Anodised Aluminium Whitepaper

Seven outstanding features of anodising and how they relate to modern building design

This document has been prepared by Australian Aluminium Finishing Pty Ltd (AAF) for distribution through Cirrus Media. For further information refer to back page.

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“Colours and finishes are critical components of architect’s designs. Decades after construction the finishes of building components should ideally be just as pure as when the projects were completed.”

Ann C. Sullivan

Architect, journalist & technology editor
for Architecture Magazine, USA

Cover image: Façade cladding and screens – SCG project – Townsend Group

Introduction

Aluminium alloy is a highly versatile material that has allowed architects and building designers to usher ideas into the physical world. From curtain walls to shop fronts, sun louvres to decorative featured-if your project is architectural, odds are that aluminium features in one form or another.

Aluminium weighs 60 percent less than steel and required considerable less maintenance[2]. It also won’t degrade on external walls like timber does[3].

Aluminium naturally forms a thin and relatively soft oxide layer on its outer surface, however there is one special process that enhances alloy whilst still preserving its natural beautiful appearance. This process is called anodising.

Since it saw common use in construction, Anodising has been considered best practice for finishing architectural aluminium[4] and is specified for its robust, weather resistant composition that protects the very base of the metal.

In anodising, the process conditions are controlled so that the surface is grown and transformed. Ultimately, this process creates products whose finish has amazing and unique properties combined with extraordinary durability.

* **White Paper on Anodising** (http://www.aafonline.com.au/content/download/14530/253552/file/White-Paper-Anodising.pdf)
** **KMH Environmental Impact Comparison** (http://www.aafonline.com.au/content/download/5528/85066/file/KMH-Environmental-Report-Anodising-Vs-PowderCoating.pdf)

The Proof is in the Building

Sydney's AMP Centre (1962)

Located at Sydney's Circular Quay, it's hard to miss the dramatic metallic curtain walling of the iconic AMP Building.

At 26 stories it was Australia's first skyscraper. When Peddle Thorp & Walker (PTW) designed the tower back on the 1960's, a key provision was to incorporate technological strategies that were to guide industry standard for the next half of the 20th century. And they delivered[1].

One enduring element that contributed to the building's status as an industry yardstick is its anodised aluminium framing[1A] – an element that has remained largely untouched since completion.

AMP 1962

AMP 2015

7 Wonders of High Grade Anodising*

E **Environment & Sustainability**
Independent sustainability analysis confirms the significant advantages of anodising in the environment. Powder coatings principally embody large petro-chemical based products and polymers**

N **Natural Beauty**
Anodising is the transformation of the aluminium itself into a natural metallic finish. In modern building design anodising complements and blends with other natural building materials.

D **Durability**
In everyday use we touch anodised products such as iPhones and kitchenware. With hardness comes durability, and Evershield High Grade anodising rates 9 on MOHS scale of hardness, comparable to rubys/corundum. Iconic anodised Australian buildings, now exceeded 50 years and still in great condition.

L **Lustres & Colours**
AAF's Evershield new colour range includes "Illustro" finishes. A unique mid-range lustre providing a silky feel, touch and look. Anodising bright finishes provide exceptional gloss readings.

E **Edge-Cover**
In the paint/powder industry "edge pull" refers to pulling back from edges leaving lower film builds creating weak points. Anodising's immersion process is deal for perforations, punching or indeed any aluminium extrusion.

S **Seaside Applications**
High grade anodising is incomparable when it comes to durability in seaside locations. AAF Evershield "Coastal" provides added protection, with proven durability and suitability for architectural seaside locations.

S **Security. Warranty & Accreditation**
All anodising is not the same. Specifying AAF EverShield High Grade Anodising is supported by Third Party Accreditation and the AAF warranty programme.

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Environment and Sustainability

A recent example of the use of anodising in modern building design is the 6 Green Star building at 8 Chifley Square in Sydney.

One key feature included an integrated externally shaded façade. Solar shading anodised by AAF Evershield High Grade Anodising.

Photography: Mirvac and Bret Boardman

Anodising contains no petro-chemically based products. In powder coating there "is a large energy embodiment in the chemicals and polymers used"

(KMH report)

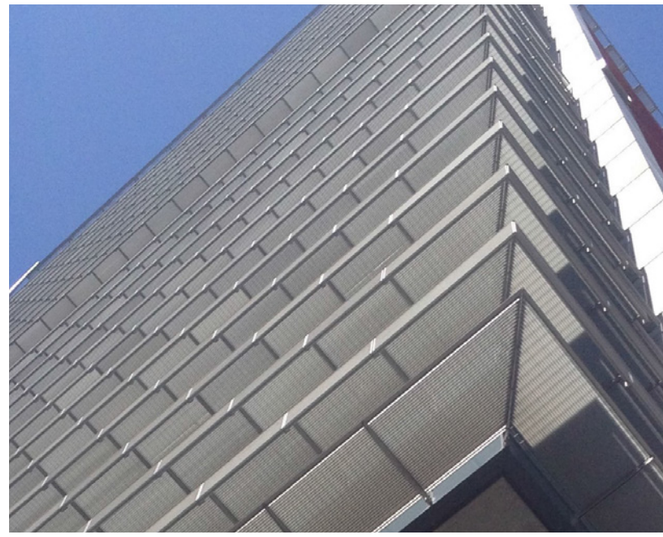
Our future depends on us all acting in a sustainable way and thinking creatively about how we impact our environment and our communities. High grade anodising meets those requirements and exceeds all other comparable forms of aluminium finishing.

A 2010 Environmental Impact Assessment prepared by KMH Sustainable Infrastructure[5] provides an independent Environmental Impact Comparison between anodising and powder coatings based on a 100 year lifecycle analysis (LCA). Results showed that anodising has almost half the required energy component compared to polyester powder coating and performs better both in terms of energy used (kWh) and greenhouse gas emissions (CO2-e).

Why does anodising outperform it's alternatives?

For starters, paints and powders are petro-chemical based organic finishes. These are generally more susceptible to the effects of UV light and weather over time. Even high grade polyesters will eventually be impacted by colour-fade, loss of gloss and chalking which all can limit the finish service life. Anodising, on the other hand, just like its base alloy, is 100% and indefinitely recyclable. The finish is integral to the alloy, a much harder finish and cannot peel off.

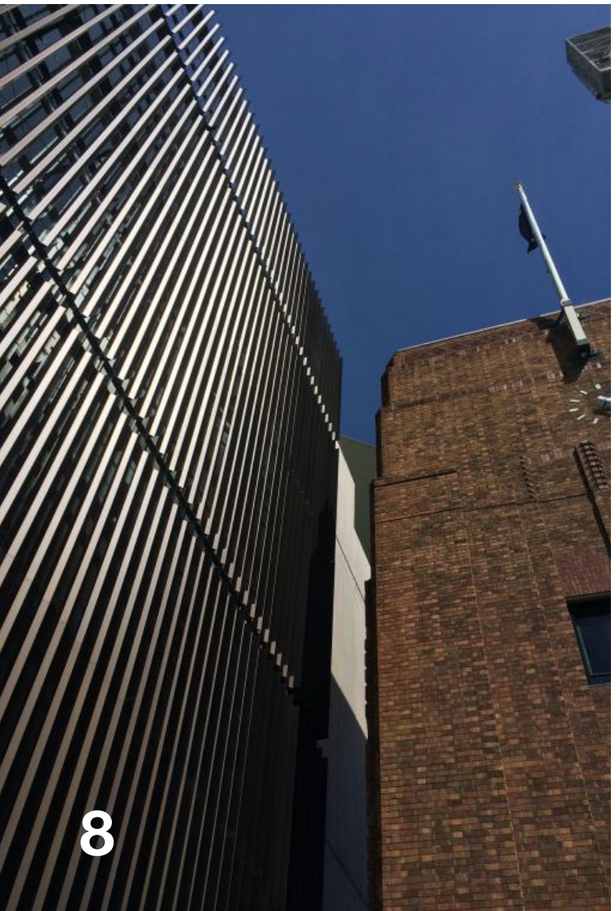
As also highlighted by the KMH report, "the lower energy consumption in recycling, chemicals and gas for anodising corresponds to lower GHG emission …"[5]

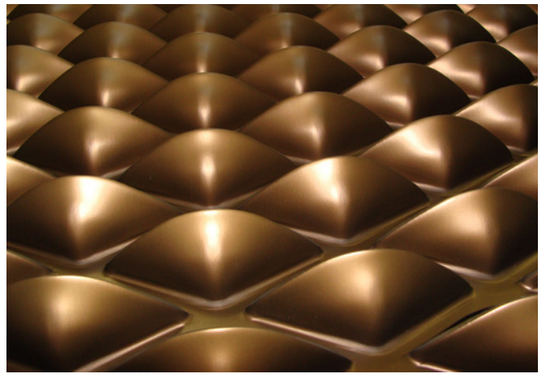


A building by Mirvac/Rogers Stirk & Partners and Lippmann Partnership.

Natural Beauty

Anodising is the transformation of the metal itself, creating a remarkable natural finish that outlasts almost any finish available. Paints and Powders are petro chemical based products applied onto the base aluminium. Anodising, due to this natural metal composition, creates an unsurpassed metallic finish that is available in various lustres and colours. Anodising complements and blends with other natural building materials such as timber, bricks, concrete & steel. Anodising is natural and enhances other finishes.





Dragonscale by Lockers is carefully formed to provide a three-dimensional, textural element to an installation, without the use of traditional perforating or expanding techniques.

The anodised façade on the new 2014 stand at the Sydney Cricket Ground complements the original brick heritage-listed Clock Tower. Finish AAF Evershield high grade anodising, colour Jamaican Chocolate. Façade cladding & screens by the Townsend Group.

Durability

The anodising immersion process is a transformation of the surface of the original metal into an incredibly hard and metallic finish. In an everyday sense, we touch anodised products on iPhones/iPads, kitchenware etc.

It is extremely hard, durable, and easy to clean and maintain. For example, AAF Evershield High Grade architectural anodising rates 9 on the MOHS scale of hardness, equal to Rubys (corundum) and just below a diamond.

There are now many examples, such as the AMP Circular Quay, Sydney, of the durability of high grade anodising in Australian landmark buildings. Now over 50 years old, and still in good condition.

In an everyday sense, we touch anodised products on IPhones/ pads, kitchenware etc. It is extremely hard, durable, and easy to clean and maintain.

After 35 years the Centre Point Tower in Sydney is another example of the extraordinary durability of high grade anodising. Maintaining its brilliant gold colour and lustre, it still stands proud and reflective

Extensive anodising by AAF and others within Federation Square blends with many other finishes on this iconic Melbourne building

Lustres, Colours and Consistency

Today there are new colouring technologies to create colour derivations of existing technology. Additionally, there is a variety of lustres available including, matt/ satin, bright and new mid-range lustres.

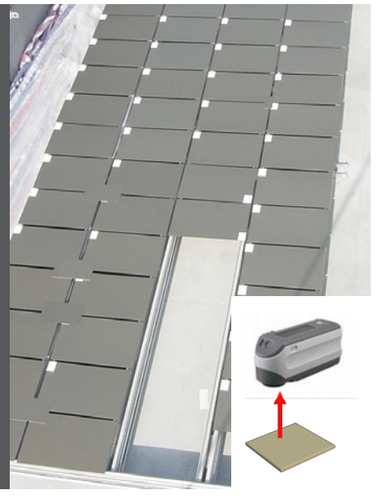
In 2015 AAF is launching a new mid-range anodising lustre. With a new soft and silky feel it offers a new dimension in appearance and reflectivity. Powder coatings offer a great variety of colours, but anodising companies such as AAF, now also offers an impressive range of colours and lustres. The AAF Evershield Cosmic range of colours has recently introduced new shades of grey and stainless steel metallic appearances.

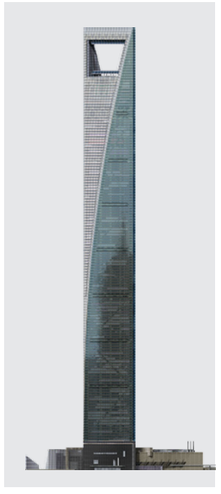
New technology, through the use of spectrophotometry, is now used by some anodisers to measure and manage colours between loads, improving the consistency of finishes. For cladded facade projects where colour consistency is key, it is also important to liaise with the anodiser prior to metal procurement so they can also advise on improving final consistency via management of consistently supplied alloy products.

When combined with many new colours and lustres, anodising choices available today have expanded significantly.

Colour Consistency

Colour matching techniques have improved significantly. Under strict specification requirements photospectometer testing was used on 7,000 anodised panels for the podium level of the Shanghai Mori Tower, the highest structure in China. Contractor Permasteelisa, and anodised by AAF in their Sydney plant.





Example of some of AAF Evershield warranty grade colours:

Matt

Platinum (E87CM)
Stella Grey (E78NM)
Star Dust (E70NM)
Apollo Grey (E66NM)

Sea Breeze (E67TM)
Portland Stone (E60TM)
Amber Gold (E42TM)
Jamaican Chocolate (E35TM)

Burnt Sienna (E29TM)
Ebony (E26TM)
Summer Maize (E82GM)
Sovereign Gold (E78GM)

Illustro

Palladium Coin (E87CL)
Aztec Silver (E68NL)
Monaco Stone (E64TL)
Medallion Bronze (E45TL)

Bronze Monument (E30TL)
Gun Barrel (E26TL)
Gold Odyssey (E78GL)

Bright

Diamond Light (E87CG)
Smokey Quartz (E60TG)
Smooth Onyx (E25TG)
Burnished Gold (E80GG)

Edge-Cover

What is edge pull?

Powder and paints are primarily applied through spray systems. A coating applied to a sharp edge will pull back from the edge, leaving the edge with a lower film build[6]. This is known as “edge pull” and creates weak points which are more susceptible to edge corrosion.

How does anodising solve the problem?

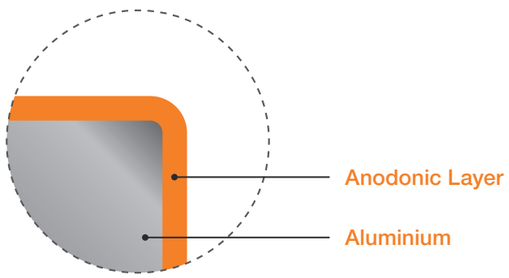
The anodising process overcomes this issue in two ways. Firstly, the etching process is comparatively much more vigorous so has the effect of smoothing sharp edges. Secondly, the anodic film then evenly grows the protective oxide layer around all surfaces, including edges and avoiding weak points around sharp edges.

Why is it important?

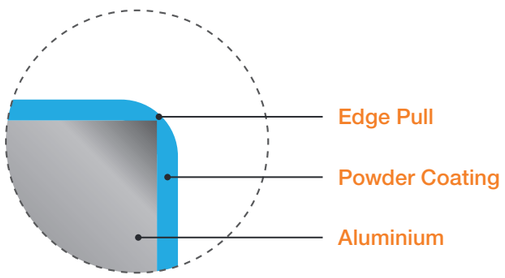
The anodising process provides a significant advantage in the durability of finishing any aluminum with sharper edges, from perforations, punching, edges on louvres or just aluminium extrusions generally.

Anodising’s winning edge cover avoids the weak points that arise on paint/powder coating finishes.

Anodising

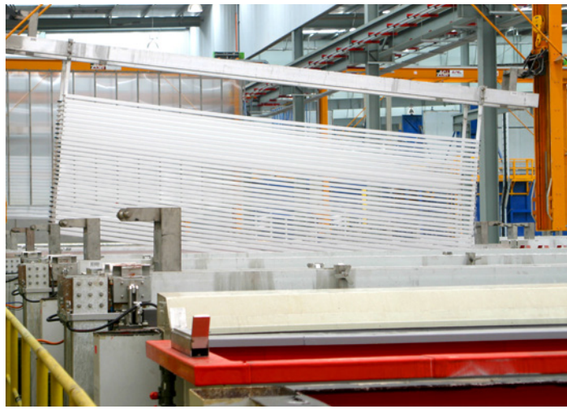


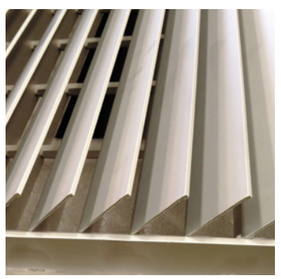
Powder Coating

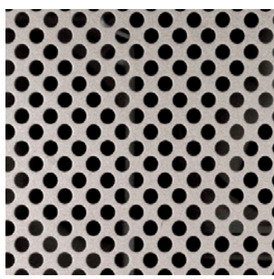


The Five Dock, Sydney, Audi “Terminal” constructed in 2008 was the world’s first in this design. The long term durability of the edge surfaces is paramount to maintain the brilliance and metallic lustre of the façade. Anodised in AAF Evershield “Diamond Light”. (Disclaimer: Not all Audi terminals are anodised by AAF).

The immersion anodising and etching process provides extraordinary edge coverage.







Sea-Side Applications

High grade anodising is incomparable when it comes to durability in seaside locations7. The higher salt (chloride) content in the sea-side air can significantly impact the durability for many finish options, whether for aluminium or other metals.

High grade anodising is long known for its excellent protection of aluminium in coastal locations. AAF also offer an Evershield COASTAL warranty grade anodising which is engineered to provide even greater protection of architectural aluminium components in seaside locations.

Award Winning Boheme, Bondi Beach, anodised in AAF Evershield Coastal Grade, colour “Platinum”. Winner of the Fenestration Australia 2013 Award for the best use of anodising.

Extensive use of anodised aluminium for yacht masts and fittings in the boating industry demonstrates the proven durability of anodising at seaside locations.

Security – not all anodising is the same

Accreditation

Third Party Accreditation has become an essential part of the Australian building industry[8]. The Australasian Institute if Surface Finishing recently outlined and launched a Third Party Accreditation program for anodisers. Companies such as AAF have joined the inaugural programme to reinforce support for consistent anodised quality in the industry.

Anodising extensive warranties

Due to extraordinary durability of high grade anodising, extensive warranty periods are available. Refer to the AAF website for details on AAF Evershield warranty Grade anodising.[9]

www.aafonline.com.au

EVERSHIELD®
HIGH GRADE ANODISING

25 Year Performance Warranty

In summary – anodising is the real deal

The real case for Anodising is its natural metallic lustre finish. Anodising increases the thickness of the natural oxide layer on the surface of metal parts rather than adding a layer of paint or powder. Its immersion process ensures all the surfaces are equally coated all the way to (and including) the edge which is especially important for louvres, solar shading, perforations and extrusion, and is something powder coating’s ‘edge pull’ cannot achieve.

The final result is a real metallic finish that is highly sustainable, looks great and will genuinely change with light and weather conditions depending on reflectivity and season.

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This document has been prepared by Australian Aluminium Finishing Pty Ltd (AAF) for distribution through Cirrus Media. With four anodising plants located in Sydney, Melbourne and Brisbane, AAF is the largest anodiser in Australia. Evershield® high grade anodising is AAF's warranty grade process.

Powder coating: AAF also operates powder coating facilities in each of the same locations which are licensed and audited to the international Qualicoat Standard. There are many features and benefits of powder coating which are well promoted by powder manufacturers. This paper is to explain some of the unique features of anodising.

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