10 Things UHPC Facades Can Do That Conventional Precast Cannot

Really?

Webinar will start at noon

Why Did I Say That?

Easier to just pitch product.

Nobody comes and asks – “I am considering precast and want to compare it to ventilated rainscreen walls.” Nobody in 20 years. Why?

"…who at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who neither know victory nor defeat.“ FDR

Petra Cast – Mahmoud Al Fayez

Façade Systems Inc – Blair Davies P.Eng.

Learning Objectives

- Get people thinking. Explore Convergence v Disruption
- Explore why these two technologies are in the same conversation.
- Explain history and how we got here.
- Position precast from an outsider's point of view.
- Explore the 10 Things UHPC Facades Can Do That Conventional Precast Cannot.
- What is the up and comer v. insulated precast concrete panels.
- The nitty gritty on how UHPC is made.
- Case studies.

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10 (lbs/sq ft)

Modern GWP

Colour consistency by design

Mold creativity

Ventilated rainscreen

Self healing – resistance to cracking

Water resistance <10mm

Bespoke by design

Retrofit [brand, fix, improve]

Economics by Mold replication

Attachment freedom

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But Let’s Dream A Bit First

Source www.ductal.com/envelope


Love Concrete, but

Concrete Reimagined

Source:
Renouveau La Fontaine (RLF)
Groups: Eurovia Infra, Pomerleau inc. and Dodin Campenon Bernard SAS

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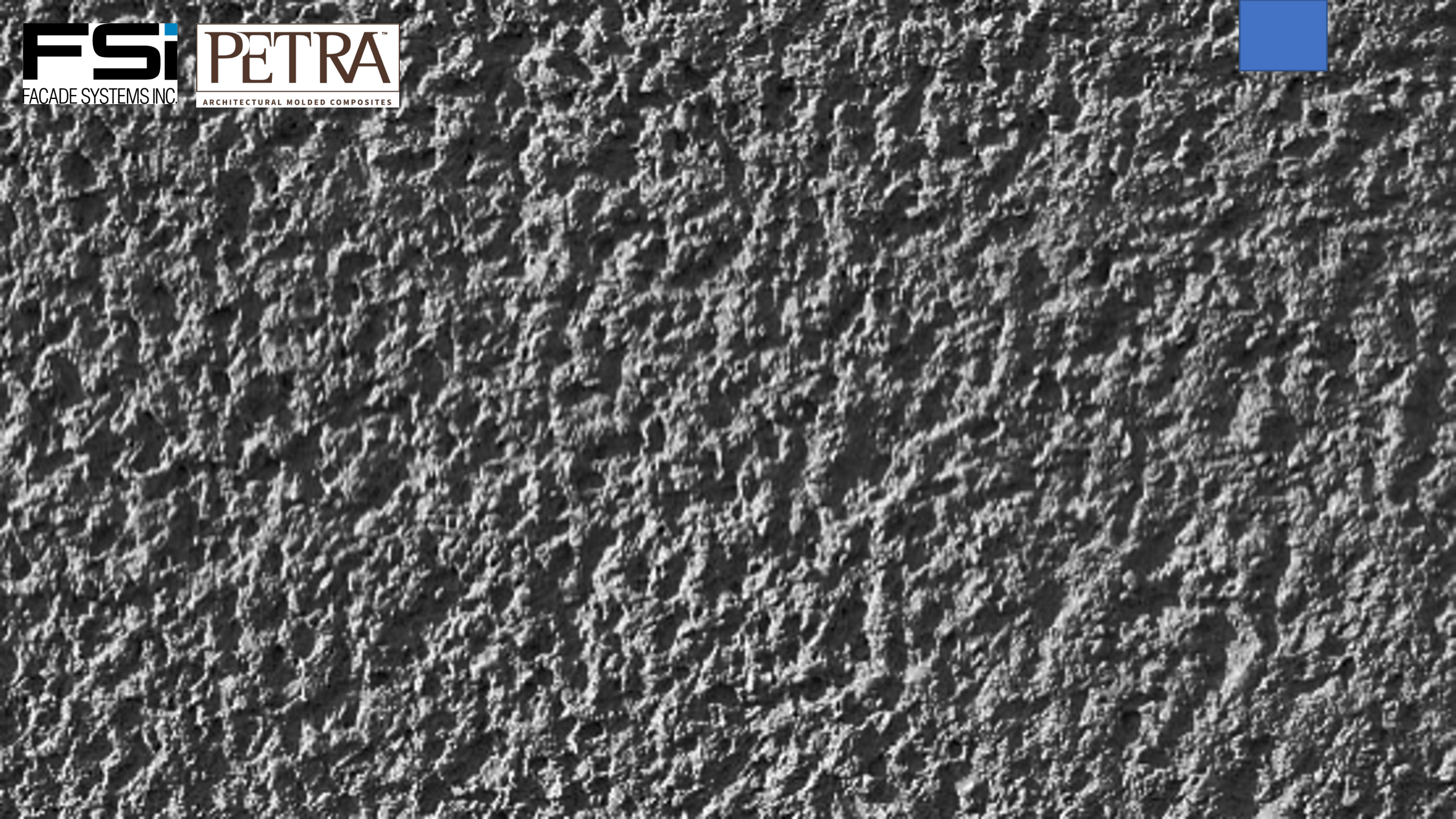
Source: CPCI. 2011
Architect: D’Ambrosio Architecture + Urbanism
Precaster Lafarge.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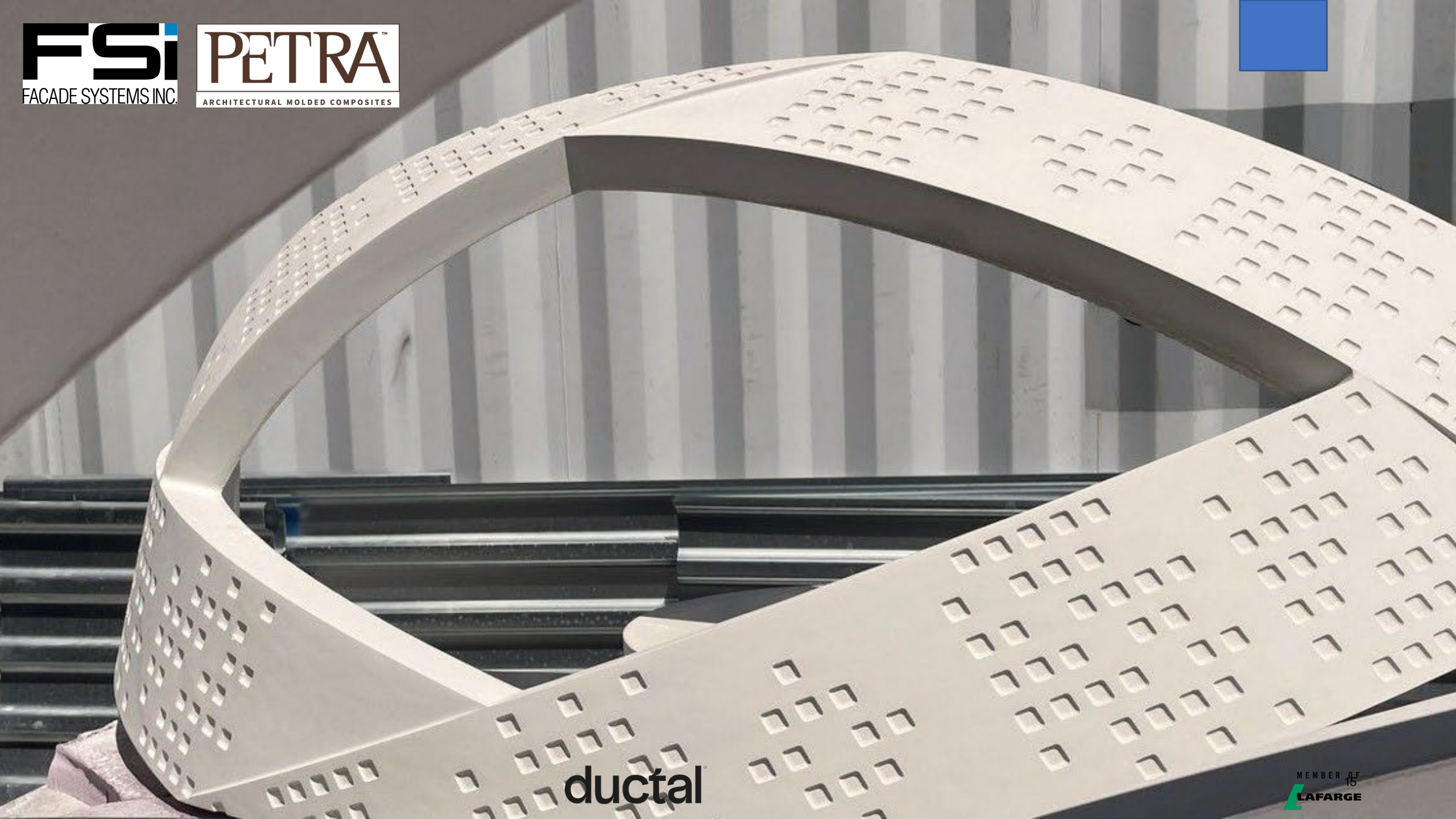
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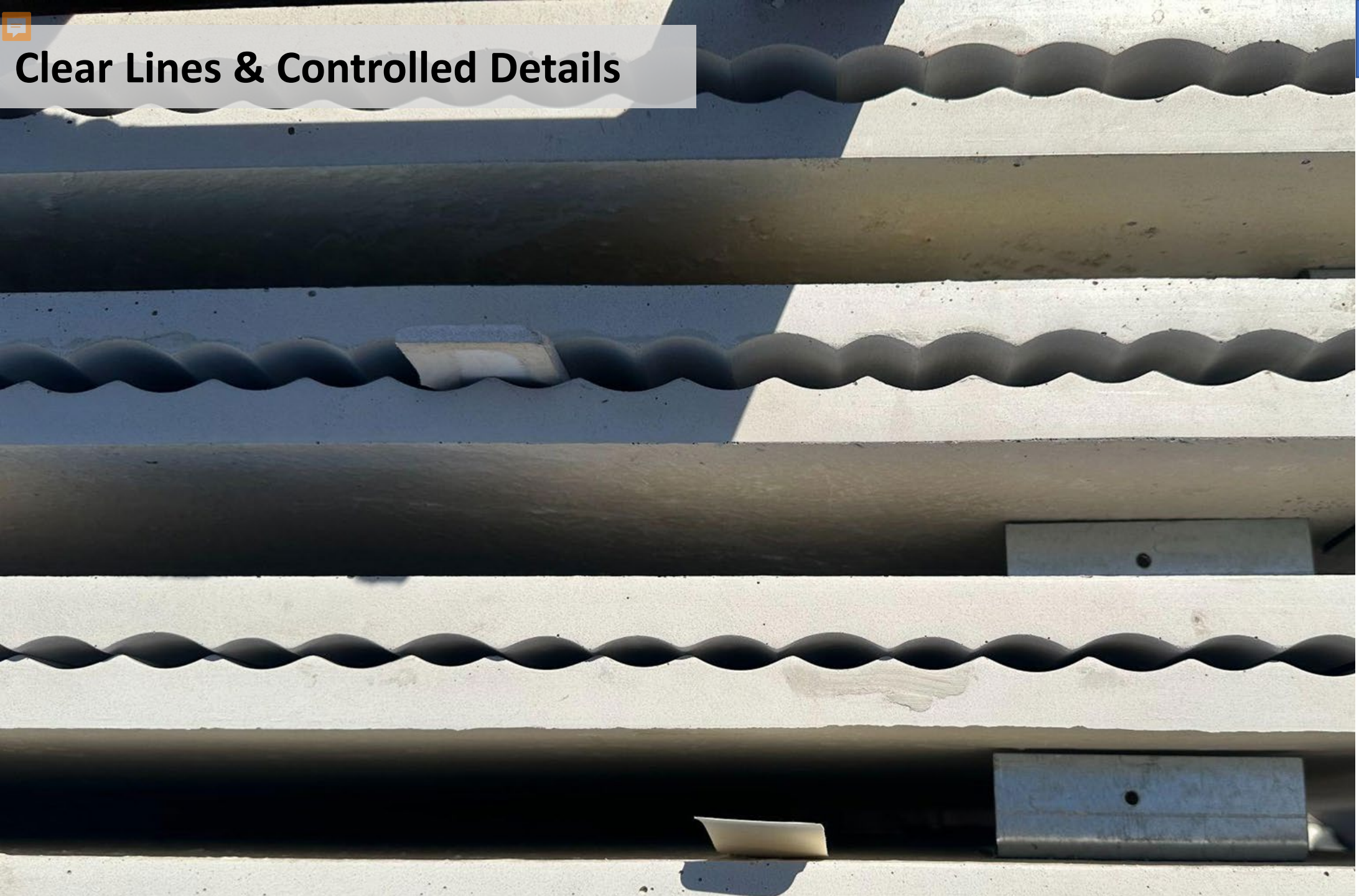
LAFARGE

Clear Lines & Controlled Details



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Convergence

Disruption

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History of UHPC

History of Precast

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The History of Precast Concrete

Kevin Stelzer, architect (30 years): "Architects are infatuated with concrete. Maybe there's a bit of Roman in all of us."

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Six Chapters in the Precast Story

THE ORIGIN

~100 BC – 476 AD

Romans invented it

Volcanic ash + lime poured into reusable wooden forms. The Colosseum. The Pantheon. The aqueducts. Then Rome collapsed — and the knowledge vanished with it.

THE GAP

476 AD – 1905

1,400 years of silence

Portland cement was patented in 1824. Precast still didn't return for another 80 years. The knowledge had to be reinvented almost from scratch. That's not a gap — that's an erasure.

THE REINVENTION

1905 · Liverpool

Brodie — precast & the soccer net

Liverpool city engineer John Alexander Brodie built the first prefabricated panel housing in 1905. He also invented the football goal net in 1889 — and said the net was the invention he was most proud of.

THE INDUSTRIALIZATION

1950s · Soviet Union

Britain ignored it. The Soviets ran with it.

Khrushchev's answer to an overcrowding crisis: Panelki in Russia, Plattenbauten in East Germany. Speed, repetition, zero aesthetics. The most prolific use of precast in history was explicitly anti-architectural.

THE REDEMPTION

1954 & 1967 · North America

Rock & Roll, the PCI, and Habitat 67

PCI founded 1954 — the same year as rock and roll. Then Moshe Safdie's Habitat 67 redeemed precast architecturally at the Montreal Expo. He called it explicitly anti-brutalist — a rejection of what precast had become.

THE PIVOT

1990s – Present

The facade use was almost an afterthought

Precast was a structural workhorse — bridges, housing frames, parking. Only recently did it become architectural cladding mimicking limestone or granite. It was never born for the facade. UHPC was.

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Precast Concrete vs. UHPC*

A comparison across design, technology, and construction

	PRECAST CONCRETE	UHPC
DESIGN		
Colour	Dozens — focus on stains	**Hundreds — integral, stained, sealed**
Texture	Wide choice, complexity in handling	**Smooth to rough, easy to achieve**
Form liners & 3D	Yes	Yes
Comparable to	Brick	Terra cotta
TECHNOLOGY		
Reinforcement	Steel or composite rebar	**Steel fibres — no rebar required**
Plant size	Large plant required	**Small plants viable**
Weight (kg/m²)	190–480	**~10 (approx. 1/20th the mass)**
GWP A1–A3 panel	60–100 kg CO_2e/m^2	**25–35 kg CO_2e/m^2**
GWP structure	High — heavy panels need more	**Negligible added load**
Attachments	Large, structural	**Variable — lightweight, $1–$100**
CONSTRUCTION		
Offsite fab	Yes	Yes — available for both
Crane	Tower crane	**Spider crane — no union rules**
Geographic limits	Yes — weight & shipping costs	**None — light enough to ship anywhere**
Best building	Condo & commercial	**No limits, including retrofit**
Retrofit/reclad	Weight often prevents it	**Purpose-built for it**

UHPC advantage Comparable

GWP figures are A1–A3 cradle-to-gate per m² of cladding panel. Full lifecycle comparison favours UHPC further. Sources: PCI industry EPD; TAKTL EPD (ASTM 2021

***shouldn't have done this**

Developed for infrastructure – Excellent for Facade

Largest global cement producer

- ductal developed for infrastructure; bridges, tunnels, ocean barriers. Behaviours of strength / weight and volume of material, extremely low water absorption, flexibility in manufacturing forms and shapes and high design freedom.
- Exactly the attributes needed for facades.
- Petracast is particularly suited for manufacturing of UHPC panels, as recognized by Lafarge.

Let's learn why

DUCTAL | Long Term Durability

Treat Island, Maine. Extreme Climate

Water absorption and extreme environment testing

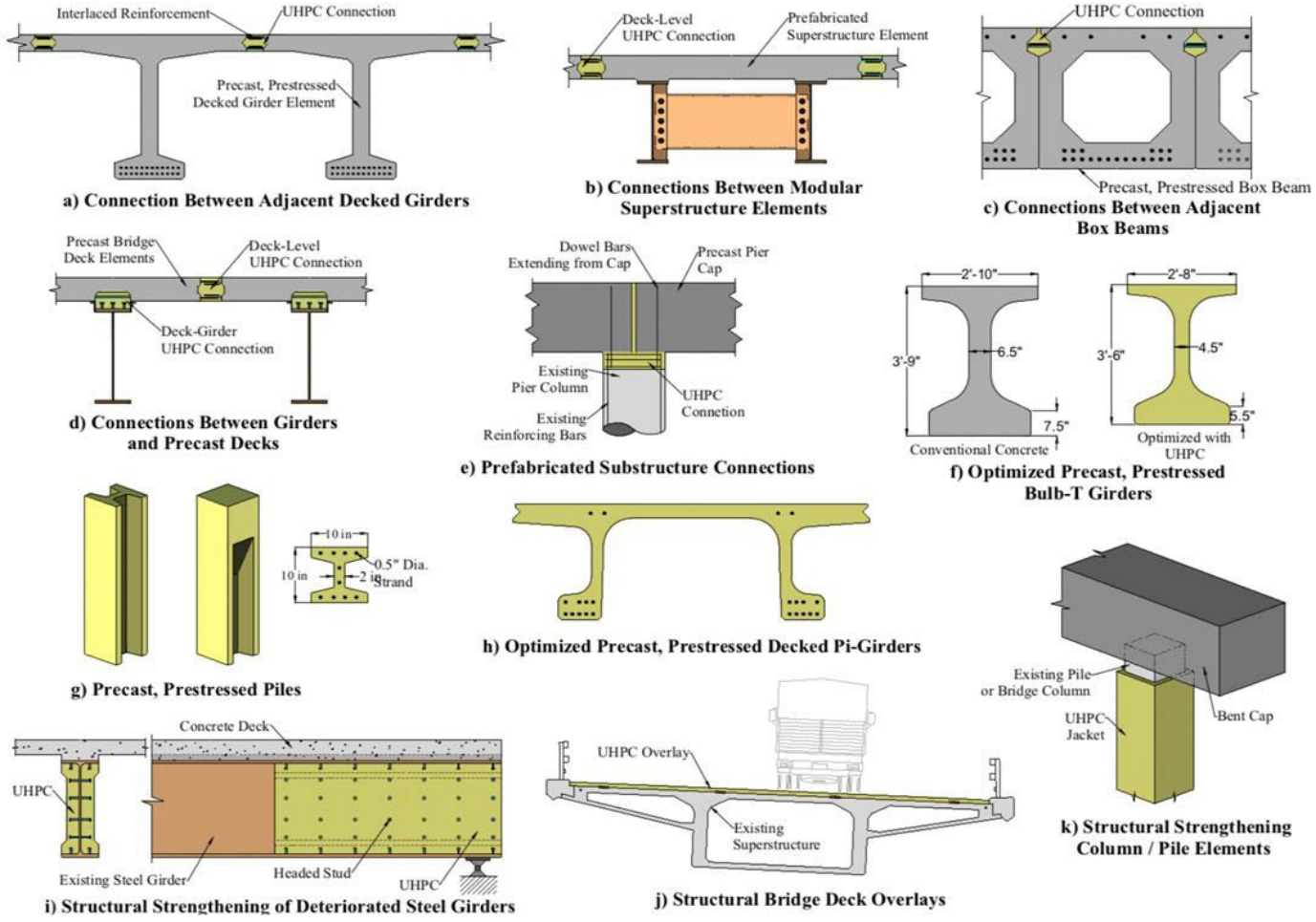
US Army Corp of Engineers

- Chloride profiles revealed penetration to a depth of only +/- 10 mm.
- Electrochemical corrosion of steel fibres* effects at a cover depth of only 25 mm following 20 years.
- No concrete failure.

Comprehensive and extended testing process.

*PVA fibres, non corrosive typically used in facade

If used on bridges and precast….facades?



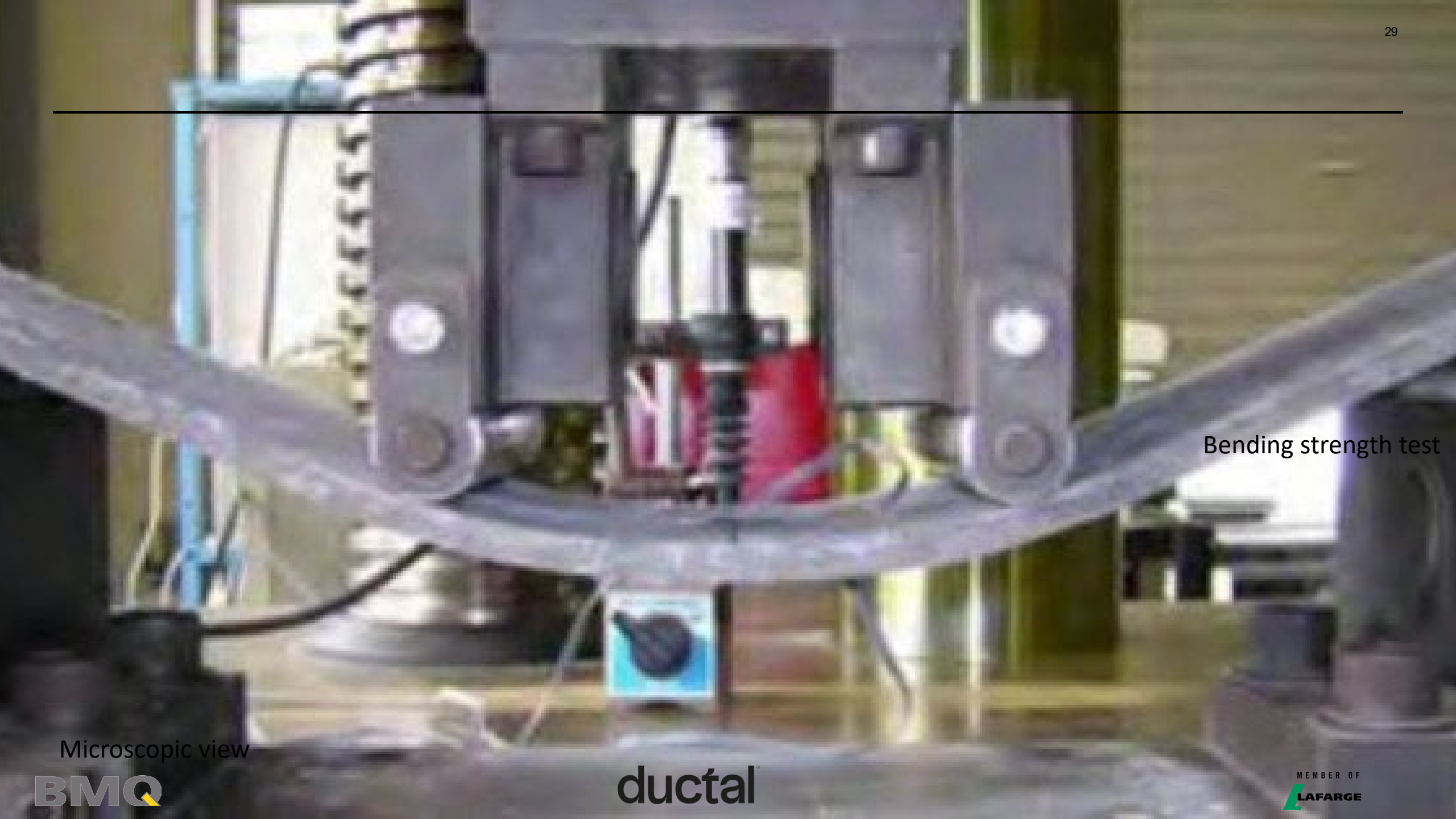
Accelerated and more durable Construction

Connect Precast Concrete, Steel or Wood Elements with UHPC with simplified connections.

UHPC joints are much simpler. Smaller joints, reduced rebar congestion, easier to install panels, no post- tension required.

Improved long-term performance.

Higher quality precast elements increase durability, and UHPC joints will last longer still, with little future maintenance.



Bending strength test

Microscopic view

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Purpose of process

- produce high-quality panels
- consistent strength, color, finish, and dimensional accuracy
- Panels to meet the approved shop drawings
- long-term performance requirements.

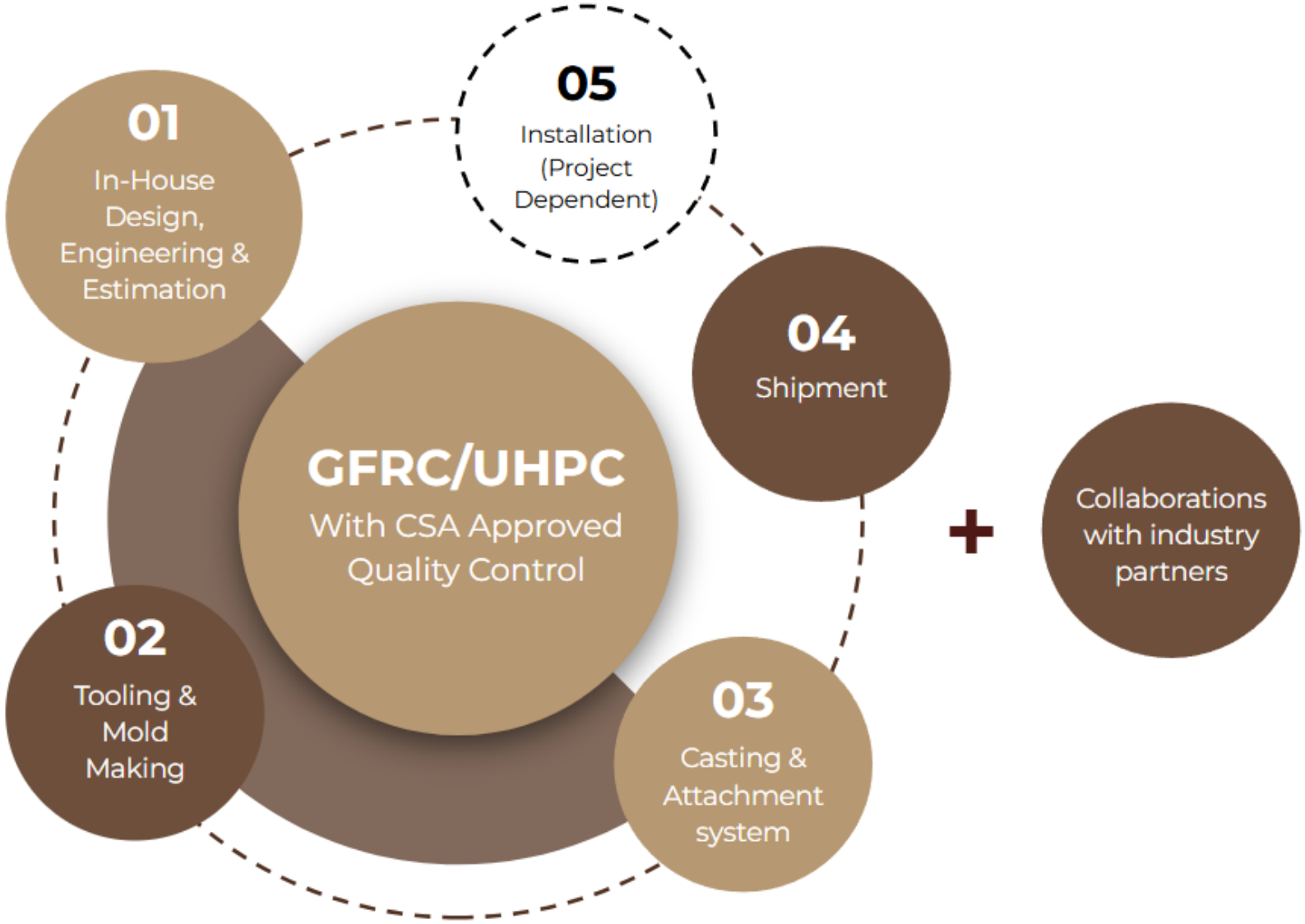
Process flow diagram

Services

the Petra advantage

A Collaborative Design Process

Work with an experienced Team of Project Manager, Designer, and Craftsperson



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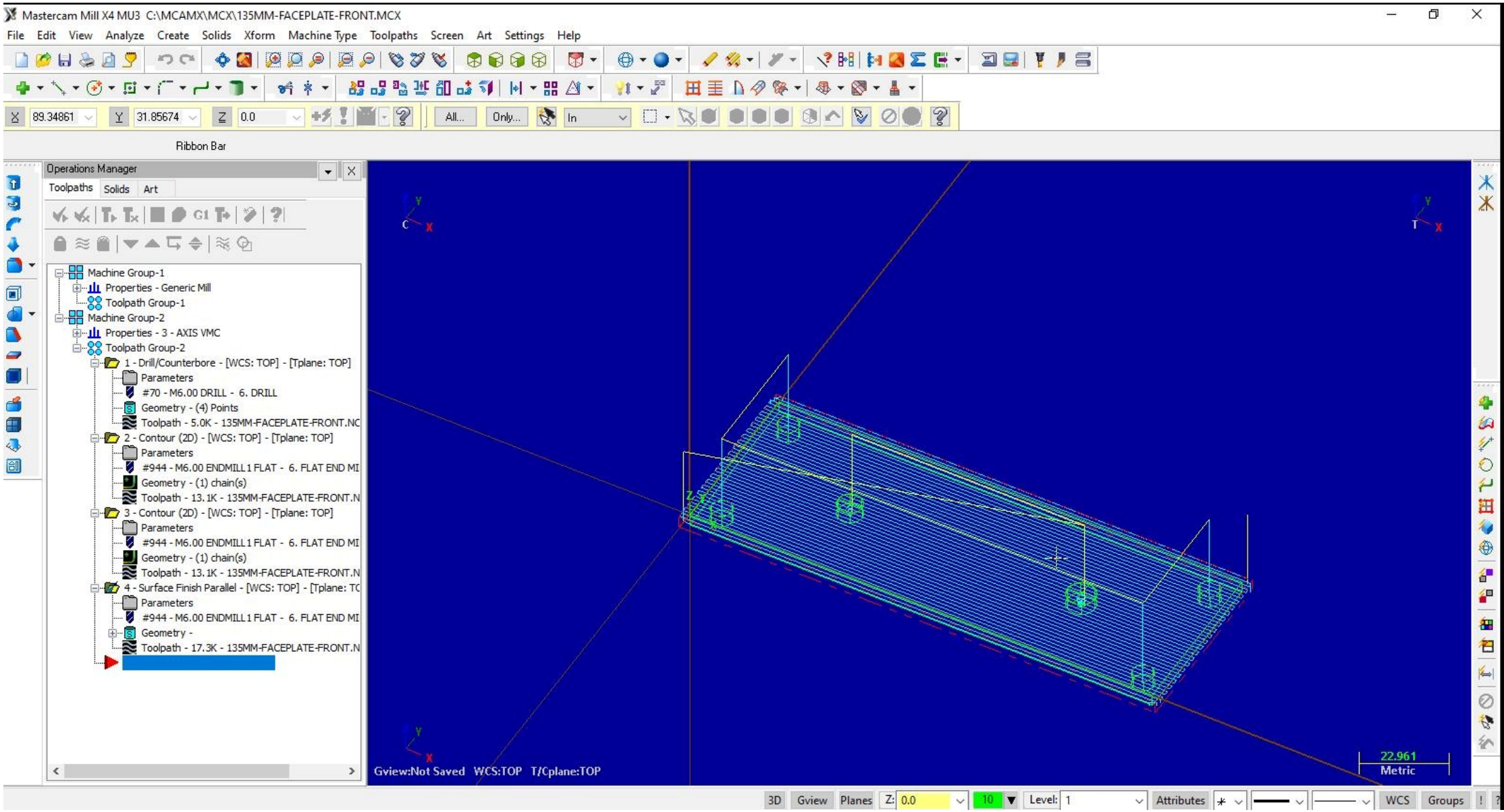
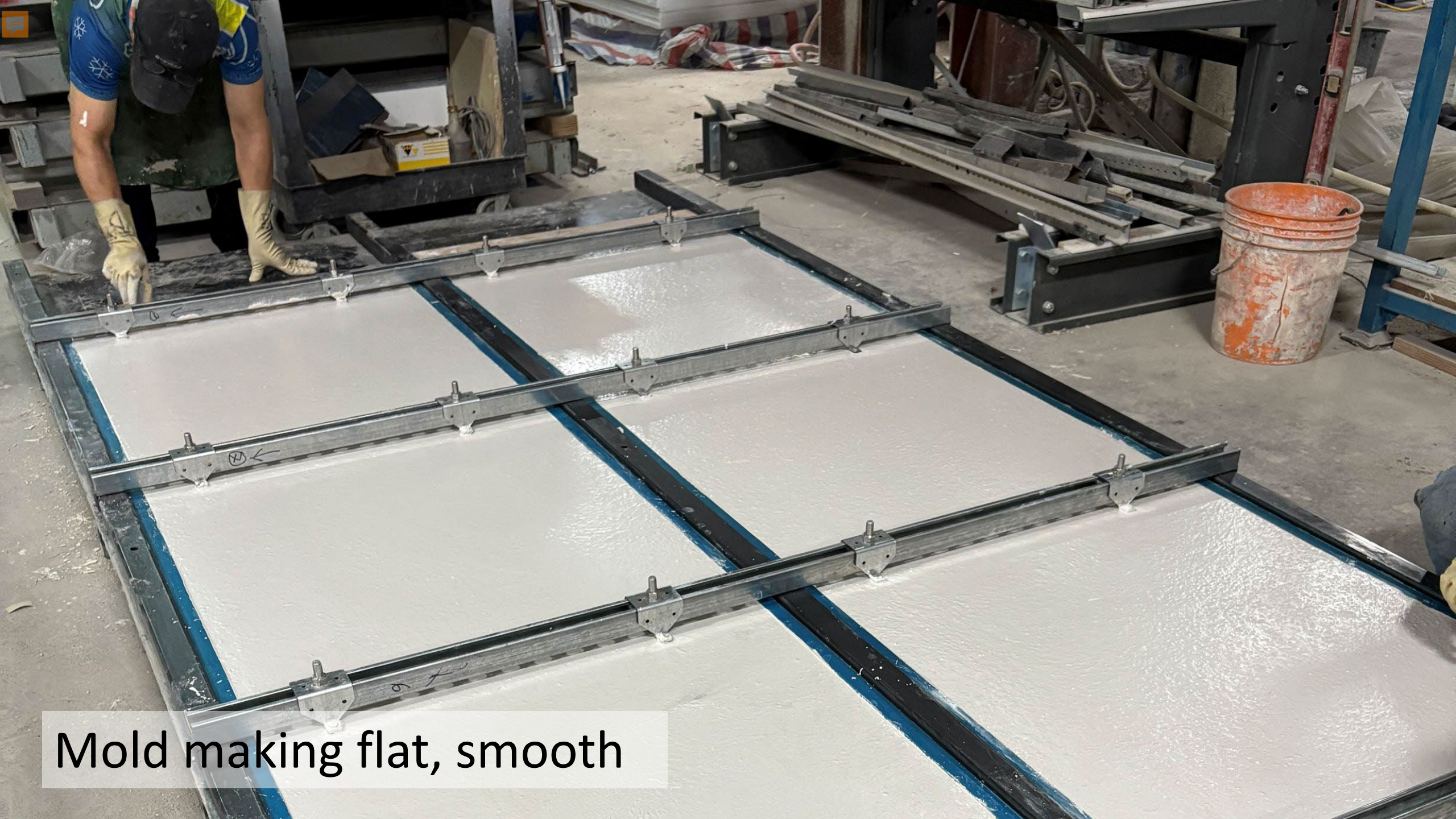
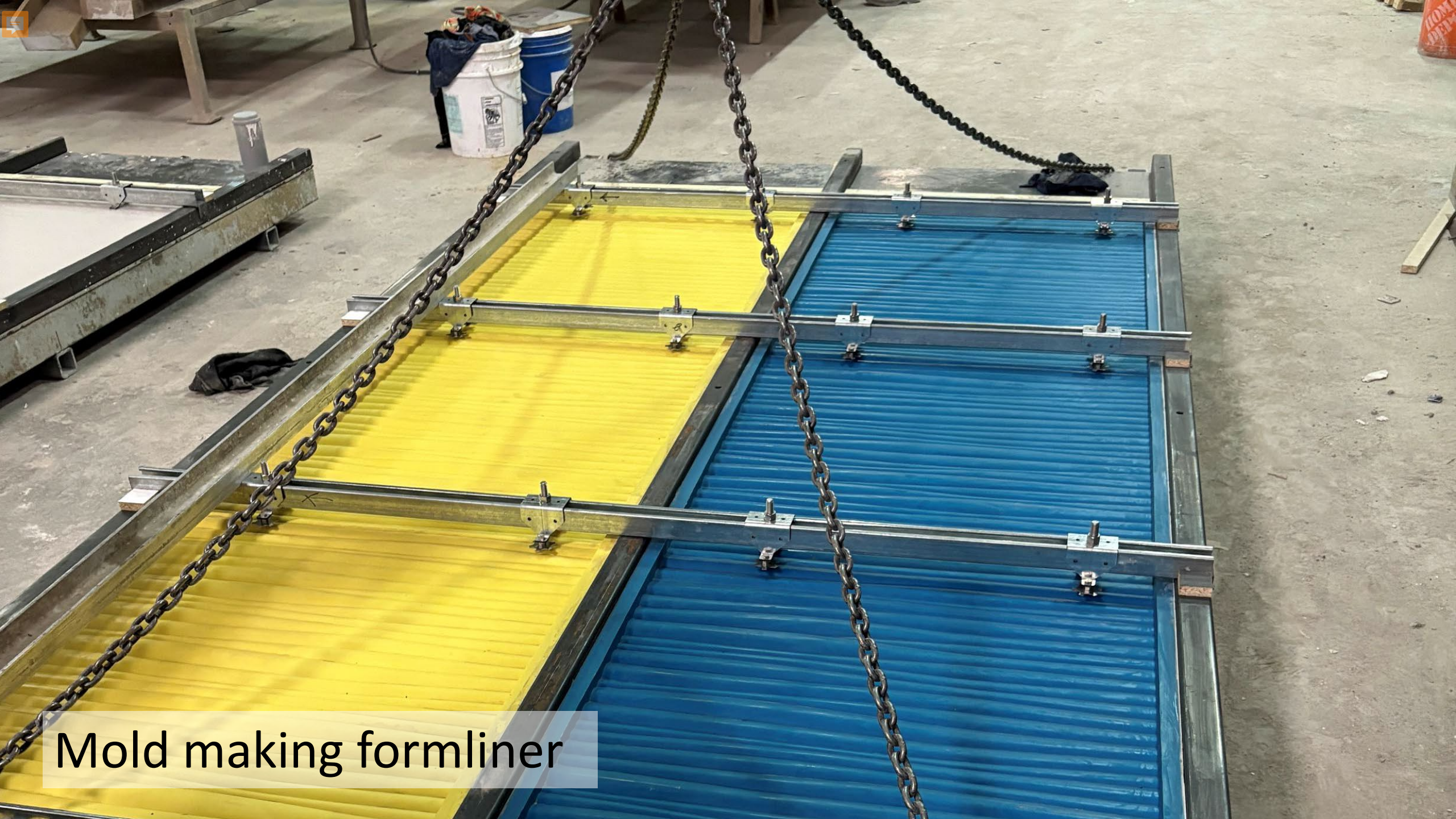
Integrated design and Automation

- For creating of actual scale mold
- CAD-CAM-CATIA integration for Production



Tooling


Mold making flat, smooth


Mold making formliner

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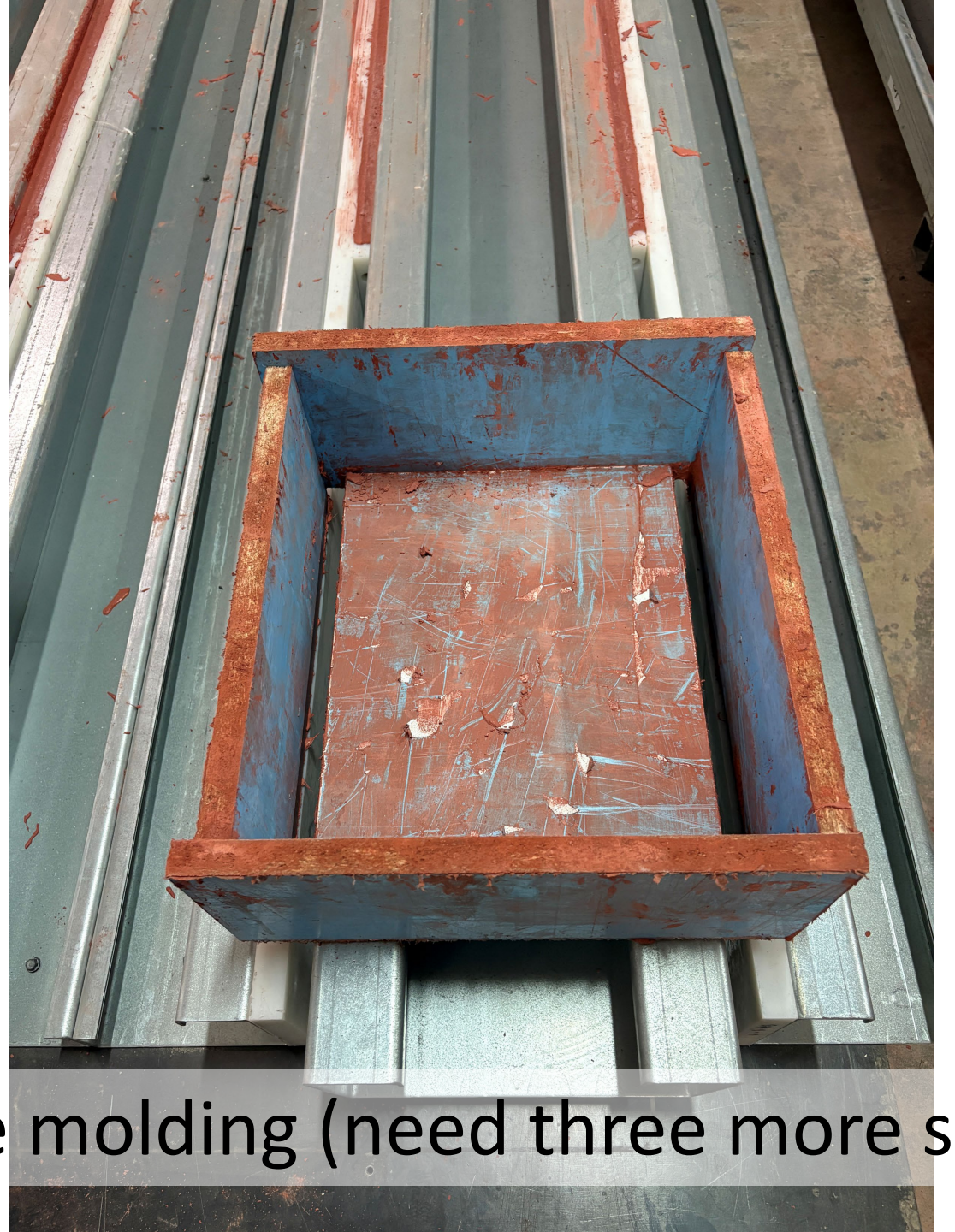

Unique – double molding (need three more slides to explain this

QC sampling

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What do we do?

Petra Design checks each UHPC panel during production, including mold setup, insert locations, mix consistency, casting, curing, surface finish, dimensions, and attachment points.

Why do we do it?

To make sure every panel matches the approved shop drawings, project specifications, quality standards, and installation requirements.

How do we know it is right?

We verify the work against approved drawings, mix codes, dimensional checks, visual inspection, test cylinders, and QC records.

What does Petra do for attachment QC?

Petra checks all cast-in inserts, anchors, and lifting points before pouring and again after demolding to confirm they are correctly located, properly embedded, clean, accessible, and ready for installation.


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AUTO
REPAIRS
MODENA FINE CARS

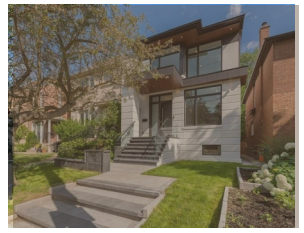
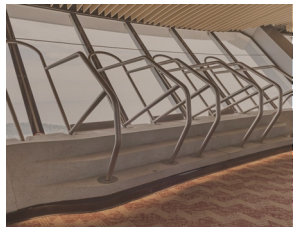




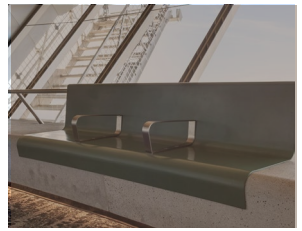




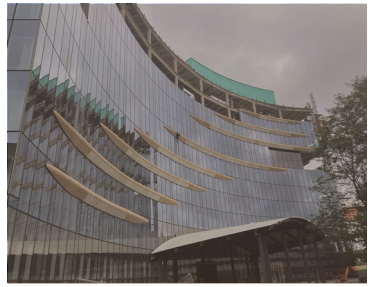


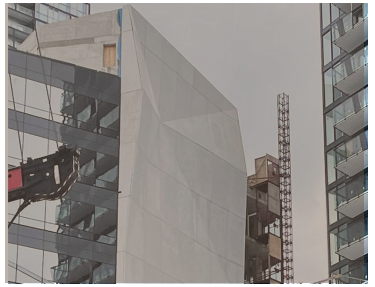





Simple to Complex






US Formliner
DESIGN YOUR CONCRETE BECKER

PATTERN BOOK

Pattern+Rhythm

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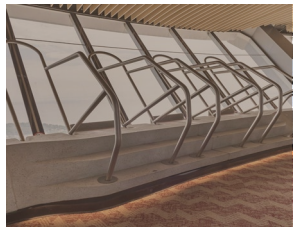






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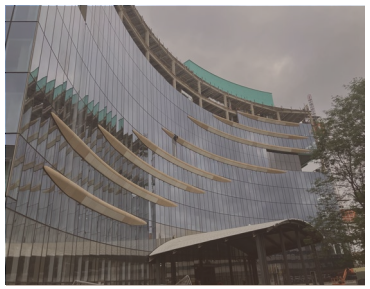

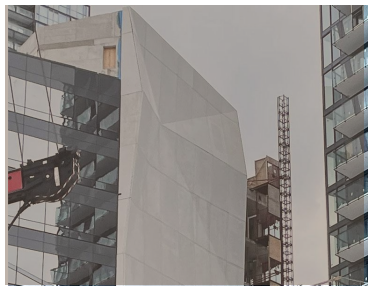


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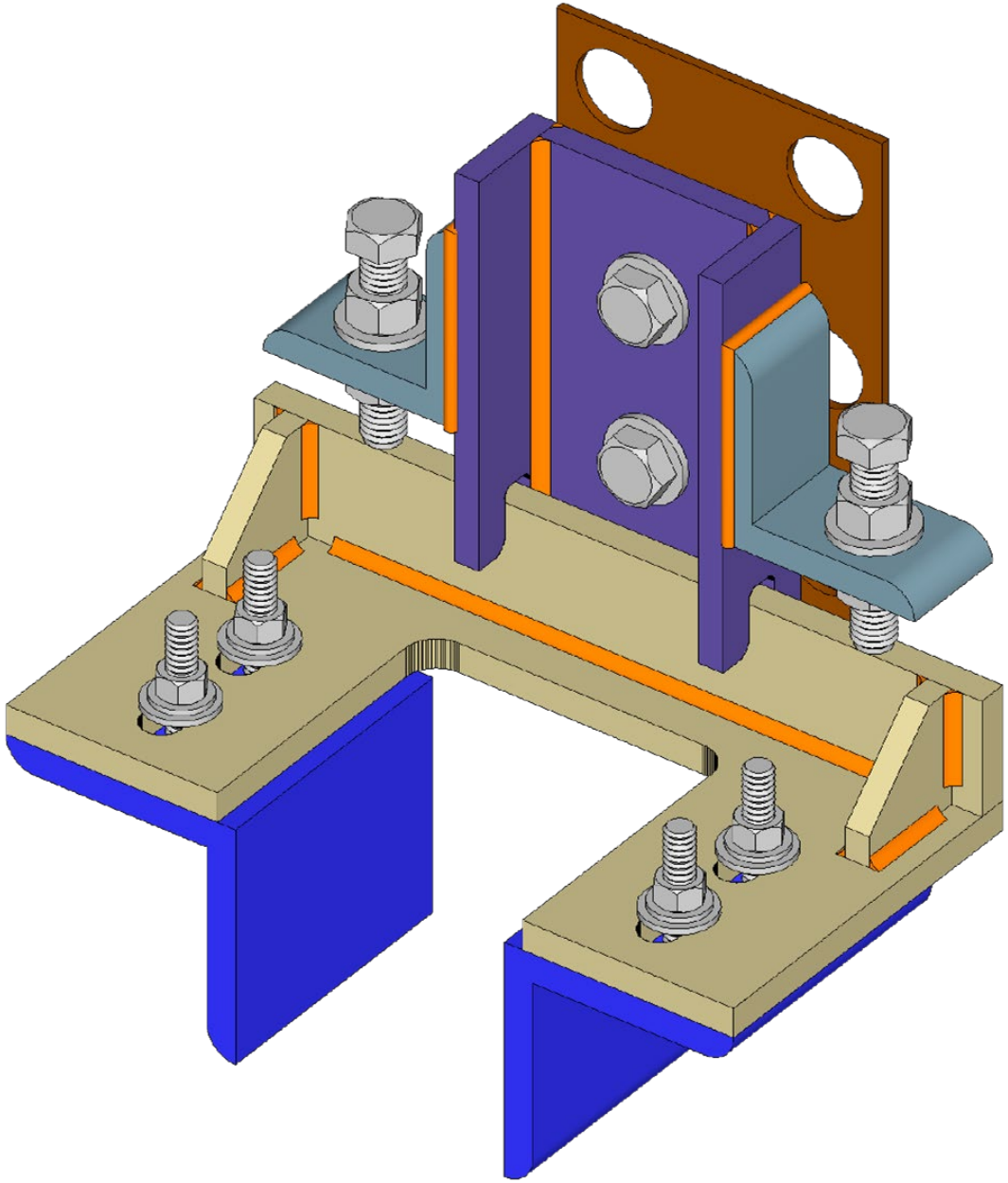

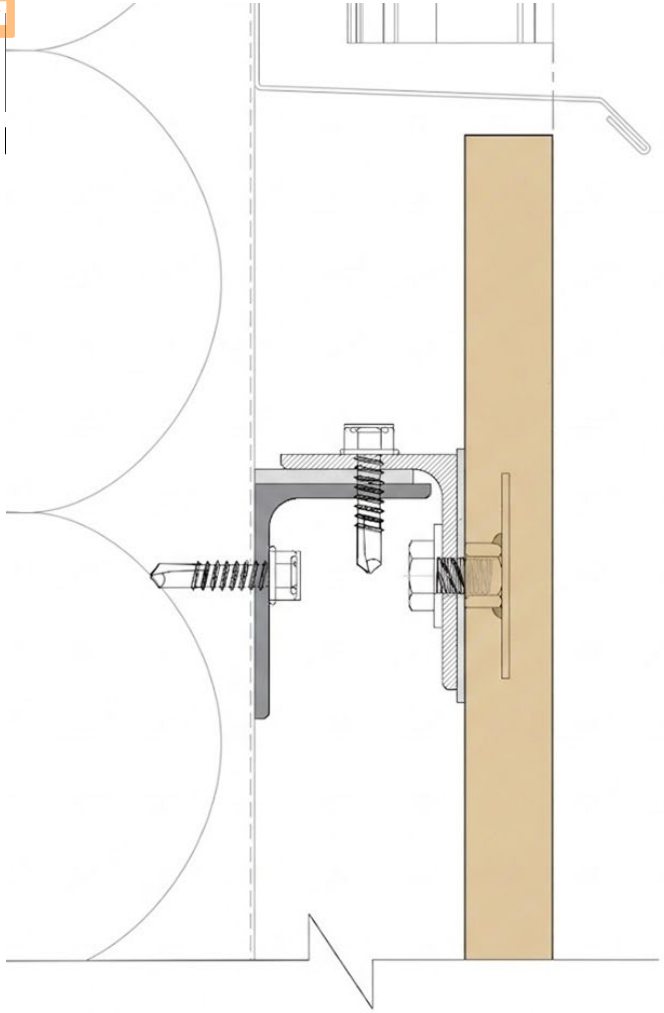

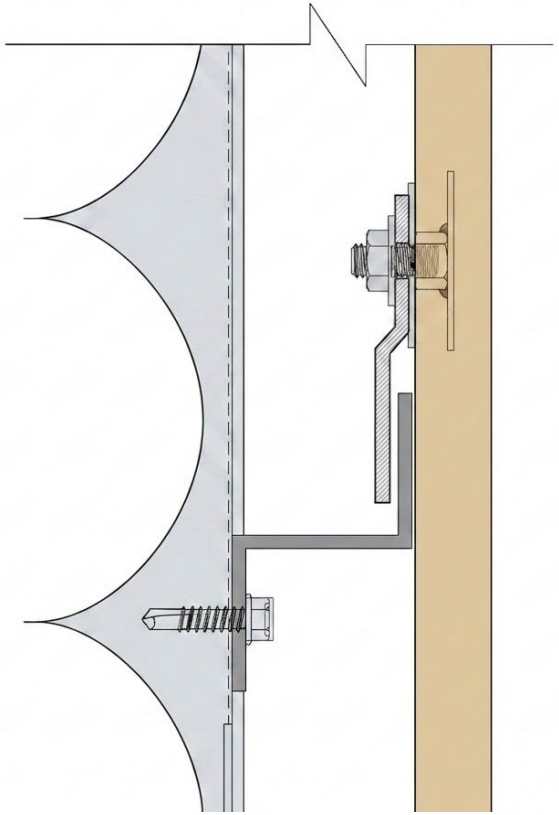

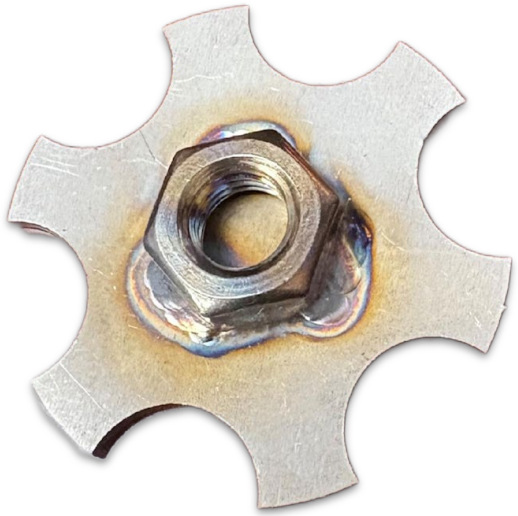

Convergence

Thermal performance

Prefab

Aesthetic

Concrete

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unitiwall

PrimeFab

Waha Hospital and LTC

- Mosinee Ontario
- Unitiwall prefab walls with metal panel and UHPC bases.
- Replaced terra cotta
- Kasian Architects
- Manufacturing currently, Construction 2026/7


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444 Logan

- Deep Energy Tower Renewal
- Triumph Primefab walls clad in terra cotta UHPC.
- Banding vertically and horizontally.
- ERA Architects
- Construction 2026


2 TONNES
12 TONNES

GC: Component Assembly

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Contractor: Innovations specialized building materials

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Disruption or Convergence – who is going to do this

Panel Mfg: Precasters or specialists

Integration: Curtain wall or Precaster

Installation: Div 03 or 07

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