

Aesthetics, Durability, & Sustainability of Extruded Aluminum Trim

Course Number: TamlynXT – EL132a

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Learning Units 1.0 LU/HSW

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Speakers List

- Ian Daniels

Course / Learning Objectives

- Discover the aesthetic and environmental benefits of specifying extruded aluminum architectural trim.
- Learn the process of extruding aluminum and how it contributes to your overall project goals.
- Explore the many profile and finish trim options available today.
- Study moisture management strategies for extruded aluminum trim and various siding materials.

Course Outline

Section 1
Aesthetics, Durability,
Sustainability

Section 2
Material

Section 3
Profiles and Finishes
Installation Practices

Section 4
Moisture
Management and
Codes

Section 5
Case Studies



SECTION 1

Extruded Aluminum Trim: Aesthetics, Durability, Sustainability

Extruded Aluminum Trim

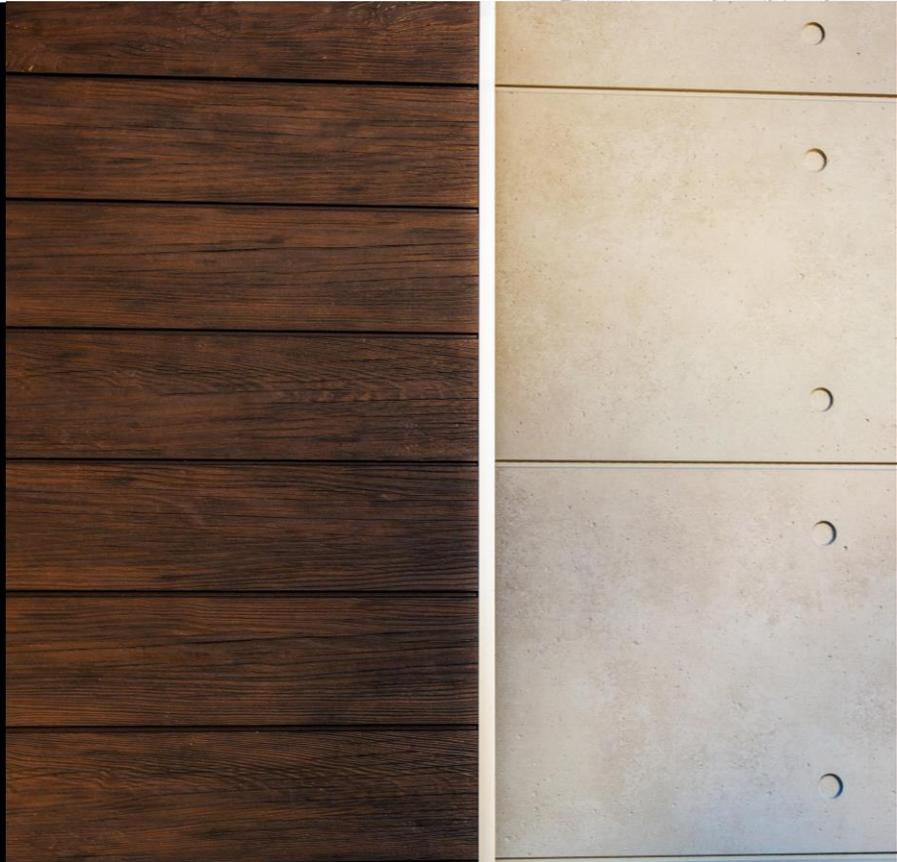


Details make a difference.

Specifying Extruded Aluminum Trim for use with various siding products improves:

- Design aesthetic
- Durability
- Sustainability

Extruded Aluminum Trim



- Manufactured to work as an integrated and complementary system with most major siding manufacturers products
- Wide range of material applications, from fiber cement panel, lap siding to tongue and groove cedar dependent upon design
- Can be specified for exterior and interior applications

Extruded Aluminum Trim



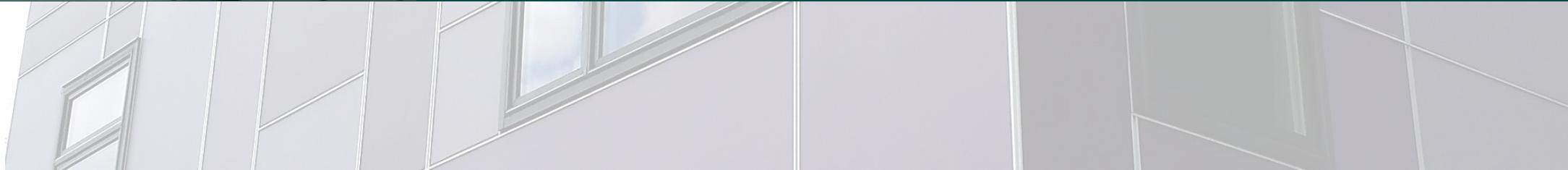
- A rise in use for the single family housing market with an acceptance from architects and homeowners for modern lines over traditional wooden trim
- Increasingly preferred for multi-family structures
- Saves time and is more convenient than using wood trim or cutting and ripping fiber cement boards or panels

Extruded Aluminum Trim



Design Aesthetic

- Design mostly driven by architects seeking cleaner details
- Adds a distinctive profiles to corner conditions
- Breaks up the monotony of flat panel walls where the same siding products are used repeatedly





Extruded Aluminum Trim

Design Aesthetic

"Using extruded aluminum trim between panel joints becomes an architectural element and is a way of expressing the joints and defining their deliberate placement. It adds a level of architectural refinement.

In our climate, stucco often requires additional oversight to be correctly executed. Aluminum trim when used with fiber cement panels or lapped siding is more cost effective than stucco and provides long term durability while achieving our design aesthetic."

Russell A. Hruska, AIA. Principal and co-founder
Intexure Architects in Houston, Texas



Extruded Aluminum Trim



Design Aesthetic

- As evidenced here, Architects can use the same panels, with Extruded Aluminum Trims and cut the panels into a variety of shapes and sizes. Your design opportunities are virtually limitless

Extruded Aluminum Trim



Durability

- Extruded aluminum material has greater longevity than materials like galvanized steel and polyvinyl chloride (PVC).



Comparison: Galvanized Steel



- Galvanized steel is initially less expensive than extruded aluminum but is less durable.
- Use of bare mill galvanized steel and aluminum flashing in direct contact with most claddings will increase chances of a chemical reaction, causing wear and break down on both products.



Comparison: Polyvinyl chloride (PVC)



- Polyvinyl chloride (PVC), third-most widely-produced plastic, least expensive, also has limitations compared with extruded aluminum.
- One manufacturer developed and manufactured PVC trim profiles to use with fiber cement siding and soffits.
- But through learned experiences and public demand, it began converting its profiles into more durable extruded aluminum.

Comparison: Polyvinyl chloride (PVC)



- 100% vinyl trim susceptible to swelling and buckling when exposed to direct sunlight.
- Painting PVC trim with dark colors (increasingly the choice of architects and developers) may cause the product to warp.
- Excess solar heat, especially in hot climates, may be absorbed subjecting the PVC to distortion due to extremes of thermal expansion and contraction.
- Paint adhesion loss due to blistering and peeling.

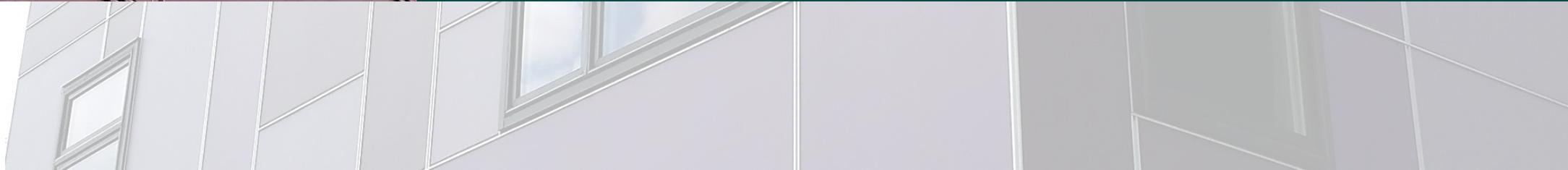


Extruded Aluminum Trim



Sustainability

- Constructed from 75 percent to 100 percent post industrial and post consumer scrap.
- Extruded Aluminum can help earn LEED® v4 certification:
 - Energy and Atmosphere Credit: Optimize Energy
 - Materials and Resources Credit: Building Product Disclosure and Optimization - Environmental Product Declaration (EPD)
 - Indoor Environmental Quality Credit: Low-Emitting Materials
- Aluminum is the only material that more than pays for the cost of its own collection



LEED Credits



Materials and Resources (MR)

- **Building Product Disclosure and Optimization: Environmental Product Declarations (EPD) Credit**
- **Building Product Disclosure and Optimization: Material Ingredients Credit**

The intent of these credits are to encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically and socially preferable life-cycle impacts. The intent is also to reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

LEED Credits



Indoor Environmental Quality (EQ)

- **Low-Emitting Materials Credit**

The intent of this credit is to reduce concentrations of chemical contaminants that can damage air quality, human health, productivity and the environment. This credit includes requirements for product manufacturing as well as project teams. It covers volatile organic compound (VOC) emissions in the indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined.

LEED Credits



Energy and Atmosphere (EA)

- **Optimized Energy Performance Credit**

The intent of the Optimized Energy Performance credit is to achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use. Extruded aluminum has very good thermal performance, so when used in conjunction with other materials in the wall cladding, can assist in optimizing energy performance.

Summary: Characteristics of Extruded Aluminum Trim



- Sustainable material, 75 percent to 100 percent post industrial and post consumer scrap. Can contribute to LEED® points.
- Replaces time-consuming cutting and ripping of fiber cement panels or boards for trim use.
- Can be used for interior and exterior weather conditions.
- Highly durable and will long outlast caulk.





SECTION 2

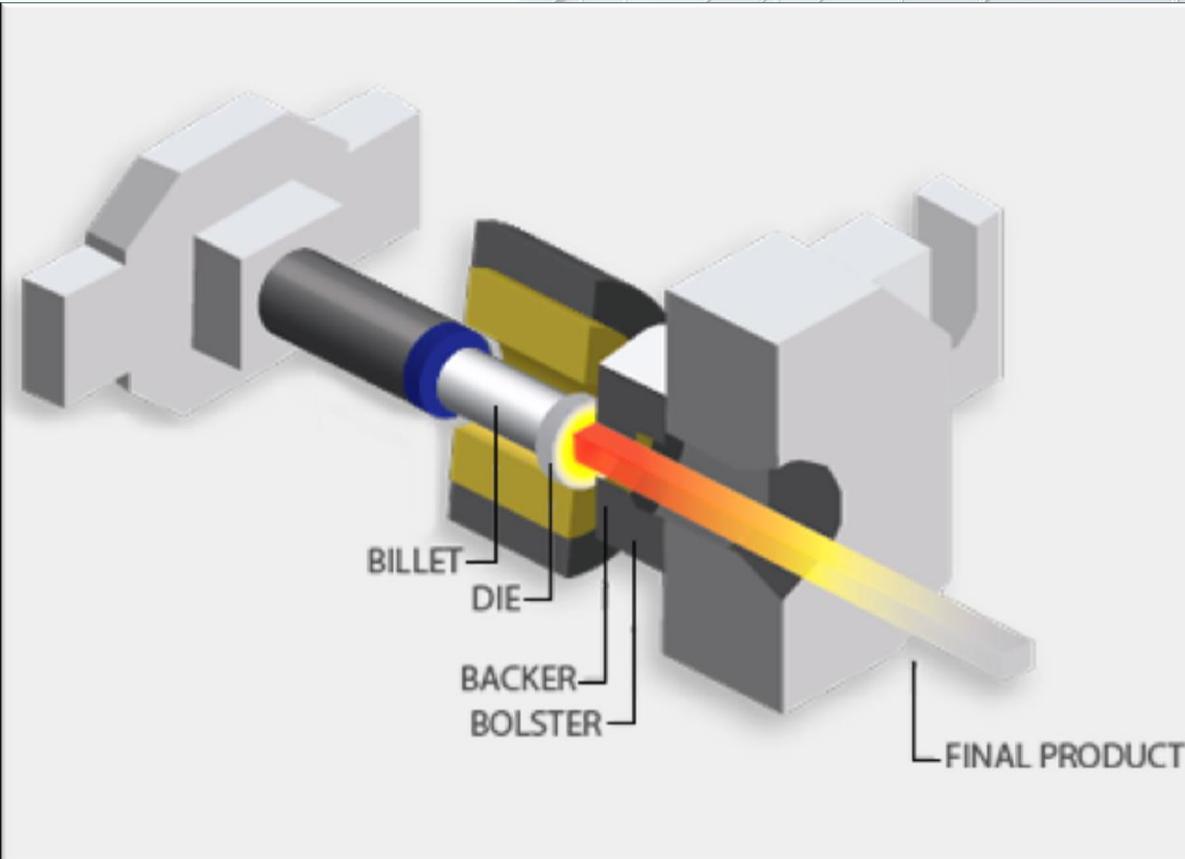
Extruded Aluminum as a Material

Extruded Aluminum as a Material



- Aluminum is the most abundant mineral in the earth's crust. Derived from bauxite, and is mined from the earth.
- After initial processing, a form called alumina undergoes smelting and alloying, producing solid billets of cast metal from which extruded aluminum shapes or profiles are made.
- Billets are 8" – 12" diameter

Extruded Aluminum as a Material



- Once the billets are created and heated they are pressed through the die which creates the intended extrusion shape.
- After passing through the die it will go through a backer and bolster which maintain the shape will adding space

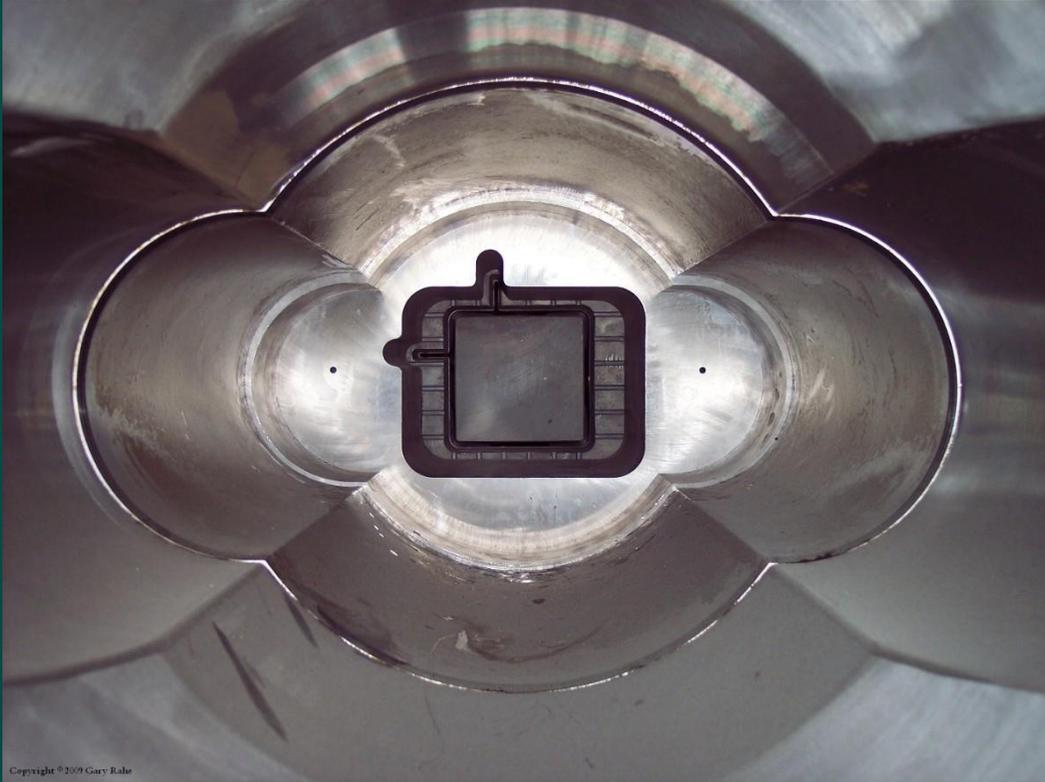
Extruded Aluminum as a Material



Extruded Aluminum as a Material



Extruded Aluminum as a Material



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Extruded Aluminum as a Material



Extruded Aluminum as a Material



Extruded Aluminum as a Material



- Most extruded shapes for architectural use are fabricated from 6063, an aluminum alloy, with magnesium and silicon.
- Type 6063-T5 Aluminum, the “architectural alloy”, has a very smooth surface. Best alloy for anodizing applications.
- T5 designation indicates it has been artificially aged and moderately heat-treated.
- Aluminum extrusion is a highly versatile metal-forming process.

Extruded Aluminum as a Material



Environmental and economic benefits

- Can be recycled indefinitely without losing its characteristics.
- Retains a high scrap value.
- Lightweight. Weighs about one-third of most other metals.
- Easier to handle and less expensive to ship.
- Strong. Trim profiles can be made as strong as needed for most applications. Strength of rigid metal prevents swelling and buckling.

Extruded Aluminum as a Material



- Weather resistant. In cold-weather applications, as temperatures fall, aluminum becomes stronger.
- Does not rust. Aluminum is protected by its own naturally occurring oxide film.
- Fire resistant, melts at over 1100°
- Not combustible. Even at extremely high temperatures, does not produce toxic fumes.

Extruded Aluminum as a Material



- Poses no health or physical hazard.
- Aluminum trim products are defined as "articles," by the Occupational Safety and Health Administration's (OSHA) and are therefore exempt from the requirement of publishing material safety data sheets.



Extruded Aluminum as a Material



- Different finishes available: liquid paint, powder coatings, and anodizing.
- Seamless profiles. Complex shapes can be realized in one-piece extruded aluminum sections without having to employ mechanical joining methods.
- Resultant profile typically stronger than comparable assemblage, less likely to leak or loosen over time.



Extruded Aluminum as a Material



- Extruded aluminum sections can be joined by all major methods in use today.
- Economical. Relatively inexpensive, may not require long lead times.
- Short-run prototypes often can be produced at moderate cost.
- Easily manufactured to accepted standard dimensional tolerances.



SECTION 3

Profiles and Finishes

Extruded Aluminum Trim Profiles



- Typically fabricated from custom die, extruded from heavy duty 6063 T-5 aluminum alloy.
- Coating protects against harsh weather conditions, while enhancing paint adhesion.
- Extruded Aluminum Trim profiles are still being created and remains a growing category.

Extruded Aluminum Trim Profiles



- Manufacturers typically warrant defective-free products for a period of 10 years for the original purchaser unless otherwise stated for specific product ordered.
- Further warranted as to adequacy of design, provided products are properly specified and installed.
- Examples of trim profiles follow.

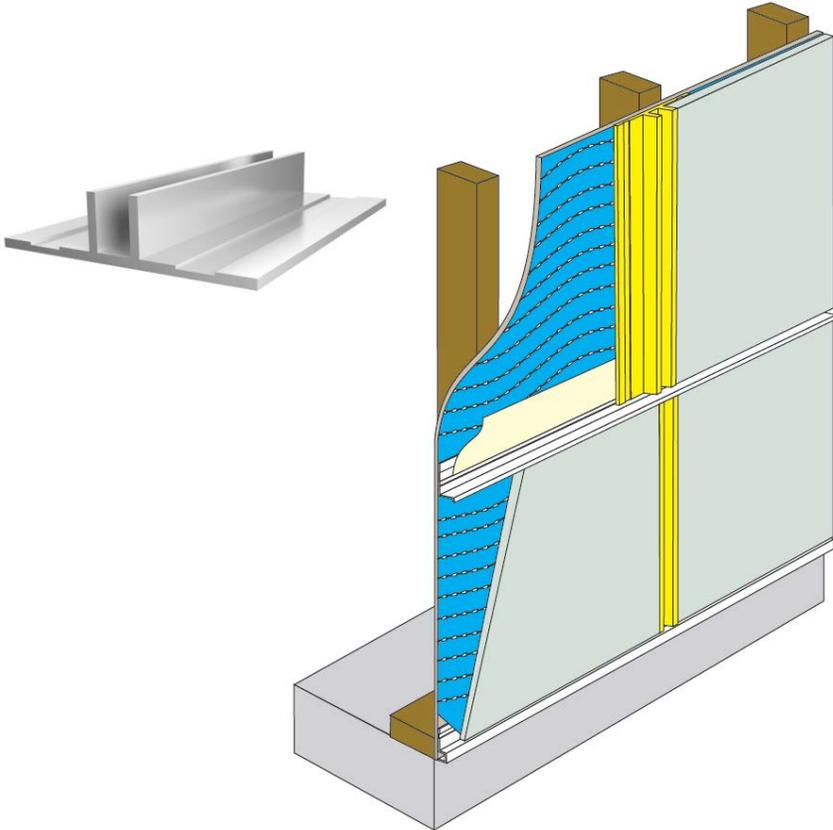
Trim Profiles



Bead or Open Wall System

- Vertical and horizontal bead trim each serve as an expansion joint between panels.
- Horizontal trim is designed to work as a system with vertical bead trim.

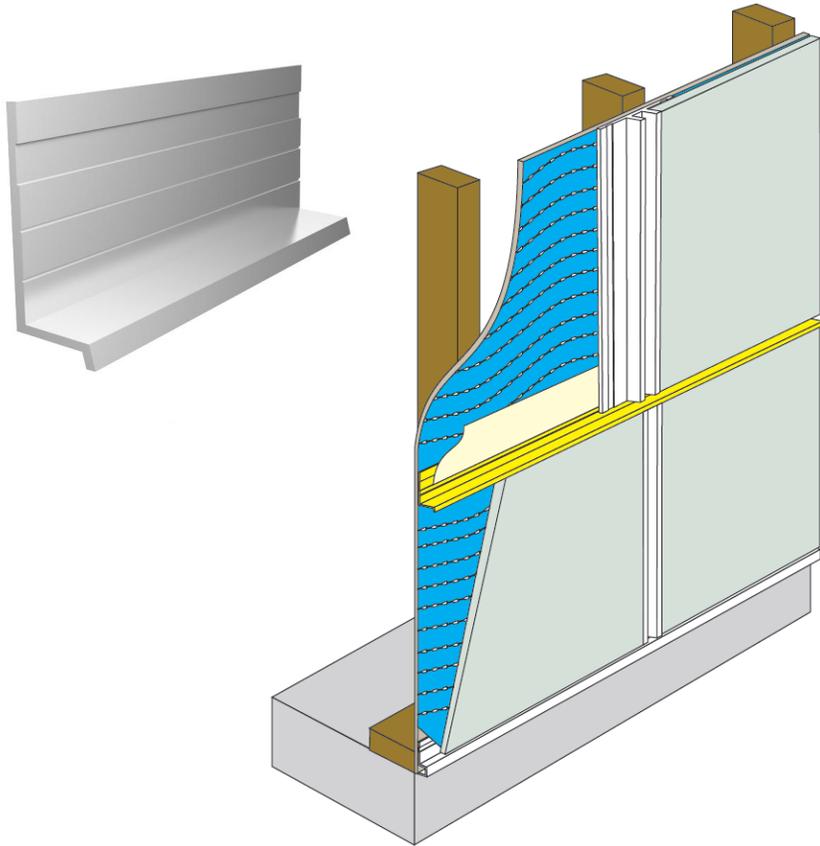
Trim Profiles



Vertical Bead

- Vertical bead trim serves as expansion joint between panels
- Creates a look of an open wall system while still having a flashing in the joint.

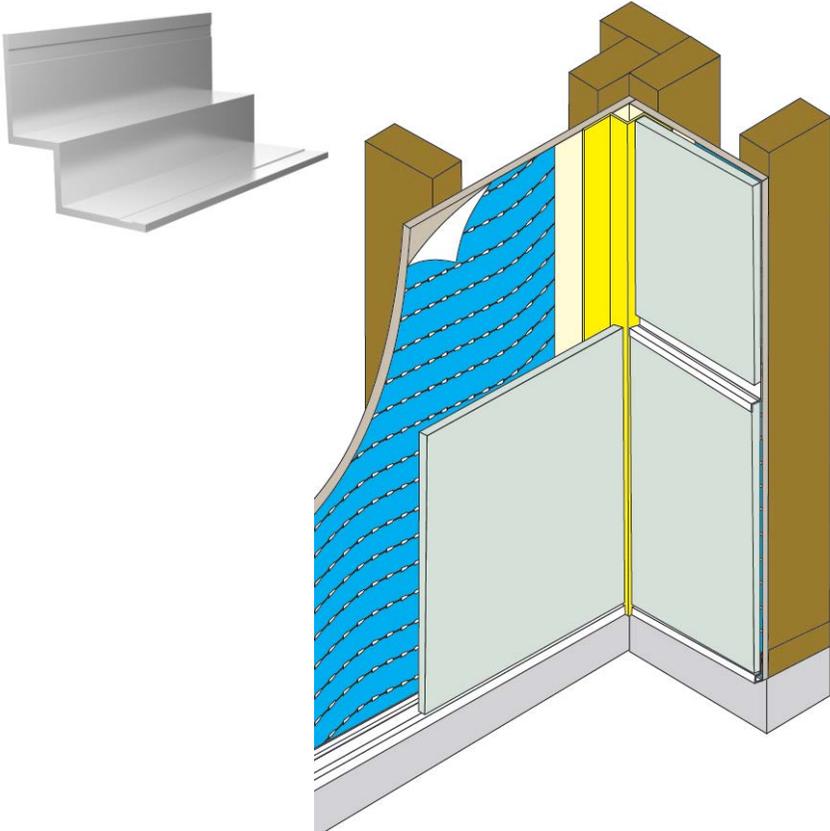
Trim Profiles



Horizontal Bead

- Horizontal bead is designed to work with the vertical bead to create an open wall system.
- It has a slope and small drip edge designed into it for moisture management.

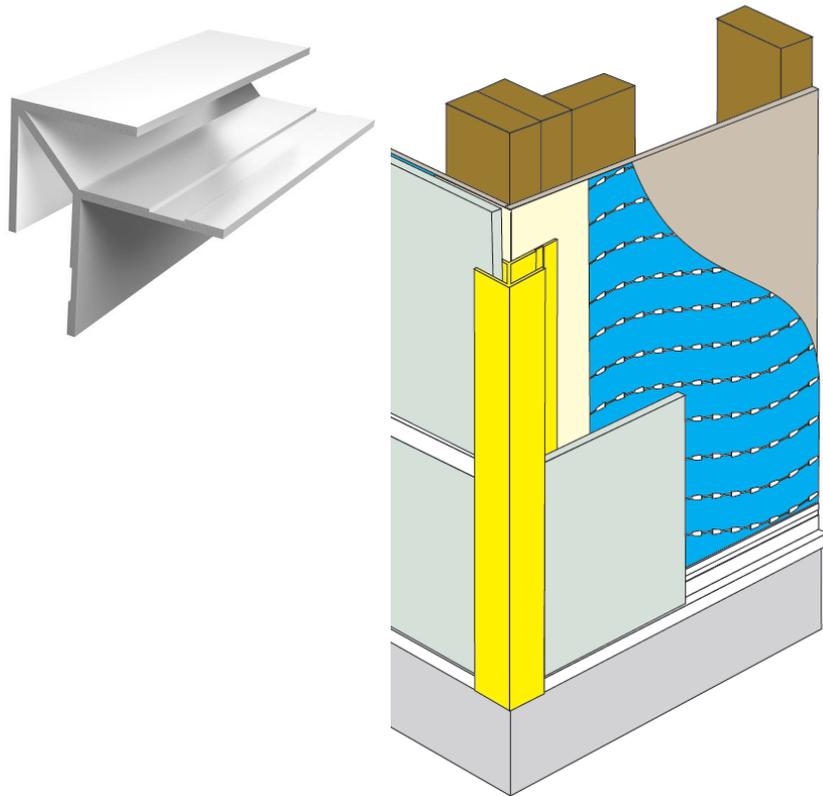
Trim Profiles



Panel Inside Corner

- Provides a minimal exposed corner.
- Eliminates a wooden corner which will be larger and has the possibility to rot.

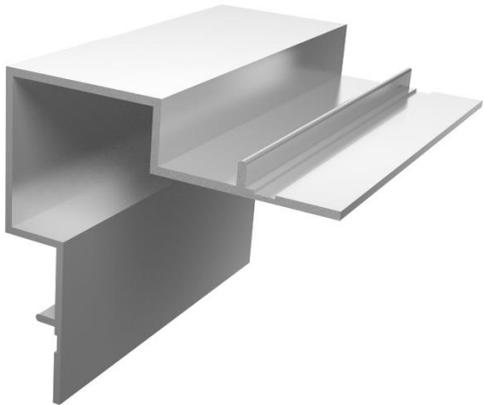
Trim Profiles



Low Profile Outside Corner

- Creates a clean outside corner for 90° conditions.
- Also available in 135° configurations
- Works well in the Bead System as well as mixed with other profiles dependent upon the aesthetic design of the building.

Trim Profiles



Other Outside Corner options

- Most manufacturers offer a variety of designs for architects to pick between.
- A lot of new designs for shapes come from the AEC community and their feedback.

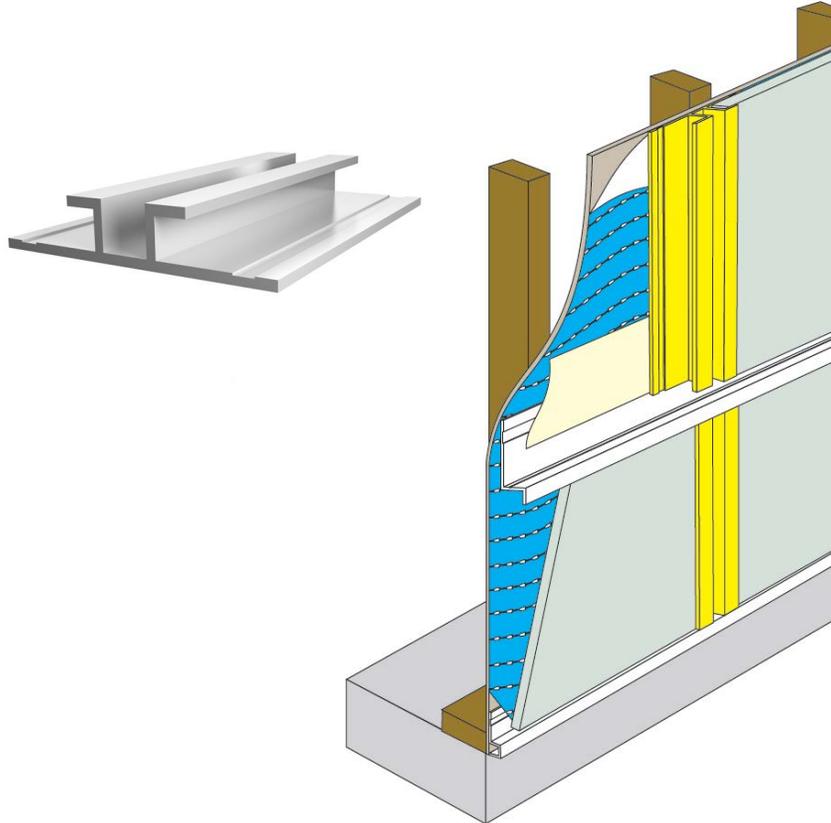
Trim Profiles



Reveal System

- Designed for wood and steel stud construction.
- Varying sizes that work with multiple siding products.
- Serves as rustproof flashing between planks and panels.
- Plank and panel reveals should not be used for horizontal joints.

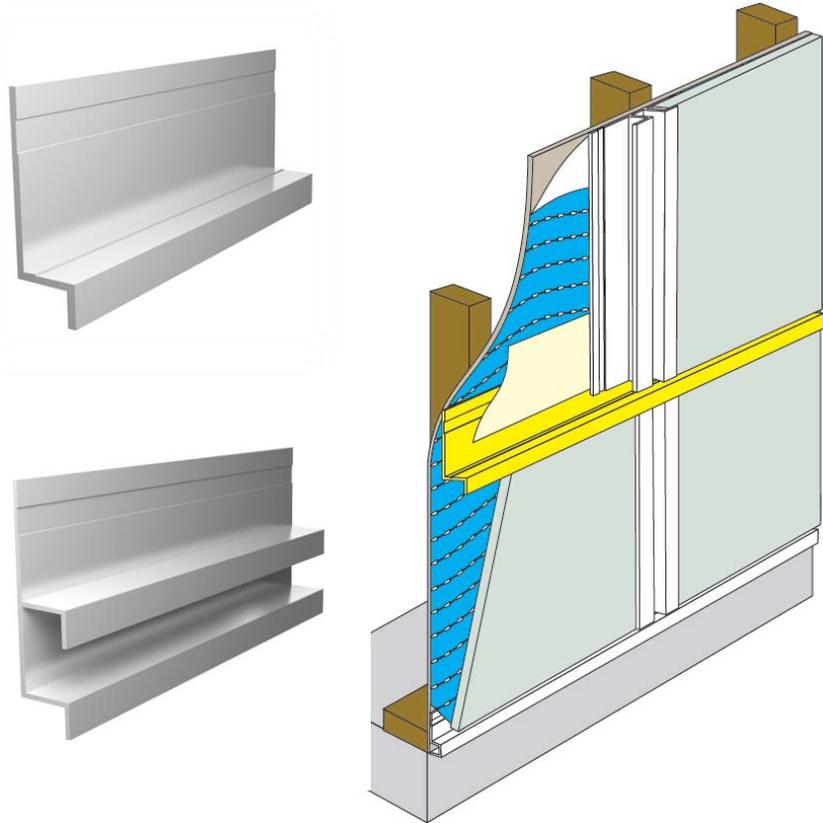
Typical Dimensions



Vertical Reveal

- Designed with faces that cover the cut edges of the panels or planks being used.
- More material makes the trim component a much more prominent design element.
- This system offers forgiveness of field cuts.

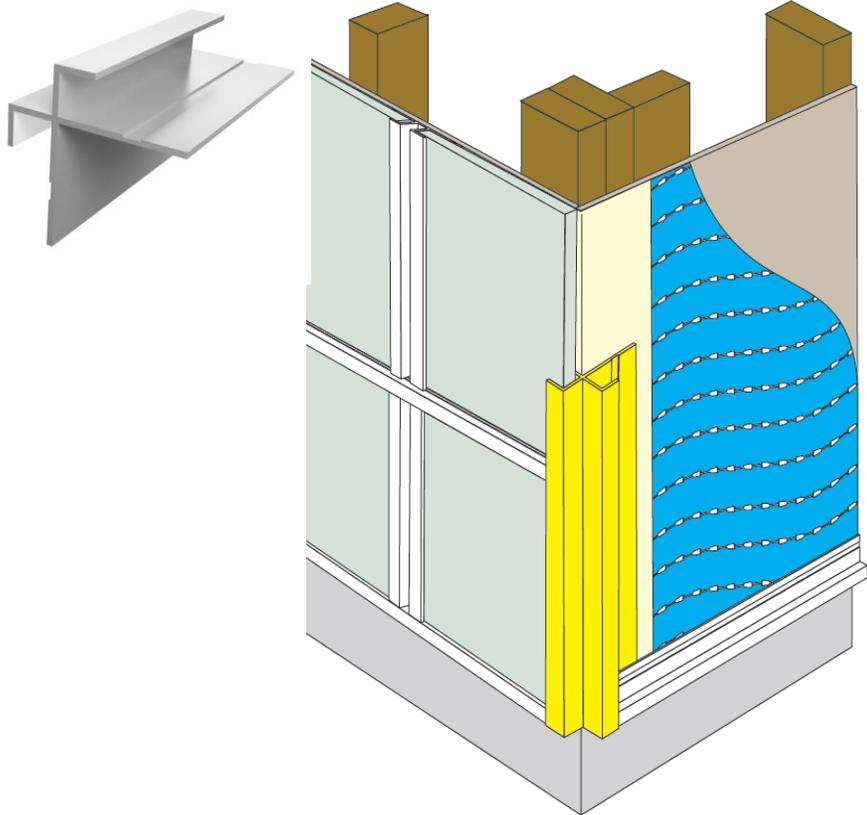
Trim Profiles



Horizontal Z and Horizontal Reveal

- Most common horizontal profile used is the Horizontal Z but the Horizontal Reveal is another offering that duplicates the Vertical Reveal.
- Horizontally dominant run, but there are solutions for vertical continuous and dominant
- Both have a slope in the design for moisture and are sized to lap the vertical

Trim Profiles



Reveal Outside Corner

- Carries the reveal created by the Vertical to the outside corner giving a distinct open outside corner

Trim Profiles



Trim Finishes



Typical extruded aluminum trim finishes:

- Primed ready-to paint for custom colors.
- Standard pre-colored finishes.
 - Different Methods available: liquid paint (acrylics, alkyds, polyesters, and others), powder coating.
- Anodized finishes – clear, black, bronze.
- Note: aluminum does not rust. It can, however, corrode if its protective coating is uncovered. Manufacturers recommend recoating trim after making end cuts and if there are surface scratches.

Trim Finishes



Pre-colored

- Most manufacturers have a standard color palette that is matched to leading pre-finished sidings
- Fully engineered paint-coating system
 - Options are Wet Paint and Powder Coating
 - Computer matched
 - Fade resistant
 - Non-VOC (volatile organic compound)

Trim Finishes



Custom color

- Design professionals requiring custom colors can specify primed ready-to-paint finish.
- Manufacturers typically provide a painting guide.
- Recommend following paint manufacturer's instructions for an eco-friendly, sustainable, recyclable, fire resistant, direct to metal (DTM) paint material if possible.

Trim Finishes



Clear anodized finish

- Controlled electrochemical conversion process that deposits an oxide film on the aluminum trim.
- Natural oxidation occurs on bare aluminum, but the *controlled* oxidation process artificially creates a thicker, harder, and more durable "oxide film."
- Extremely durable finish, resistant to most forms of corrosion.
- Clear anodized finishes can vary slightly from one piece of trim to another. Design professionals should consider this characteristic before ordering.

Trim Finishes



Special color anodized finishes

- Typical colors: gold, black, bronze.
- As with clear anodized, finishes can vary from one piece of trim to another.
- Typically, color will fall within a certain range, can usually be determined prior to anodizing.
- Manufacturer should provide anodized color details upon request.
- Specifiers should require anodized coating thickness be tested in accordance with **ASTM B244-68**.

Trim Finishes



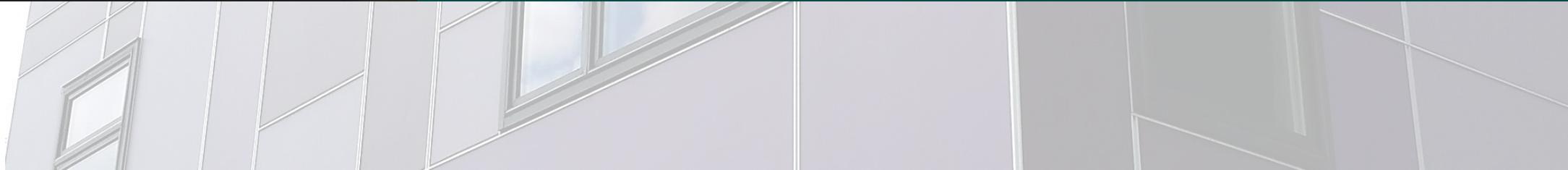
Custom pattern

- Design professionals can also order trim in a custom pattern.
- For example in an airport interior, the wallpaper pattern was repeated on the aluminum trim covering panel joints in order to provide a continuous unbroken appearance.
- Shown here, a custom pattern resembles natural wood.

Installation Practices



- Installed shingle fashion
- Results typically in Horizontal Dominant layouts
- Aesthetic profiles
- Non Structural
- Does NOT hold the cladding in place



Installation Practices



- Minimal Nailing of profiles
- Hot-dipped galvanized ring shank most common fastener
- NEVER run vertical profiles in horizontal fashion (traps water)
- Leave proper gaps for drainage on horizontal profiles
- Do Not Caulk
- Jmolds, F Reveals and other terminations, Prevent Moisture Transfer



Summary: Characteristics of Extruded Aluminum Trim

Adds a design aesthetic to a wide range of building types.



Offers multiple profile choices.



Typically fabricated from custom die-extruded heavy duty 6063 T-5 aluminum alloy with a coating that protects against harsh weather conditions and allows for paint adhesion.



Typically designed to match color and dimensions of the country's major siding manufacturers.



SECTION 4

Moisture Management and Codes

Moisture Management With Extruded Aluminum Trim



- Trim is designed with capillary breaks for vertical runs, shingle fashion for horizontal profiles.
- Architectural trim profiles do *not* form a complete moisture management system.
- Some manufacturers do supply moisture management products that complement their trim line and help meet code requirements, and aid in best practice
- Design professionals are advised to consult with the siding manufacturer for "best practice" applications to ensure color, dimensional and thickness match.

Keeping Moisture Out

Walls with cladding can leak just like masonry walls. Must drain and dry moisture.



Water is most significant factor in premature deterioration of buildings.



Leakage paths exist at any opening in the wall surface, e.g. joints between materials, around windows and doors, vents, cracks, porous surfaces.



Trim manufacturers either recommend or offer moisture management products that help meet code requirements.

Wrap and Rainscreens



Exterior walls performance requirements included in 2009 ICC 1403.2:

"Weather protection: Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing, as described in Section 1405.4 (above.) The exterior wall envelope shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a water-resistive barrier behind the exterior veneer, as described in Section 1404.2, and *a means for draining water that enters the assembly to the exterior.* Protection against condensation in the exterior wall assembly shall be provided in accordance with Section 1405.3. (1405.3 Vapor retarders. Class I or II vapor retarders shall be provided on the interior side of frame walls in Zones 5, 6, 7, 8 and Marine 4.)"



Drainable Wrap



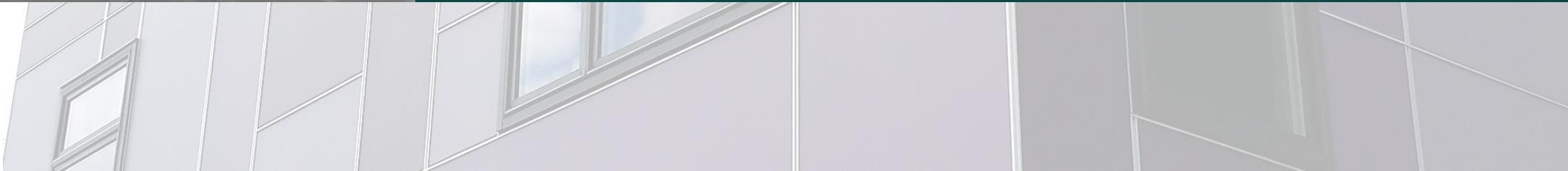
- Primary insurance of moisture mitigation for the building envelope is wrap specifically designed to allow water or moisture to drain.
- Integrated wrap/drainage product requires no additional installation step, no design change to wall/siding assembly.
- One type of wrap eliminates excess moisture from exterior wall by providing drainage space between the wrap and exterior sheathing.
- Achieved by bonding very small spacers to the wrap.



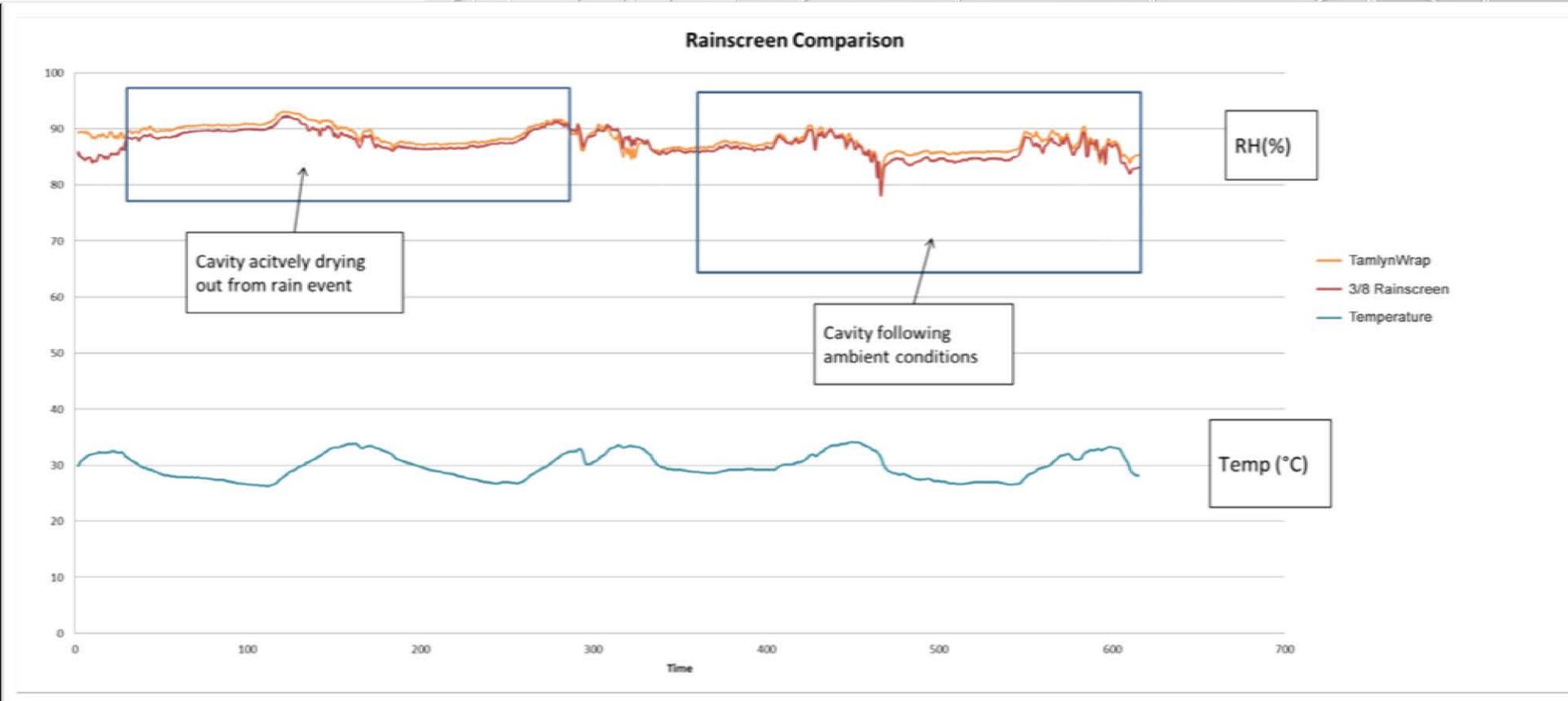
Drainable Wrap



- Achieved by bonding very small spacers to the wrap
- Drainable Wrap with 1.5mm *Non-Compressible Spacers* provide a drainage space behind the cladding.
- This gap aids by eliminating the “hydrostatic pressure” created when two flat products are tight together.
- This type of wrap performs as well as a 3/8” rainscreen, in both drainage and drying capabilities.



Drainable Wrap



Rainscreen



- Rainscreen wall assemblies are another option for meeting code requirements.
- Moisture management technique for controlling rain entry in an exterior wall.
- Generally comprises air space immediately behind exterior cladding plus water resistive barrier that wraps the building wall assembly.

Rainscreen



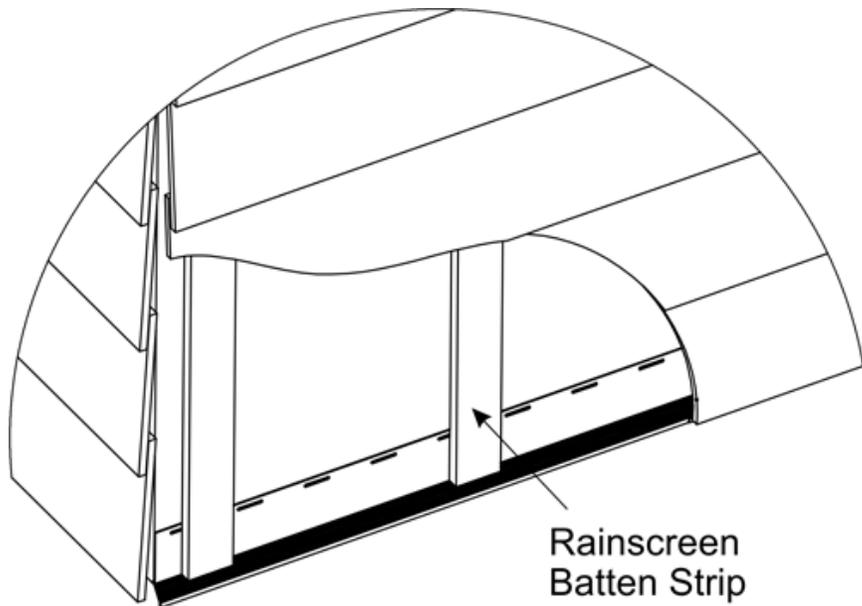
- Water reaching the back of the cladding drains from the wall assembly via the space created by the rainscreen.
- Rainscreen systems also help move air throughout the air space, for quicker drying of water vapor accumulated in the interior wall assembly.
- Rainscreen options include:
 - Pressure Treated Lumber
 - Metal, normally hat channel but also Z girts
 - Plastic Products, most also promote cross ventilation

Pressure Treated Furring Strips for Rainscreen



- Manufacturers advise always applying a layer of self-adhered material, e.g. asphalt, butyl tape before installing aluminum flashing or trims on treated lumber.
- Prevents chemical reaction between flashing and copper azole in treated lumber.
- Copper azole is a wood preservative replacement for chromated copper arsenate (CCA) which has been phased out for most residential applications.

Rainscreen



- Rainscreen products. These can be batten strips in the form of plastic slats on top of the housewrap.
- Example of a rainscreen strips product used to create a cavity between the cladding and building wall.
- Note the vented Zbar at the base providing a weep point for water/moisture and allowing air flow behind the cladding. It also helps to prevent insects and rodents from entering the cavity



SECTION 5

Case Studies

Aluminum Trim for Affordable Housing



New Hope Housing – Houston, Texas

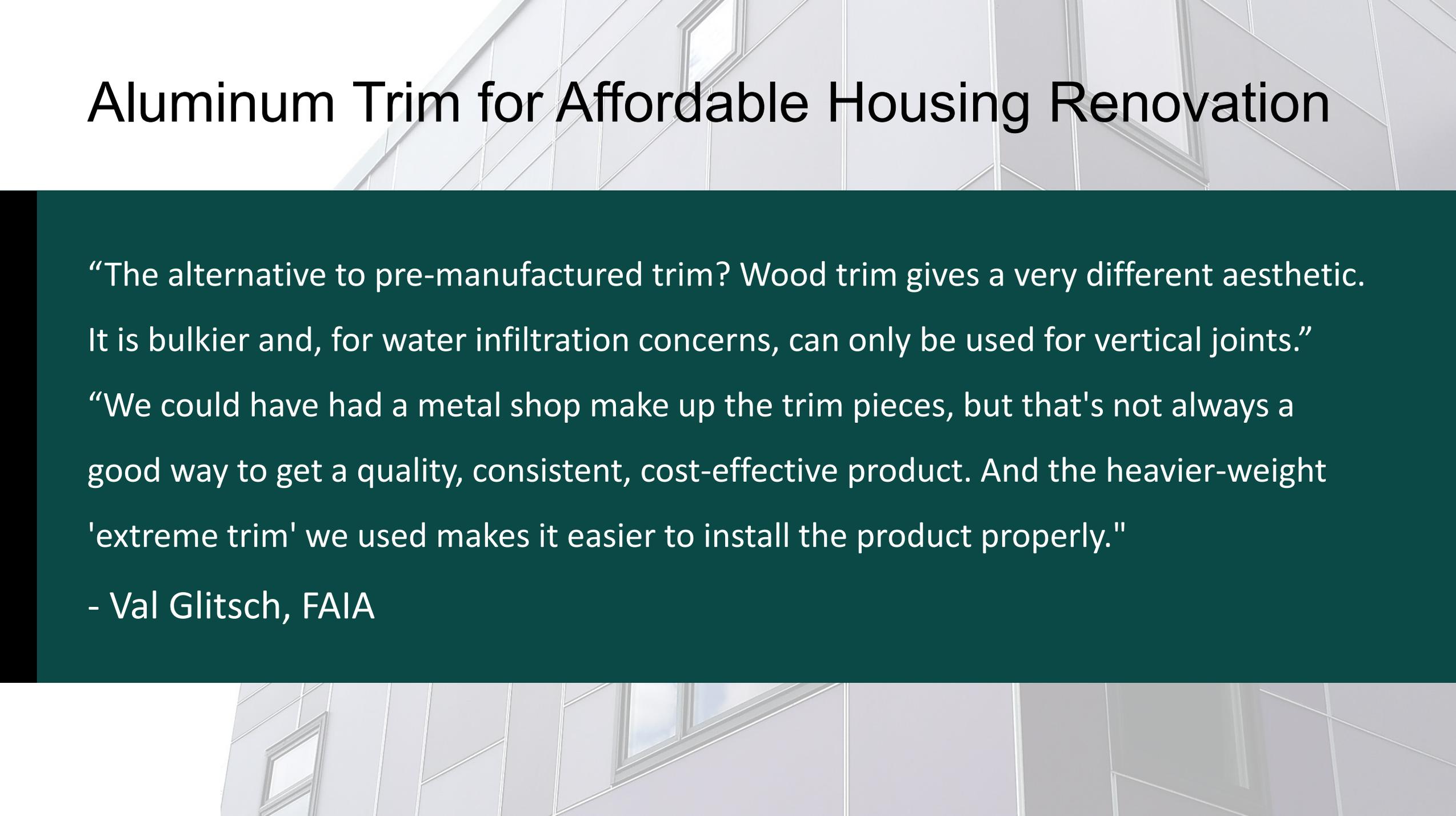
- Exterior a mix of fiber cement panel and lap, stucco and brick.
- Extruded Aluminum trim was used to create reveals in the panel and lap, inside and outside corner conditions and between materials

Aluminum Trim for Affordable Housing Renovation



New Hope Housing – Houston, Texas

- Inside corner for transition between panel and lap
- Vertical Bead
- Horizontal Z
- Reveal Corner for panel and lap
- Note gaps should be maintained between panels and horizontal trims below, to allow water to properly drain from behind the panel



Aluminum Trim for Affordable Housing Renovation

“The alternative to pre-manufactured trim? Wood trim gives a very different aesthetic. It is bulkier and, for water infiltration concerns, can only be used for vertical joints.”

“We could have had a metal shop make up the trim pieces, but that's not always a good way to get a quality, consistent, cost-effective product. And the heavier-weight 'extreme trim' we used makes it easier to install the product properly.”

- Val Glitsch, FAIA

Aluminum Trim for Preparatory School



Peak Preparatory School – Dallas, Texas

- Exterior a mix of fiber cement panel and lap and brick.
- Extruded Aluminum trim was used to create reveals in the panels and finished in black to accent them further.

Aluminum Trim for Preparatory School



Peak Preparatory School – Dallas, Texas

- Vertical Bead
- Horizontal Z
- Reveal Corner for panel

Aluminum Trim with Drainable Wrap for Student Housing



Texan 26 – Austin Texas

- Exterior is a mixture of fiber cement panel, lap siding, and board and batten
- Builder utilized a drainable wrap below the various siding materials in conjunction with a rainscreen at place
- Wood furring strips installed over drainable wrap with non-compressible gap allows furring strips to dry.

“A drainable wrap was chosen for the effectiveness under multiple siding products and for maintaining its gap once installed.” Jon Standley, Project Manager



Aluminum Trim with Drainable Wrap for Student Housing



Texan 26 – Austin Texas

- Extruded Aluminum is used with the fiber cement panel to create a reveal system.
- Clear Anodized finish
- Reveal System

Extruded Aluminum Trim: Key Considerations

- Available in a number of configurations, allowing you to create a system as aesthetically pleasing as your imagination can allow
- Add architectural distinction exteriors and interiors of a wide range of building types.
- Typically manufactured to work as a system with most major siding products.
- More convenient, easier to install than trim made from wood or fiber cement panels. Saves labor time.
- Sustainable material, 75 percent to 100 percent post industrial and post consumer scrap. Can contribute to LEED points.
- Trim products by themselves do not necessarily include moisture management or insulation, so it's critical that design professionals understand how to incorporate these systems into their building designs.

Thank you!