A&I COATINGS




Vitreflon

Engineered FEVE Coatings

2ND EDITION

Development of FEVE

An Overview

The world's first solvent soluble fluoropolymer for coatings was developed over 40 years, and the same chemistry remains at the forefront of protective coating technology today due to the extremely durable nature of fluoropolymer coatings. Chemically a fluoropolymer coating is a fluoroethylene-vinyl ether alternating copolymer also known as FEVE.

Lumiflon, manufactured by Asahi Glass is a coating resin, which when formulated into a conventional coating product exhibits very high levels of UV resistance and provides excellent durability when used as the topcoat in a corrosion resistant coating system.

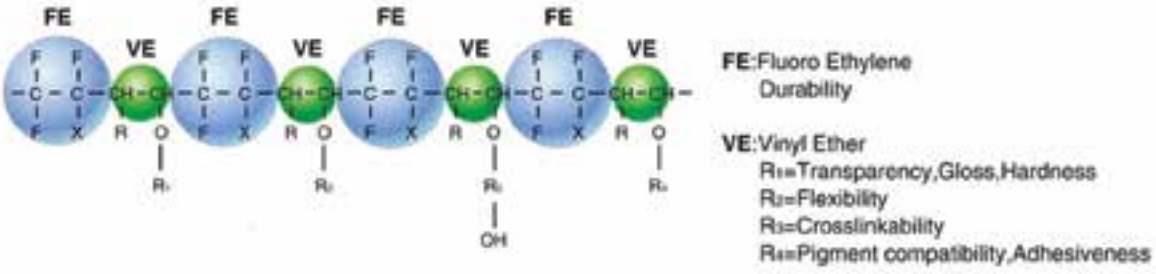
A&I Coatings' Vitreflon fluoropolymer coatings are based on Lumiflon resin. Vitreflon coatings were originally released to the Australian market in 2001 and since then A & I have supplied enough Vitreflon to protect over 1 million square metres of substrate.

The Chemistry

What is Fluoropolymer Technology?

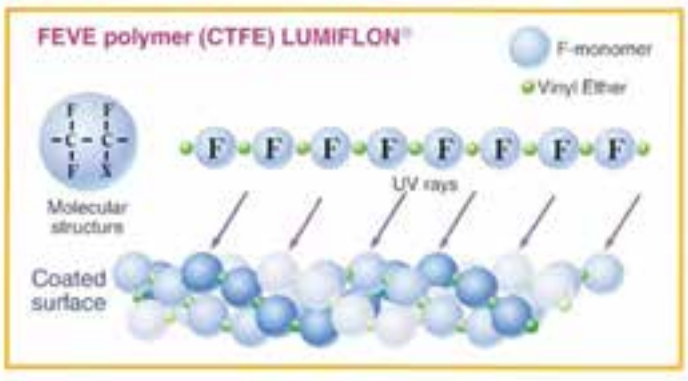
The polymeric structure of a Fluoropolymer is a very systematic arrangement of fluoro-ethylene and vinyl-ether molecules.

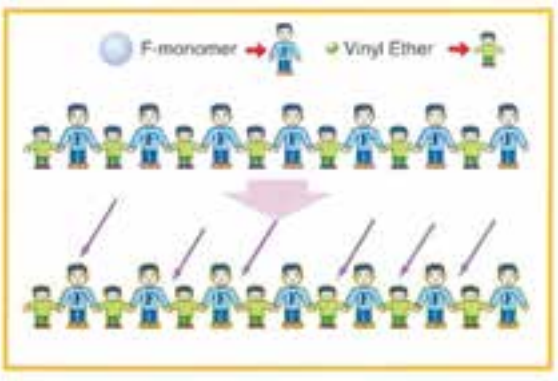
This image demonstrates the arrangement, and also shows that each fluoro ethylene molecule has 3 fluorine atoms as opposed to two in PVDF or PVF2 coatings.

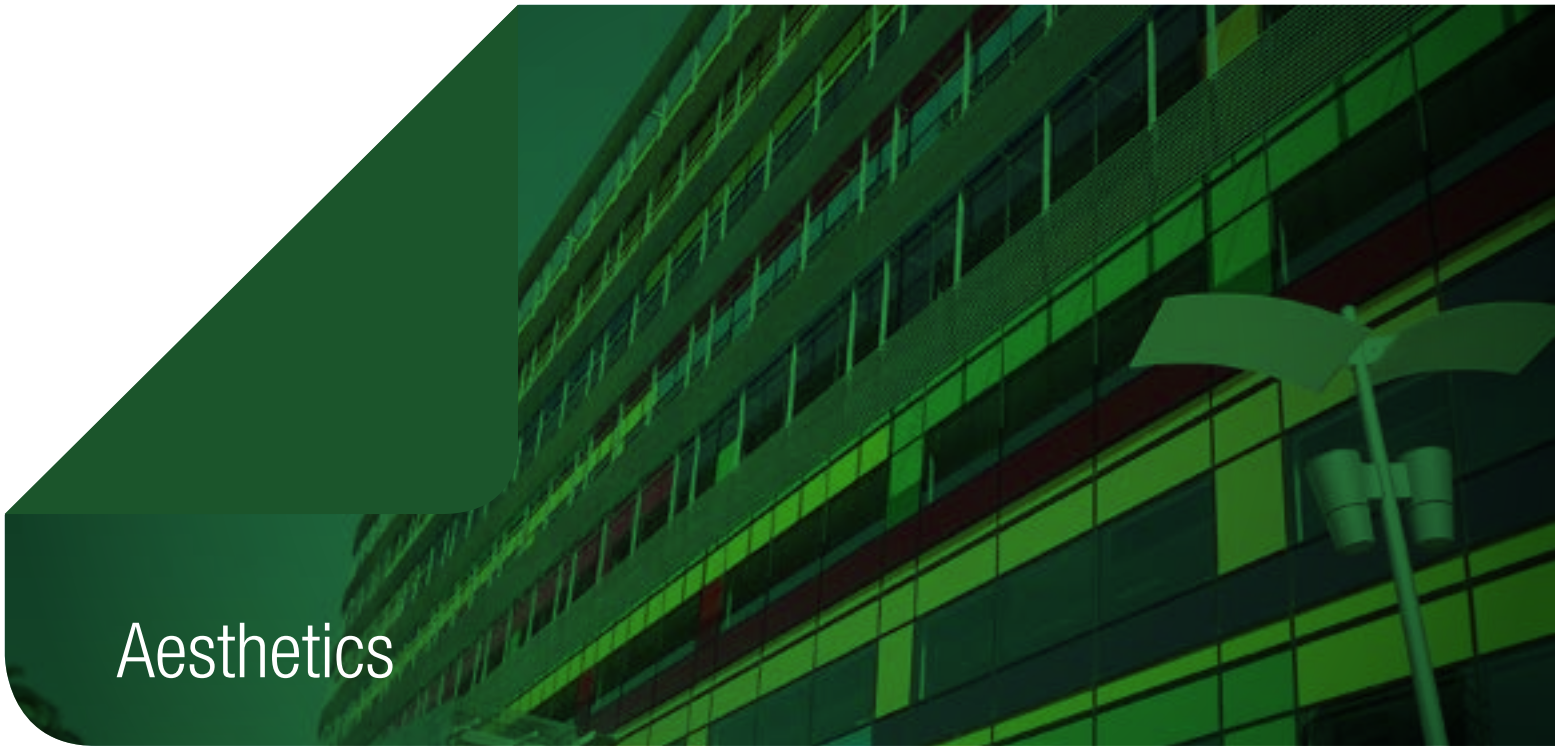


Why is Fluoropolymer so durable?

1. The fluoroethylene molecule derives high integral strength from it's high frequency of fluorine atoms
2. The carbon-fluoride bond energy in fluoroethylene molecules is far greater than the energy of UV rays
3. The fluoroethylene and vinyl ether units are arranged in an alternating sequence – this means that the strong and stable fluoroethylene unit protects it's neighbouring vinyl ether unit – just like the father protecting his son below







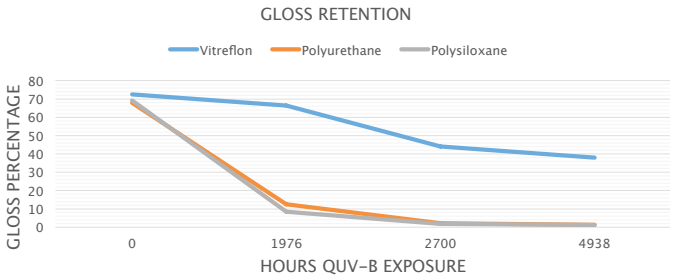
Aesthetics

Aesthetics

Vitreflon coatings offer a virtually unlimited range of colours including metallic and pearl finishes for a standout architectural finish. Gloss levels available range from a high gloss right down to a completely matt finish, catering for vast architectural expression.

And one of the best features of Vitreflon, it continues to look great year after year!

Architects, engineers, specifiers and asset owners choose Vitreflon because it provides them with the ability to achieve great finishes and gives them the confidence in coating performance with little or no major maintenance throughout the life of the coating – estimated at up to 60 years!



HOURS QUV-B EXPOSURE	GLOSS PERCENTAGE		
	VITREFLON	POLYURETHANE	POLYSILOXANE
0	72.5	67.9	69.1
1976	66.5	12.5	8.5
2700	44.1	2.2	1.9
4938	37.9	1.3	1.2

QUV-B (ASTM D4587)

Commercial Building after 15 years

Building: NAB Bank Headquarters

Where: Docklands Melbourne

When: 2002

Age: 15 years

This building is within metres of the coastline and uses Vitreflon in the colours most prone to fading (Bright Blue, Red, Orange and Purple). 15 years later there has been less than 10% colour change according to an independent inspection and test report by CSIRO.

AS 1580 Methods 481.1 – 12

Corrosion Resistance

Each year, corrosion related issues cost countries billions of dollars and can dramatically add to a projects overall lifecycle cost. Therefore using the best corrosion resistant technology available will dramatically decrease the overall life cycle cost of a project.

Advantages of Vitreflon coatings for corrosion protection

1. Resists degradation due to weathering and exposure to chemicals
2. Displays excellent erosion resistance (loses very little film thickness over expected lifespan)
3. Keeps corrosion initiators from penetrating the topcoat and degrading the zinc-rich primer underneath

Typical mild steel coating system for a C3 environment

Salt spray exposure in accordance with AS 2331.3.1.

After 600 hours exposure the Vitreflon coating system displays the least blistering and rust creep in comparison with polyurethane and polysiloxane coating systems. Each system is over mild steel abrasive blasted to ISO 8501 Sa 2.5 and each system achieved a minimum dry film thickness of 350 microns.

Sustainability

Definition

Living on the earth's income rather than eroding its capital. It means keeping the consumption of renewable natural resources within the limits of their replenishment. It means meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Coating Impact

Coatings play a tremendous role in preserving and protecting things that are part of our daily lives. Coatings preserve the bridges we drive over and the tunnels which we travel through. However each time coating maintenance needs to be carried out or infrastructure needs to be repainted represents an ecological footprint from VOC's released, energy consumed and waste which needs to be disposed of.

VOC Reduction

Vitreflon coating systems typically lasts 2 – 3 times longer than top quality polyurethane or polysiloxane coating systems thereby greatly reducing the level of VOC's released over the life of the coating system.

Energy Reduction

Coating maintenance is a detailed exercise requiring sanding, abrasive blasting or power tool cleaning. By extending the life of building materials the cost and energy associated with reinstatement of a paint system is reduced in turn reducing our dependence on natural resources and our environmental impact.

It all comes down to longevity, Vitreflon reduces the environmental impact associated with production, transportation (energy consumed, greenhouse gases emitted), and VOCs off-gassed during the repainting/ recoating process.

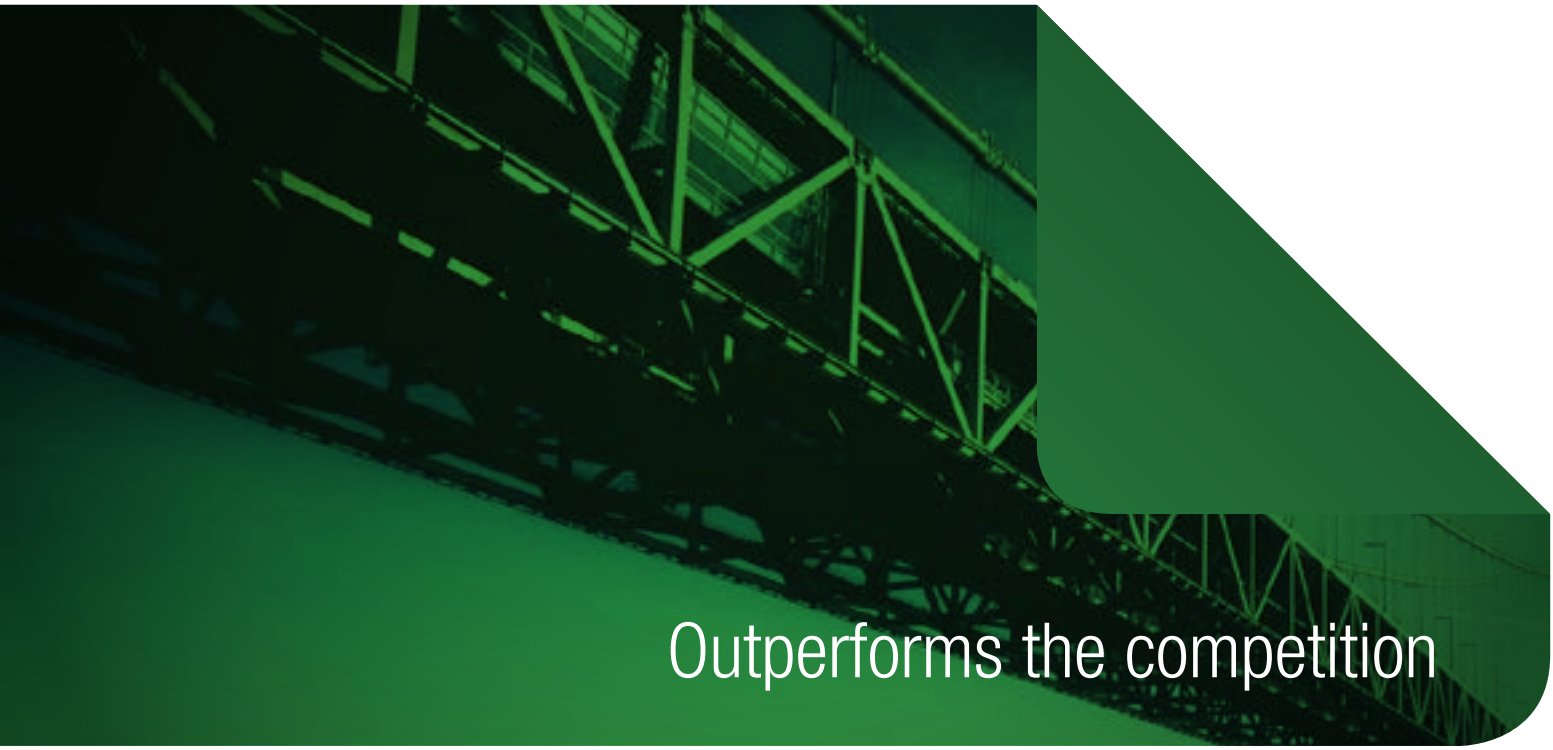
Gloss and colour retention of Tokiwa Bridge

OCTOBER 1988

APRIL 1993

APRIL 2007

INITIAL GLOSS	FINAL GLOSS	GLOSS RETENTION	COLOR CHANGE
75%	69%	91%	ΔE=3.5



Outperforms the competition

Vitreflon and PVDF Comparison

PVDF is the abbreviation for polyvinylidene fluoride, which can also be referred to as PVF2. This technology known as fluorocarbons or fluoropolymers, display excellent durability and is widely used in architectural applications today.

Vitreflon is a fluoro ethylene vinyl ether polymer also known as FEVE or PVF3. Both FEVE and PVF2 display similar long term durability and coating performance however some fundamental differences are listed below.

	VITREFLON	PVDF
Resin Type	Solution	Solvent Dispersion
Curing Temperature	Room Temp. to 230°c	>250°c
Gloss @ 20°	5 to 90	5 to 35
Colour Range	Unlimited	Limited
Recoatability	Excellent	Difficult
Application	Can be applied onsite	Must be applied as coil or powder coating

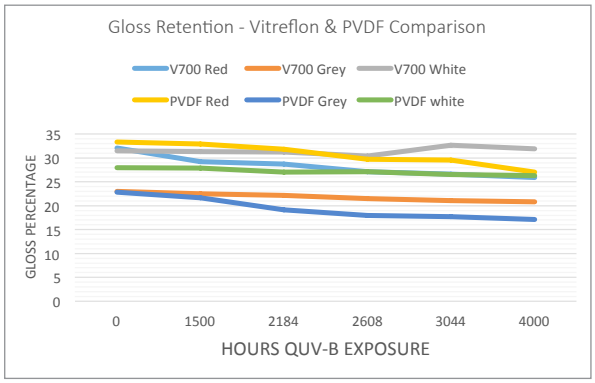
Vitreflon and PVDF Comparison

Vitreflon and PVDF Comparison

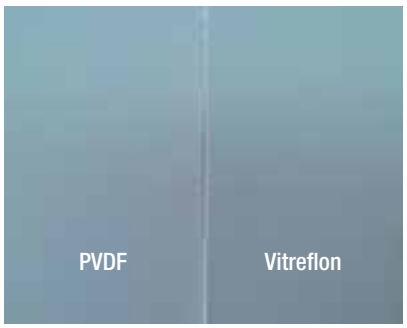
Test Method: QUV Accelerated Weathering Test in accordance with ASTM D4587. The testing details and regime are as follows: Type 1 lamps (UVB-313) and the cycle is 8 hours UV at 60 degrees C followed by 4 hours Condensation at 50 degrees C.

Purpose: Compare the gloss retention of Vitreflon 700 in comparison to PVDF coating in the colours, White, Anthracite Grey and Red 201.

Result:



4000 hours exposure



Lower Life Cycle Cost

The bitterness of poor quality remains long after the sweetness of low price is forgotten!

One consideration is initial price, another and altogether different consideration is long term value. With Vitreflon coatings the difference becomes very clear.

Vitreflon coatings typically last 2 – 3 times longer than high quality polyurethane coatings. In this day and age the costs of maintenance are only going upward making it more and more important to consider the long term value of your coating solution.

Vitreflon coatings are used to protect steel, CFC, fibreglass, GRC, concrete and other materials from the harmful effects of UV, rain, wind and chemicals.

The exceptional performance properties of Vitreflon transform to your bottom line. It is estimated that the life cycle cost of Vitreflon is only 40 – 80% of the life cycle cost of polyurethane.

Life Cycle Cost Advantages

- The initial applied cost of Vitreflon is only 5 – 10% higher than polyurethane (in a standard 3 coat system on mild steel)

Expected Lifespan of Vitreflon

- 30 – 60 years

Expected Maintenance of a standard polyurethane coating in this time frame

- 2 – 3 repainting cycles

Additional Costs of repainting

- Waste Disposal
- Asset Down Time
- Access
- Cost to the environment (emissions, resources)

The Products

Vitreflon 700

Application Method	Spray
Ratio	4:1
Solids	30% by volume
Recommended DFT	30 – 60 microns
Applications	Best suited for prefinished façade panelling
Gloss Level	Matt to 85%
Features	Very smooth, even finish

Vitreflon 700HB

Application Method	Spray, brush and roll
Ratio	4:1
Solids	34% by volume
Recommended DFT	30 – 60 microns
Applications	Best suited for complex shapes such as bridges and architectural steelwork
Gloss Level	Matt to 85%
Features	Very smooth, even finish and ability to achieve good vertical build

Vitreflon 744 Anti-Graffiti

Features	Vitreflon 744 is exactly the same as Vitreflon 700 but with the additional feature of being very graffiti resistant

Vitreflon 790

Application Method	Spray, brush and roll
Ratio	4:1
Solids	62% by volume
Recommended DFT	50 – 125 microns
Applications	Best suited for architectural and industrial steelwork
Gloss Level	Matt to 75%
Features	Excellent vertical build. 125 microns DFT can be achieved in 1 coat

Enviroflon 8480

Application Method	Spray, brush and roll
Ratio	5:1
Solids	40% by volume
Recommended DFT	50 – 75 microns
Applications	Façade panelling, steelwork and concrete
Gloss Level	Satin to 75%
Features	Very good graffiti and chemical resistance
VOC content	23 grams per litre

Research Conducted with Government Agencies by AGC

Tokiwa Bridge - Japan

This bridge was previously painted in chlorinated rubber and repainted after 8 years with fluoropolymer. The coating remains in good condition after 29 years.

Daiichi Mukaiyama Bridge - Japan

The first coating system applied to this bridge was a zinc rich primer followed by a fluoropolymer topcoat. The coating remains in good condition after 29 years.

Nikko River Bridge - Japan

The first coating system applied to this bridge was a zinc rich primer followed by a fluoropolymer topcoat. The coating remains in good condition after 30 years.

Images supplied by AGC

AGC Projects

Asahi Glass Project Achievements

Structures protected with fluoropolymer coatings

Akashi-Kaikyo Bridge 1998 - Japan

Tokyo Gate Bridge – 2012 - Japan

Landmark Tower – 1993 - Japan

Rainbow Bridge - 1993 - Tokyo

Images supplied by AGC

A&I PROJECT

University of Queensland - Global Change Institute

Products used:
Envirophos 2300 Zinc Phosphate Epoxy Primer
Enviroset 2100 MIOX Epoxy
Enviroflon 8480 FEVE Topcoat

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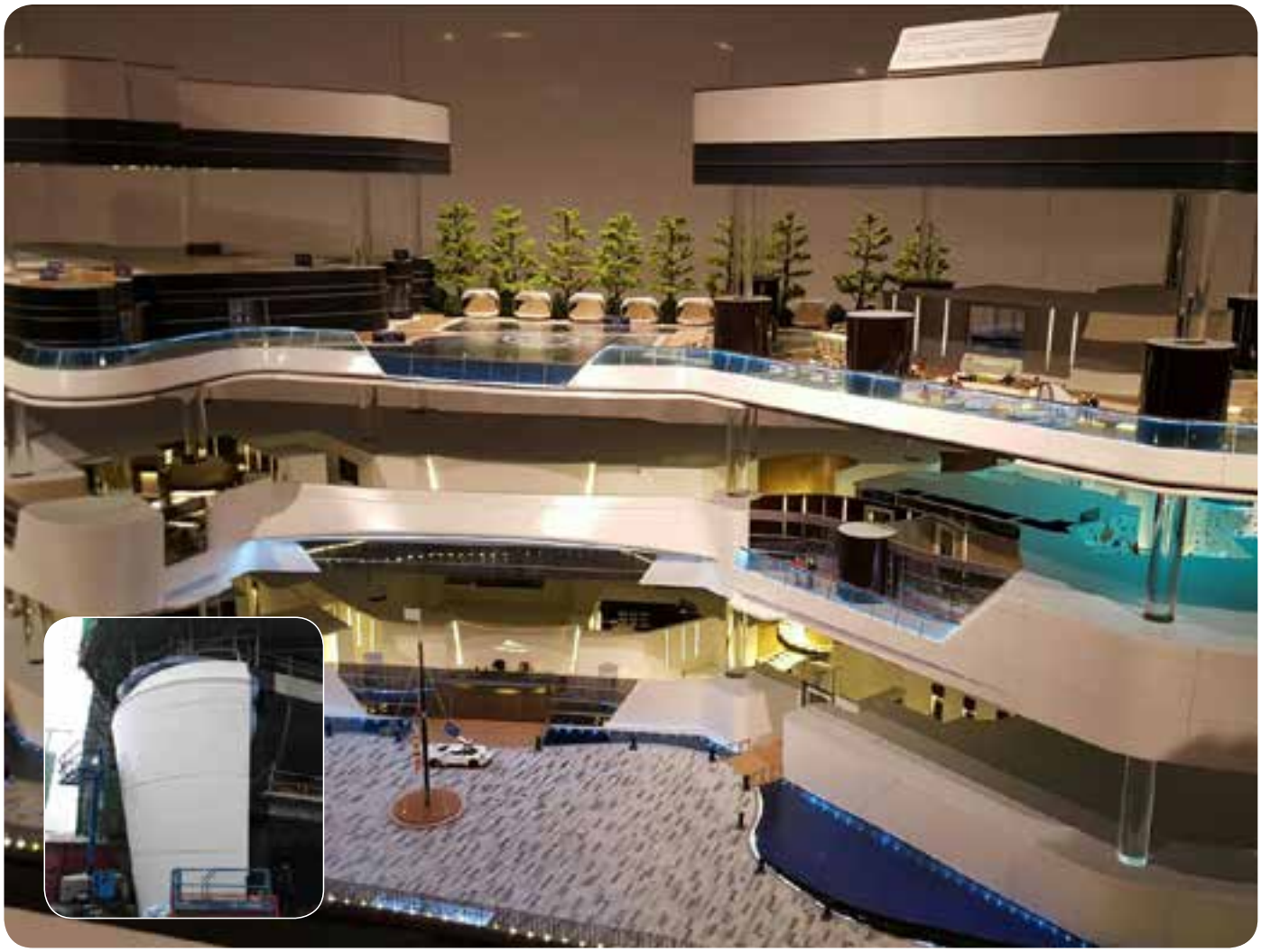
TW6 Hong Kong



Products used:
Vitreset 416 MIOX Epoxy Primer
Vitrethane 555 Polyurethane Intermediate
Vitreflon 700HB FEVE Topcoat

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Wahroonga Prep School

Products used:
Vitrethane 555 Polyurethane Primer
Vitreflon 700 FEVE Topcoat

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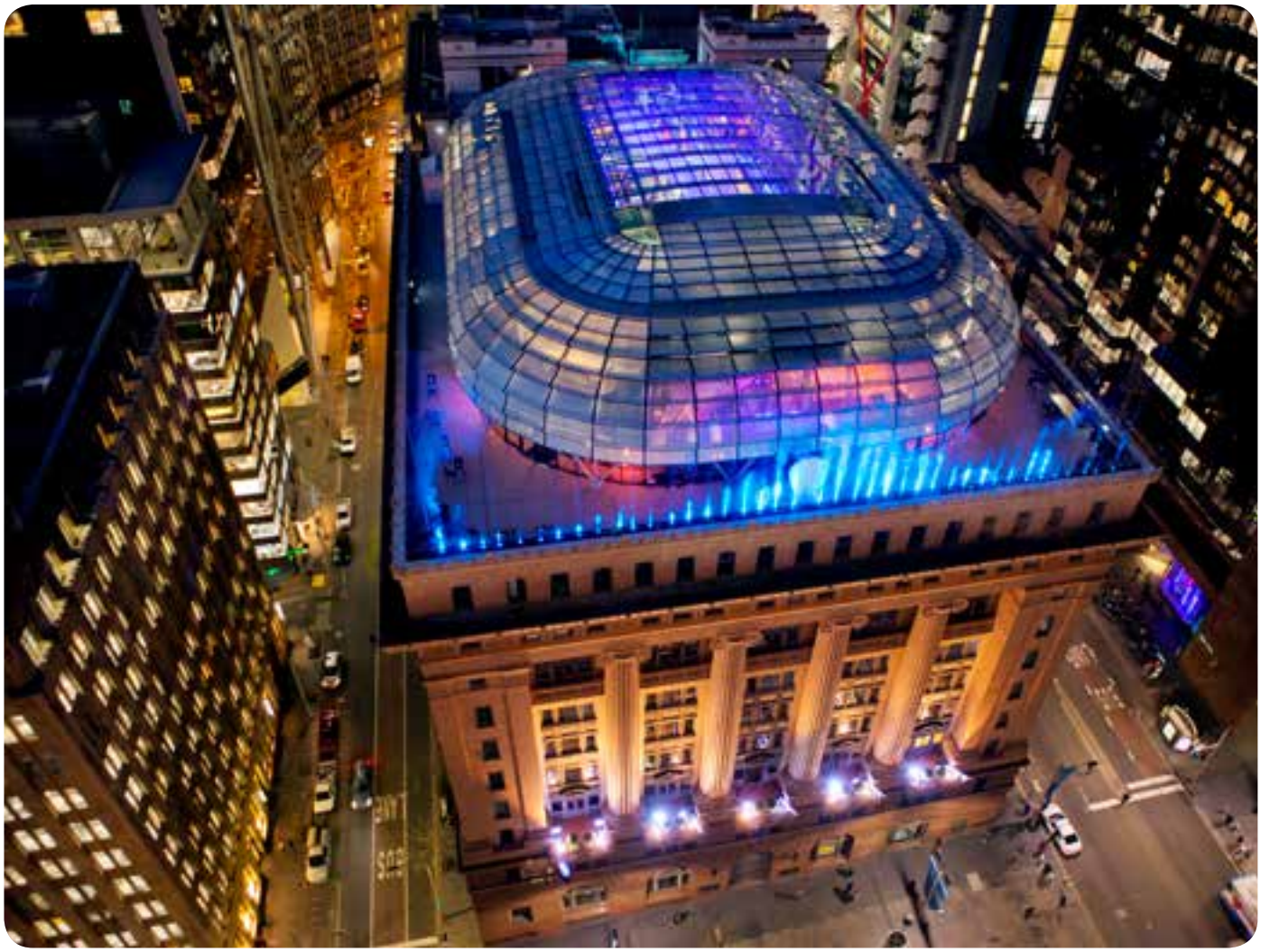
50 Martin Place



Products used:
Envirophos 2300 Zinc Phosphate Epoxy Primer
Enviroset 2100 MIOX Epoxy
Enviroflon 8480 FEVE Topcoat

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Composite Fibre Bridges

Products used:
Vitreflon 700HB FEVE Topcoat

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Spanda - Perth, Western Australia
Composite Fibre Substrate

Products used:
Vitrephos 560 Epoxy Primer
Vitreflon 700HB FEVE Topcoat

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M Pavilion Sculpture

Products used:
Vitreflon 700HB FEVE Topcoat

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Cudgegong Rd Station

Products used:
Vitrezinc 586 Zinc Rich Epoxy Primer
Vitreflon 790 High Solids FEVE Topcoat

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Cairns Convention Centre Refurbishment

Products used:
Envirophos 2300 Zinc Phosphate Epoxy Primer
Enviroset 2100 MIOX Epoxy
Enviroflon 8480 FEVE Topcoat

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Aura Bridge

Products used:
Vitrezinc 586 Zinc Rich Epoxy Primer
Vitreset 416 Epoxy Intermediate
Vitreflon 790 High Solids FEVE Topcoat

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Finzels Reach Bridge

Products used:
Vitrephos 560 Epoxy Primer
Vitreflon 700HB FEVE Topcoat

A&I COATINGS

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