AAF QUEENSLAND

RESEARCH & DATA — 03

DURABILITY & REAL-WORLD EVIDENCE

Architectural Anodising — A Finish for Generations

More than laboratory testing or manufacturers' warranties, the performance of existing buildings provides valuable evidence of how architectural finishes endure over decades.

Introduction — Measuring Durability in Generations

Modern architecture increasingly recognises the importance of extending the useful life of buildings and their materials.

Reducing embodied carbon is an important beginning. However, keeping existing building components in service can also make a substantial contribution to sustainability by reducing unnecessary refurbishment and replacement.

The selection of architectural finishes plays an important role.

Anodising is an electrochemical process that transforms the aluminium surface into a protective oxide layer, rather than applying a separate organic coating.

When correctly specified, manufactured and maintained, high-grade architectural anodising can provide long-lasting protection while preserving the natural metallic appearance of aluminium.

Its performance is supported not only by technical standards and laboratory tests, but also by documented examples of anodised aluminium remaining in service for many decades.

Some of these examples predate modern performance standards and current architectural warranty periods.

Research by Professor Michael Stacey and colleagues, including the International Aluminium Institute's *Aluminium and Durability* programme, provides particularly valuable evidence.

This paper reviews that research, together with significant Australian architectural examples and the developing body of evidence from coastal and marine applications.

3.1 Architectural Anodising — A Finish for Generations

Understanding Durability Beyond the Warranty

Architectural finishing systems are commonly assessed through product specifications, performance testing and manufacturers' warranties.

These are important indicators when selecting suitable materials for buildings.

However, three separate measures should be distinguished:

Product warranty

A contractual undertaking by a manufacturer or supplier covering specified aspects of product performance, subject to defined conditions and exclusions.

Anticipated service life

An estimate of how long a product or building component is expected to remain suitable for its intended use under specified conditions.

Measured performance in service

Evidence obtained from examining and testing materials that have already been installed and exposed to their actual operating environment over time.

These three measures are related but are not interchangeable.

A product may remain suitable for service well beyond its warranty period. Equally, inappropriate specification, poor installation or inadequate maintenance can reduce performance.

Evidence From Existing Buildings

One of the most useful approaches to assessing durability is to examine buildings that have already experienced decades of environmental exposure.

Research may consider:

- The age and original specification of the finish.
- The building's location and exposure conditions.
- The condition and appearance of the aluminium.
- Remaining anodic film thickness.
- Evidence of corrosion, staining or other deterioration.
- Historical maintenance and refurbishment.
- Whether the original components remain in service.

These observations provide information that complements accelerated laboratory testing.

International Aluminium Institute Research

The International Aluminium Institute supported a research programme led by Professor Michael Stacey examining aluminium's contribution to sustainable buildings.

The work, published as *Aluminium and Durability — Towards Sustainable Cities*, investigated the performance of aluminium in existing architecture.

A particularly important feature was the examination of buildings incorporating aluminium finishes that had been exposed for many decades.

The research included visual assessments and non-destructive testing of selected components.

The findings provide practical evidence of aluminium's potential for long-term architectural service and demonstrate why durability should be included in life cycle environmental assessment.

Why This Matters for Sustainability

Where original aluminium components can remain in service, buildings may be refurbished without replacing otherwise suitable materials.

This can preserve the energy and resources invested in producing those components and reduce the need for additional manufacturing.

The important question is therefore not simply how long a finish is warranted, but how long the completed aluminium component can remain useful.

3.2 Oxford — New Bodleian Library / Weston Library

A Remarkable Example of Architectural Anodising Durability

One of the most significant documented examples of long-term anodising performance is the New Bodleian Library at the University of Oxford, England.

The building was designed by Sir Giles Gilbert Scott and constructed between 1936 and 1940.

Its aluminium windows were fabricated and anodised by James Gibbons of Wolverhampton, with installation taking place around 1939.

At that time, anodising was a relatively new industrial finishing process.

Refurbishment After More Than 70 Years

During the redevelopment of the New Bodleian Library into the Weston Library, the original aluminium windows were inspected to determine whether they could be retained.

The refurbishment programme, led by architects WilkinsonEyre, involved substantial investment in modernising the historic building.

Rather than automatically replacing the original window frames, the design team examined their condition and remaining protective finish.

The findings were particularly significant.

The aluminium frames remained sufficiently serviceable to be retained, cleaned and reglazed as part of the refurbishment.

Scientific Measurement of the Original Finish

The research programme included non-destructive measurements undertaken in November 2013, when the original anodised windows were approximately 74 years old.

Testing was undertaken on windows from all four building elevations, together with an internal reference location.

The investigation identified silver anodising, with measured film thicknesses ranging from approximately 7.4 to 30 microns.

The measurements demonstrated that the original anodic oxide finish remained present after many decades of exposure.

Importantly, the researchers also observed that the film thicknesses varied considerably and that most of the tested windows would not have satisfied the later BS EN ISO 7599:2010 thickness requirements for new installations.

Despite this, the actual condition and performance of the existing windows provided sufficient confidence for the refurbishment team to retain them.

This distinction between modern specification requirements and measured performance of an existing installation is particularly informative.

An Extended Useful Life

The refurbishment team assessed the retained anodised windows as suitable for a further 60 years or more.

Combined with the service already achieved, this produced an anticipated useful life extending to approximately 135 years from original installation.

This figure is a project-specific projection, not a measured 135-year service life or a general guarantee for anodised aluminium.

Nevertheless, it is a remarkable demonstration of the potential value of retaining existing components.

An Important Sustainability Outcome

The significance of the Oxford example extends beyond the condition of the anodising.

The original aluminium frames were retained during an extensive building redevelopment, allowing new glazing to be incorporated without unnecessary replacement of the framing.

This preserved existing material and supported the continued architectural use of the building.

The Oxford research demonstrates the value of examining actual performance when assessing the remaining useful life of aluminium.

After approximately 75 years of service, the existing anodised aluminium was retained rather than replaced — with the design team anticipating many further decades of useful life.

3.3 Australia's Early Anodised Buildings

Australia's Architectural Aluminium Heritage

Australia was an early adopter of modern aluminium curtain wall architecture.

During the 1950s, 1960s and subsequent decades, architects increasingly incorporated aluminium framing and facade elements into major commercial buildings.

Anodising was an important finishing technology during this period, offering durable metallic finishes suited to contemporary architectural design.

A growing number of these buildings are now old enough to provide valuable information about the long-term performance of architectural aluminium.

However, it is important to distinguish between a building's age, the age of its aluminium components and verified evidence of the condition of the original anodic finish.

ICI House — Melbourne

Completed 1958 | Approximately 68 years old in 2026

ICI House, now known as Orica House, at 1 Nicholson Street, East Melbourne, was designed by Bates Smart & McCutcheon.

The building was an important milestone in Australian modern architecture and one of the country's earliest examples of large-scale glass curtain wall construction.

Its facade incorporated aluminium framing and glazing, and the building has been identified in AAF's historical research as an example of early architectural anodising.

ICI House is particularly relevant because of its age, architectural significance and continuing use.

The 2025 Australasian Aluminium Extrusion Conference paper records an earlier limited examination arranged by Australian Aluminium Finishing, in which anodic film thickness at an accessible location was reported to remain serviceable.

However, this should be regarded as a preliminary observation rather than a comprehensive scientific condition assessment.

A detailed investigation of the original materials, previous facade interventions and current condition would provide valuable additional evidence.

Australia Square — Sydney

Completed 1967 | Approximately 59 years old in 2026

Australia Square, designed by Harry Seidler & Associates with structural engineer Pier Luigi Nervi, is one of Australia's most significant modern commercial buildings.

Its circular tower and innovative facade construction established new directions in Australian high-rise architecture.

The building remains an important example of the long-term use and adaptation of mid-century architectural materials.

Its original aluminium window and facade components warrant further investigation to establish their finishing specifications and any subsequent replacement or refurbishment.

While Australia Square is an important potential research subject, the original extent and condition of anodised aluminium have not yet been sufficiently documented for AAF to present it as a verified long-term anodising performance case study.

Collins Place — Melbourne

Completed 1981 | Approximately 45 years old in 2026

Collins Place is a major Melbourne commercial development designed by I. M. Pei & Partners, with Bates Smart & McCutcheon as associate architects.

The development comprises two prominent office towers and associated commercial spaces.

Its architectural design and extensive use of modern facade materials make it a worthwhile subject for long-term aluminium finishing research.

AAF's next investigation should establish the original aluminium specifications, which elements were anodised, and whether those finishes remain in service.

The distinction between original materials and components altered during later refurbishment will be important.

Developing an Australian Evidence Register

These buildings illustrate the opportunity to establish a structured Australian record of architectural aluminium performance.

A useful register should record original finish specifications, installation dates, environmental exposure, inspection findings and any replacement or refurbishment.

Where historic photographs, test measurements and technical records can be obtained, individual buildings can be developed into detailed case studies.

The objective is to replace assumptions about architectural durability with documented evidence from actual buildings.

3.4 Brisbane's Architectural Anodising Heritage

Queensland's Early Architectural Aluminium

Brisbane experienced major commercial development during the 1960s and 1970s, when aluminium curtain walls and modern facade systems were becoming increasingly established.

These buildings are now approaching or exceeding 50 years of age, making them particularly relevant to an investigation into the long-term performance of architectural finishes in subtropical conditions.

Queensland also presents demanding environmental conditions, including strong sunlight, humidity, rainfall and marine exposure.

Studying early aluminium buildings in Brisbane may therefore provide valuable local evidence for contemporary specification.

Former MLC Building — 243 Edward Street

Brisbane's former MLC Building at 243 Edward Street, at the corner of Adelaide Street, is identified in architectural records as a 1965 project associated with Bates Smart & McCutcheon and Conrad & Gargett.

The building is of interest because of its period of construction and its relationship to the development of modern commercial architecture in Brisbane.

Further investigation is required to establish the extent of original anodised aluminium, whether the facade materials have been replaced, and their present condition.

Historical architectural drawings, building records and photographs may help identify the original finishing specification.

Former Hitachi Building — 239 George Street

Another building of interest is the commercial tower at 239 George Street, formerly known as the Hitachi Building.

Completed in 1976, it represents a later period of Brisbane's high-rise development.

Its facade construction and original aluminium finishing specifications warrant investigation.

A survey could help identify whether original anodised aluminium remains, the type and thickness of any anodic finish, and whether later refurbishment has altered the facade.

The identity and history of this building should be kept separate from the earlier MLC Building at 243 Edward Street.

Research Opportunities in Brisbane

AAF Queensland proposes to progressively document suitable historical buildings through:

- Original architectural and construction records.
- Information from architects, facade contractors and aluminium suppliers.
- Historic and current facade photographs.
- Maintenance and refurbishment records.
- Physical inspection and suitable non-destructive testing where access is permitted.
- Identification of original anodising specifications and measured remaining film thickness.

This research may help establish a useful local record of how architectural aluminium has performed under Queensland conditions.

The initial buildings identified are research candidates, not yet confirmed examples of exceptional anodising durability.

The Value of Local Evidence

International studies such as the Oxford research provide important information.

However, local research would assist architects and specifiers in understanding performance under Australia's particular climate and exposure conditions.

A developing archive of Brisbane buildings could become a valuable contribution to AAF Queensland's Research & Data Centre.

3.5 Coastal and Marine Performance

Architectural Anodising in Salt-Laden Environments

Australia's extensive coastline presents particular challenges for external building materials.

In Queensland and the Northern Territory, many buildings are located close to the sea or exposed to airborne salts, high humidity and intense solar radiation.

Aluminium is widely used in these environments because of its combination of strength, low weight and inherent corrosion resistance.

Anodising can further enhance corrosion resistance by developing a controlled protective aluminium oxide surface.

However, performance in marine and coastal environments depends on the complete material and finishing system.

The Importance of Appropriate Specification

Anodised aluminium is not immune to corrosion.

Marine salts, deposits, crevices, dissimilar metals and unsuitable alloy or finishing choices can contribute to deterioration.

Successful coastal specification requires consideration of:

- Aluminium alloy suitability.
- Environmental corrosivity and proximity to the coast.
- Appropriate anodic film thickness.
- Correct sealing and process control.
- Component design, drainage and avoidance of moisture traps.
- Compatibility with fixings and adjoining materials.
- Appropriate cleaning and maintenance.

High-grade architectural anodising should therefore be specified according to the intended exposure conditions rather than colour or appearance alone.

Marine Applications and Refurbishment

Aluminium is widely used in marine applications, including boat structures, window framing, fittings and other components.

Anodising has a long history as a protective treatment for aluminium exposed to demanding marine conditions.

These applications provide opportunities to study the long-term condition of anodised aluminium under particularly severe environmental exposure.

AAF Queensland is interested in documenting examples where original anodised components have been retained during vessel or building refurbishment.

In some projects, glazing, seals, hardware or other components may require replacement while the aluminium framing remains suitable for continued use.

Such outcomes can demonstrate the environmental and economic value of retaining existing materials.

However, each case requires proper documentation before conclusions can be drawn.

Developing Australian Marine Case Studies

AAF Queensland has identified opportunities to examine past marine and vessel refurbishment work, including projects associated with Alfab and other aluminium fabricators.

Potential research should record:

- Original installation and finishing dates.
- Aluminium alloy and anodising specification.
- Type and duration of saltwater exposure.
- Cleaning and maintenance history.
- Evidence of corrosion or other deterioration.
- Components replaced during refurbishment.

- Original anodised components retained.
- Current photographs and, where practical, test measurements.

These details would allow individual projects to be assessed objectively.

Sustainability in Coastal Environments

Coastal buildings and marine structures may require significant maintenance during their operating life.

Where a durable aluminium finish allows original components to remain in service through refurbishment, the environmental benefits can be substantial.

This may reduce the need for replacement materials, processing, transport and installation.

The potential advantages should be assessed against actual project conditions and available alternatives.

For demanding coastal environments, appropriate specification, controlled processing and regular maintenance are essential to achieving long-term performance.

Conclusion — Documenting a Finish for Generations

Architectural anodising has a long history of protecting and enhancing aluminium.

Its integral oxide surface provides distinctive metallic appearance, surface hardness and corrosion resistance.

However, the strongest evidence of durability comes from examining how finished aluminium has actually performed in service.

The Oxford Weston Library provides an important scientifically documented example, where anodised aluminium windows were retained after approximately 75 years and assessed as suitable for further service.

Australia also has a valuable architectural aluminium heritage that warrants closer investigation.

Historic buildings in Sydney, Melbourne and Brisbane, together with coastal and marine applications, offer opportunities to extend this evidence through inspection, measurement and documentation.

Not every historical building will demonstrate the same performance, and findings should be interpreted according to the original materials, specifications and exposure conditions.

Nevertheless, these investigations may provide increasingly useful evidence to assist in sustainable architectural design.

AAF Queensland is committed to developing this research collection, bringing together independent studies, Australian building records and practical industry experience.

Our objective is to help architects, designers and building owners make informed decisions about finishes that can support the long-term use of aluminium.

A finish for generations is more than a warranty statement. It is a performance objective supported by appropriate specification, quality processing and real-world evidence.

Research References and Further Reading

1. Stacey, M. (2014/2015)
Aluminium and Durability — Towards Sustainable Cities.
International Aluminium Institute.

Includes architectural case studies and non-destructive testing of existing aluminium finishes.

2. Stacey, M. and Bayliss, C. (2015)
Aluminium and Durability: Reviewed by Inspection and Testing.
Materials Today: Proceedings, Volume 2, Issue 10, pp. 5088–5095.

3. Exova (2014)
Inspection and Testing Report N965283.
Non-destructive investigation of anodised and coated aluminium, including the New Bodleian Library.

Reproduced within the International Aluminium Institute's durability research.

4. Wyllie, B. (2025)
Low-carbon Aluminium is a Great Start — Next, Aluminium's Journey to Further Optimise Sustainability.
7th Australasian Aluminium Extrusion Conference, Brisbane, 15–16 July 2025.

Includes discussion of the Oxford research and Australian architectural heritage.

5. Heritage Council Victoria
ICI House — Cultural Heritage and Climate Change Case Study.
Historical and conservation information concerning ICI House, Melbourne.

6. State Library of New South Wales
Australia Square, Sydney.

Historical architectural records and project documentation concerning Harry Seidler's Australia Square.

7. Heritage Victoria / City of Melbourne
Historical architectural records for Collins Place, Melbourne.

8. Brisbane Modern / Docomomo Australia
Historical architectural records identifying significant modern buildings in Brisbane, including the former MLC Building.

9. Standards Australia
AS 1231 — Anodic Oxidation Coatings.
AS 4312:2019 — Atmospheric Corrosivity Zones in Australia.

Historical building examples are included at differing stages of verification. Where original finish specifications, current condition or test results remain unconfirmed, they are identified as subjects for further research rather than established performance case studies.

Explore Further

Research-01 — Anodising: The Technology
Understanding the electrochemical process and the characteristics of architectural anodising.

Research-02 — Sustainability & Environmental Performance
Research into emissions, environmental product declarations and whole-of-life performance.

Research-04 — Technical Performance & Australian Standards
Specification requirements, anodic thickness, corrosion resistance and applicable standards.

Research-05 — Specification, Certification & Maintenance
Guidance for architects and fabricators in achieving appropriate long-term finishing performance.

Contribute a Building or Project Example
AAF Queensland welcomes information about historic anodised buildings, documented condition assessments and marine refurbishment projects.

Architectural Anodised Finishes Pty Ltd
56 Granite Street, Geebung, Brisbane QLD 4034
www.aafonline.com.au