Oran Park Library Case Study

FABRITECTURE
WHERE DREAMS TAKE SHAPE

Oran Park Library

In late 2017, the new Oran Park Library & Community Resource Centre underwent a AUD$13.8million redevelopment as part of a voluntary planning agreement between UrbanGrowth NSW Development Corporation and Camden City Council.

The works included an artwork piece which specified a lightweight architectural ETFE façade at the front of the library. The intention of the façade was to add a striking artistic feature to the building, whilst, at the same time, providing an effective solar barrier. Because of the design, the structure came within the art budget for the council.

The façade was awarded to Fabritecture under a design and construct contract for the ETFE pillows, supporting steelwork, and air supply system to support the pneumatic ETFE system.

Project Details

Location: Oran Park, NSW Australia

Completed: 2017

Scope: Design & construct

Size: 189m² (2,034ft²)

Fabric: Custom digital printed coloured ETFE & standard print ETFE

Framing: Custom steel

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Design Features

The lightweight façade designed and constructed by Fabritecture features 31 triangular shaped 2-layer ETFE pneumatic (air-supported) cushions, alternating in colour and direction. There are four different types of cushions, ranging from 10.6 to 12.59 metres, and in 4 colour variations.

Fabritecture simplified what was a very complicate geometry by changing the design of the façade to a more efficient system and using repetitive cushion shapes, This change resulted in a façade that looked like the original concept and making it more buildable to be within the client's budget.

The underside of the outer ETFE foil is digitally printed in custom red, yellow, and white and combined with standard clear ETFE with a standard frit pattern print,. The internal layer is clear ETFE therefore with when combined with the different external layer colours and frit allowed for varying levels of light transmission

A custom LED lighting system is incorporated into the supporting steelwork which provides backlighting and adds a dynamic feature to the façade at night-time.

The façade structure sits 3 metres in front of the main glass curtain wall of the library and provides a block to the heat transmission from the Western sun. The 3-metre air gap between the façade and the glass curtain wall circulates enough air to dissipate any redundant heat passing through the ETFE façade. The ETFE foil has sufficient translucency, despite the colour and frit patterns, to ensure adequate natural light into the building, whilst keeping the library internal temperature cooler.

Although functionality was the primary motive of the structure, the architectural intent for the façade was a distinctive piece of artwork that would engage the local community. This is achieved through the dramatic crystal facet effect resulting from the ETFE cushion shape as well as the colour variations and the impactful night-time lighting.

The façade structure provides a block to the heat transmission from the Western sun.

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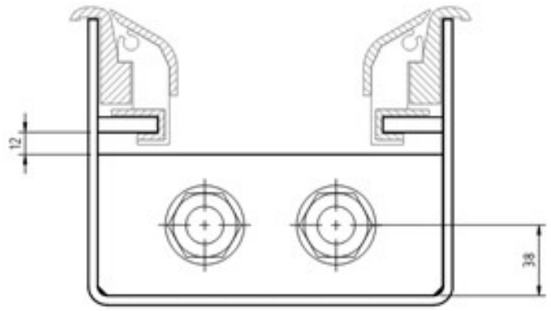
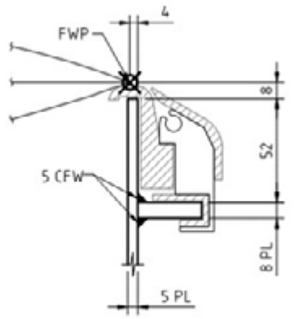
Supporting Steelwork



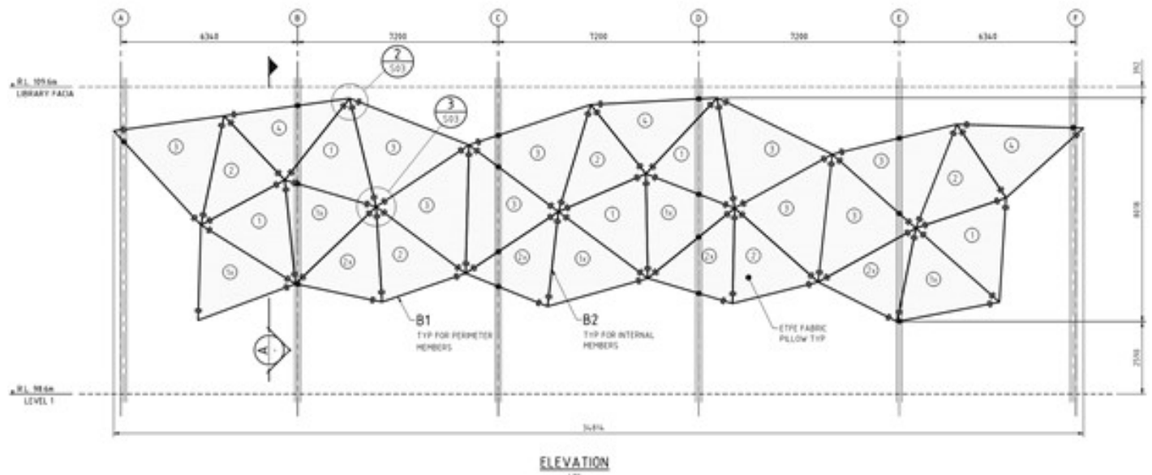
Typical splice connection



The structural steel supporting the ETFE cushions is a self-supporting system comprised of custom, narrow profile RHS and folded plates. The perimeter beam is comprised of 120 x 80 x 5 RHS and folded plate, and the internal beam is 5PL custom folded plate. The complexity of the geometry where the triangle cushions points all meet was the primary reason for the custom profile, It allowed us to create simpler node connections treating the triangles as all individual cushions.

The supporting steelwork was completely assembled on the ground before lifting to connect seamlessly to the building columns.

The aluminium extrusion system that is connected to the steelwork for connecting the ETFE cushions is a single style extrusion with EPDM gasket. This extrusion was connected to the steelwork and then ETFE cushions attached to the extrusion all prior to lifting.



ELEVATION

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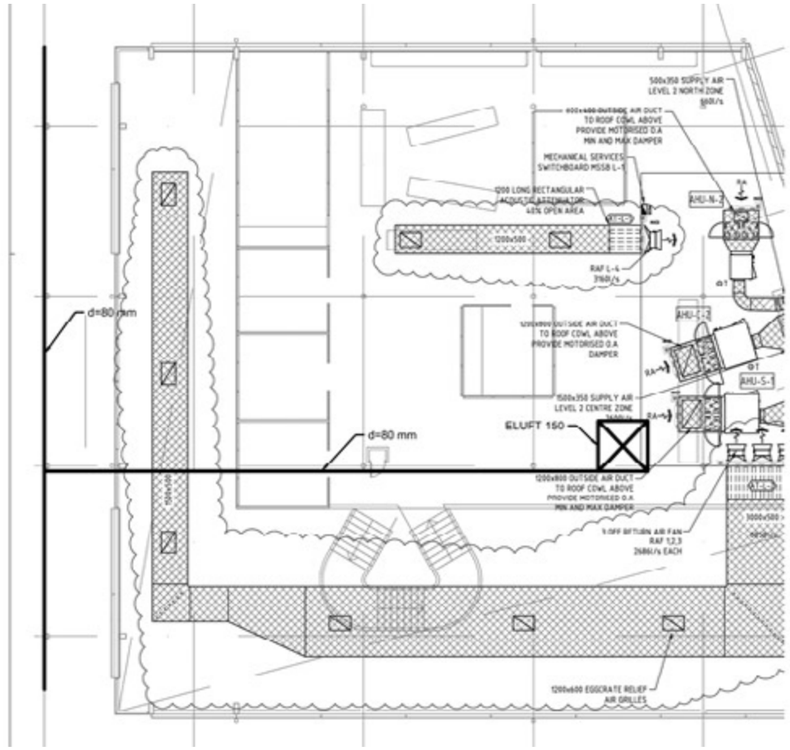
Air Supply System

The Eluft 150 air supply system is housed within the roof of the library. The plenum system—the stainless-steel ducting which feeds the air supply system to the ETFE façade—runs through the roof then out through a column supporting the façade. The system then runs neatly and discreetly along the top of the structure to feed the ETFE cushions.

The 50mm flexible ducting system which feeds air into the ETFE cushions is designed quite uniquely. The air supply feeds the top cushions and then works its way down vertically through each lower cushion in the façade, with each cushion connected to its predecessor to facilitate this process. This intelligent design removes the need for a larger ducting system creating a very neat and aesthetic look.



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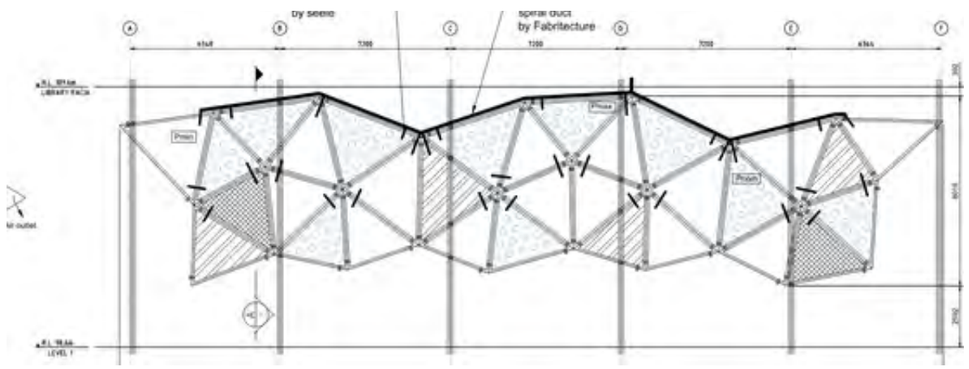
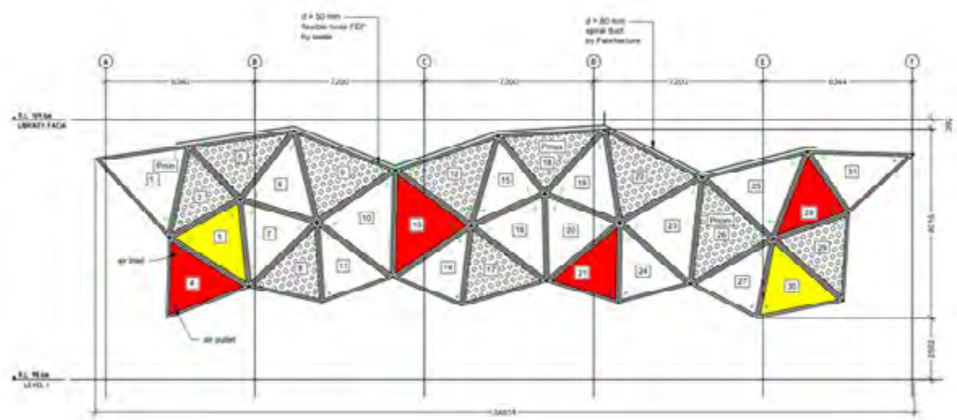
ETFE Custom Printing

The digital printing process is quite unique compared to the standard printing process, which is typical for ETFE. Because the Red, Yellow, and White colours were non-standard and in small quantities, digital printing onto the underside of the outer layer of the ETFE cushions was required to meet with client specifications.



There were four colour variations for the façade cushions:

- Digitally printed red with 100% ink coverage
- Digitally printed yellow with 100% ink coverage
- Standard silver dot print with 52% ink coverage
- Standard white ETFE



Fabrication & Installation

Fabrication

The structural steel system supporting the façade is constructed from custom folded plate (on the internal beams) and RHS + folded plate on the perimeter beams. The design allowed simplified node points allowing each cushion to become independent. The design also allowed the framework to be constructed and lifted as one piece.

The ETFE film was digitally printed, then fabricated offshore and delivered to site for installation.

Installation Method

The steelwork was custom designed so that it could be delivered to site in kit form, constructed on the ground then lifted into place in one continuous piece, and secured to the existing columns.

Firstly, the perimeter beam was partially assembled, followed by partial assembly of the internal beams. The main nodes (where the triangular shapes join to support the ETFE cushions and form a junction) were attached to the steelwork, followed by completion of assembly of the internal beams. The bottom section of the perimeter beam was the last to be added.

Next, the deflated ETFE cushions were installed onto the custom extrusion system.

20-tonne Franna cranes lifted the structure into place in 1 piece, secured by spreader beams, while the crew–using a 40-foot scissor lift–connected the frame to the existing columns on the library.

The air ducting system was connected to the top cushions and then inflated to their design pressure, thus completing the installation of this amazing structure.

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The End Results

2018 IFAI Award of Excellence

2018 LSAA Commendation

2018 STA Award for Excellence

The perfect blend of form and function.

The new Oran Park Library & Resource Centre is now home to Fabritecture's distinctive, functional, award-winning piece of art which serves to dramatically enhance both the external aesthetic and internal comfort of the Oran Park Library—the perfect blend of form and function.

This South-West suburb of Sydney has seen some tremendous economic, social and residential growth in the last 5-10 years, and Fabritecture is proud to be part of the suburb's rapid growth and development.

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