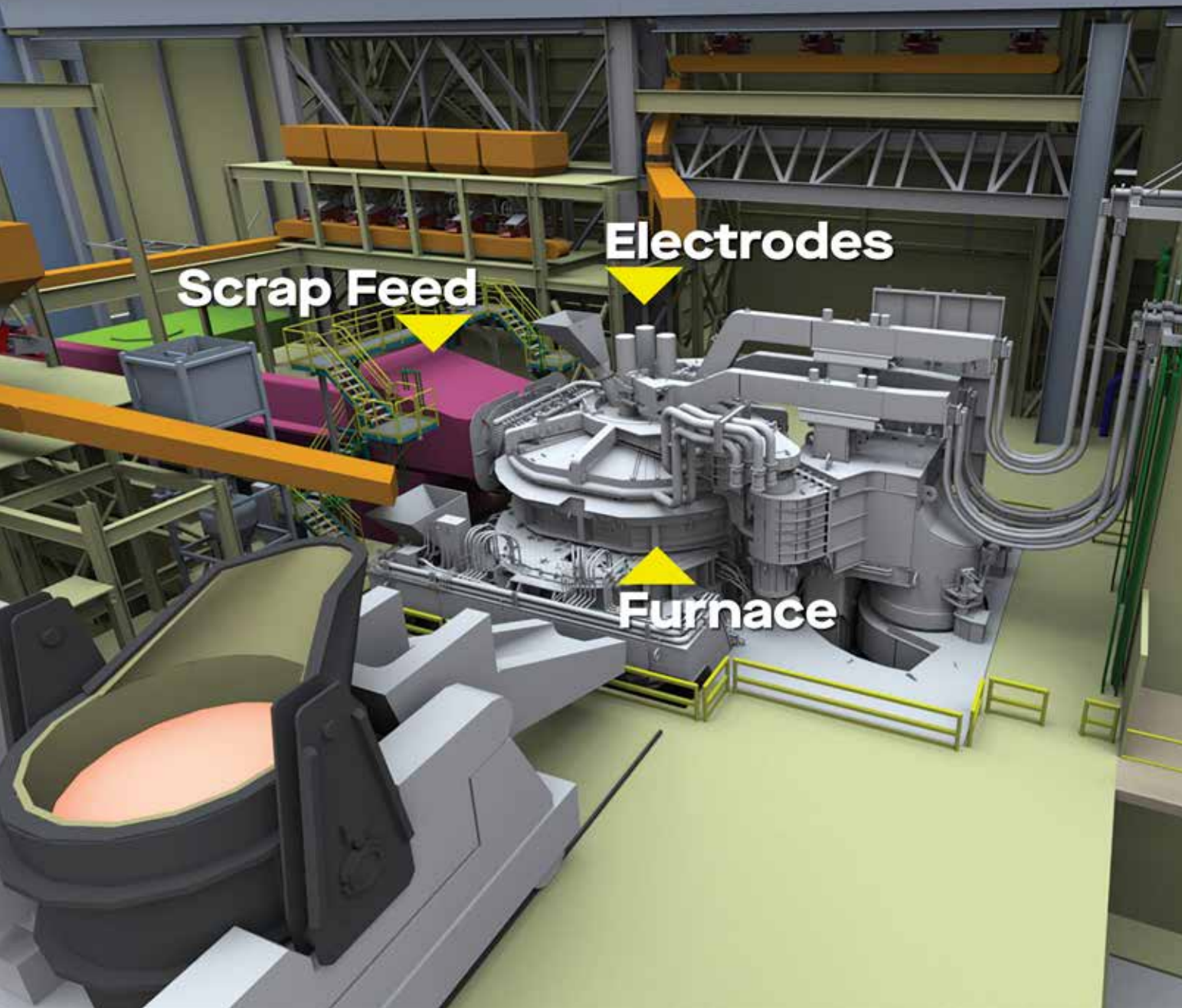
“The Government will contribute up to \$140M through the Government Investment in Decarbonising Industry, or GIDI fund, administered

by EECA, as a co-investment. This project would not happen otherwise. This is a bold breakthrough initiative by the Government – but it’s the right one, especially when you see the carbon reduction dividend that helps the country meet its global decarbonisation targets under the Paris Agreement.

New Zealand Steel will commit the additional \$160M, which includes the planned investment at Glenbrook to underpin the future of steelmaking in New Zealand. The immediate focus is to move at pace over coming months to confirm the remaining critical aspects of the new operation, including the relevant regulatory approvals.

“From our perspective, this is a necessary step to secure steelmaking in New Zealand for many years to come. I’m delighted to say this is a great example of business and Government working together to meet the country’s goal of net-zero emissions by 2050.





Steel is infinitely recyclable, and this model will make New Zealand as close to self-sufficient as possible.

Specifically, for our industry, the importance of a domestic supply is vital. This investment is key to ensuring key products continue to be produced locally, and the EAF will mean that the steel itself will out perform the world average in terms of embodied carbon, enabling New Zealand Steel to produce steel with an average embodied carbon per tonne of 1.6 tonnes CO₂/tonne steel (the world average is 1.9 tonnes CO₂/tonne steel). The New Zealand Steel published Environmental Product Declarations (EPDs) for steel products will be updated in the future to reflect this dramatic shift in production method.

Another benefit of the EAF, is the establishment of a significant domestic scrap steel recycling loop, avoiding the cost and carbon miles of exporting about half of NZ's scrap steel – about 300,000 tonnes a year.

It's great to know that in the future, the steel you recycle on site, could then make it back to the mill and see life again as a brand new roof somewhere else across the country.



The Managing Director and CEO of New Zealand Steel's parent company, BlueScope, Mr Mark Vassella attended the announcement with the Prime Minister and says the co-investment is a landmark deal that showed the power of well-constructed public/private partnerships or investments.

"New Zealand Steel and the Government should be very proud of their initiative and the hard work that has led to today's announcement," Mr Vassella says.

Mr Davies says: "Steel is infinitely recyclable and this model will make New Zealand as close to self-sufficient as possible using renewable energy to recycle domestic scrap steel, rather than shipping it offshore.

"This project is a partnership that would never have happened without the support of the Government and the other key contributor Contact Energy who recognised the potential and had the commitment to help make it happen.

"This is a pragmatic response that not only sustains our critical domestic steel supply, but also provides a collaborative approach with government and industry to be world leaders in lower emissions steel."

New Zealand Steel, our country's sole producer of flat rolled steel products, manufactures and markets a range of products for the roofing sector. Their COLORSTEEL® brand is one many of you will be familiar with, along with ZINCALUME®. Their steel is also used across the country for steel framing (AXXIS®) and structural beams.





LODGE CHARM IN COASTAL NEW ZEALAND

Overlooking the bay on the coast of Lower Hutt sits a striking American lodge-inspired building with high vaulted ceilings and luxurious open spaces. A generous pool is mounted into the deck with an ample entertainment area that flows from inside the home to the outdoors. This design is the work of Luke Hammington, Director and founder of Prime Designs. The business, founded in 2014, has established itself firmly

in the Wellington region, working with clients to create great homes at a reasonable price point.

The York Bay home is an elegant example of synergy between client and designer, with the client contributing heavily in the design process. “She had a very clear idea of the style she wanted and what she wanted out of it.” Luke explains, “She came in with a Pinterest board full of American and Canadian lodges, hunting lodges, that sort of thing. Those really big wooden, beautiful timber, big grand lodges. So, our key was to try and replicate that but in compliance with the NZ Building Code.”

The project was a technically challenging one with structural issues due to the location. Being situated in a picturesque location overlooking the bay unfortunately included the hillside consisting of approximately 4 metres of soft earth. With the client’s brief including a large outdoor deck and outdoor pool the Prime Designs team worked with a geotechnical engineer and a structural engineer to find a feasible solution onsite that met the structural needs, but also took into account the client’s budget.

Material choices on the exterior were key to achieving the American-lodge style vision for this project. Schist cladding lines the lower part of the exterior wall, leading into batten board cladding,

finished with cedar shingles sitting beneath the roof gables. The roof is a complex structure with a multitude of gables, valleys, and hips installed over different storeys.

“A corrugate roof or any kind of longrun profile just wouldn’t have looked right on this house. It needed to be some kind of tile or shingle or shake style, so naturally that kind of brings you to look at steel tile.” Explained Luke, “We thought about actual cedar shingle or Cambrian slate tiles, but they posed a whole lot of extra hassle and cost. Their weight meant a whole lot of extra engineering work, while going with a metal tile would give us the look without worrying about weight. It just made sense to go with a steel tile because it has





With Wellington's renowned wind conditions, being able to withstand wind loadings were important. The Stratos tiles chosen have been proven to withstand wind speeds of up to 350kph.

the look we were after, fewer issues, and a bonus was that it was significantly more cost effective." After reviewing the options, Gerard Roofs' Stratos profile steel pressed tile was chosen for the York Bay home, with its design reminiscent of traditional shake roofing materials.

The design of the roof evolved over time, with the original design looking more like a traditional two storey house without the imposing gables that cut into the main ridge space. However, Luke felt that to capture the character of the client's brief, the roof needed to make a bold statement. American hunting lodges are characterised by their large gables, high roofs, and use of wide-open spaces. With the site's strict height in relation to boundary rules, and a maximum eight metre height limit, the design had to recreate this atmosphere while being constrained within the rules. An amazing multi-level, complex roof was designed to allow for extensive internal spaces and the desired impact of an imposing exterior.

This design came with a few hurdles to overcome. "There were some parts that were one and a half storey height roofs, so they were coming out at mid storeys rather than a full two storey faces. So, from a structure point of view there were a few challenges around making that work but probably from a construction point of view, there were a large number of hips and valleys in the roofs to give the look that we came up with." Luke explains, "The roof was a big job, and a critical part to get right."

With the site being in an exposed position overlooking the harbour in Lower Hutt, considerations had to be made not only over design, but in material choice. With Wellington's renowned wind conditions, being able to withstand wind loadings were important. The Stratos tiles chosen have been proven to withstand wind speeds of up to 350kph in testing conducted by the James Cook University in Townsville, Australia. This resilience against wind is due to the tile's unique design allowing fastenings to be applied horizontally at right angles to the wind's lifting forces. Additionally, the interlocking installation manner creates a matrix of steel tiles tightly locked together

to create a single structural unit. This results in a very lightweight yet robust roof with a high strength-to-weight ratio.

To match the grandiose exterior, the interior had to be equally opulent. When creating the original design, Luke suggested a double height void in the living areas, to recreate the spacious atmosphere characteristic of American lodges. Although the client originally preferred to use the space for a bedroom instead, she decided Luke's original idea suited her vision better, and the designs were redrawn. Both the client and Luke agree this was the right decision with this becoming a focal piece of the design. "I quite like when you come in the front door, you look up and you see an open stairwell to your left and then you see a bridge along the top." Luke explains "Then you see the double height void past the bridge. I think that's all quite spectacular." The roof of the main living area is cleverly designed as a skillion roof, but interior decorative beams are overlaid, imitating bulky structural beams. This allows for the continuation of the lodge aesthetic, while reducing cost. The interior was beautifully styled by the client herself. This was a key element of the project, drawing the aspects of the building and design together to create an impactful first impression. Luke affirms "The client had a great eye and followed through on the styling right down to the last detail. The fitout was completed so well and really matched the styling, which really made the project stand out to me".

The ambitious project stands completed, with its impressive gables overlooking the bay. And though Luke and the team at Prime Designs have many other projects on the go, he remembers this project fondly saying "The project turned out really awesome. If you look back on the original ideas and where we got to, it was amazing." Reflecting on the client's feedback, "The client was definitely stoked with the overall outcome; all the products and the overall design ended up delivering on her original vision, and the roof was a critical part of that."

■ |||





TAUPO AIRPORT TERMINAL

Full-height landscape murals at either end of the building tell visitors about the local environment



As well as being a functional and efficient space, Taupo Airport's new terminal was designed to provide a sense of arrival and a sense of place.

This was recognised at the Waikato-Bay of Plenty Architecture Awards, with the terminal earning a win in the commercial architecture category for its "efficient, functional layout" and "artwork [that] tells the story of the volcanic region".

Full-height landscape murals at either end of the building tell visitors about the local environment as do other features that bring the natural world into the building such as the rimu trunks from the Pureora Forest that provide sculptural elements, and the central mauri stone from Tauhara Quarry that is placed in the waiting area and mimics the shape of Tauhara's peak.





There is also a remarkable, large-scale ceramic artwork by Barry Brickell, which has been restored and installed to showcase the volcanic history of the area.

Shelter Architects lead architect Paul Raven says that the building needed to engage with and reflect the local landscape and environment while providing a welcoming gateway for residents and visitors.

“When they arrive, visitors needed to know where they were, and locals needed to feel like they were back home.

“That was part of our bid for the job right from the outset; that it’s a gateway to this area and what it has to offer and we wanted people to be drawn into that.”

He added that there was also a lot of collaboration with iwi, artists and local tradesmen and interest groups that helped to shape the narrative of the building.

Paul says one of the challenges of the job was building the new terminal while the airport was still operating, although moving construction from the old site to a new location helped to ease that problem.

The site for the new terminal was shifted to the south, allowing uninterrupted operations of the existing terminal and reducing costs. This took careful planning because of constraints around airport safety and security.

“With the new terminal, we wanted to realign it and have it more connected to the runway and also to capture the view of Tauhara to the north and Ruapehu, Tongariro and Ngauruhoe to the south.

“To do that, we used a raked roof that skews the line of the building off towards the view of these mountains.”

Paul says the raked roof is also more dynamic and wing-like with the full-height glass walls and the deep eaves of the roof giving the impression that the roof is floating.

He says of the \$10 million terminal, which was built by Taupo’s Watts Construction and is three times the size of the old terminal, “it’s really a glorified shed but the detailing is what elevates it”.

Financial constraints meant a simple steel portal structure with an AspireSpan insulated panel system roof was the most cost-effective way to go. “Using one material for the roof is much more cost-effective; if you start using a few different components then the costs go up dramatically.”

AspireSpan consists of a 0.59mm profiled roofing sheet bonded to a PIR flat core with a ceiling panel sheet bonded to the underside. Panels can be up to 24m in length.

Shelter Architects made a point of choosing materials such as Abodo timber, Zenith plywood ceiling panels and timber framing from the region. The terminal also has energy-efficient fittings, mechanical systems, and low waste practices.

Come the time the old terminal is demolished, many of the materials will be recycled as part of the drive to minimise waste.

That has already been achieved by rescuing the Barry Brickell ceramic artwork that has pride of place on one of the terminal’s interior walls.

Paul says, “The Barry Brickell work came off the side of a local building and was going to the dump but Chris Johnson [chair of the airport committee] managed to get some funds to rescue and restore it,” says Paul.

“It would have been such as shame to see that go into landfill because it’s an amazing work and tells the story of the volcanic plateau – you can see the area’s landforms and lakes when you look at it.”

Paul says the terminal, which opened earlier this year, is a tribute to the people involved and the vision of the Taupo District Council, which wanted to go beyond a bland airport space to create something that was unique and reflected the character of Taupo.





“It was a collaborative effort driven by locals, bringing the right people in at the right time – and I’m really pleased with the sense of arrival you get at the airport.”

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Shelter Architects

Based in Taupo, Shelter Architects services all of New Zealand and the Pacific Islands.

The company was founded when Stephenson and Turner modified its ownership structure in 2022, creating more autonomous and independent regional offices.

Although rebranded as Shelter Architects to reflect a more modern and dynamic studio, the Taupo office maintains strong ties and working relationships with the collective group.

Shelter prides itself on understanding the first principles of Architecture, and having complete confidence to tackle any type of project, big or small, and in any medium of building design.

Shelter chooses to not specialise or pigeon-hole themselves, but rather enjoy the variation in different types of projects, and the clientele, sites, briefs and budgets that go with that.

Forever upskilling and learning, the Shelter team thrives on the endless possibilities and ideas that Architecture pioneers, and embraces both the history and future challenges that building and design offer.

Roofing supplier:

Metalcraft Roofing
www.metalcraftgroup.co.nz

Roofing contractor:

Phlex Construction
 Phone: (07) 929 7979

Roofing material:

ColorSteel Aspirespan in ‘Slate’

REFLECTIVITY, REFLECTANCE AND GLARE

This is a review and update of an article published in Scope 10 years ago. We then produced two technical articles about Solar Reflectance and Thermal Emittance and the relationship between the apparent visual colour of a metal roof and its ability to absorb or not absorb heat. The way in which these visual factors can be modified by the use of “cool pigments” to allow the use of darker colours while reducing heat gain was also covered.

In 2023 it seems that this is again a topic of interest/concern, and indeed quite recently I was struck (almost literally) by the quite blinding glare from a new unpainted Zincolume® roof on the skyline, seen at just the wrong angle. How much heat is a concern in New Zealand is not clear, and we notice a current preponderance of dark and even black roofs, which suggests that this is not an issue.

Glare

Over the years there has been much talk of glare and “reflectivity” and “reflectance” with the two latter terms being used more or less interchangeably.

We now find “Solar reflectance” which is defined as the ratio between the solar energy globally reflected by a surface and the total incident solar energy. Traditionally, roofing materials’ SR can be between 0.05 and 0.5 (e.g., 0.05 for black membrane roofs, 0.08–0.5 for metal roofs, and 0.2 for clay tiles). So this is to do with heat as well as light. Confusingly we then have the “Solar Reflectance Index (SRI)” which is the measure of solar reflectance and thermal emissivity of materials. Solar reflectance or reflectivity is the ability of a material to reflect solar energy from its surface into the atmosphere.

And then we also have “Total Solar Reflectance (TSR)” measures the amount of solar energy across the entire spectrum that is reflected away from an object. This correlates closely to the temperature that the object will reach on a hot summer’s day.

Light Reflectance Value (LRV) on the other hand, focuses solely on the total quantity of visible light that is reflected by a surface in all directions and at all wavelengths.

So we could say that “Glare” is measured by LRV and heat gain or loss by TSR and SRI measures both. Glare seems to be more of a concern in New Zealand than heat gain.

Various dictionaries define glare as “To shine with or reflect a very harsh, bright, dazzling light”. Motorists who drive in the morning or evening (like nearly all of us) will have at one time or another been nearly blinded by incoming direct or reflected sunlight straight into their eyes, not necessarily from a roof. The TipTop icecream factory was at an earlier time notorious for creating blinding reflections on the Auckland Motorway at Mount Wellington, although this seems to have been mitigated by the use of different glazing.

The glare from house roofs has also long been an issue ranging from annoyance to serious eyesore and BCAs in New Zealand have been proactive in trying to prevent this, particularly in rural areas. Queenstown Lakes District Council even specifies acceptable colours, and limits “reflectance”.

21.7.2	Buildings	RD
	Any building, including any structure larger than 5m ² , that is new, relocated, altered, reclad or repainted, including containers intended to, or that remain on site for more than six months, and the alteration to any lawfully established building, are subject to the following:	Discretion is restricted to:
	All exterior surfaces* must be colored in the range of browns, greens or greys, including:	a. external appearance;
	21.7.2.1 Pre-painted steel and all roofs must have a light reflectance value not greater than 20%; and	b. visual prominence from both public places and private locations;
		c. landscape character;
		d. visual amenity.



Internationally the emphasis has over time shifted somewhat from glare reduction (minimum reflection of visible light) to “cool roofs” where the cost of air conditioning for cooling can be reduced by roofs which have minimum thermal gain

In NZ while there are some attempts to promote “cool roofing” or White Roofs as environmentally friendly, this is debateable in the current heating/cooling building environment



From the QLDC District Plan, and “The reflectance of the surface of a material is its effectiveness in reflecting radiant energy. For homogeneous and semi-infinite materials, reflectivity is the same as reflectance.” Wikipedia. Measured with a reflectance spectrophotometer.

Bluescope in their bulletin about glare suggest that this is only an issue at certain angles and at a single point in time of year. While this may be true for maximum glare it is also true that unpainted steel roofs and light coloured painted roofs can cause

visual glare issues for years at any time when the sun hits at a shallow angle. This would apply beyond just a fixed viewpoint and view angle.

It is true that driving past a building with a “shiny” roof the glare changes by time of day and angle of incidence.

Heat Gain

Internationally the emphasis has over time shifted somewhat from glare reduction (minimum reflection of visible light) to “cool roofs” where the cost of air conditioning for cooling can be reduced by roofs which have minimum thermal gain (maximum reflection of IR radiation) and maximum thermal emissivity. It seems likely that this concern will increase as global warming proceeds. In New Zealand this seems less of an issue with a large number of dark or even black roofs being installed. This is probably a fashion stimulated pattern, but maybe also this is because of better internal insulation; either way it still means much heat being re-radiated into the atmosphere – and adds to global warming.

Glare reduction and low heat gain (i.e. less glare and less heat) are mutually incompatible. Surfaces which reflect IR normally reflect visible light as well and so minimum heat gain/maximum heat loss will probably result in higher glare. We can see this in the extreme heat gain in the Arctic Ocean, where premature loss of high-albedo ice early in the year is causing temperatures to increase even more than elsewhere in the world.

The use of “cool pigments” which has been promoted as a feature of some dark colours, can offset this to some extent by allowing reflection and emission at one level in the IR part of the light spectrum and to a lesser degree in the visible part of the spectrum. Many roof paints today claim to use “cool pigments”, although such pigments have been used for decades without being called “cool” because they are also more cost effective and durable.

In the New Zealand environment preventing thermal gain/maximising thermal emission seems not to be seen as particularly important at present. There is also a difference between a house with a space and then insulation separating the roof cladding from the inside and commercial buildings where typically the roof cladding (plus foil/underlay etc) are directly exposed to the internal building space and can radiate heat into this space. If you believe advertisements for ventilation systems claiming to extract heat from the roof space, it would seem that getting hot is useful, so for domestic roofs more thermal gain may be beneficial in reducing heating costs, although the numbers derived from the thermodynamics don't really bear this out. When MRM have looked at potential benefits from heat gain into buildings from the roof, there seems little real movement either way.

“Glare”, however defined, continues to be undesirable in many visual environments.

In NZ while there are some attempts to promote “cool roofing” or White Roofs as environmentally friendly this is debateable in the current heating/cooling building environment, and avoiding glare is more important in many locations. Some BCAs are making this a point of issuing consents.

What is “low glare”?

To some extent this is in the eye of the beholder, but there is a test method for reflectivity which can be used – ASTM E903-96. The Queenstown BCA guideline implies “reflectance” of 0-20% as best, 21-35% as acceptable and over 35% as unacceptable. The Queenstown guide also says that materials with non-shiny, textured or matt/powder finish are preferable.

Which leads to another measurement that is applicable to visual glare (but not to thermal reflection), which is gloss, and a Sheen Gloss meter can be used to determine the “glossiness” of roofing materials.

We have previously considered mainly long run metal roofing, but in fact there are other roofing materials which need to be considered once we are



Clearly, where glare is seen to be an issue, standard gloss coil-coated product of light colours are likely to be worse.

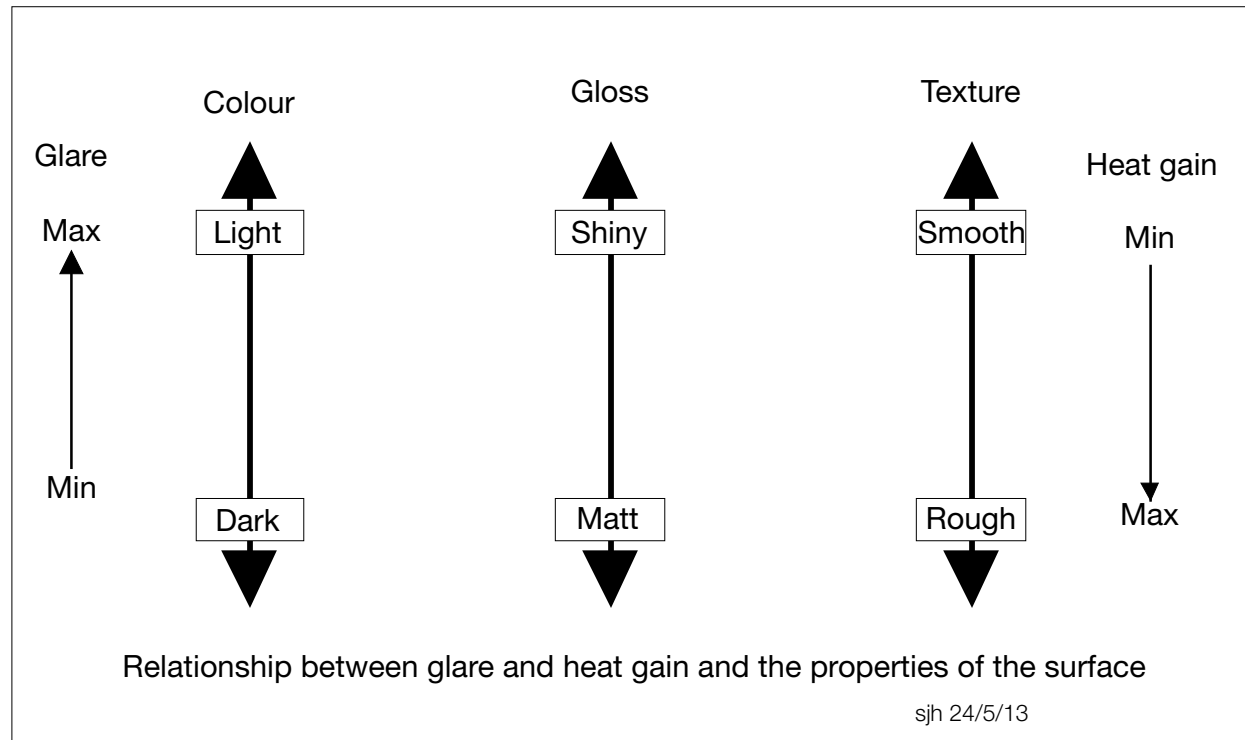
Heat gain from using darker products on domestic roofs is likely to be minimal and not thought important in New Zealand houses.

looking at houses, rather than commercial buildings. Metal tiles which are also part of NZMRM's range, and concrete tiles, clay tiles, asphalt shingles and built up roofing all have their own properties.

Clearly, where glare is seen to be an issue, standard gloss coil-coated product of light colours are likely to be worse. Unpainted Zinalume with its very light colour and quite high initial gloss may be worse, but it does weather down. Dark coloured textured tiles are likely to be the best with no glare at all.

The following qualitative diagram shows the relationship between the three properties of Colour, Gloss, and Texture and Glare/Heat gain.

New concrete tiles normally have a high gloss acrylic coating, and asphalt shingles use flat granules,



Trade-off between glare and heat gain

The diagram shows clearly that for unmodified products the two properties are in opposition – highest glare has least heat gain, and vice versa. The heat gain factor for darker coloured finishes may be mitigated by the use of “cool pigments” which are said to be reflective in the IR (heat) more than in the visible part of the spectrum and so allow the use of darker colours (to reduce glare) without as much heat gain as using standard pigments.

From the above the most obvious way to minimise glare in sensitive locations is to use dark coloured textured chip metal tiles. Use of cool pigments could allow use of darker coloured painted metal roofing.

Heat

1) Under roof (eave to ridge) ventilation.

Oak Ridge National Laboratory in the US has done work on under roof ventilation of metal tiles as reported in the Decra Green Brochure, which shows that under-roof ventilation for metal tiles (and presumably other materials) is significantly better at reducing heat gain than any colour modification. “The study concluded that there is a potential trade-off between solar reflectance and over the deck venting when modelling for energy efficiency; “venting of the stone-coated metal roofs is just as important as the solar reflectance for reducing the heat gain into the attic and conditioned space.”

2) Earlier research done by NZMRM was not able to show significant heat gain or loss from long-run metal roofs installed in the normal way.

Mitigation of:

Glare

- 1) Minimise by use of low-gloss, textured dark colours with lower “Reflectance”. The Queenstown Lakes district plan quoted above covers this
- 2) Reduction of visible glare by adjustment of the location/screening. The Bluescope Technical Bulletin TB-28 deals with this method.
- 3) Use of cool pigments allowing darker colours with less heat gain.
- 4) Use of glass covered solar panels (either thermal or pv) or skylights may create spots of high glare in an otherwise low-glare roof, and pv coating/laminate will be better for glare.

Conclusion

Minimum Glare from domestic roofs can be achieved by using dark coloured textured metal tiles. A good result is from using medium to dark post-painted metal tiles. Darker coloured or “matt finish” long-run roofing is better than light colours or bare metal.

Heat gain from using darker products on domestic roofs is likely to be minimal and not thought important in New Zealand houses. If heat gain is thought to be an issue the use of “cool pigments” may reduce it and under-roof ventilation has been shown to be effective.

Stuart Hayman June 2013 Updated July 2023



Gloss (60° Sheen Gloss) figures for various products that we are aware of are –

- Textured metal tiles – zero
- Satin metal tiles (post painted) – 4-8%
- Low gloss coil-coated painted– 10-15%
- New Zinalume 20-25%
- Standard coil-coated painted – 25-30%

which would be similar to but slightly less effective than textured tiles. Unglazed clay tiles should have low glare, but a noticeable colour.

It would be necessary to do some testing to ASTM E903-96 and using Sheen Gloss of all materials in various colours to get a definitive quantitative statement, but in general – post-painted metal tiles (textured or satin) are better in reducing glare than roofing made from any pre-painted coil. This is unrelated to colour from a gloss point of view, although darker pre-painted colours will have less visual impact.



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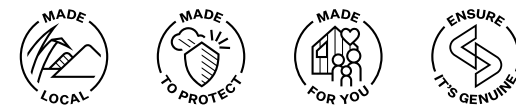


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REVOLUTIONIZING COMMERCIAL ROOFING: WINSTONE WALLBOARDS' GIB FACTORY IN TAURIKO

The construction landscape has witnessed a game-changer with the launch of Winstone Wallboards' GIB Factory in Tauriko. This project, a result of collaboration and innovation, is setting new industry standards. Harkin Roofing, one of the largest commercial roofing companies in the

Bay of Plenty, has not only contributed to this state-of-the-art facility but was also announced the winner of the Commercial Roof of The Year award, at the RANZ Roofing Awards 2023, hosted in July.





The core of this project lies in combining cutting-edge materials with skilled craftsmanship. The GIB Factory stands as a testament to the synergy of innovation and expertise, with its expansive expanse adorned by approximately 50,000m² of Dimond Roofing's DD630 roofing and BB900 wall cladding profiles. This harmonious pairing of high-quality materials and masterful installation not only guarantees unwavering structural strength but also serves as a living example of how roofing and cladding can harmoniously elevate the visual allure of architectural design. The DD630 roof profile ensures robust protection against the elements

while the BB900 wall cladding adds a distinctive touch, contributing to the facility's aesthetic brilliance.

Harkin Roofing's pivotal role in the GIB Factory project deserves special mention. Their dedication to precision, durability, and visual appeal shines in the factory's roof. Winning the Commercial Roof of The Year award at the RANZ Roofing Awards 2023 cements their position as roofing industry leaders and emphasizes the significance of recognizing innovators.

The GIB Factory project stands as a testament to the power of collaboration between industry giants. The partnership between Winstone Wallboards, Dimond Roofing, and Harkin Roofing has given rise to a facility that embodies innovation and paves the way for future construction ventures.

In a shifting construction landscape, the GIB Factory stands tall as a symbol of progress, reminding us that the pursuit of excellence knows no bounds. This project inspires architects, builders, and craftsmen to embrace innovation, challenge norms,

and aspire to new heights. It exemplifies that each structure can seamlessly blend functionality and beauty.

In conclusion, the Winstone Wallboards' GIB Factory in Tauriko signifies more than just a structure; it's a testament to endless possibilities when innovation and dedication intersect. As we look toward the future of construction, let this project remind us that New Zealand's construction industry leads in innovation and distinction, crafting spaces that inspire, elevate, and redefine norms.





ST ALBANS TOWNHOUSES

With New Zealanders embracing living in apartments and townhouses, there is a boom in multi-unit housing – and Christchurch is no different.

With that in mind, designer Sam Connell, from Figure & Ground, was engaged to come up with a multi-unit development for a St Albans site that had been cleared of an earthquake-damaged character house.

One of the main focuses was optimising the site coverage while building in sympathy with an area with character homes.

The 613sq m site is zoned Residential Suburban Density Transition Zone, which demands a lower density than the medium density zone. Within the constraints of that zoning and rules around site coverage and recessions planes, Sam designed a plan for four two-storey dwellings of 125sq m with three bedrooms.

Sam says, “The way that we have designed it, the dwellings are basically a mirror image of each other.”

The configuration of the dwellings has the living and kitchen areas as well as garage on the ground level with three bedrooms and a bathroom upstairs. The master bedroom, with en suite and walk-in wardrobe, sits over the garage. The dwellings are separated by inter-tenancy walls that are fire- and acoustic-rated.

Sam says using a gable roof was a given in an area with traditional housing.

“There is lots of character housing in St Albans and a character overlay nearby that runs down to Rugby Park so the gable roof form was more in keeping with that traditional style. There is a steeper gable on the main roof, with a lower pitch roof over the garage and master bedroom, and a valley flashing connecting the two roof forms.”





The Heritage Tray roofing and cladding is also in keeping with a more traditional look and is a long-lasting product.

"We specify a lot of tray cladding and roofing in our projects because of its looks, its lifespan and it's easy to maintain. It's a good product particularly from a maintenance point of view because you don't have that requirement for frequent maintenance or to set up scaffolding to do that work."

"We used the white-plastered walls to break up the tray profile."

He adds, "With tray profiling it can be tricky to detail around doors and windows to get the standing seam in the right place but that's the reason we have teamed up with Reads Roofing because you have a good idea of how they will detail a job and the way they work – plus Aaron is quite a craftsman when it comes to that."

Roofer Aaron Read, of Reads Roofing, says that he enjoys the technical side of planning out roofing and particularly cladding, which is what people can easily see and critique.

"The best practice for laying out cladding is not always what's drawn – it's better to sit down with the designer, the owner and the builder and talk the job through," he says.

"There were a significant amount of corners that needed to be individually folded – I was in there every second day for a month getting sheets done"

"With this job, we wanted to have the ribs of the roof and the cladding line up perfectly so we had to reverse engineer it so we could lay the roof in line with the walls. Tray looks very simple but it is challenging to make it look effortless."

Aaron said having a good relationship with Dimond Roofing meant he could achieve the level of detail he wanted in a timely fashion so the project wasn't held back.

"The ground floor had folded corners in the doorway areas so that meant having to lay up to the door, measure the sheet then get Dimond roofing to fold the tray in their sheet metal flashing folder. There were a significant amount of corners that needed to be individually folded – I was in there every second day for a month getting sheets done but it's all about communicating what you need done and why then people understand and get on board with it."

Aaron says there was a lot of problem-solving on the job and liaising with the builders – DP Built – and scaffolders about staging various aspects of the construction.

"On the top storey there's a negative detail corner flashing, which I actually designed on the job for that job. We tried a new system with no external fixings and no rivets and it worked and looked cool. We had the team from All Steel fabrication use their brake folder to create our nine-fold corner flashing."

He adds, "There are also some junctions where it goes from tray to cedar and we had to work with the builders so they didn't clad that part of the wall until we had done our bit." Sam says he chose the lighter Sandstone Grey colour for the tray profile as it looks better when the sun is shining directly on it. "Some of the darker colours can 'oil can' in direct sunlight but the outcome has been good with the Sandstone colour."

'Oil canning' is the visible waviness in the flat areas of metal roofing and walling. Oil canning produces an aesthetic effect inherent in standing seam tray profiles and profiles/flashings with wide flat elements. It is not detrimental to product performance.

It can occur during the forming and installation processes and during thermal expansion of the roof sheeting during its life cycle. The effect can be more or less pronounced depending on differing light and sun angle conditions and the coating gloss levels.

For Heritage Tray, oil canning can be reduced by a vented roof underlay.

There are several options to reduce the oil canning effect in tray-type profiles and flashings, for example:

- a) increasing the thickness of the material,
- b) using stiffening swages in wide flat elements and
- c) limiting flat elements to less than 150mm width.



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Phone: 03 336 0045

Roofing and cladding material:
ColorSteel Heritage Tray in 'Sandstone Grey'

Roofing Installer:
Reads Roofing, Christchurch
Phone: 027 323 4270



CHANGING AESTHETICS IN MEDIUM-DENSITY DEVELOPMENTS

Auckland's intensification is well underway, with traditional standalone houses on full sections rarely being built and medium to high density dwellings are now the most common type of consented dwelling. While common overseas, this style of housing is relatively new to New Zealand's suburbs and a challenge seen with early medium density developments is the prioritisation of function over form.

Many early homes were built in unappealing uniform rows with uninventive exteriors and shapes. However, design thought has progressed since

these early developments and an example of a modern, fresh medium density project can be found in the heart of Kumeu.

Golden Homes, the building company tasked with constructing 47 of the homes within the development, wanted to ensure their homes not only fit the homeowner's lifestyles, but added beauty to the neighbourhood. To combat traditional medium density 'sameness', Golden Homes built their homes with exterior design differences; utilising diverse cladding types, changing colours, and different layouts. The double storey buildings running along Papatupu Way have a warm timber cladding offset with dark accent walls, while adjacent buildings are outfitted in white to provide contrast. However, the one aspect that remained the same was the roofing material.

"When we're specifying a roofing material, it's really important that that roofing material is going to stand up to the weather events that we've

been experiencing recently." Golden Homes' Site Supervisor, Paul Houchen, says. This is why Gerard Roofs' Stratos steel tile was chosen as the material for the project. "The tiles are lightweight, they're extremely strong, and in the weather events that we've had in Auckland particularly, they've performed really well."

One of the factors adding strength to the tiles is the irregular pattern of the Stratos tile used in this project. Another is the interlocking design, where the tiles lock together to form a single structural unit. Seamlessly integrating with the roof tiles, Gerard Roofs' matching sanitary and extraction vents were installed across the rooftops. Golden Homes frame with steel making Gerard Roofs' pressed steel tiles an easy choice as they are extremely lightweight and designed to be compatible with both steel and timber framing.

A key concern for any builder is to ensure the job is finished on time and on budget. Delays of any sort can be costly, not only monetarily, but also in reputational damage. This was another factor for Golden Homes working with Gerard Roofs. "For us, as a group home builder, what we really like about using Gerard Roofs is we're able to send the plans off for quoting early in the piece" Paul explains, "Then when our trusses go up and we're ready for roofing, we can speak to our Roofing Coordinator, he arranges the boys to be onsite, everything gets delivered and the whole process goes smoothly.". The tiles for the entire roof can be palletised and sent to site without having to measure and order flashings and other pieces later.

The development is bustling as new homeowners move in and final touches are completed on the last of the homes. The mixture of exterior styles creates a welcoming atmosphere with each home having its own personality. As the sun sets over the warm hued cladding and textured rooftops, Paul reminisces "It's quite exciting to see a project go from a slab to the roof, get finished off. Quite often I have contact with the people after they move in and take over their units. So that's quite gratifying for me, to see that whole process come to fruition."

■ |||



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