



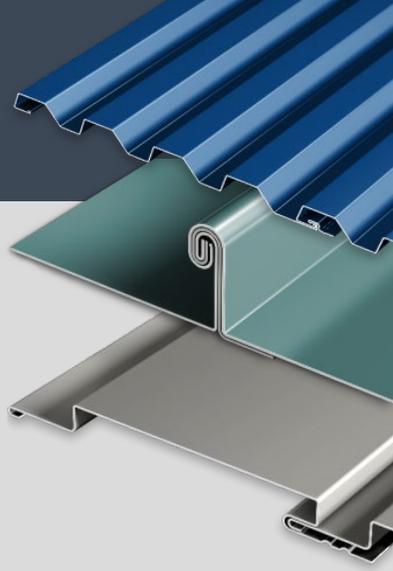
# Design Inspiration for Architectural Metal Roof and Wall Panel Systems



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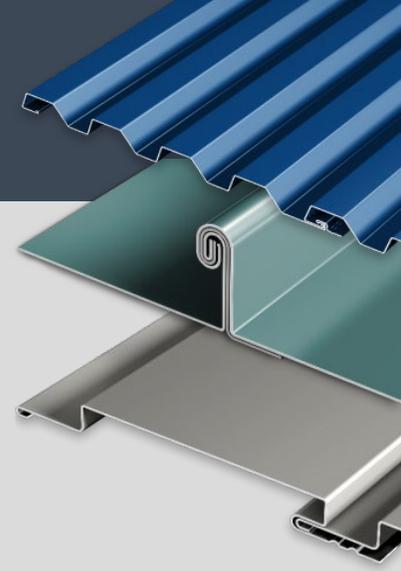
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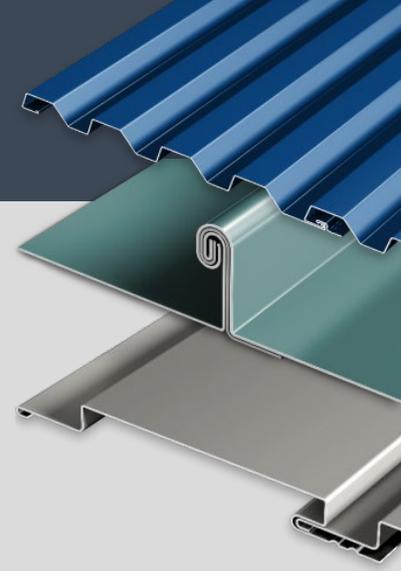
# Course Description

Architectural metal wall and roof panel systems lend themselves to practically unlimited applications in almost any climate or environment. Residential, institutional, commercial, retail, recreational, industrial, hospitality, multifamily, and mixed-use structures all are ideal applications for architectural metal wall and roof products. This course provides design options for metal roof systems and metal architectural wall panels for numerous applications and examines case studies in which these products have been innovatively used.



# Learning Objectives

1. Examine architectural metal roof and wall systems and their use in residential, multifamily, and commercial design.
2. Explore metal roof system design options that enhance the aesthetic applications of the built environment.
3. Consider architectural metal wall panel design options that enhance the aesthetic applications of the built environment.
4. Review case studies in which architectural metal roof and wall systems were innovatively used to enhance the experience of the occupants in and around the space.



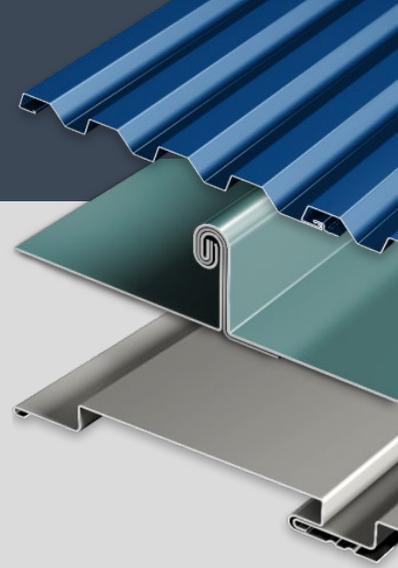
Examine architectural metal roof and wall systems and their use in residential, multifamily, and commercial design.



# Standard Finishes

Typical finishes for metal roof products include:

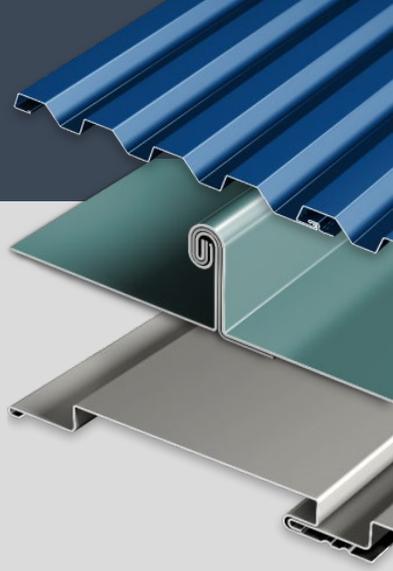
- Silicone-modified polyester (SMP)
- Stone-coated/granular
- Polyvinylidene Fluoride (PVDF)



# Standard Finishes

## Silicone-modified Polyester (SMP)

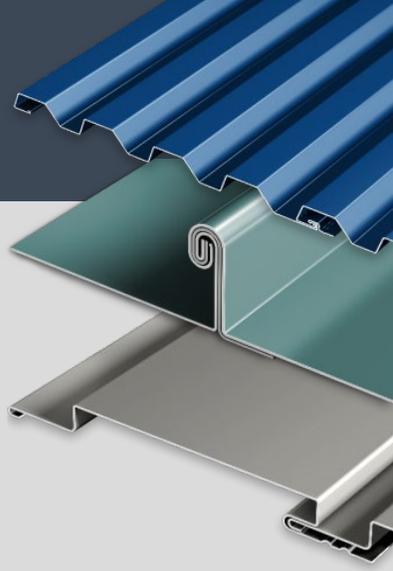
- Composed of silicone additives in a base resin of polyester
- Silicone supplements the paint's performance by improving gloss retention and weather resistance



# Standard Finishes

## Stone-Coated/Granular-Coated Panels

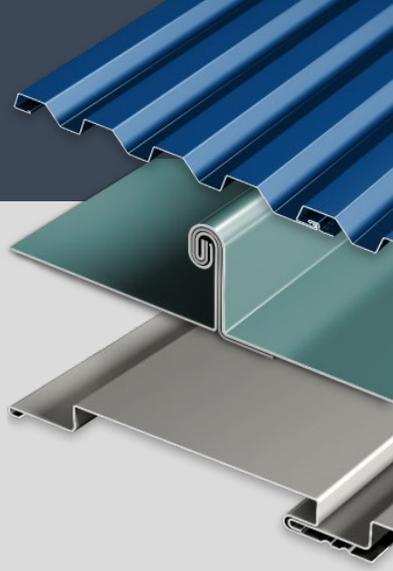
- Formed and shaped to style – coated with an acrylic polymer adhesive
- Granule coating is applied – bonding the stone chips to the specially primed steel panel
- Clear coat sealer is applied over the top for extra protection



# Standard Finishes

## Polyvinylidene Fluoride (PVDF)

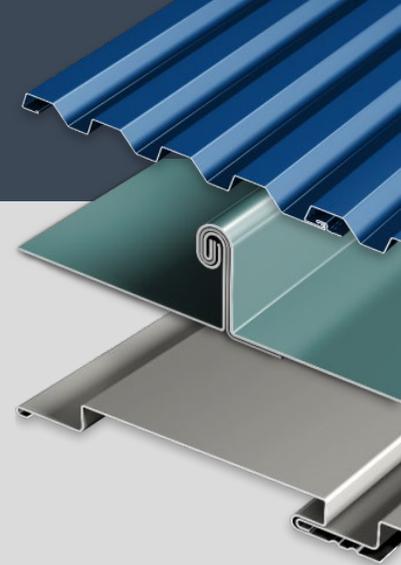
- Offers superior durability and versatility
- Originally developed for use in abrasive environments
- Provides protection for steel and aluminum roofs and walls
- Resists chalking, weathering, and fading
- PVDF paints are considered the most durable in the industry



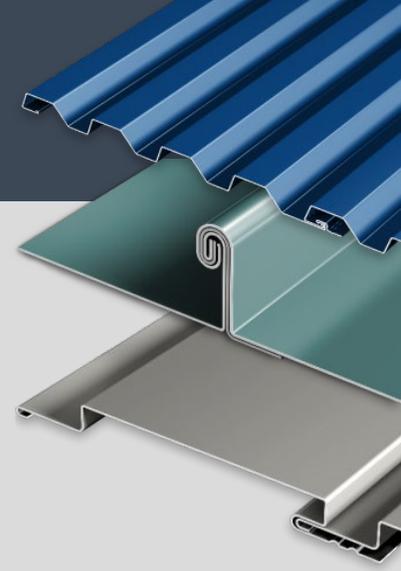
# Roof and wall considerations

Metal applications – increasingly being used in contemporary and industrial designs

- Extensive color palette provides options to match most architectural styles
- Able to be paired with other exterior products
- Metal designed with PVDF paint reduces the cost of heating and cooling a building
- Performs well – and adds to the aesthetics of a newly constructed building, remodel project, or roof replacement



# Residential roof and wall considerations



## Metal Application – conversation points

- Focus on lifetime value – not upfront cost
- Proper maintenance of the roof – will yield a higher return on investment



# Case Study: Fields Residence

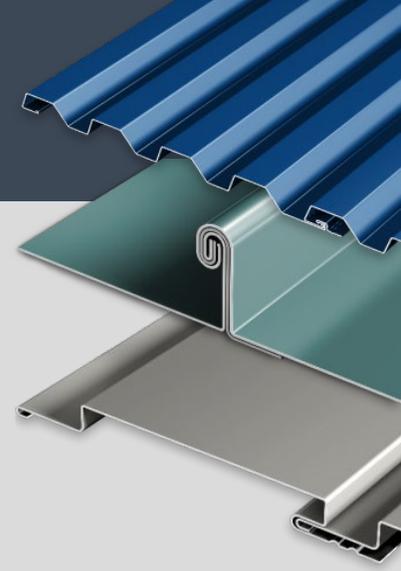


**Location: Chicago, Illinois**

Exterior wall: Standing seam panels in weathered zinc finish

# Multifamily and Commercial Considerations

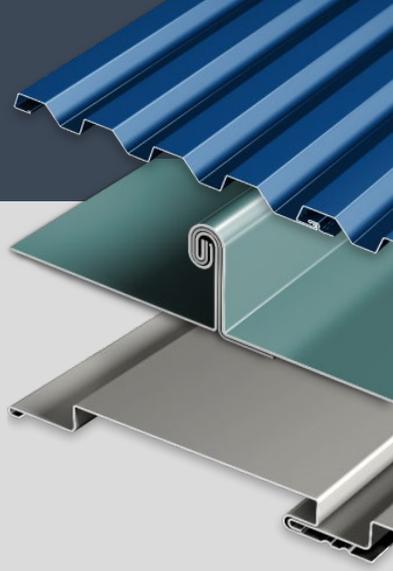
- Cost more upfront
- Higher return on investment in the long run
- Last significantly longer than alternative materials
- Require less maintenance



# Multifamily and Commercial Considerations

## Fire Resistance

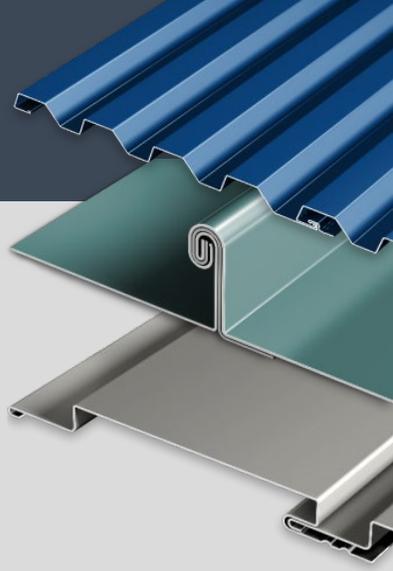
- While fire is always a risk in any building, metal wall and roof panels can act as a barrier to an exterior fire to help keep it from spreading



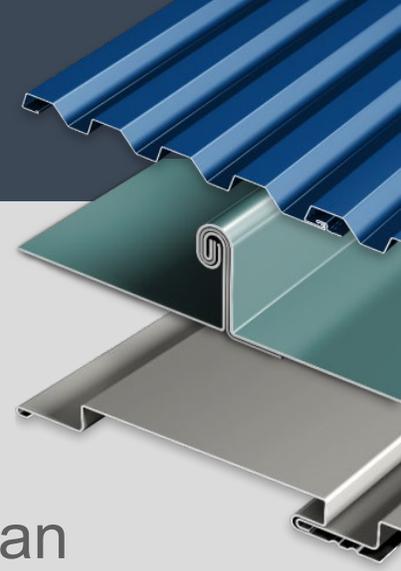
# Multifamily and Commercial Considerations

## Faster Installation Time

- Faster installation than alternative materials such as brick, granite, precast, and others
- Lighter-weight materials than comparative alternatives and, therefore, can require less support structure



# Multifamily and Commercial Considerations



## Aesthetics

- Metal walls systems can contribute to stand-out, high-tech designs by bending, curving, perforating, and joining in geometric configurations.
- Signage or screening also can be incorporated, and a wide variety of colors and finishes is available.



# Case Study: Alan Apartments



**Location: Mesa,  
Arizona**

**Cladding: Flush and  
reveal wall panels**

# Case Study: Court & Walnut



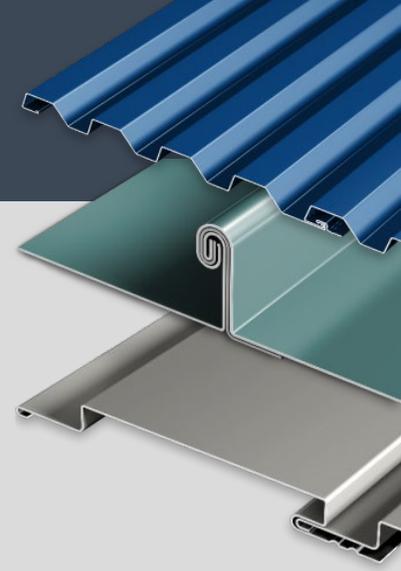
**Location: Cincinnati, Ohio**

Cladding: Metal panels and glass. Vertically installed metal panels in four colors

Explore design options for metal roof systems that enhance the aesthetic applications of the built environment.



# Primary Factors for Metal Roof Specification



## Sizes

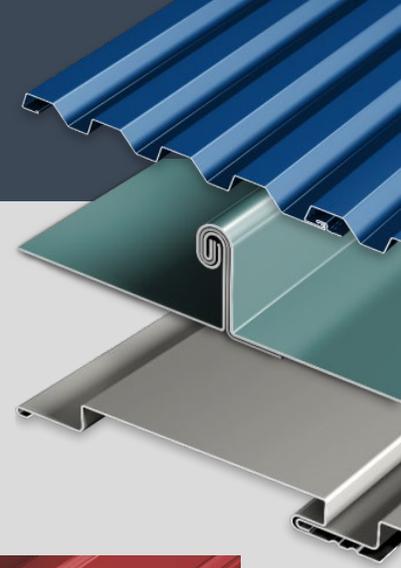
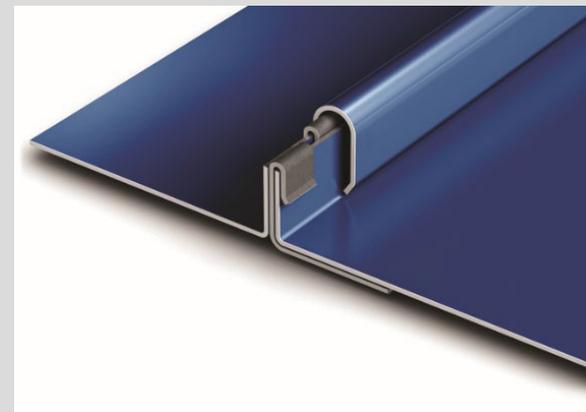
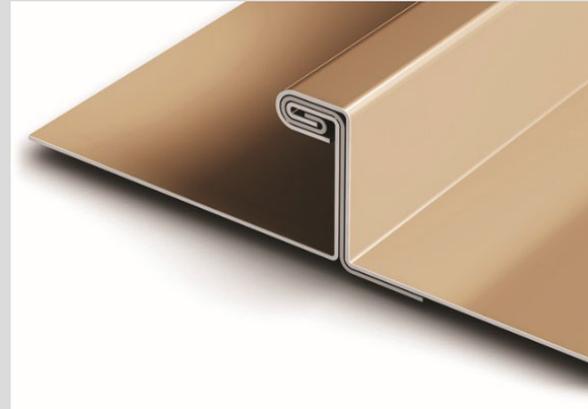
- Architectural metal roofing systems are produced in factory-formed lengths of up to 64 feet; longer lengths available.
- Longer panels also can be formed on the jobsite with portable rollformers.



# Primary Factors for Metal Roof Specification

## Profiles

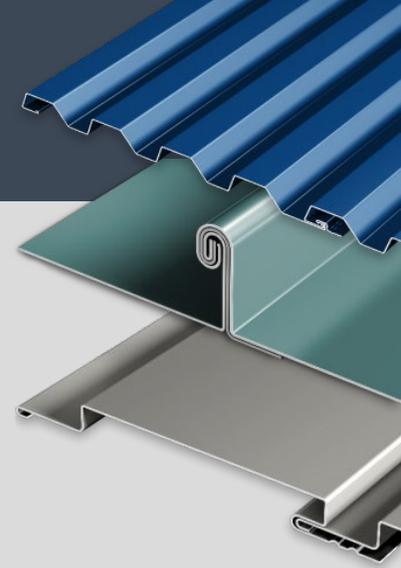
- Standing seam metal roofs are available in different heights and seam styles.
- Seam styles include :
  - Snap-seam
  - Mechanically seamed
  - Cap seam



# Primary Factors for Metal Roof Specification

## Profiles – Snap-seam

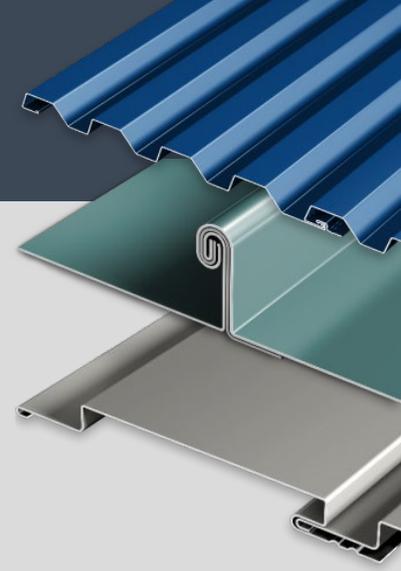
- Feature architectural aesthetics and structural performance
- Maximum factory-produced panel length is 64 feet
- Feature varying leg heights with a continuous interlock for improved structural performance and wind resistance
- Factory eave notching saves on labor costs by eliminating the need for field cutting
- Intended for use in roofing applications
- Minimum 2:12 pitch might be required



# Primary Factors for Metal Roof Specification

## Profiles – Mechanically Seamed

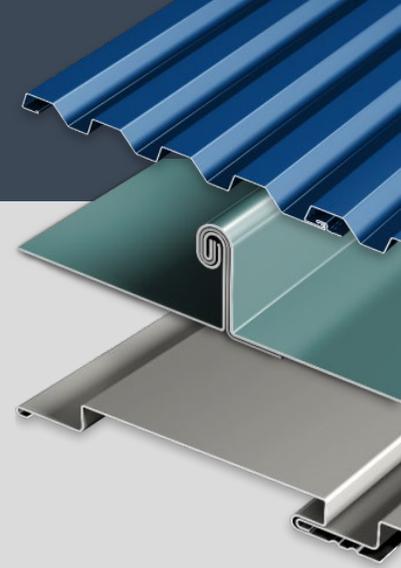
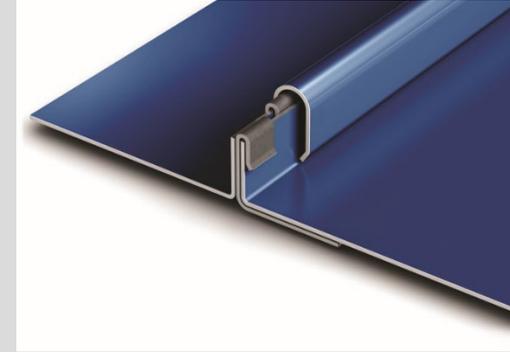
- Combine structural performance with architectural aesthetics
- Can be leveled to provide superior flatness
- Maximum factory-produced panel length is 64'
- Can be produced in multiple gauges of steel and aluminum
- Feature varying leg heights that require mechanical field seaming after installation
- Minimum 1/2:12 pitch might be required



# Primary Factors for Metal Roof Specification

## Profiles – Cap-Seam

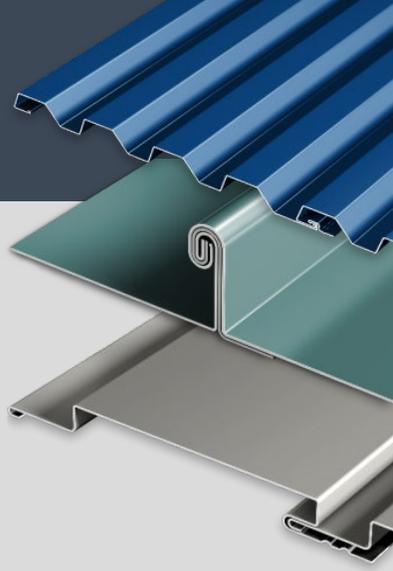
- Ideal for roofing, mansard, and fascia applications
- Should be installed over waterproofed solid surface
- Factory rollformed in continuous lengths
- Simplicity of pan design provides superior flatness and greater workability on site
- Should be installed over solid decking with underlayment applied horizontally eave-to-ridge
- Can be curved
- Ideal for barrel vaults and entrance ways
- NOTE: Not all panels can be done to low slope and achieve watertight warranties



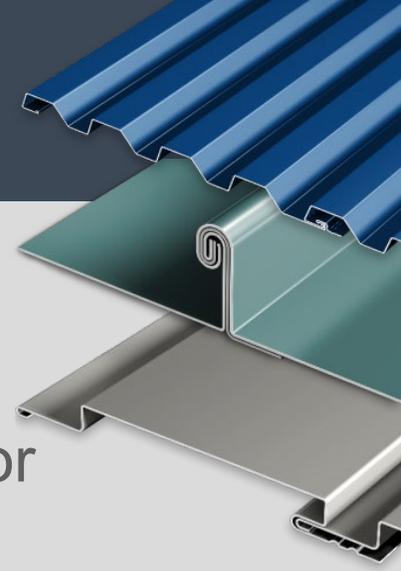
# Primary Factors for Metal Roof Specification

## Pitch

- The pitch of a roof drives the type of metal roofing system used
  - In general, below a 2:12 slope, some type of mechanically seamed panel is used, typically a 2-inch, 2 1/2-inch, or 3-inch-tall panel.



# Primary Factors for Metal Roof Specification



## Contrast

- Selecting a roof color that contrasts with the color of a structure's exterior façade will help the building stand out and command attention.

## Light-Colored Roof

- A light-colored roof can add visual height, making a structure appear taller.

## Dark-Colored Roof

- Alternatively, a darker metal roof may give the appearance of more modest height or draw less attention to a building.

## Environmental Surroundings

- The need to blend in aesthetically.

# Case Study: Shirley Ryan AbilityLab



**Location: Burr Ridge, Illinois**

Wall/roof: Steel standing seam roof in Zinc; soffits

# Case Study: Desert Diamond Casino West Valley



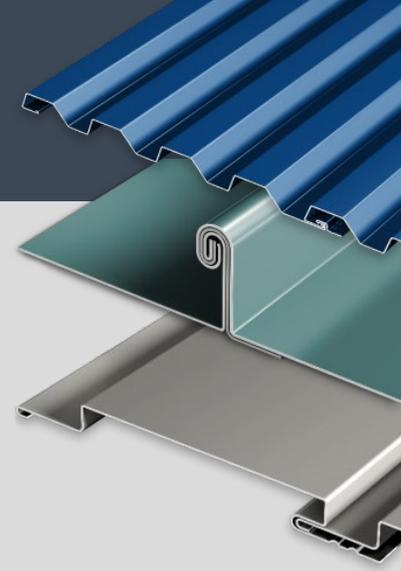
**Location: Glendale,  
Arizona**

**Cladding: Perforated  
wall panels**

# Cool Roofs

## What is a “Cool Roof?”

- A roof that reflects and emits the sun’s heat back to the sky instead of absorbing and transferring it into the building
- Benefits of a Cool Roof
  - Keeps buildings cooler and occupants more comfortable
  - Reduces energy costs and the stress on air conditioners
  - Contributes to green building status
  - Mitigates the creation or effects of urban heat islands





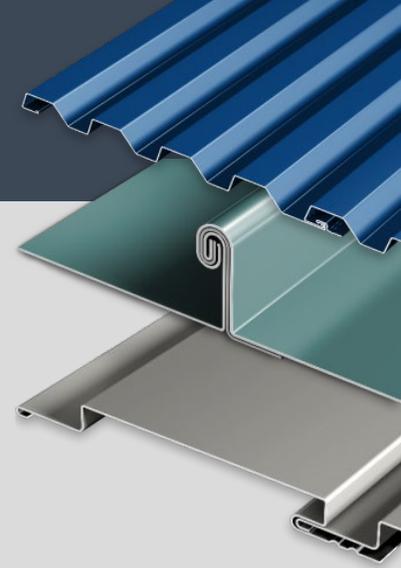
# Thinking Outside the Envelope: Curving





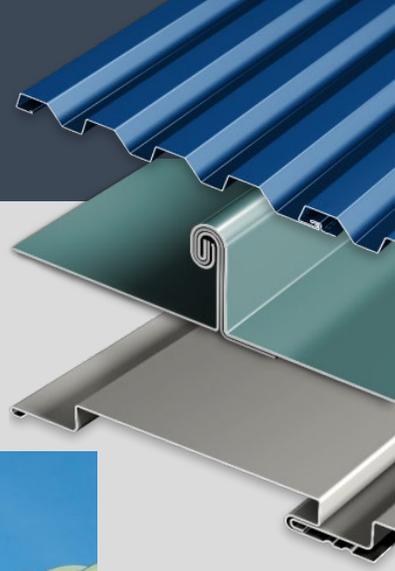
# Thinking Outside the Envelope: Curving

Barrel Roofs





# Thinking Outside the Envelope: Curving



## Panel Considerations for Specifiers

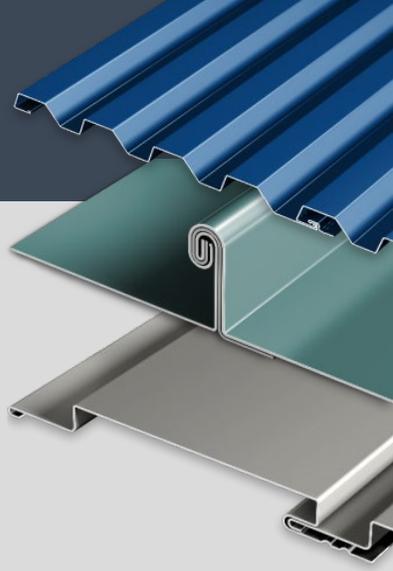


# Thinking Outside the Envelope: Curving

## Structural Considerations for Curved Roofs

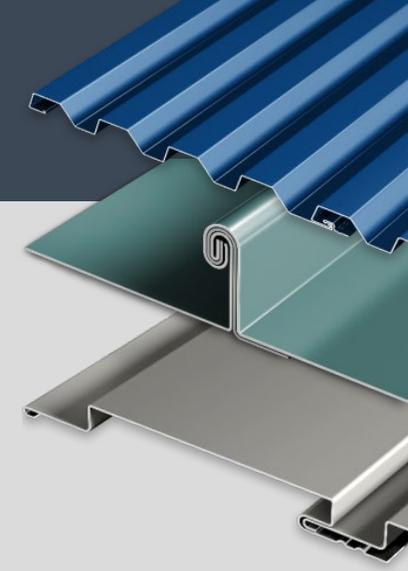
Architects and other stakeholders must take into account two major design considerations for curved roof applications:

1. If a continuous-length panel is used, the designer must consider the thermal movement of the panel, including the use of steel compared with aluminum, and may need to use “fixed” clips at the center of the apex to allow the panel to float to both eave lines. An early design-development stage discussion with the roof manufacturer is necessary.
2. Wind loads are especially important with the ASCE 7-2016 standard. The design-development stage discussion should include wind loads from the design professional’s structural engineer of record so both the design professional and the manufacturer know up front the wind loads that will be experienced.





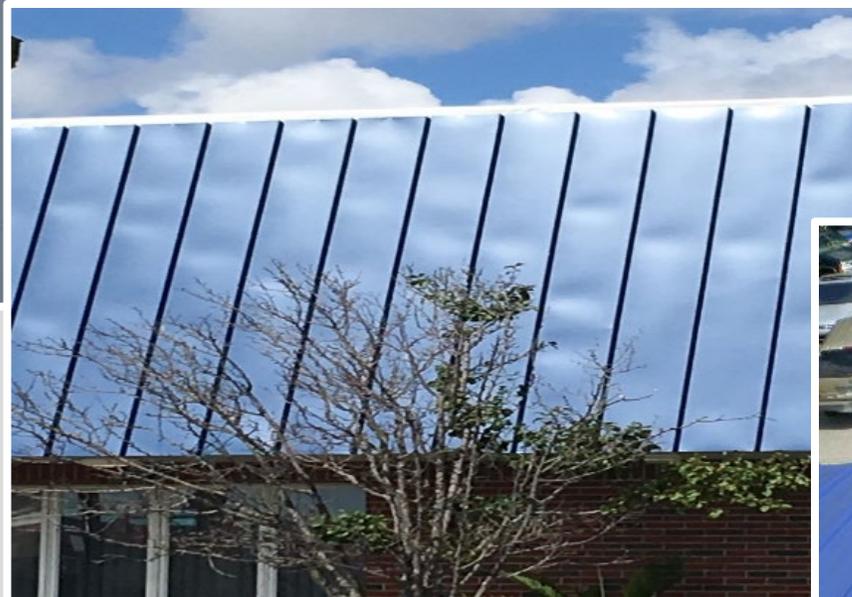
# Potential Problems with Metal Roofs



Poor seaming technique



Cladding reflects the deck



Vented through rib



# Case Study: Winn Science Center



**Location: Dallas, Texas**

Roof: Domed and  
pitched copper



# Case Study: Latrobe Elementary

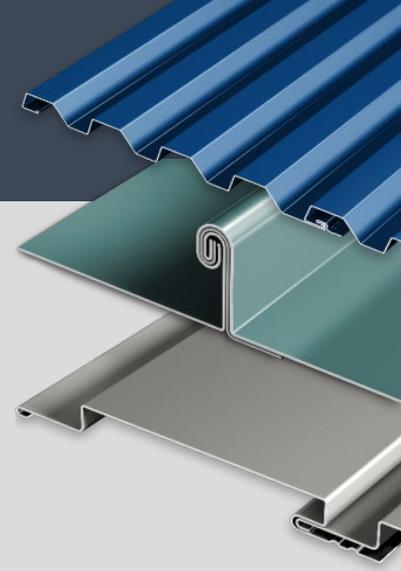


**Location: Latrobe, Pennsylvania**

**Wall/roof: Standing seam steel roofing, aluminum soffit**



# Water Drainage, Performance, and Aesthetics



## Potential Benefits

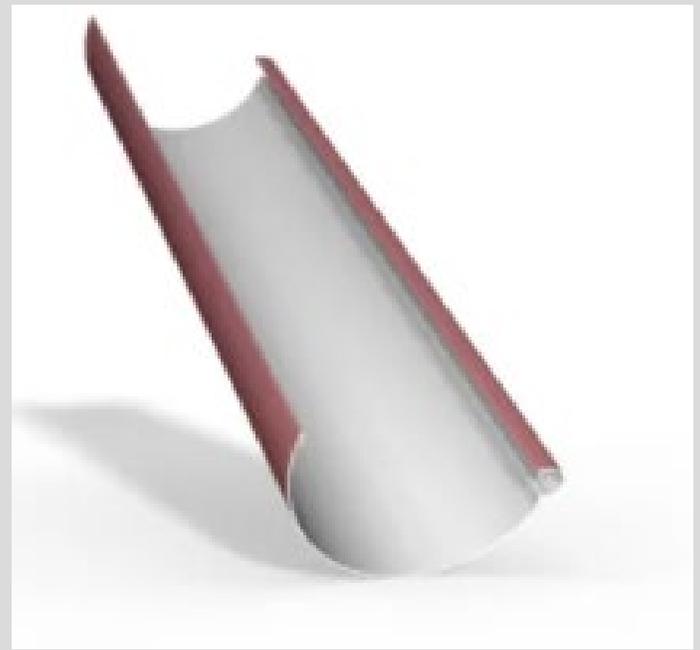
- Water drainage systems, including gutters, downspouts, and scuppers, can both enhance roof performance and complement a building's aesthetics.
- Engineering such as a heavy aluminum gutter strap design can promote ease of installation and help the drainage systems withstand harsh environments.



# Water Drainage, Performance, and Aesthetics

## Gutters

- Variety of colors, sizes, and materials
- Easy installation
- Decreased labor costs



# Water Drainage, Performance, and Aesthetics

## Downspouts

- Available in standard sizes or fabricated to meet specific job requirements
- Manufactured with simple connection configurations
- Specifying downspouts provides maximum roof drainage



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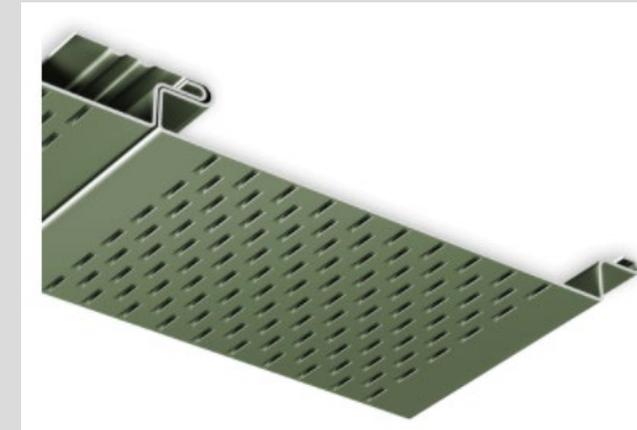
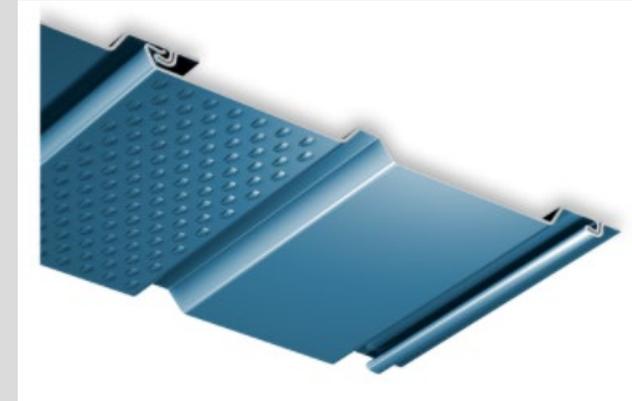
**OPEN**



# Don't forget...

## Soffits

- When made of aluminum, can be ventilated to allow for increased airflow capacity
- Various profiles available – solid, half vented, or fully vented
- Roll-formed to exact lengths
- Matching “J” trim available





Explore design options for architectural metal wall panels that enhance the aesthetic applications of the built environment.



# Metal Wall Panel Options

## Ribbed

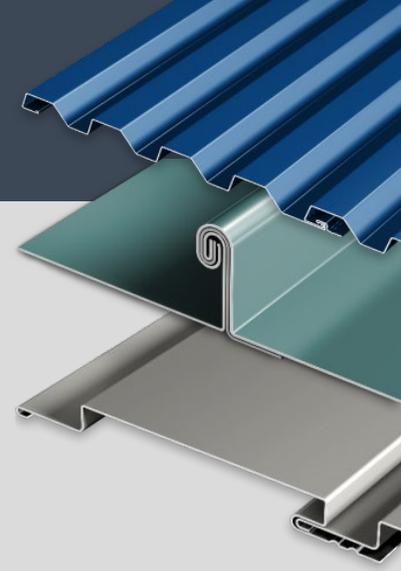
- Rib depth varies, and some panels can be intermixed to add visual intensity to a building's exterior.

## Flush and reveal

- Flush and reveal panels are designed for wall, fascia, and soffit applications where a flat appearance is desired.

## Tiles

- Stamped tiles can be applied to roof or wall installations. Designed to enhance architectural design, tiles add dimension to the exterior of any structure.



# Case Study: Ronald McDonald House



**Location: Cincinnati, Ohio**

Wall/roof: Flush-seam wall panels in multiple colors

# Case Study: Urban Air Adventure Parks



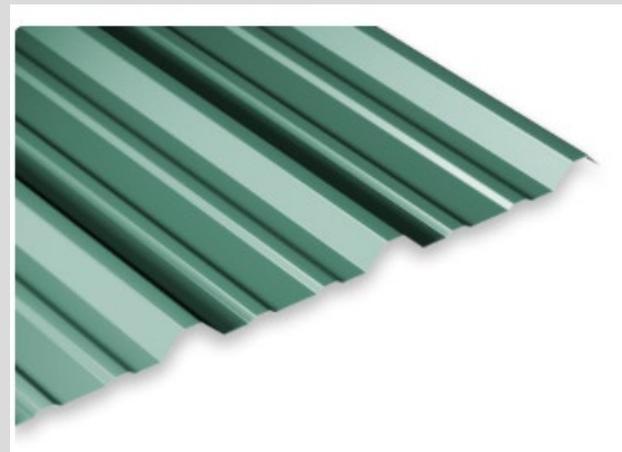
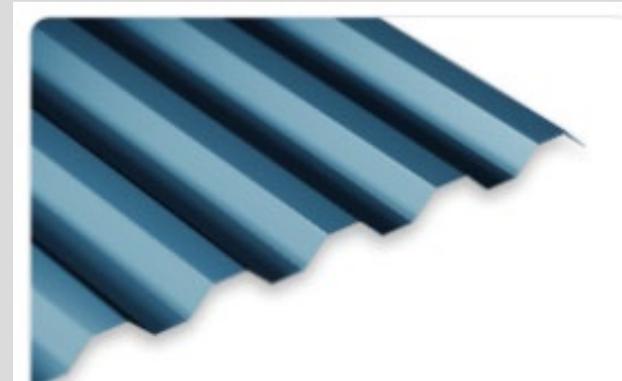
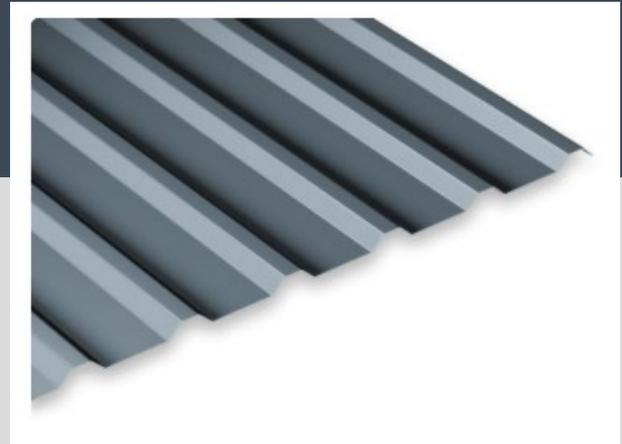
**Location: Dublin, Ohio**

Roof: Multicolor metal panel façade

# Exposed Fasteners

## Exposed Fastener Systems

- Allow for cost-effective creative design flexibility – for a wide range of applications
- Can be used in wall, interior, and linear panel applications
- Available in several coverage widths – full range of gauges and materials
- Matching screws
- Closure strips available

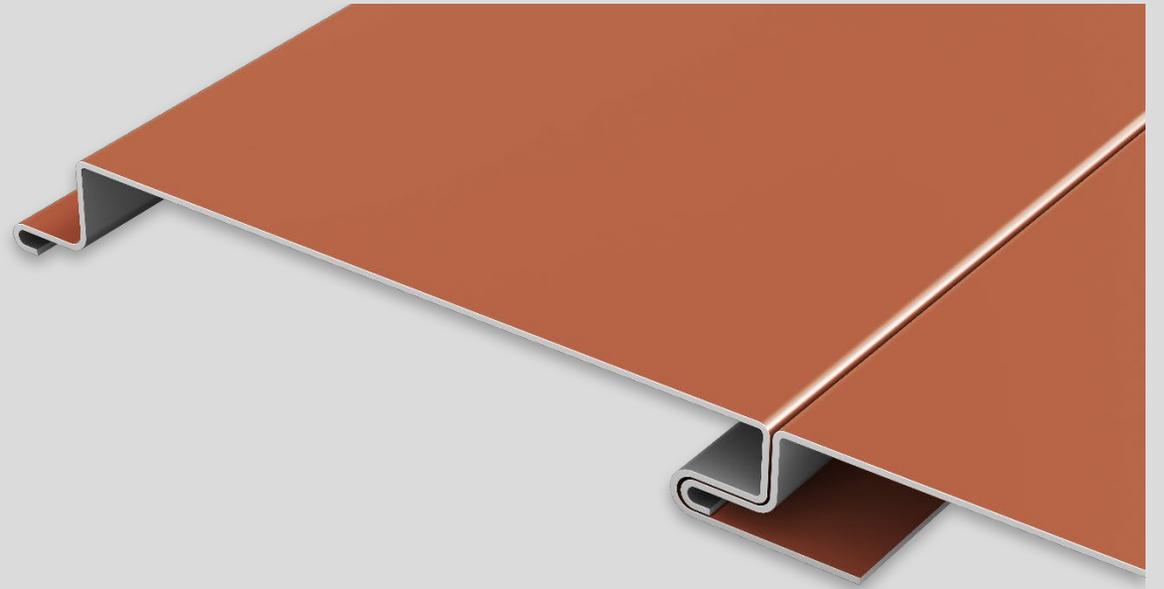




# Concealed Fasteners

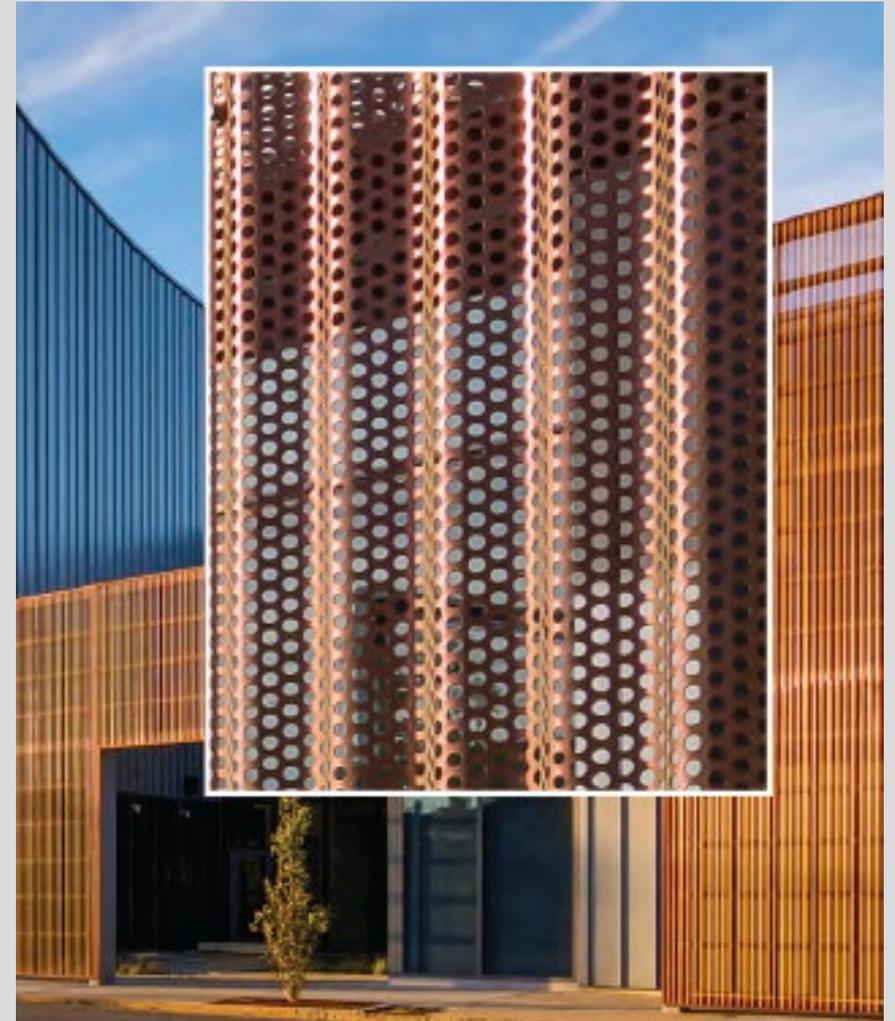
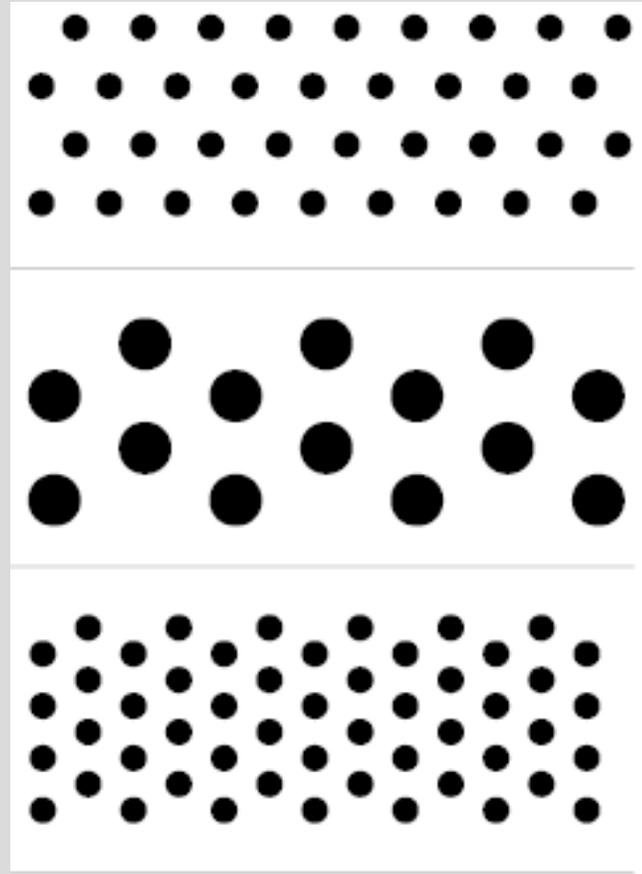
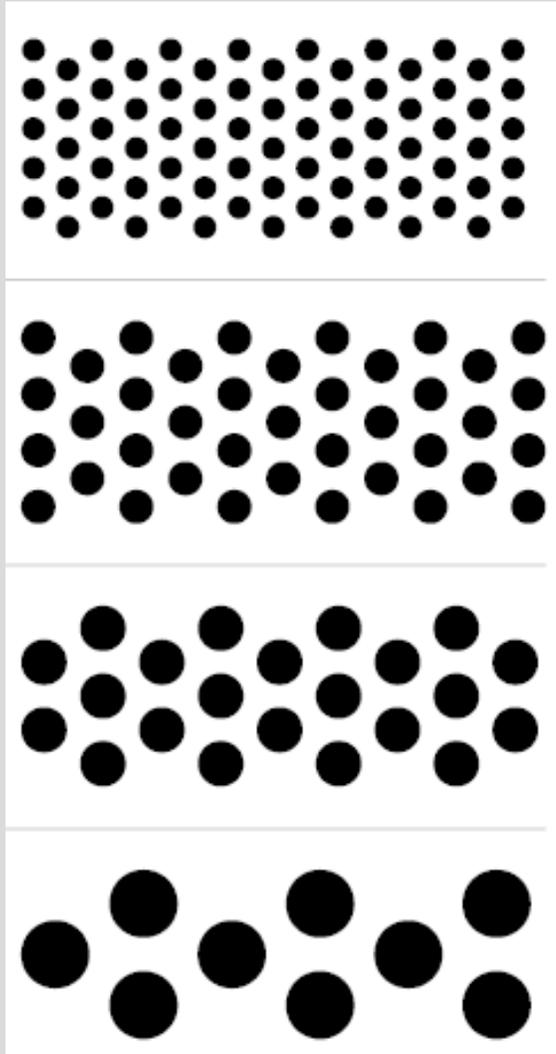
## Concealed Fastener Systems

- Create an uninterrupted surface where metal panels are situated on top of and attached to a clip system
- Can be “stitched” into place





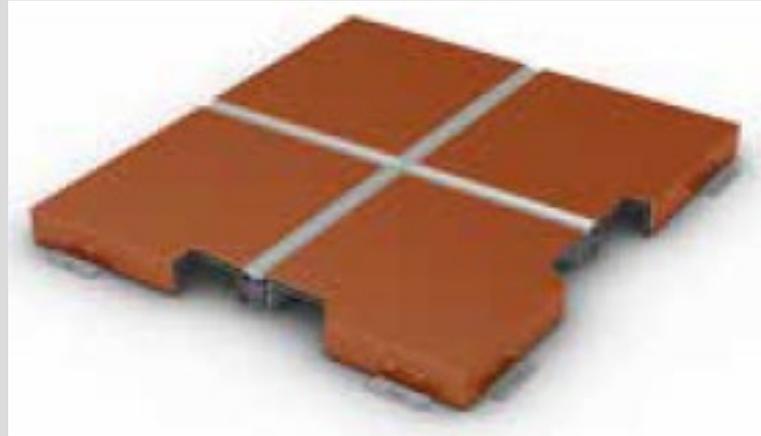
# Perforated Aluminum Panels





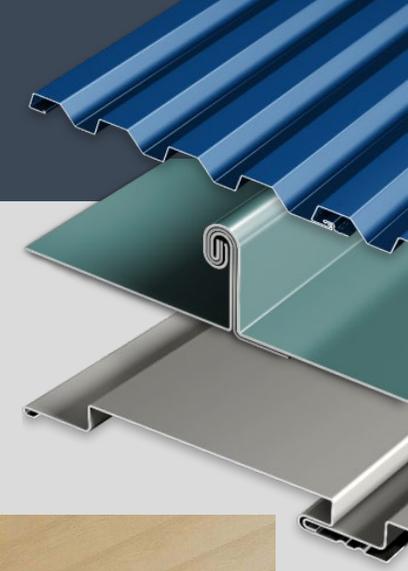
# Composite Panels

Composite wall panels offer another dimension in design flexibility, providing performance and visual effects for any commercial or retail application.





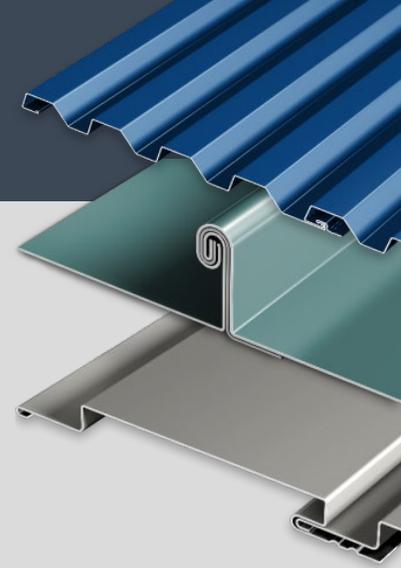
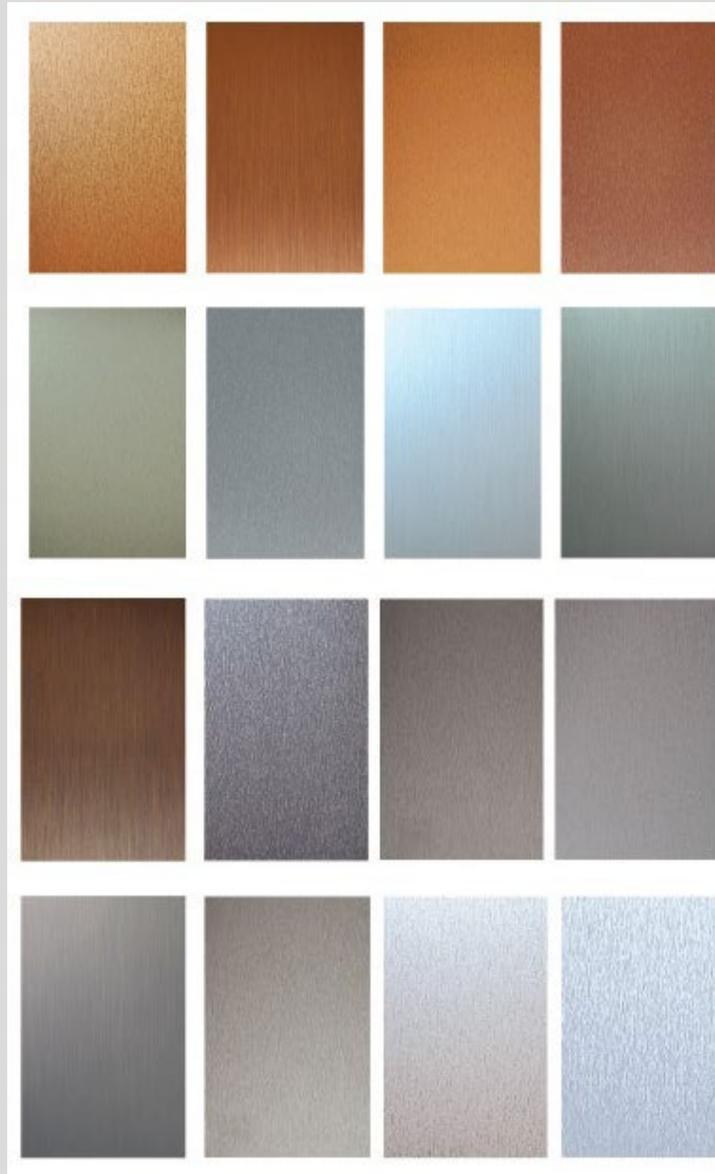
# PVDF Wood Grain Finishes



**Ideal for use when the performance and durability are required, but the look and beauty of wood are desired.**



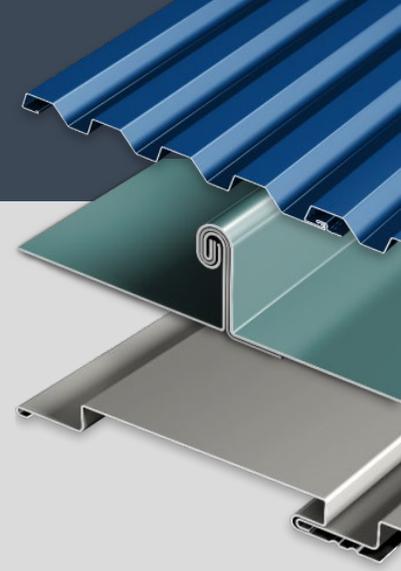
# PVDF Simulated Natural Metal Finishes



An array of finishes ensures creative design flexibility for a finishing touch to any project or architectural style.

# Conclusion

Architectural metal wall and roof panels combine design flexibility with cost-effective installation. Multiple profiles such as ribbed, flush and reveal, can include exposed or concealed fastener systems for a variety of building envelope applications including roofs and walls. Perforated aluminum panels and composite panels also offer design diversity. Nearly unlimited color options, in addition to PVDF natural metal and wood grain finishes, add to visual interest, helping to make architectural metal roof and wall panels suitable for applications ranging from residential to multifamily and commercial.





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# Thank You

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