Wood-Patterned Aluminum Products: Innovative Design Solutions

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Knotwood
10914 NE 39th Street Suite B3
Vancouver, WA 98682
Tel: 360.433.9403
Fax: 360.448.7260
Toll-Free: 1.855.566.8966
Email: education@knotwood.com
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Wood-Patterned Aluminum Products: Innovative Design Solutions

Presented by: Knotwood
10914 NE 39th Street Suite B3
Vancouver, WA 98682

Description: Leading aluminum extrusion manufacturers have established a variety of methods pertaining to material grade, surface protection, and component solutions to maximize the benefits of aluminum to suit a wide variety of applications. These advancements in technology have led to the development of sustainable wood-patterned aluminum products designed for exterior and interior applications. This course focuses on how these products can be used as a beautiful, high-performance, durable alternative for real wood in a range of applications, including screens, facades, decking, fencing, gates, cladding, and more.

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Purpose and Learning Objectives

Purpose:

Leading aluminum extrusion manufacturers have established a variety of methods pertaining to material grade, surface protection, and component solutions to maximize the benefits of aluminum to suit a wide variety of applications. These advancements in technology have led to the development of sustainable wood-patterned aluminum products designed for exterior and interior applications. This course focuses on how these products can be used as a beautiful, high-performance, durable alternative for real wood in a range of applications, including screens, facades, decking, fencing, gates, cladding, and more.

Learning Objectives:

At the end of this program, participants will be able to:

- discuss the favorable attributes, performance characteristics, and green features of aluminum that combine to make it a valuable material in sustainable design and construction
- contrast the benefits of aluminum in terms of performance and recyclability to alternative building materials
- explain the sustainable manufacturing process and design benefits of wood-patterned aluminum, and
- state the range of uses, the maintenance requirements, and cost considerations of wood-patterned aluminum products.

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Why Choose Aluminum?

Introduction

Innovation drives our world. New developments and technologies spur a constant search for new and improved materials to satisfy the limits of our imagination, yet few have surpassed the sheer versatility of aluminum. It is a metal that may be cast, rolled, drawn, or extruded and may be finished by polishing, anodizing, or coating to achieve a myriad of visual and functional effects.

Aluminum takes up 8% of the Earth's core mass; it is the most widespread metal on Earth and the third most common element on our planet after oxygen and silicon. Because it easily binds with other elements, pure aluminum does not occur in nature. Aluminum ore, known as bauxite, is mined and then processed into aluminum.

A mere 200 years ago, very little was known about this metal. Yet today, there is no other material that can compare to aluminum when it comes to its range of uses due to its many favorable attributes and properties.

Wood-Patterned Aluminum Products

Leading aluminum extrusion manufacturers have established a variety of methods pertaining to material grade, surface protection, and component solutions to maximize the benefits of aluminum to suit a wide variety of applications. These advancements in technology have led to the development of wood-patterned aluminum products for exterior and interior applications. These products are made with an architectural grade 6060 T-5 alloy and 6063 T-6; both are common alloys used for windows, doors, and curtain walls.

This course focuses on how wood-patterned aluminum products can be used as a beautiful, high-performance, durable alternative for real wood in a range of applications, including screens, facades, decking, fencing, cladding, and more.

Before we discuss these products in detail, a review of the benefits of this versatile material is presented in subsequent slides.

Benefits of Aluminum

Lightweight

One of the best known properties of aluminum is that it is a very lightweight metal, with a density one-third that of steel and a weight 50% less than wood when compared equally. A lightweight material translates to low transport costs and easy installation and handling. The low density of aluminum accounts for it being lightweight, but this does not compromise its strength. In fact, with a very high strength-to-weight ratio, aluminum will maintain its structural integrity in all types of environments and conditions.

Durable

Aluminum is extremely durable and, at the same time, is easy to fabricate, form, rivet, and bolt; plus, it can be welded.

Rust Resistant

Unlike steel, aluminum doesn't rust. When steel is cut, rust begins to form instantly; if left unchecked, rust will spread and become flakey, and ultimately the steel object will fail. Not so with aluminum. When aluminum is cut, the exposed surface reacts with the oxygen in the air to form an extremely thin layer of oxide. This oxidized layer then serves to protect the base material underneath and improves the aluminum's resistance to corrosion in harsh environments. This naturally-occurring layer is self-repairing if damaged.

Benefits of Aluminum

Chemical Resistant

Aluminum is resistant to corrosion and attack by most chemicals as it is protected by the oxide that forms on the outer surface. When aluminum is anodized, the thickness of the natural oxide layer on the surface is increased. Aluminum oxide—one of the hardest man-made substances—enhances the durability and often the visual appeal of the aluminum.

Attractive Finishes

When extruded, aluminum can feature pleasing aesthetics with attractive matte or reflective finishes.

Non-Warping

Aluminum is not only lighter and stronger but is also straighter than real wood. Manufacturers of wood-patterned aluminum supply lengths of up to 21.3′ (6.5m), ensuring every extrusion is true to form. This means building with a perfectly crafted, marine-grade material that is easier to install than wood and won’t warp over time.

Insect Proof

Aluminum is impervious to insects; therefore, there is no need to worry about borers or pests affecting the surface finish. In contrast to wood, aluminum doesn’t require additional chemical treatments to protect it from pest attack.

Benefits of Aluminum

Freeze and Frost Resistant

Unlike most steel grades, aluminum does not become brittle at low temperatures; instead, its strength increases. And since aluminum doesn't absorb water or moisture, aluminum products won't warp or expand to the degree other materials do when exposed to freeze/thaw conditions.

Non-Combustible

Fire resistance and resilience are important properties of building products and this is where the benefits of aluminum truly surpass the use of wood. Metal is non-combustible, so it will not ignite or fuel a fire. Quality wood-patterned aluminum products have been manufactured to meet international fire standards.

Non-Porous

Aluminum is ideal for wet, damp, shady environments. Unlike wood, aluminum is non-porous and will not swell or support the growth of mold or mildew when exposed to wet conditions. Aluminum doesn't retain water; therefore, it's easy to maintain as it doesn't require regular sealing, making it a more practical solution than wood.

Benefits of Aluminum

Heat Conductance

Aluminum is an excellent heat conductor. It can absorb heat quickly but is able to radiate the heat into the air because of its low density. Therefore, it is often used to remove heat in automotive radiators and electronic heatsinks. Similarly, it is cooler in exposed situations, such as cladding and decking applications. Naturally, in direct sunlight the aluminum will be warm; however, aluminum dissipates heat faster than any other material. Tests have shown wood-patterned aluminum decking to be slightly cooler than traditional decking materials, including common wood species, ipe (tropical hardwood), and composites.

Slip Resistance

In terms of slip resistance, wood-patterned aluminum is suitable for most covered areas. For use around swimming pools and wet areas, a non-slip coating should be specified, or an anti-slip coating from a quality hardware store should be applied. Some non-slip coating systems may require resealing and cleaning procedures. Be sure to always follow the sealer manufacturer's recommendations.

Benefits of Aluminum: Sustainability

As concerns over global warming and the sustainability of our planet grow, environmentally-friendly building products have never been more important.

Compared to timber and polyvinyl chloride (PVC), aluminum has a minimal impact on the environment and low greenhouse gas emissions.

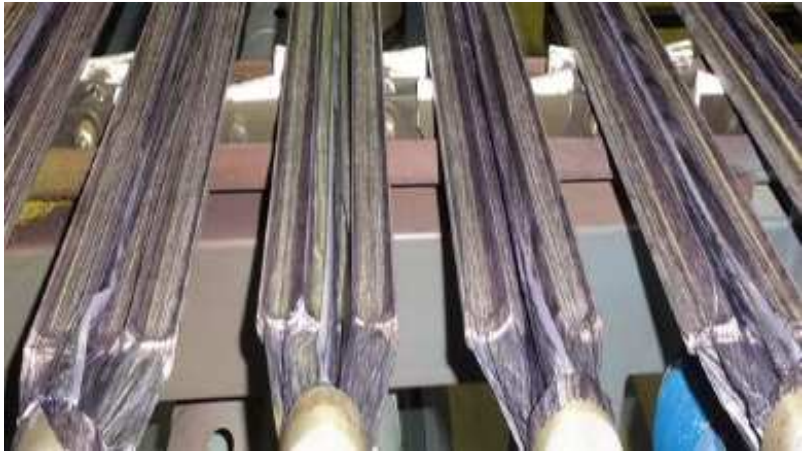
Furthermore, metal is one of the most recycled materials on the planet, and aluminum boasts one of the highest recycling rates of any metal. Aluminum is 100% recyclable. It can be recycled over and over again and retain its properties indefinitely.

Benefits of Aluminum: Sustainability

Recycling aluminum scrap requires only 5% of the energy used to make new aluminum.

Old scrap—such as that from beverage cans, building, and transport—is gathered and recycled via an efficient network of scrap metal merchants who sort and separate it from other metals, such as iron and steel. This scrap is usually remelted by secondary refiners into silicon-based alloys used predominantly for aluminum castings.

Recycling one tonne of aluminum saves five tonnes of bauxite and 15,000 kilowatt hours of electricity. This illustrates why recycling aluminum makes excellent environmental and financial sense.



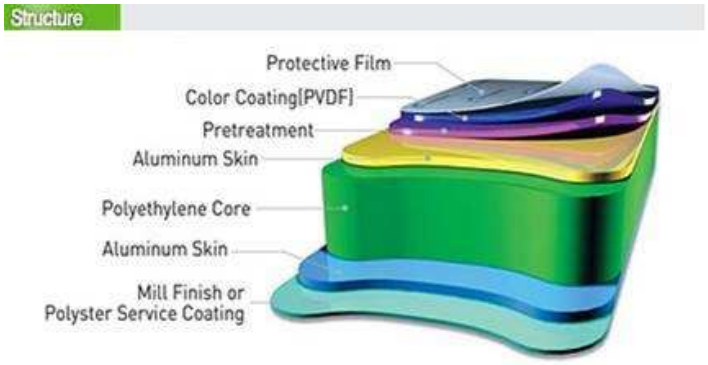
Alternative Building Materials

Aluminum Composite Cladding

In addition to real timber and steel, there are other building materials for which aluminum extrusions can provide a superior alternative, including aluminum composite cladding panels, wood/plastic composites, and pressure-treated wood.

Aluminum composite cladding panels consist of two aluminum faces and a core material, such as polyethylene, a mineral-based material. While offering good thermal and durability performance, these products have recently made headlines due to a deadly residential tower fire in London in June 2017 in which 71 people lost their lives. The polyethylene core is considered combustible and loses the ability to bind to the outer aluminum skin in a fire, causing it to deform and delaminate. This allows a fire to spread rapidly in a vertical direction.

In terms of sustainability, the combination of material types also increases the difficulty of recycling these products.



Wood/Plastic Composite (WPC)

Wood/plastic composite (WPC) decking products are hybrids, created when wood and plastic are combined and extruded through a machine. The plastic component is vulnerable to UV degradation and presents a higher fire hazard in the material than wood alone. WPCs have a lower strength and stiffness than wood and require more joists for decking applications. Furthermore, WPCs have a high expansion rate and moisture can be absorbed into the wood fibers within the material, making them susceptible to fungal attack.

Common issues concerning performance include:

- scratching
- splitting
- color fade, and
- poor stain resistance.

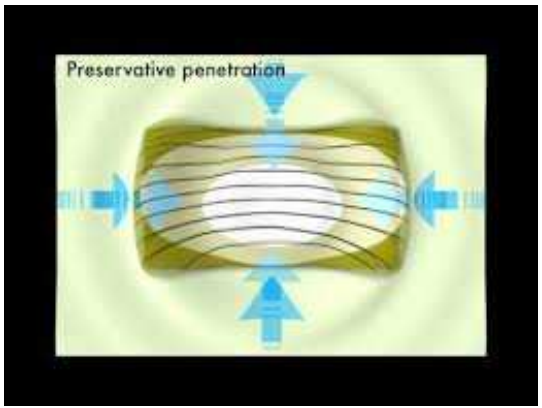
While recyclable plastic can be used as an ingredient, the polymers and adhesives used in its manufacture make it difficult to recycle a WPC product. Efficient re-use is limited to recycling into other wood/plastic composite products. The colorants, coupling agents, UV stabilizers, foaming agents, and lubricants used to produce WPCs further reduce their green credentials.

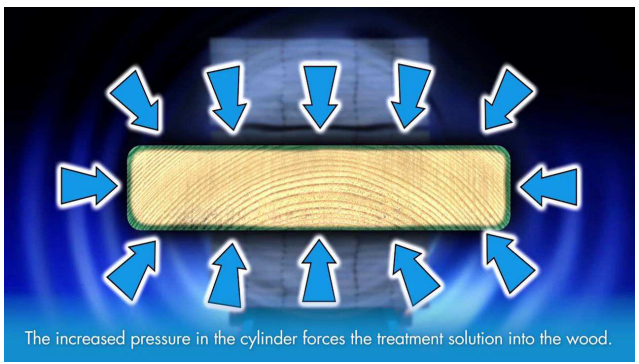
Pressure-Treated Wood

Pressure-treated wood possesses the same properties as raw wood (including flammability); however, the risk of rot due to fungal and pest attack is greatly reduced.

To manufacture pressure-treated wood, timber is placed in a vacuum chamber together with a preserving agent and heated for a period of time. The wood absorbs the liquid and the heat bakes it into the wood fibers. Note that the preserving agent can be varied to suit the intended application. As well, the distance the agent penetrates the fibers can vary. The thicker the wood, the less likely the agent will reach the wood's core. This means that risk of pest and fungal attack is reduced but still present. Furthermore, the preserving agent's effectiveness decreases over time as it leaches out of the wood fibers.

Wood is a renewable resource in contrast to aluminum's recyclability. Care must be taken when disposing of treated wood, due to the toxic nature of the preservation agents.







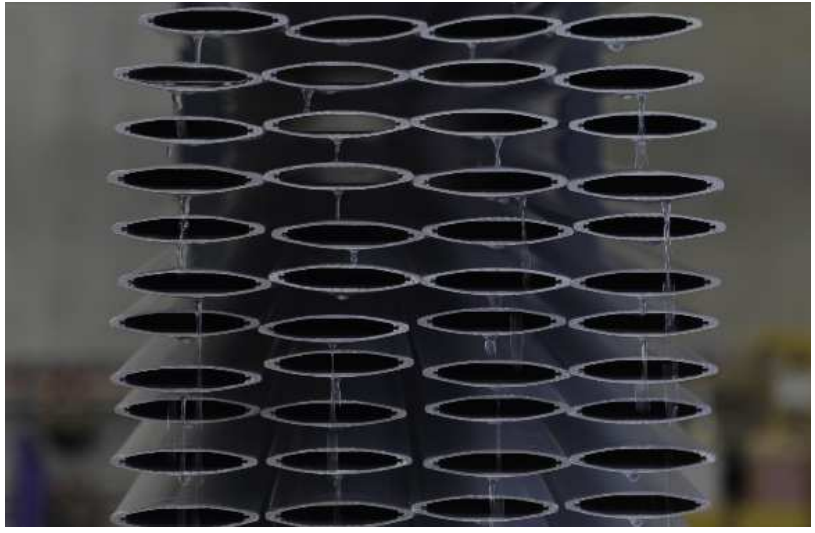
Wood-Patterned Aluminum: Manufacturing

Extrusion/Pre-Treatments

In this section, we look at the manufacturing process of wood-patterned aluminum, which begins with extrusion.

In the extrusion of aluminum, long billets are cut to manageable lengths, heated, then fed into the container heater of the extruder. The billet is then pushed through the die by hydraulic force to form the extruded shape.

Next, the extrusions undergo pre-treatments (i.e., media blasting, chemical cleaning, and mechanical cleaning) to remove old coatings, corrosion, and ingrained impurities. These processes also enhance adhesion by “keying” the surface. The multiple-stage chemical pre-treatments involve submersing the aluminum in acid to remove the natural, oxidized coating, allowing for the application of a protective coating (e.g., chromate or other chrome-free equivalents) prior to powder coating.



Powder Coating

The next stage in the process involves specially-developed powder coating wherein the powder is electrostatically charged and applied via an electrostatic gun. Because the powder is charged, it is drawn to the aluminum surface, minimizing overspray. Any unused or oversprayed powder can be recovered so waste is kept to a minimum.

Polymerization is performed afterwards by heating the profiles in an oven to achieve a smooth, durable, permanent finish. This base coat also serves to protect the aluminum from external factors such as abrasion, corrosion, weather, humidity, and UV damage.

Powder-coated aluminum already has a proven track record with external windows and sliding doors, often outlasting the building it was installed into. Due to its durability, powder coating is also widely used in the automotive, appliance, and agricultural industries.

Powder coating on aluminum is a minimal maintenance solution as it is easy to clean and maintain.

Powder Coating

Powder coating is a lead-free finish resulting in a smaller environmental footprint than some other types of finishes.

Liquid finishes (like paints and varnishes) are based on solvents, which release VOCs into the air, contributing to atmospheric pollution. Furthermore, powder coating generally produces thicker coatings than traditional liquid finishes, which negate running or sagging paint.

Available in the market are wood-patterned aluminum products whose architectural finishes are VOC-free and meet the global American Architectural Manufacturers Association (AAMA) standards. These products are backed by an extended exterior guarantee (20 years film integrity and 15 years color) covering the key aspects of coating performance, such as color and gloss stability, cracking, checking, and chalking.

Wood-patterned aluminum is available in a smooth or textured natural finish.

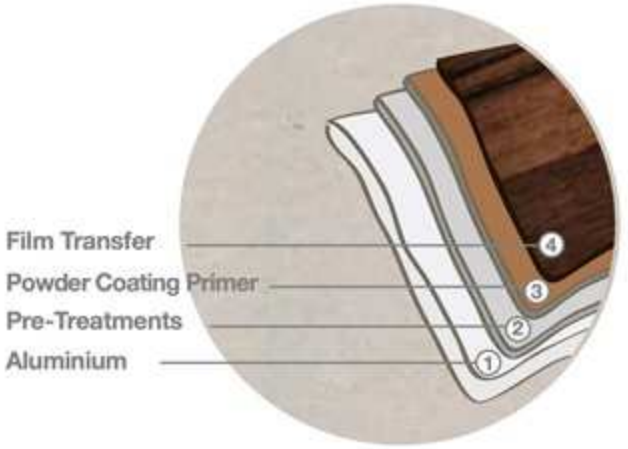
Art Sublimation

The final stage is all about decorating the powder-coated aluminum via a process called art sublimation.

The process involves wrapping the powder-coated aluminum in a wood-grain film. It is set on a conveyor system where the air is vacuumed from the film around the aluminum profile.

The conveyor moves the aluminum into an oven where, under heat and pressure, the film transfers the wood-grain image onto the aluminum. Note that the image penetrates deep into the powder coat about 95% versus inferior prints that are only on the surface.

The process of art sublimation ensures the wood-grain film covers the entire aluminum profile.

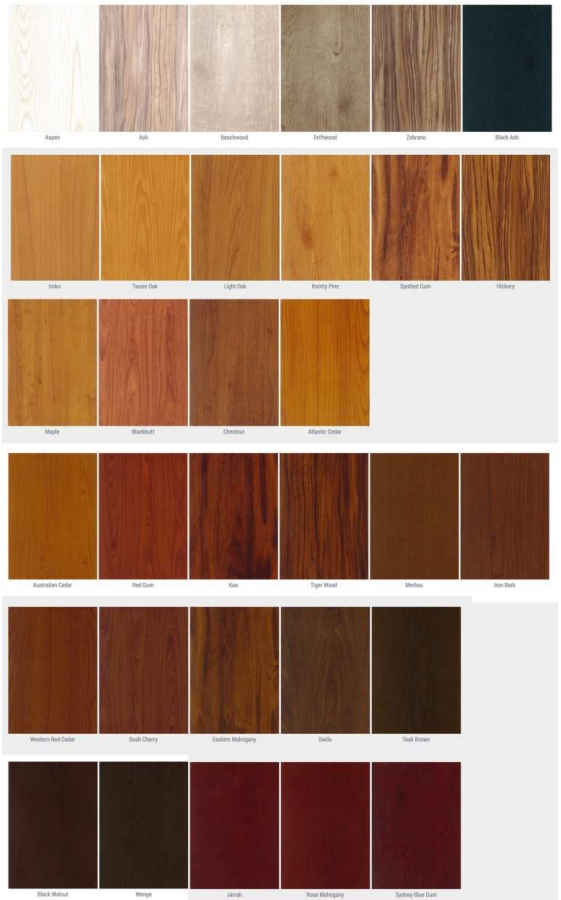


Heat and pressure transfer the pattern onto the aluminum.

Art Sublimation

The powder coating and sublimation processes produce colors and patterns that mimic the look and feel of real wood, from traditional warm, woody hues to dark, modern ashes.

By combining the capabilities of aluminum with the natural beauty and timeless appeal of wood, a world of opportunities opens up to use a durable and cost-effective solution where wood has traditionally been specified. With the world's timber stocks in decline, this is a concept that is being embraced by the architectural community.



Used on aluminum systems and products, art sublimation produces wood-like aluminum in an extensive range of wood grains.

More Than Wood….

Along with replicating the look and feel of wood, the art sublimation process also allows for custom images to be applied to aluminum extrusions.

Shown at right are some examples of the designs that can be produced by sublimation technology.

Sublimation technology allows manufacturers to replicate any image onto aluminum.


FABRIC

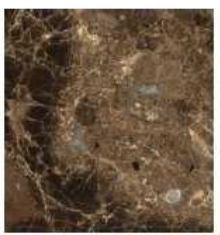

PATTERN


CARBON FIBER


PATTERN


JEANS


WATER


MARBLE


COPPER PATINA


LEAVES


STONE

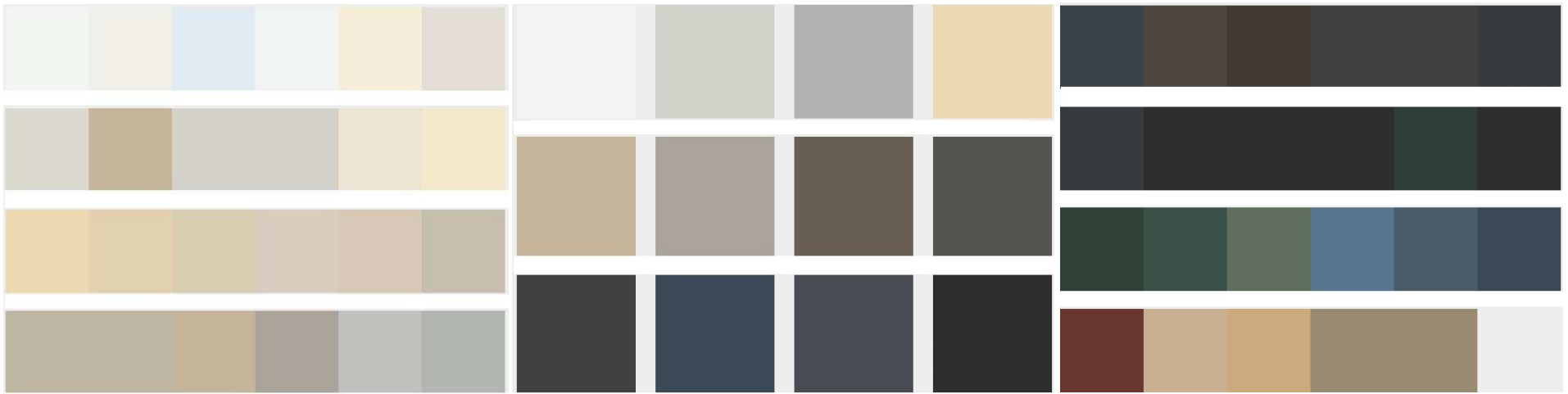

FABRIC


ANIMAL PRINT


ANIMAL PRINT

Powder Coat Colors

Along with wood-grain patterns and custom images, classic and contemporary powder coat colors can also be specified for aluminum profiles. Some examples are shown below.



Anti-Graffiti Coating

An unfortunate symptom of modern society is that many items placed in an urban environment are often mistreated.

Smooth wood-patterned aluminum products are available with an anti-graffiti finish designed with an extremely hard surface, which is resistant to stains and chemical attack. Paint and markers can be easily removed from aluminum surfaces that have anti-graffiti coatings.

Featuring a high gloss, anti-graffiti coatings are ideal for applications where a high level of aesthetic appeal is required.

Design Benefits

Design Benefits of Wood-Patterned Aluminum

Reviewed in this section of the course are the design benefits of wood-patterned aluminum, beginning with its versatility.

Leveraging off the inherent benefits of aluminum and the powder coating system, aluminum can be shaped and designed to maximize its potential performance for any given application.

For example, an exterior cladding system (reviewed further in the presentation) is more likely to have a horizontal load or impact applied to it than a vertical load, so additional strengthening walls (internal legs within the cladding board) have been incorporated to suit load requirements.

Connection Methods

The connection methods are another benefit of wood-patterned aluminum. Welding aluminum is costly and it reduces its strength by roughly 50%.

Wood-patterned aluminum has connection methods that are weld free. These aluminum modular systems have been designed to conceal joints, screws, rivets, and fixings, resulting in simple systems that are versatile and durable, and offer ease of installation. Not only does this increase joint strength, but it also negates the need for specialized welding labor and equipment.

Pictured at right, this cladding system incorporates an interlocking design that minimizes fixings and provides a more water-resistant solution.

A wood-patterned aluminum cladding system creates a clean finish that hides any unsightly screws or rivets.

Connection Methods

Another example is the innovative aluminum batten system (discussed in next section), a two-part connection system that simply clicks together, designed for enhanced aesthetics. It features a built-in bracket that provides a unique floating look that hides fastening hardware.

These easy-to-install systems negate the troubles of fastening through the face and plugging holes with unsightly plastic caps. The hardware is completely hidden.

Component Design: Corner Joiners

Corner joiners have been developed to allow certain extrusions to be joined at 90 degrees using a simple miter joint.

This method is most commonly used in manufacturing gates; however, the principle can be applied to many other applications where a right-angle joint is required (e.g., battens).

The joiner is constructed from solid aluminum so galvanic corrosion is not an issue and the full strength of the aluminum is maintained, unlike a welded joint. Additionally, the joiner is completely concealed, providing a clean joint.

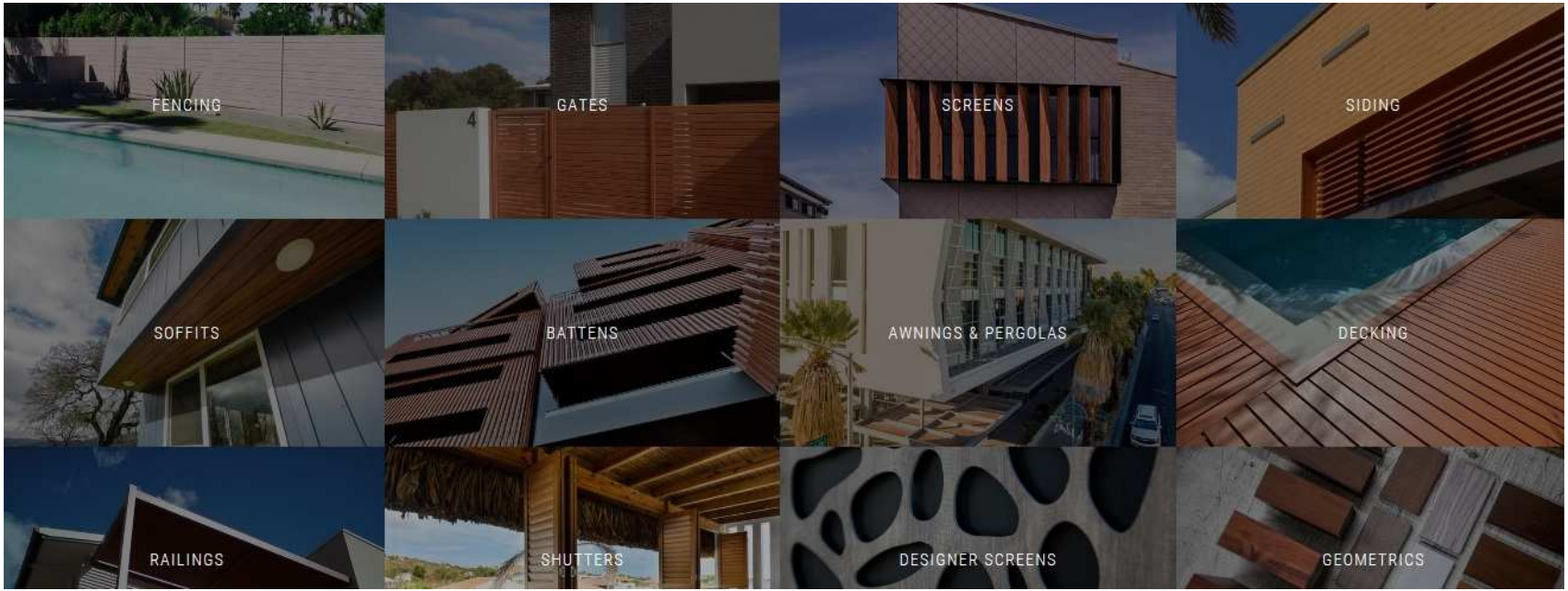
Note: In exterior-interior applications where thermal transfer may be an issue, consideration should be given to the separation of aluminum components.

Component Design: End Caps

A range of extrusions have been designed to complement wood-patterned aluminum systems—such as internal and external corners, starters, corner clips, and cover clips—to conceal the ends of extrusions.

End caps are machined from sheet aluminum to provide a neat finish to rectangular (rhs) and square (shs) aluminum extrusions. These end caps can be provided in a matching wood-patterned finish to create a seamless uniform finish.

END CAPS / BASE PLATES / FIXED LOUVER END CAPS



Wood-Patterned Aluminum: Products

Wood-Patterned Aluminum Products: Introduction

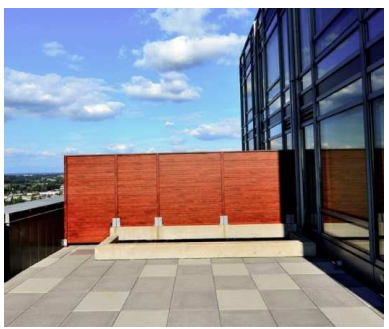
Currently, the most popular applications of wood-patterned aluminum in the United States are architectural screens, facades, and exterior cladding.

However, as a durable alternative to wood, wood-patterned aluminum can be used in many applications, such as:

- fences
- gates
- soffits
- battens
- pergolas and trellises
- decks and railings
- shutters, and
- designer screens.

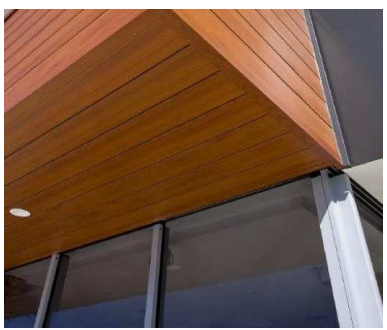
Fence

Gate



Screen

Pergola



Soffit

Fencing

Wood-patterned aluminum fencing systems offer the flexibility to suit a range of design requirements. Architects/designers can choose the height, size, and width of the slats, which may be laid vertically, horizontally, diagonally, or mixed-and-matched.

Vertical fence with alternating 6″ and 2″ slats with spacer mounted on traditional Hawaiian rock wall with added privacy louvers

View from opposite side

Fencing: Batten Spacing

Slats may be spaced apart to access the view beyond or butted together for full privacy.

Horizontal fence with 4″ slats and 1″ spacers

Fencing: Lightweight

Wood-patterned aluminum fencing systems are 50% lighter per square meter than treated pine, which translates to ease of handling and transporting materials off and on site.

Standard Fence Parts

Standard fence parts include one-way and two-way posts, top/bottom rails, slats, corner posts, and spacers.

Posts are typically available in two sizes: 2″ x 2″ (50mm x 50mm) and 2 ½″ x 2 ½″ (65mm x 65mm).

Slat sizes:

- 1 ½″ x ⅝″ (38mm x 16mm)
- 2 ½″ x ⅝″ (65mm x 16mm)
- 4″ x ⅝″ (100mm x 16mm)
- 6″ x ⅝″ (150mm x 16mm)

ONE WAY POST OR RAIL

TOP/BOTTOM RAIL

SLATS 1 ½″, 2 ½″, 4, 6″

TWO WAY POST

CORNER POST

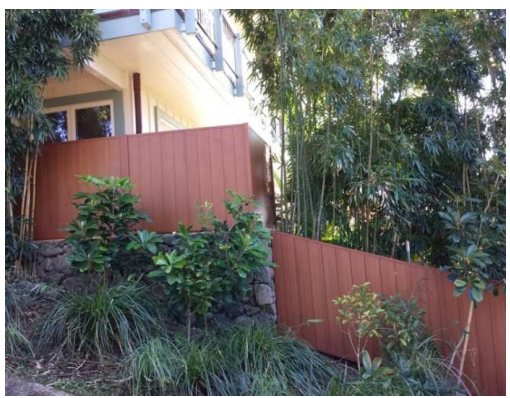
INFILL/SPACER

Fencing: Installation

Specifically-designed fence components facilitate ease of installation, with no need for pre-drilling. Furthermore, the use of U-channels that clip together allows for easy installation on a grade or uneven terrain.

Wood-patterned fencing features hidden fastening and spacer systems that negate unsightly screws or rivets.

A full range of color-matched end-caps, spacers, and hardware is available in either plastic or metal, depending on budget and the level of finish required.



Fence installation on uneven grade

Gates

Gates are commonly installed at various locations in residential properties, including driveways, front and side entrances, and pools.

Gates need to perform repeatedly, often daily, and for this reason they must be durable to withstand frequent use.

Offering strength, durability, and style, wood-patterned aluminum gate systems are designed with reinforced, hard-wearing components that simply clip together and remain true and stable over time.

Custom hickory-patterned aluminum sliding electric gate with anti-graffiti coating.

Standard Gate Parts

Wood-patterned aluminum gate components are available in two frame sizes:

- 2 ½″ x 1 ½″ (65mm x 38mm)
- 4″ x 2″ (100mm x 50mm)

Slat sizes:

- 1 ½″ x ⅝″ (38mm x 16mm)
- 2 ½″ x ⅝″ (65mm x 16mm)
- 4″ x ⅝″ (100mm x 16mm)
- 6″ x ⅝″ (150mm x 16mm)

The gate frame uses a reinforced corner stake combined with a cold-weld epoxy to create corners that have over 2,600 lb/in^2 (180 kg/cm^2) of holding power, stronger than traditional welded gates.


LARGE GATE FRAME


SLATS 1 ½″, 2 ½″, 4,″6″


SMALL GATE FRAME


POST 2 ½″ & 4″

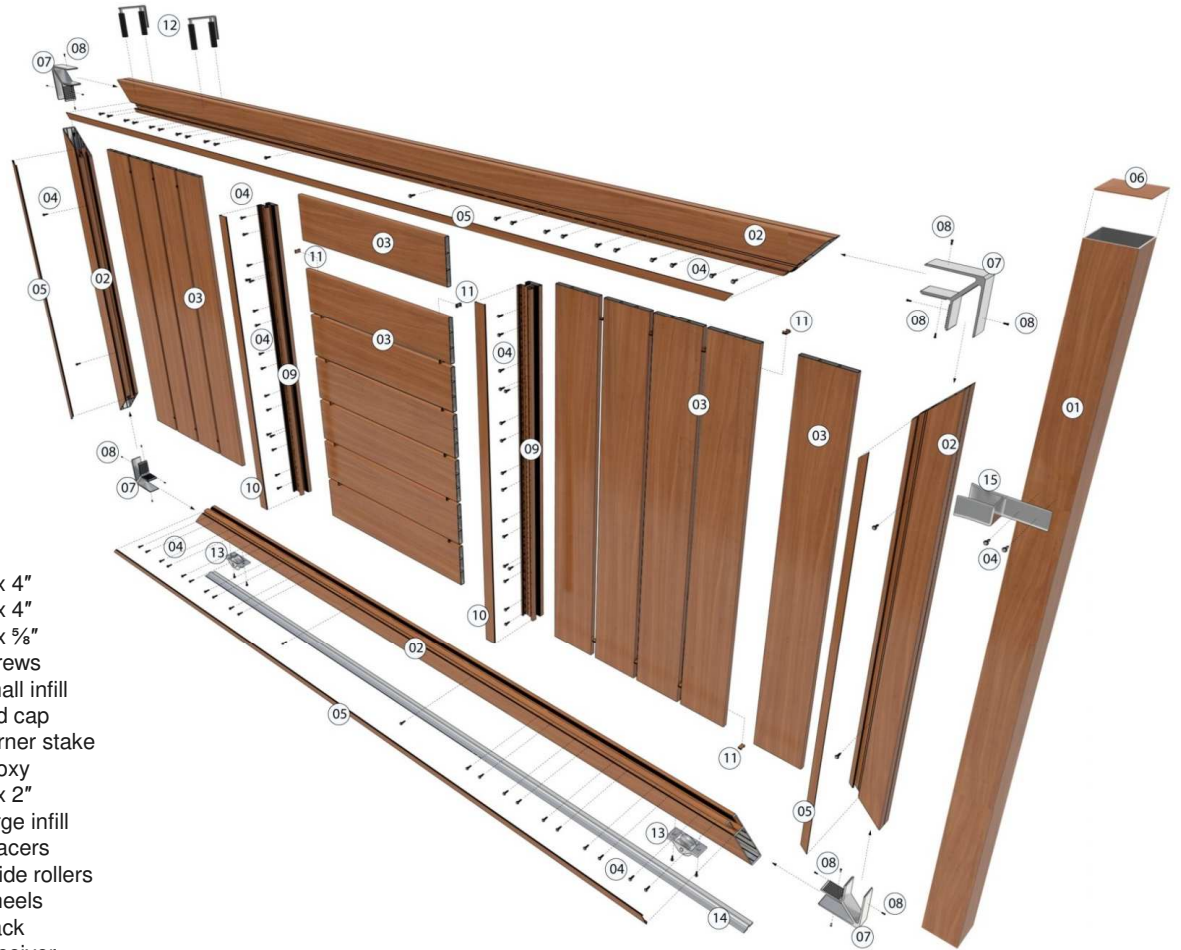

CORNER STAKE


INFILL/SPACER

Gates: Installation

Featuring the same hidden fastening channels employed in the fence and screen systems, wood-patterned aluminum gate systems offer sleek aesthetics with no unsightly screws or rivets.

Sliding gates can be built as large as required. For hinged gates, it is recommended not to exceed 9′ (2.74m) wide x 6′ (1.8m) high. Slats should not span more than 6 ½′ (2m) without a post or support.



01 4″ x 4″
02 2″ x 4″
03 4″ x ⅝″
04 Screws
05 Small infill
06 End cap
07 Corner stake
08 Epoxy
09 2″ x 2″
10 Large infill
11 Spacers
12 Guide rollers
13 Wheels
14 Track
15 Receiver

Gates: Accessories

A full range of color-matched accessories is available for gate systems, including hinges, end caps, locks, and roller kits.

Gates: Design Flexibility

With wood-patterned aluminum gate systems, architects/designers have the freedom to choose slat shapes, sizes, and fixings to meet specific design requirements.

Gates: Examples

Gate systems are adaptable to a range of applications from a hinged entrance gate to a sliding driveway gate or side door.

Due to the strength of the gate system, this 10′ double-swing horizontal gate in Western red cedar color does not require added racking support.

Gate created by cutting 2 ½″ (65mm) slats on an angle and alternating them with vertical 4″ (100mm) slat panels.

Screens

Screens made of wood-patterned aluminum have been designed to suit an array of applications requiring shade and airflow, privacy, or concealment of equipment, such as garbage bins, air conditioners, pool filters and pumps, and water tanks, etc.

Unlike wood screens, wood-patterned aluminum screens won't rot, warp, or require routine painting and maintenance, making them a very cost-effective solution.

Screens: Slat Sizes

Screen components are available in five slat sizes:

- 1 ½″ x ⅝″ (38mm x 16mm)
- 2 ½″ x ⅝″ (65mm x 16mm)
- 4″ x ⅝″ (100mm x 16mm)
- 6″ x ⅝″ (150mm x 16mm)
- 3 ½″ elliptical blade (88mm x 10mm)

Post sizes:

- 2″ x 2″ (50mm x 50mm)
- 2 ½″ x 1″ (65mm x 25mm)
- 2 ½″ x 2 ½″ (65mm x 65mm)

Screens: Installation

With basic DIY skills, one can easily create screens to fit any opening or application.

The screens are simple to install and are based on an easy-to-assemble system that provides the flexibility to choose the thickness, spacing, and angle of the battens. This allows the designer to have full control over the amount of privacy, airflow, and sun penetration for each project.

There are multiple styles to choose from: flat slat with full privacy or with a gap, adjustable louver, or angled louver that offers a modern style.

Cladding

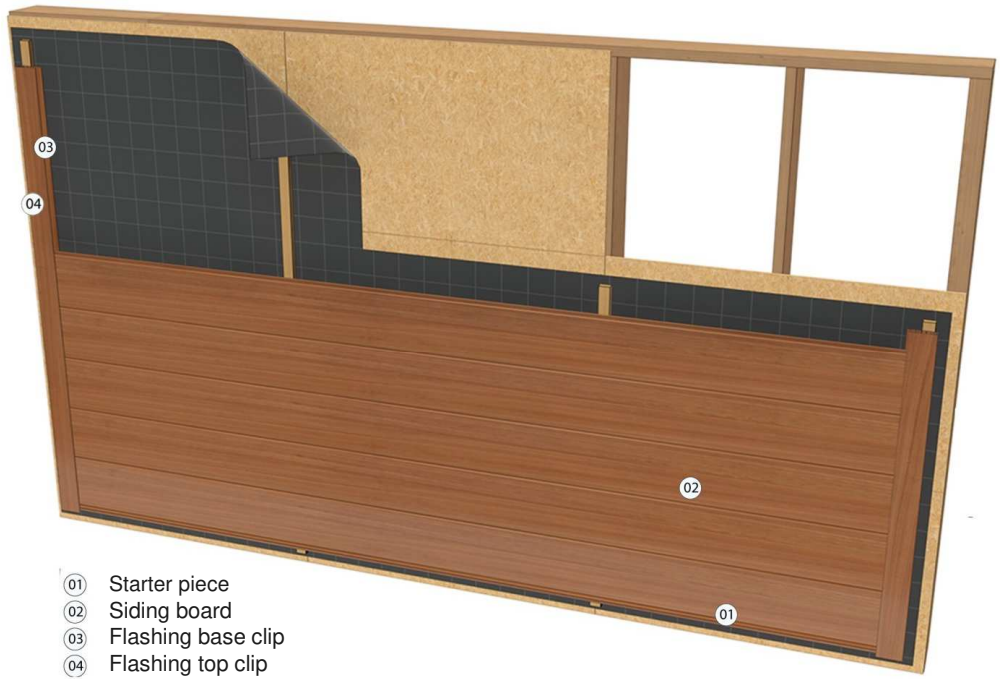
Wood-patterned aluminum cladding is based on a tongue-and-groove board system that includes extra components (i.e., finishing angles, clips, joining boards, and covering ends) to easily maneuver around windows, corners, and joints.

Cladding

Wood-patterned aluminum cladding is designed as a facade fixed product and is not intended to be a total waterproofing system. The interlocking system lends itself well to easy waterproofing and it will not degrade if subjected to heavy, driving rain. The cladding system uses specialized clips to conceal any possible thermal expansion or contraction without damaging the material.

All cladding extrusions come in 18′ 6″ (5.65m) lengths (in a variety of widths and finishes) to ensure easy coverage of large areas.

When installing wood-patterned aluminum cladding systems, ensure full compliance with local building codes to facilitate a successful installation.



Soffits

Soffits are a key construction element that provide a clean, finished look to the underside of eaves.

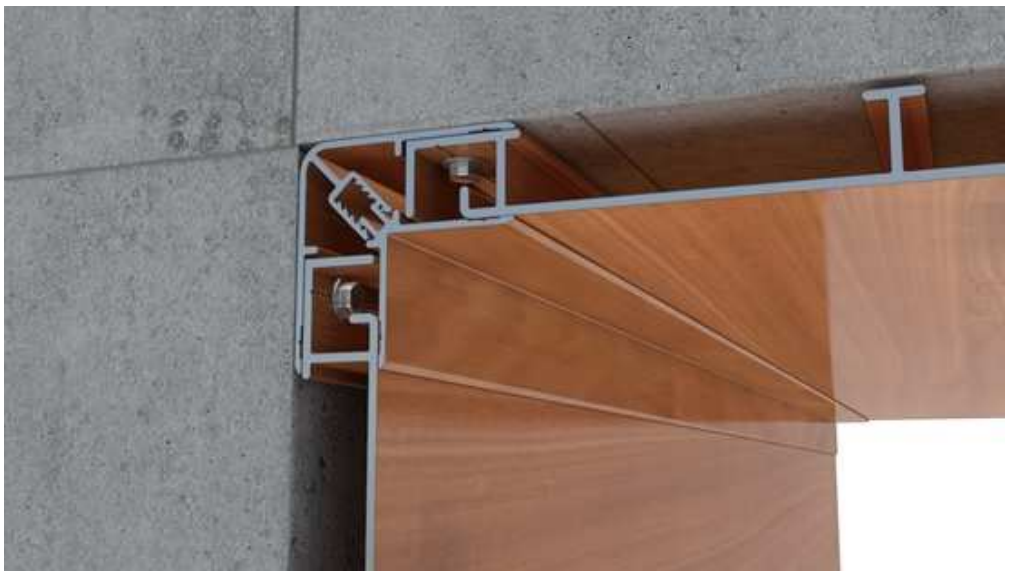
A wood-patterned aluminum soffit offers a pleasing appearance that combines the strength and durability of aluminum with the natural appeal of wood.

Wood soffits have traditionally required frequent maintenance due to the build-up of humidity and rapid deterioration of the paint applied to the wood.

However, wood-patterned aluminum soffits not only eliminate the need for repainting and regular maintenance, but they also promote maximum airflow efficiency.

Soffits

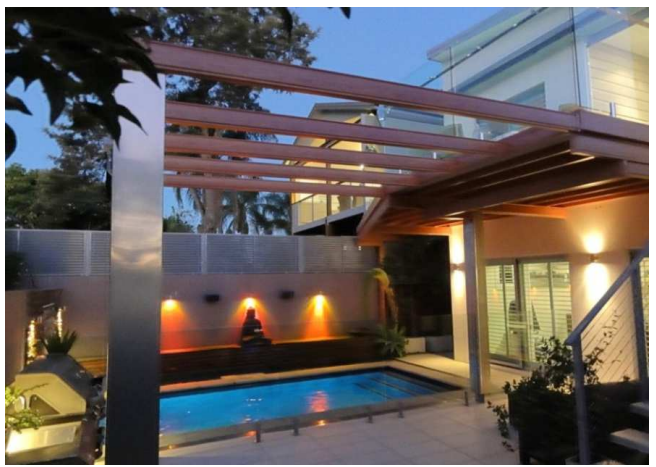
Lightweight and easy to install, wood-patterned soffits simply snap together, which streamlines installation especially when working overhead. A variety of slat sizes and styles are available. Each profile offers a distinct look to complement a range of design requirements.



Battens

Wood-patterned battens come in a variety of shapes and sizes that allow an architect/designer to conceive their own sequences using the available elements. Architects/designers can mix and match lengths and sizes to create a random look, or keep a clean, uniform finish by keeping to one size and length. Battens may be mitered to create a variety of structures such as pergolas and trellises. Additionally, battens may be mounted at any angle so the looks one can achieve are virtually limitless.





With their design flexibility, anything can be created with wood-patterned aluminum battens from a bold architectural statement, to a stylish sun shield and screen, to a decorative pergola.

Battens

A wood-patterned aluminum batten system does not rely on small clips to hold the battens together.

It comprises a two-part system (Parts A and B shown in the adjacent image) wherein the battens click together to connect the whole length of the battens for easy attachment and strength.

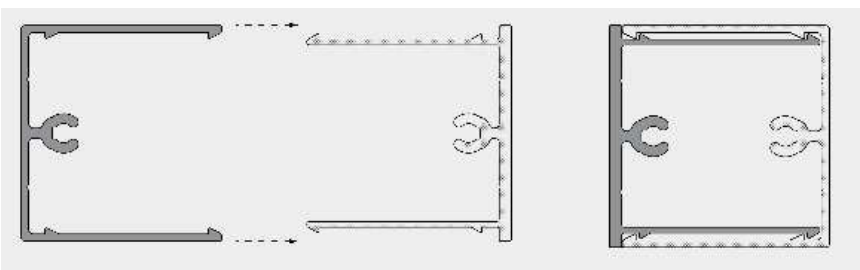
2″ x 2″ (50mm x 50mm)
PART B

2″ x 4″ (50mm x 100mm)
PART B

2″ x 6″ (50 mm x 150mm)
PART B

2″ x 8″ (50mm x 200mm)
PART B

2″ (50mm)
PART A



Battens: Examples of Applications

Battens: Pergolas & Trellises

Presented below are some stunning examples of wood-patterned aluminum batten applications.

The battens used to create the roof for this pool bar not only provide shelter for the staff and patrons, but they also offer a truly tropical feel.

The battens and slats used to create this trellis combined with the matching seating create a unique look for this pedestrian shelter.

Decking

Decking can add tremendous value to a property and there are many reasons why aluminum is an ideal decking material. It is lightweight, easy to install, and impermeable to insect infestation.

A wood-patterned aluminum deck offers simple interlocking installment and strength, and unlike wood, it will not combust, crack, rot, fade, or chip.

Furthermore, aluminum decking does not require expensive, time-consuming maintenance (e.g., sanding, staining, and oiling).

Decking: Installation

Wood-patterned aluminum decks use all-metal components and fixings for strength and durability. All decking extrusions come in lengths of up to 18′ 6″ (5.65m), which allow spanning over large areas while maintaining strength and form.

With a choice of two simple snap-together systems designed to conceal fasteners and screws, aluminum decks offer simple, efficient installation.

- Interlocking decking boards are available in a variety of lengths, widths, and finishes. Extrusion pieces clip together to form a slat-like finish, resulting in less overall wastage.

- Providing a smooth, gapless finish, overlapping board systems are composed of a two-part slat system and can face fix to any frame. They are available in a range of widths and are ⅝″ (16mm) thick when put together.

Decking: Applications

Wood-patterned aluminum decks are suitable for the following applications:

- Boardwalks
- Verandas and patios
- Poolside decks

It is recommended that protective mats or furniture pads be used to protect the deck surface against contact from sources such as furniture legs, BBQs, and planter stands.

Also, to reduce the likelihood of scratching and damaging the surface, it is best to refrain from dragging furniture and heavy objects along the deck.

Railing Systems

Designed for interior and exterior use, a wood-patterned aluminum railing system is a secure and safe option.

Consisting of all-metal components, the system can be attached to pre-existing walls and surfaces, or used in conjunction with aluminum decking or aluminum cladding systems.

Commercial Railing System

Residential Railing System

The slats of the railings are inserted into a channel system using spacers to achieve the desired look.

Handrail ranges can be used on their own as a support to an existing staircase or walkway, or attached to the top of the handrail system for a streamlined look.

Shutters

Wood-patterned aluminum shutters are ideal in all climates and can complement any indoor or outdoor living area. A stylish and practical solution, aluminum shutters are built to withstand all weather conditions while providing easy control of light and ventilation. Aluminum shutters have been designed to reflect harmful UV rays and heat while allowing light through.

Whether it be plantation shutters or outdoor screening, aluminum shutters come in a variety of frames and mounting methods for design versatility. To suit a range of applications, shutters can be fixed, hinged, sliding, or bi-folding.

Frame extrusions come in lengths of up to 18′ 6″ (5.65m) and each shutter section can be made to any size, allowing full control of style and function.

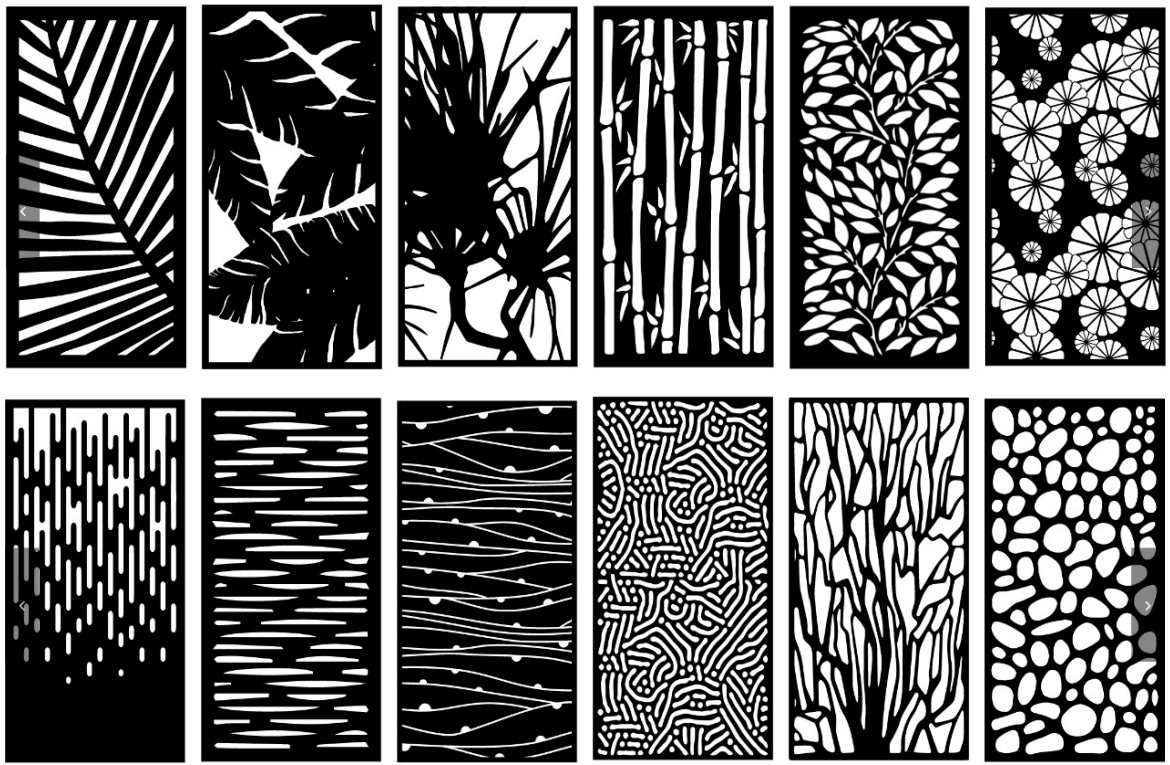
Shutters: Examples

Designer Screens

Available in the market is a range of designer screens that can be used to introduce an extra element of style to any space.

Specialized router machines are utilized to create custom-designed screens to exact specifications, or one can choose from in-house designs. (Some examples are shown here.)

When architecturally used, these screens will enhance the look of any residential or commercial space.



Designer Screens

Designer screens come in a variety of sizes and can be used for various applications including balustrades, fences, and gates.

The screens can be assembled with custom framing systems, which work well for privacy screens and gates.

When used as a design feature on an existing wall or structure, small standoff fixings can be used for a clean look.

Maintenance & Cost Considerations

Maintenance

To maintain the good looks of wood-patterned aluminum, the surface needs regular washing using a soft brush or cloth, a mild pH-neutral detergent, and warm water, followed by a rinse with fresh water. This ensures that substances—such as airborne salts, dirt, and pollutants that are detrimental to the long-term performance of wood-patterned aluminum—are removed. If power washing is required, a low-pressure washer is recommended.

- In areas where the atmosphere is deemed to be non-hazardous (e.g., rural or regular urban environments), cleaning is recommended at least every 12 months.
- In areas subject to high pollution, such as industrial areas, geothermal environments, or coastal environments, the cleaning frequency should be increased to every three months.
- In particularly hazardous locations (e.g., beachfronts, severe marine environments, or areas of high industrial pollution), cleaning should be done monthly.

Maintenance

Painting near wood-patterned aluminum may cause paint splashes to mar the appearance of the aluminum surface.

Mineral spirits may be used to remove paint splashes provided that the surfaces are thoroughly washed with a soft brush and mild pH-neutral detergent, followed by thorough rinsing with fresh water immediately afterwards. It is recommended that the solvent be tested for suitability on a non-visible powder-coated section prior to its use.

Strong and abrasive household cleaners and solvents, such as those recommended for thinning various types of paints (e.g., methyl ethyl ketone or paint thinners), are harmful to powder coating and must not be used for cleaning purposes under any circumstances. Acidic, alkaline, or alcohol-based cleaning products should not be utilized either.

Cost Considerations

There are three aspects to include when considering the cost of a wood-patterned aluminum product:

- Initial supply cost
- Installation cost
- Whole of life cost

While the initial supply cost of timber may be cheaper, it is not a reasonable comparison as it does not take into account the costs associated with sanding, staining, painting, oiling, and filling imperfections.

To compare apples with apples, the wood product would need to at least be pre-painted or oiled.

The initial pricing of wood-patterned aluminum is comparable to a composite or quality hardwood; however, aluminum provides long-term savings because of its low maintenance requirements.

Installation Cost: Aluminum vs. Timber

As a manufactured product, wood-patterned aluminum is consistent in its dimensions; therefore, no modifications are required on-site to create a professional result. Conversely, using real wood, one must allow for a percentage of waste as the lumber may arrive bowed, split, warped, moldy, etc.

Other on-site installation considerations associated with timber:

- Weatherproofing to prevent it from getting wet
- Protection from sun exposure to prevent splitting, cupping, or bowing
- Cutting out unacceptable blemishes or deformities
- Time spent choosing the best face with the least imperfections
- Each piece must be installed with the bows in the same direction
- Sanding and finishing

Another cost that may be overlooked is safety equipment. With the reduced installation time of wood-patterned aluminum comes the reduced need for equipment, such as scaffolding, etc.

While these details may not be the direct responsibility of the architect/designer, the choice of building materials can have a positive impact on overall project time, cost, and quality.

Whole of Life Cost: Aluminum vs. Timber

It is difficult to compare the whole life costs of wood-patterned aluminum to alternative materials.

A realistic cost analysis would need to include all the hidden costs associated with each material.

Keep in mind that wood-patterned aluminum is maintenance free, whereas wood eventually needs to be stripped and refinished. In time, wood products may require replacement due to rotting or warping.

Please remember the **exam password MATERIAL**. You will be required to enter it in order to proceed with the online examination.

Summary

Important Points

- There is no other material that can compare to aluminum when it comes to its range of uses due to its many favorable attributes and properties. Compared to wood and polyvinyl chloride (PVC), aluminum has a minimal impact on the environment and low greenhouse gas emissions. Furthermore, aluminum boasts one of the highest recycling rates of any metal.

- In addition to real wood and steel, there are other building materials for which aluminum extrusions can provide a superior alternative, including aluminum composite cladding panels, wood/plastic composites, and pressure-treated wood.

- Wood-patterned aluminum combines the natural beauty and timeless appeal of wood with the capabilities of aluminum.

- Aluminum systems and products are offered in an extensive range of wood grains, created via a powder coating/art sublimation process to produce wood-like aluminum that’s greener, safer, stronger, and easier to use than wood.

- Currently, the most popular applications of wood-patterned aluminum in the United States are architectural screens, facades, and exterior cladding; however, it can be used in many applications, such as fences, gates, soffits, decks and railings, pergolas and trellises, shutters, designer screens, and more.

References & Resources

- "Aluminium." *Wikipedia, The Free Encyclopedia,* December 2017, https://en.wikipedia.org/wiki/Aluminium. Accessed December 2017.
- "History of Aluminum." *The Aluminum Association*, n.d., http://www.aluminum.org/aluminum-advantage/history-aluminum. Accessed December 2017.
- "Powder Coating." *Wikipedia, The Free Encyclopedia,* November 2017, https://en.wikipedia.org/wiki/Powder_coating. Accessed December 2017.
- "Sustainability." *Capral Aluminum.* Capral Limited, n.d., http://www.capral.com.au/Sustainability. Accessed December 2017.
- "What Is Aluminium?" *All About Aluminium*. UC RUSAL, n.d., https://aluminiumleader.com/about_aluminium/what_is_aluminum/. Accessed December 2017.

Conclusion

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