

# Designing with Commercial/Industrial Insulated Metal Wall Panels

Course Number: IMP008

Day, Date, and Time: Thursday, June 21, 12:30pm – 1:30pm

Learning Units: 1 LU/HSW/SD Hour

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# Speakers List

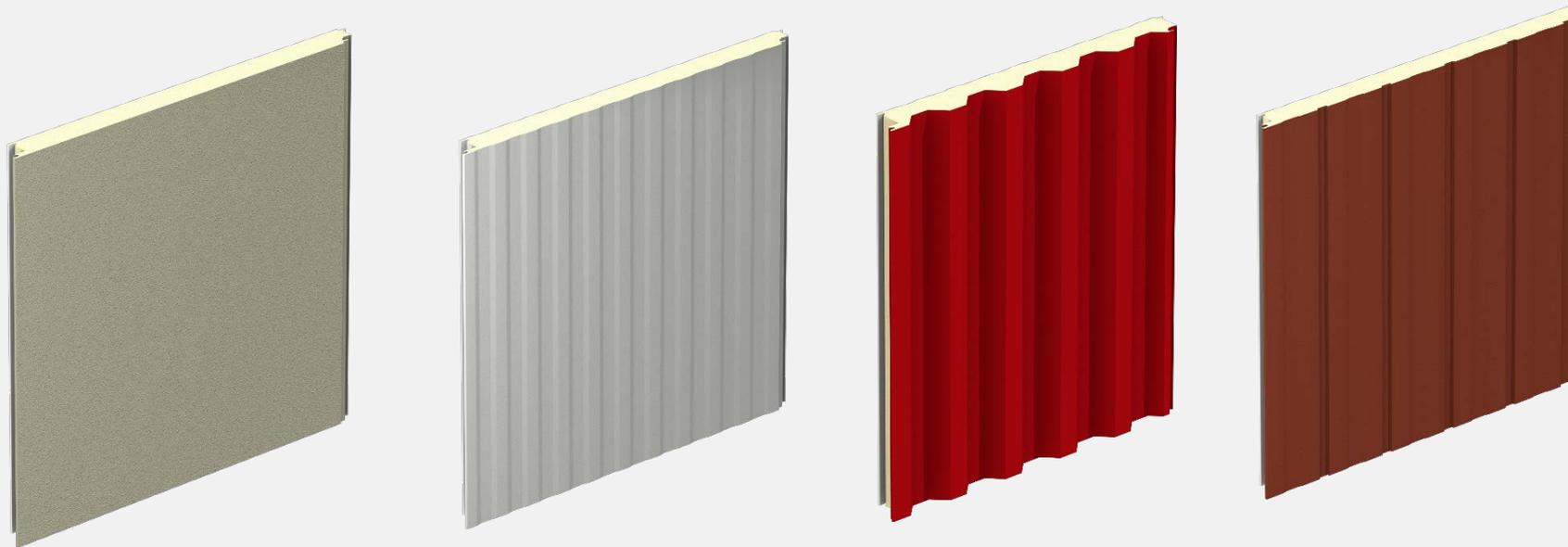
Kevin Franz - AIA, LEED AP BD+C, CSI, CDT

# Course / Learning Objectives

- Understand the characteristics that best describe commercial/industrial insulated metal panels (IMPs)
- Understand the design options for commercial/industrial IMPs
- Visualize the installation process of IMPs, including flashings and sealants
- Recognize the factors affecting panel spans, and the relationship of these factors to structural supports
- Understand how IMPs provide all necessary air, water, vapor and thermal control layers through a single component
- Comprehend why IMPs are ideally suited for pre-engineered buildings (PEBs)
- Knowledge of IMP code compliance
- Be able to differentiate between the various paint, corrosion, panel and weathertight warranties available with IMPs

# What are Insulated Metal Panels?

- Rigid urethane foam sandwiched between two sheets of pre-painted metal
- Single component provides exterior finish, interior finish and ALL building envelope control layers



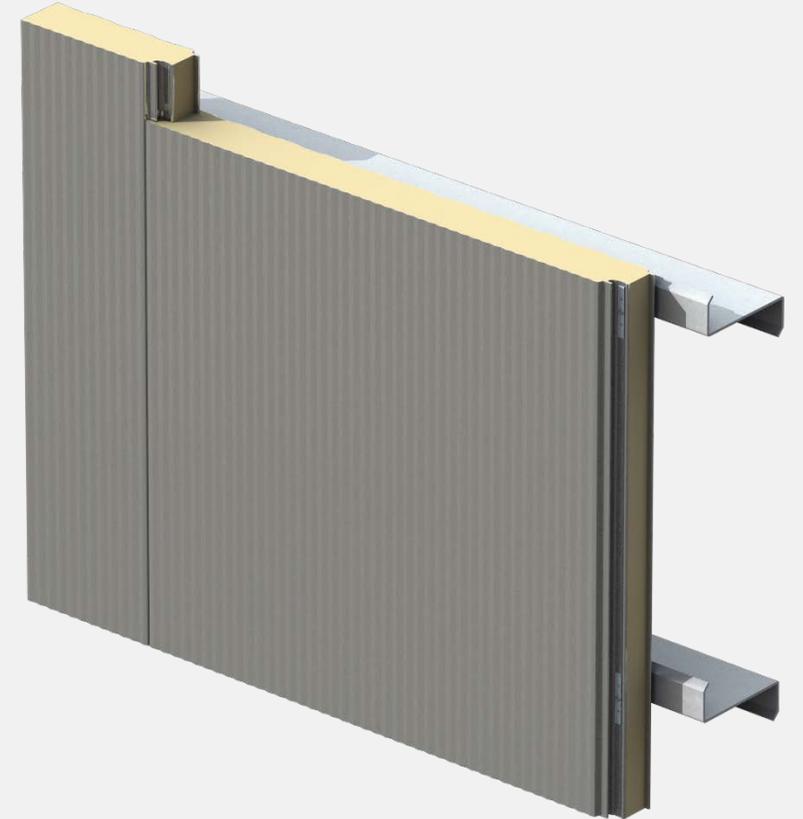


## IMP Characteristics

- Functional and attractive
- Lightweight, single step installation
- Factory insulated, provides all finish and control layers
- Economical, energy saving and sustainable

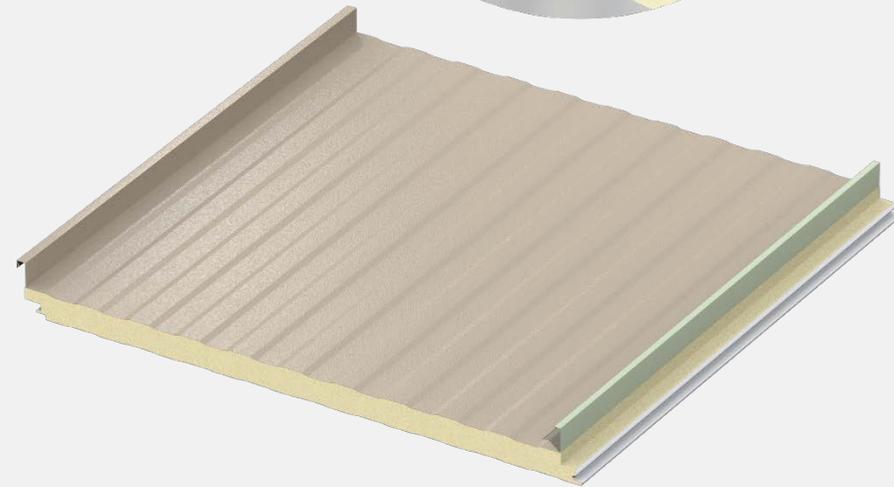
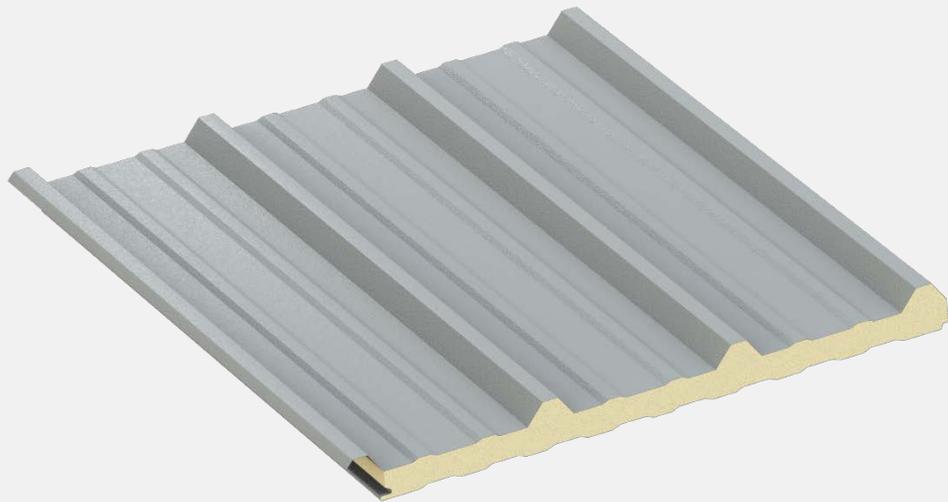
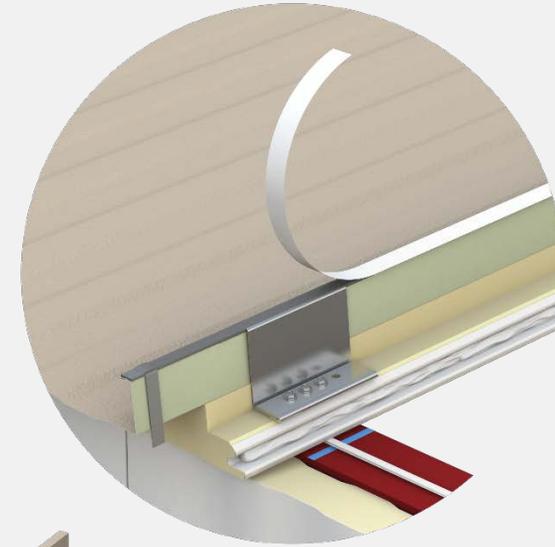
# Configurations - Wall

- 2" to 6" thick ( $\approx R14 - 45$ )
- Standard widths: 42", 36", 30", 24"
- Wide variety of profile and finishes
- Concealed fasteners



# Configurations - Roof

- 2" to 6" thick ( $\approx R14 - 45$ )
- Standard widths: 42", 36"
- Wide variety of finishes
- Concealed and through fastened options



# Commercial and Industrial Market Description

## Commercial and Industrial wall *panels*:

- Lighter gauge facings (26-22 gauge)
- Profiled and embossed
- Vertical orientation (90%+)
- Standard widths (42" most common)
- Metal flashings more often than aluminum extrusions
- Minimum post-fabrication (bends and folds)



# Commercial and Industrial Market Description

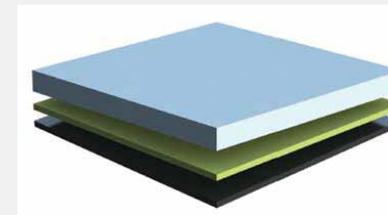
## Commercial and Industrial *projects*:

- Balance of performance and aesthetics
- Moderate design sophistication
- Low to moderate budgets
- *Often pre-engineered buildings*
- *Examples: manufacturing plants, distribution centers, box retailers, churches, aviation*

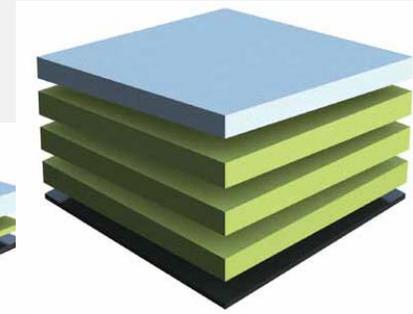


# Design Options - Finishes and Coatings

- Prefinished on BOTH exterior and interior faces
- Essentially maintenance free
- Resists UV degradation, corrosion, acid rain, chemicals, pollutants
- 20 Year+ finish warranties
- Smooth, embossed and stucco finish options



Standard 1.0 mil.



High build 3.2 mil.



Standard embossing



Heavy embossing



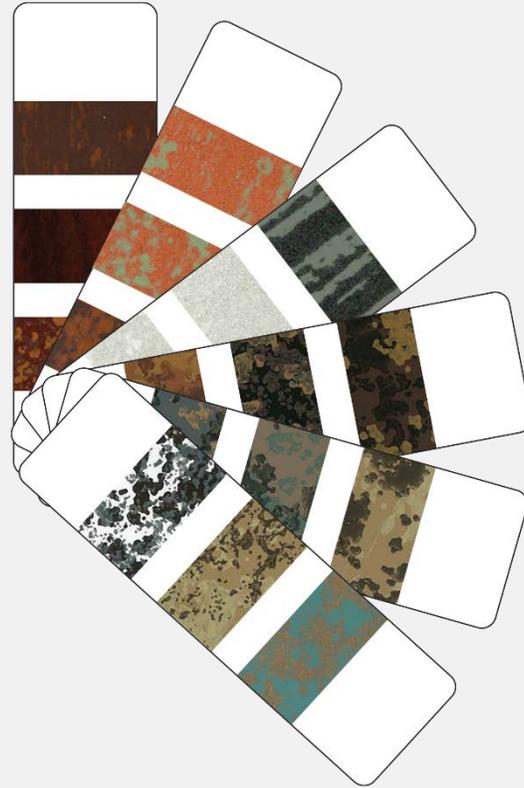
Stucco finish



# Design Options - Finishes and Coatings



- Solids
- Micas
- Metallics
- Color shifting



- Weathered metals
- Patinas
- Variegated stone



- Stucco\*
- Pre-cast\*

# Design Options – IMPs and Masonry

Gatherings Shopping Center  
Location: Port Arthur, Texas  
Architect: Architectural Alliance Inc.



# Design Options – Mosaic Patterns

Detroit Public Safety

Location: Detroit, Michigan

Architect: SmithGroup/JJR



# Design Options – Color and Profile Variations

Exeter YMCA

Location: Exeter, New Hampshire

Architect: Bruce Ronayne Hamilton



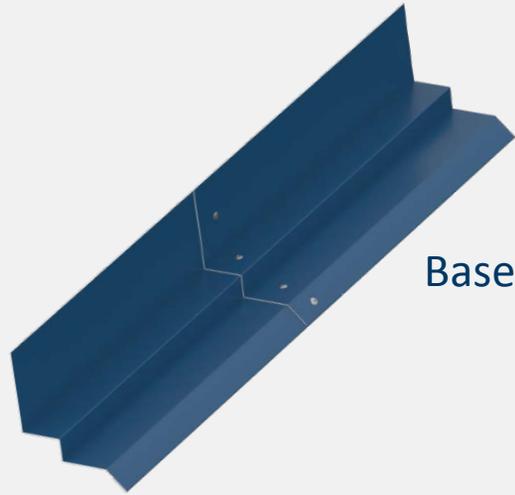


## Design Options – Accent Bands



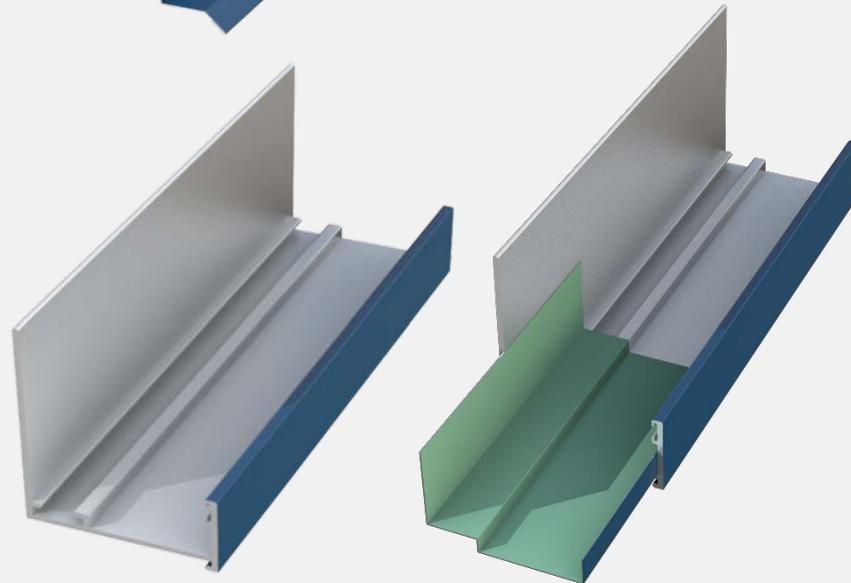


# Design Options – Flashings and Extrusions



Base flashing

Corner flashing

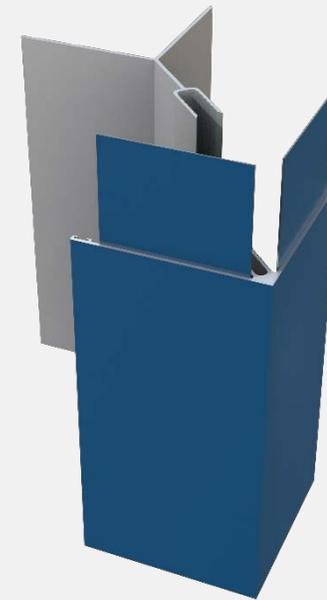


Base extrusion

...w/lap strip



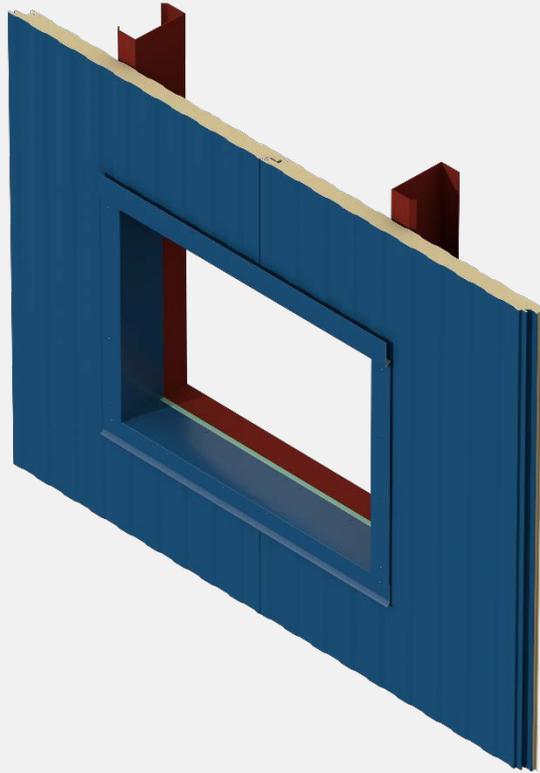
Corner Extrusion (2 pce.)



...w/lap strips

# Design Options – Flashings and Extrusions

- Metal flashings are most cost effective
- Aluminum extrusions provide superior durability and aesthetics



Window opening with metal flashing



Optional aluminum extrusions

## Design Options – Interior Exposed

- Exposed interior ideal for manufacturing, storage or athletic facilities
- Durable, washable, bright interior



## Design Options – Interior Finished

- Vertical hat channels installed over girts
- Gypsum sheathing applied to hat channels



# Support Structure

Stotz Equipment

Location: Marana, Arizona

Architect: Davidson Architects



# Support Structure

## Wall panel spans determined by:

- Wind loads (pressures)
- Panel thickness
- Panel facings (profiles and gauges)
- Structural support gauge and spacing
- Deflection criteria



# Support Structure

Vertical panels require *horizontal* supports

- Pre-engineered buildings
- Structural steel





# Support Structure

***Question: Why do IMPs and pre-engineered buildings (PEBs) work so well together?***

***Answers:***

- ✓ Girt spacing and gauges adaptable to IMPs
- ✓ Adjustable girts provide accurate alignment for panels
- ✓ Compatible deflection characteristics
- ✓ Same crews and equipment can be used to install both products
- ✓ IMPs installed *exterior* of girts, eliminates cavity wall condensation
- ✓ Compatible:
  - Flashing and trim details
  - Construction sequence
  - Metals/materials/sealants
  - Engineering requirements
- ✓ Similar distribution channels/market segments



# Support Structure

***Question: Why are IMPs also compatible with structural steel buildings?***

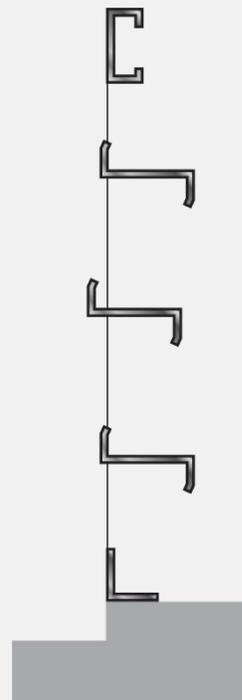
***Answers:***

- ✓ Heavier girt gauges allow maximum panel spans, saving materials and labor
- ✓ Compatible deflection characteristics
- ✓ Same crews and equipment can be used to install both products
- ✓ IMPs installed *exterior* of girts, eliminates cavity wall condensation
- ✓ Compatible:
  - Flashing and trim details
  - Construction sequence
  - Metals/materials/sealants
  - Engineering requirements

# Support Structure

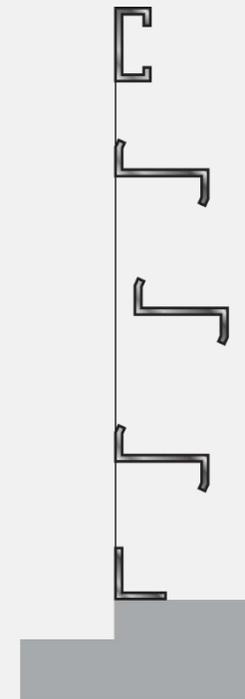
## *Tolerances*

- Horizontal supports should be **adjustable** inwards/outwards of wall plane
- Girt alignment critical to panel appearance
- Slight outward bow = acceptable
- Inward bow = *not* acceptable



≤ 8' spacing: +1/8", -0"

≥ 8' spacing: +1/4", -0"



# Installation

Balletto Vineyard & Winery

Location: Santa Rosa, California

Architect: O'Malley, Wilson, Westphal



# Installation

***Faster installation is a primary benefit of IMPs:***

- ✓ Factory assembled component
- ✓ One piece wall assembly
- ✓ Lightweight
- ✓ Pre-finished
- ✓ Less affected by weather

***The next slide features a video animation of panel installation!***

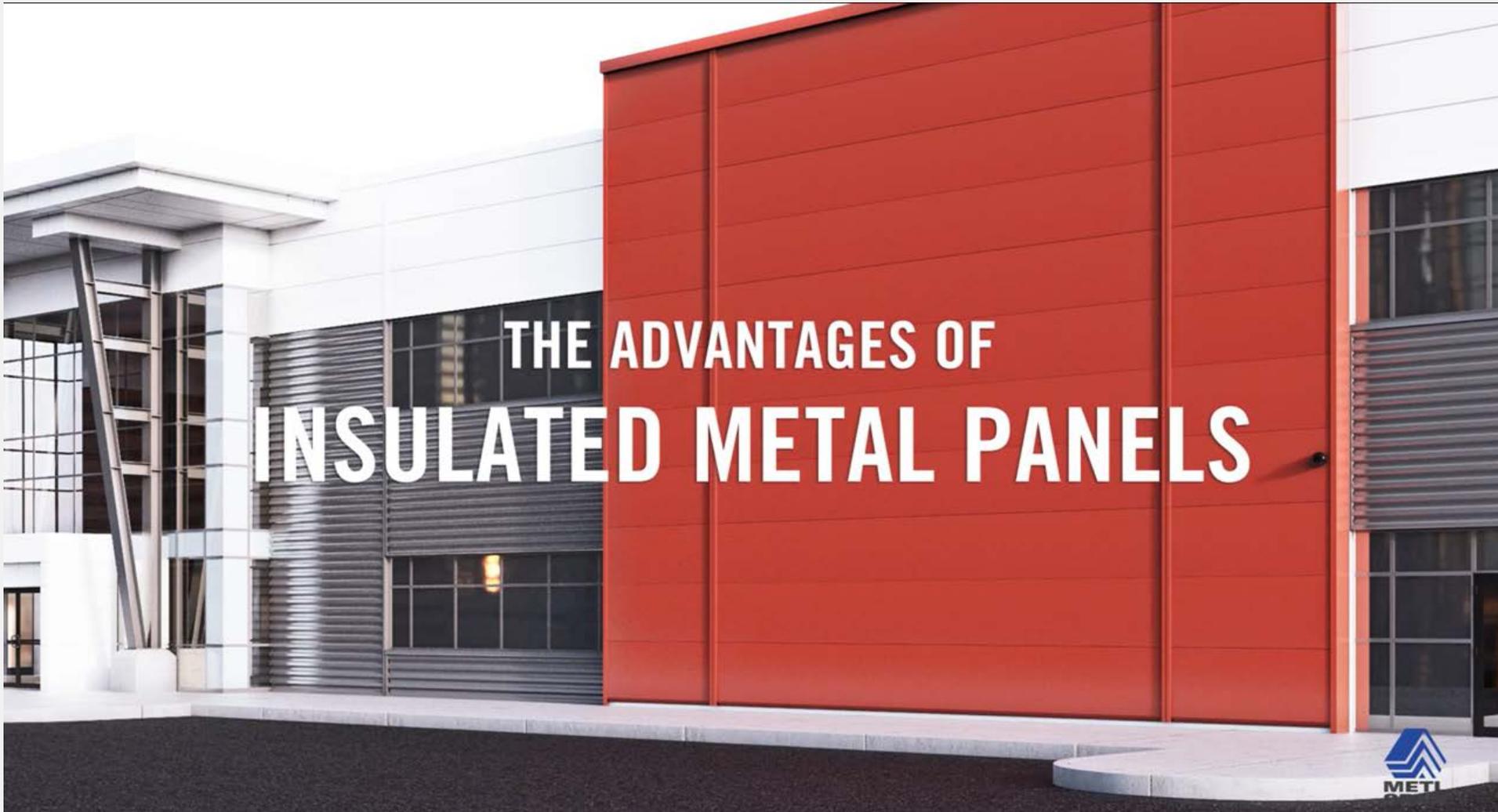




# Installation



# IMPs and Building Control Layers



# IMPs and Building Control Layers – Water

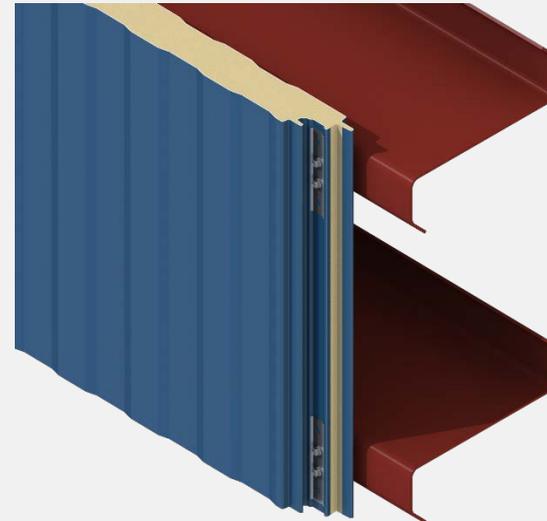
## Barrier Walls



### Single line of defense:

- Lacks redundancy

## Insulated Metal Panels



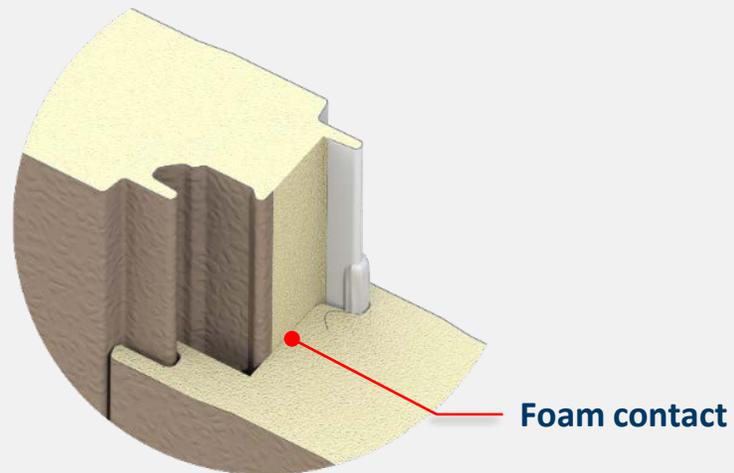
### Hybrid technology: barrier AND rainscreen functionality:

- Outer water shedding layer
- Integral joint drainage
- Interior liner side provides redundancy

# IMPs and Building Control Layers - Thermal

## Insulated Metal Panels Minimize Thermal Bridging

- Panel faces are separated
- Foam to foam edge contact ( $\geq 2.5''$  thick panels) provides continuous insulation
- Panel mounting clips attach to exterior facings only
- R values up to 45+



# IMPs and Building Control Layers - AIR

- Protects against air infiltration
- Serves “double duty” as vapor barrier
- Does not require redundant assemblies

**Insulated Metal Panel**



*Replaces need for wraps and fluid applied assemblies*



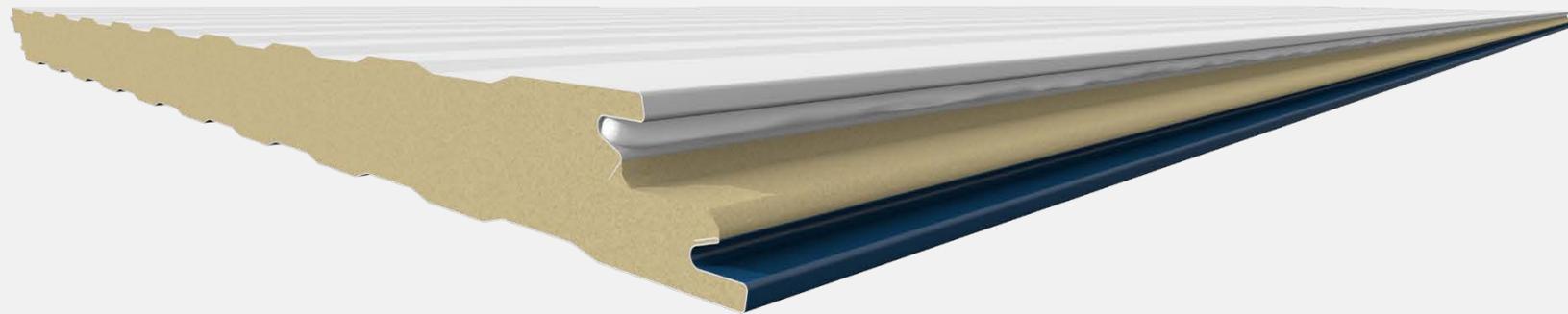
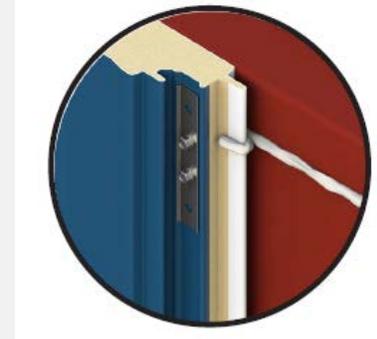
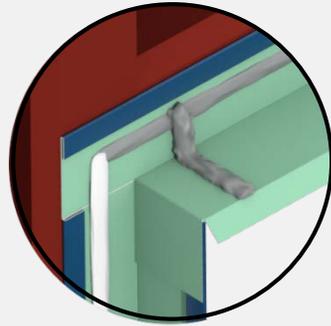
**Wraps**



**Fluid Applied**

# IMPs and Building Control Layers - Vapor

IMPs provide an integral vapor barrier – panels sealed to structure and flashings



# IMPs and Building Control Layers – Barrier Walls

## *New technology for rainscreen barrier walls*

- Metal panel cladding over **IMPs**
  - Minimum continuous 3/8" air gap
- Terracotta tile over **IMPs**
  - Minimum continuous 3/8" air gap
- Brick veneer over **IMPs**
  - 1" air gap



**Metal Panel Cladding**



**Brick Veneer**

**Terracotta Tile**

# Retrofitting with IMPs – Case Study



# Code Compliance: Fire and Structural

Blount Community Church  
Location: Maryville, Tennessee  
Architect: Michael Brady Inc.





# Code Compliance: Fire and Structural

- **FM 4880/4881** (Walls): large scale testing regimen
  - Flame Spread of  $\leq 25$ , Smoke Developed rating  $\leq 450$  (Class A)
- **FM 4471** (Roof): large scale testing regimen
  - Class 1A rated assemblies
- **ASTM E-72** - Structural test for positive/negative wind loads
  - Deflection criteria used *exceeds* code requirements
    - L/180 for walls and L/240 for roofs
- **UL 580, FM 4471** - Wind uplift ratings



# Code Compliance: Thermal Transmittance

- **R-values** range from  $\approx 14$  to 45 as tested per **ASTM C518** at 75°F mean temperature (panel core testing)
- **R-value** test data also available per **ASTM C1363** (panel assembly testing)
- **U-value** data also available to assist in code compliance
- **Technical services** can provide data for ALL three energy code compliance pathways:
  - Prescriptive tables
  - Envelope trade-off
  - Building energy cost budget

# Code Compliance: Water Penetration and Air Infiltration

## *No uncontrolled water leakage:*

- 6.24 psf air pressure differential for walls (**ASTM E 331**)
- 12 psf for roof panel assemblies (**ASTM E 1646**)

## *Air infiltration $\leq 0.04$ cfm/sf:*

- 6.24 psf air pressure differential for walls (**ASTM E 283**)
- 12 psf for roof panel assemblies (**ASTM E 1680**)

*IMPs meet or exceed all code requirements for air and water leakage without supplemental control layers.*

# IMP Product and Installation Warranties

Davidson Center for Space Exploration  
Location: Huntsville, Alabama  
Architect: Gresham Smith and Partners





# IMP Product and Installation Warranties

- **Paint finish warranties**
  - Chalk, fade and adhesion
  - Terms for each may NOT be the same
  
- **Paint system *resin* determines extent of warranties**
  - PVDF (polyvinylidene fluoride) aka Kynar, Hylar
  - FEVE (fluoroethylene vinyl ether)
  
- **Thicker paint films** help protect against substrate failure, but is not a *guarantee*.

*Paint warranties apply to the paint film itself and not the underlying metal. They are NOT the same as corrosion warranties.*

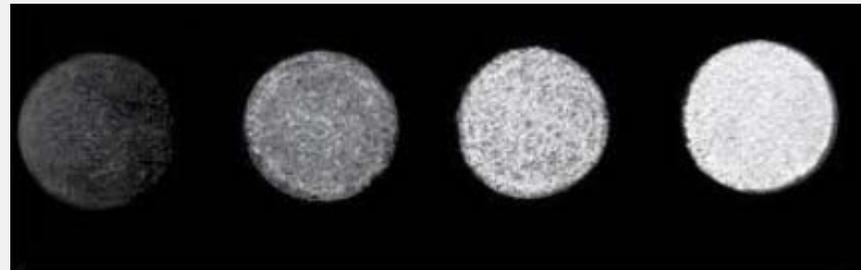
# IMP Product and Installation Warranties

*Paint terms explained...*

**Fade**



**Chalking**



Minimum chalking  
#8 rating

Lots of chalking  
#2 rating



- Good results remember **“chalk high, fade low!”**



# IMP Product and Installation Warranties

## ➤ Corrosion warranties

- Apply to base metal only
- Require the use of AZ-50 coated steel
- Not available with G-90 substrates
- Aluminum substrates recommended for marine environments
- Exclusions
  - projects within 1,500 feet of marine environment
  - corrosive environments (chemical processing, waste water plants etc.)

*Corrosion warranties are different than paint warranties and apply to the underlying metal substrate, not the paint!*



# IMP Product and Installation Warranties

## ➤ Weathertight warranties

- *Most* leaks are *installation* related
- *Some* leaks are *detail/design* related
- *Very few* leaks are product related
- Some IMP manufacturers offer weathertight warranties, but typically require installing contractor participation
- Best bet = weathertight warranty should be provided by General Contractor

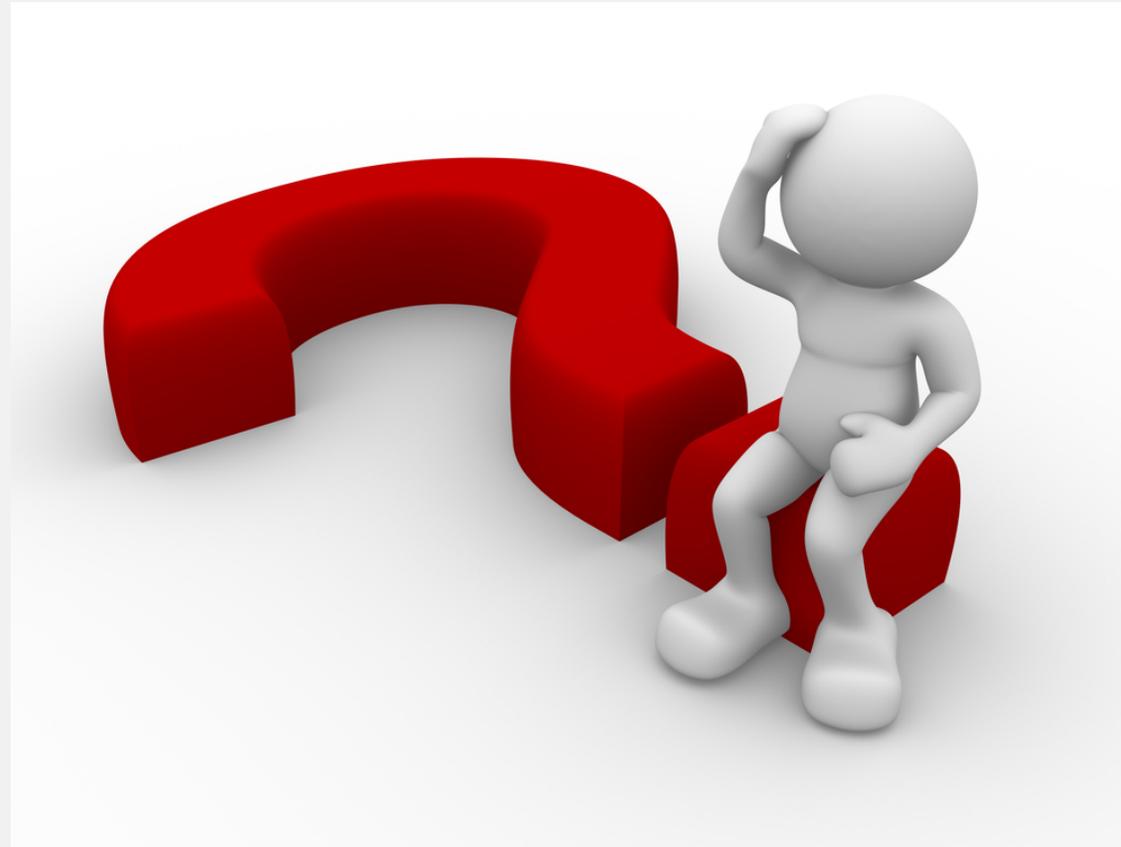
- *Manufacturers supply materials and recommended installation details.*
- *Contractors (and sub-contractors) are responsible for proper installation!*

# Sustainability and Transparency

- IMPs provide substantial contributions to the USGBC LEED® Green Building Rating System
- Environmental Product Declarations (Type III)
- Health Product Declarations



# Questions?



Thank you!