



PROJECT

BMW showroom 31-40 West Terrace, Adelaide

DESIGNERS

Aurecon P/L

DESIGN TEAM

Niko Tsoukalas and Matthews Architects

FACADE ENGINEER

Aurecon

ESD CONSULTANT

Aurecon

PRINCIPAL GLAZING CONTRACTOR

Construction Glazing

PRINCIPAL GLAZING RESOURCE

Viridian

PRINCIPAL GLAZING

External customised stressed frameless façade including vertical sliding glass door – a 10mm heat soak tested toughened clear internal glass lite laminated to a 6mm heat soak tested low iron external glass lite with a 1.52mm interlayer including an ITO spectrum selective interlayer.

External clerestory and other external glass – 6.38mm ComfortPlus Green.

Internal customised frameless glass car hoist shaft – 15mm toughened heat soak tested monolithic clear glass.

Internal customised frameless glass hoist doors – 8mm heat soak clear toughened laminated to a 8mm heat soak tested toughened glass with a 0.76mm PVB interlayer.

Internal frameless glass offices (utilising a Manet system) – 10mm toughened heat soak tested monolithic clear glass.

PROJECT COST

\$5 million



Classy Glass

Text – Peter Hyatt
Photography – aurecon

Viridian glass performs a pivotal role in bringing to life BMW's flagship Adelaide headquarters. Designed by Aurecon, the project utilises a high performance glass facade to ensure a cool spotlight remains on its products. And it has been one of the first and certainly the most articulate of car-makers whose showrooms provide an appropriate fit for its vehicles.



Economic slump. What economic slump? Australia's new vehicle sales are booming as is competition to woo buyers. BMW Australia is opting for high brand visibility to help differentiate itself in such a highly competitive marketplace. With such intense competition, cool design can make all the difference.

High visibility goes a long way towards claiming top perch and BMW Adelaide's busy West Terrace showroom is a high profile example of just how a prestige vehicle dealership recognises the role design plays in product appeal.

A dynamic glass façade cleverly brings out the best in the vehicles on display. Aurecon's lead designer and engineer Niko Tsoukalas has created a suitably innovative engineering solution for the German marque.

Minimalist glass walls supported by post-tensioned steel rods and held by custom designed patch fittings contribute to the highly transparent veil. In addition, the bespoke veil had to deliver outstanding environmental performance.

"The project had to be convincing," says Tsoukalas. "It had to express the product dynamic within and I believe that is our

success here. It articulates a structure that lets the product perform to its best."

Niko Tsoukalas discusses the project Vision editor Peter Hyatt.

The project's level of subtraction is what makes it such an intriguing addition.

I hope so. That's the feedback. Because these cars are so beautifully engineered we wanted to reflect that quality of design and construction. It is unusual to work this way but it proves that there are alternatives. We made it our business to understand the culture of the client and product. Beyond that you customise and tailor the unique solution for them.

You've worked on other prestige showroom including Audi and Mercedes. How does this project differ?

All the showrooms have their corporate philosophy but the great thing about BMW was that they allow some flexibility and scope for local interpretation and imagination with their corporate branding. They were definitely open to recommendation and the application of local ideas. That's often not the case with a centralised or global branding philosophy.



Designer - Niko Tsoukalas



Your design effectively defers to the product and acts as a giant showcase rather a giant showoff. There is that obvious difference that this is a very rational building that expresses less of itself but more of the product.

Exactly right. If that's how you read it then I've done my job because that is the BMW philosophy. When you design a showroom they need to showcase the technological solutions that they promote. The showroom really exists to support the vehicles and reinforce the brand.

What did the experience at BMW teach you?

That what we designed and saw through to construction was similar to the principles that produce a high performance vehicle. The corporate ethos demanded a suitably stringent standard. A strong engineering skill-set allowed us to interpret that and hopefully reward that trust in us.

What was the biggest test?

The glazing is incredibly complex. The task was to balance optimum transparency and manage environmental/solar loads. Even though it's a small job it is technically challenging and demanded a high level of craftsmanship. The construction

requirements pushed everyone involved and the result felt like we were overseeing the production of a car.

What distinguishes this from the majority of showrooms with a big glass aesthetic?

It's the freedom from columns. There is a really elegant transparency that reflects the engineering values of the BMW brand. The whole façade is held in place by tensioned vertical stainless steel rods. They have 150 kilonewtons of tension applied to each of them. There's a pylon under each of those rods and only the rods and patch fittings hold each glass panel in place. There are no columns at all and so that system effectively supports the mass. The complexity there is that we're stressing off a roof that is cantilevered by 7m in two directions and it gives the impression that the whole building and wall is floating.

That's quite some weight yet it appears almost weightless.

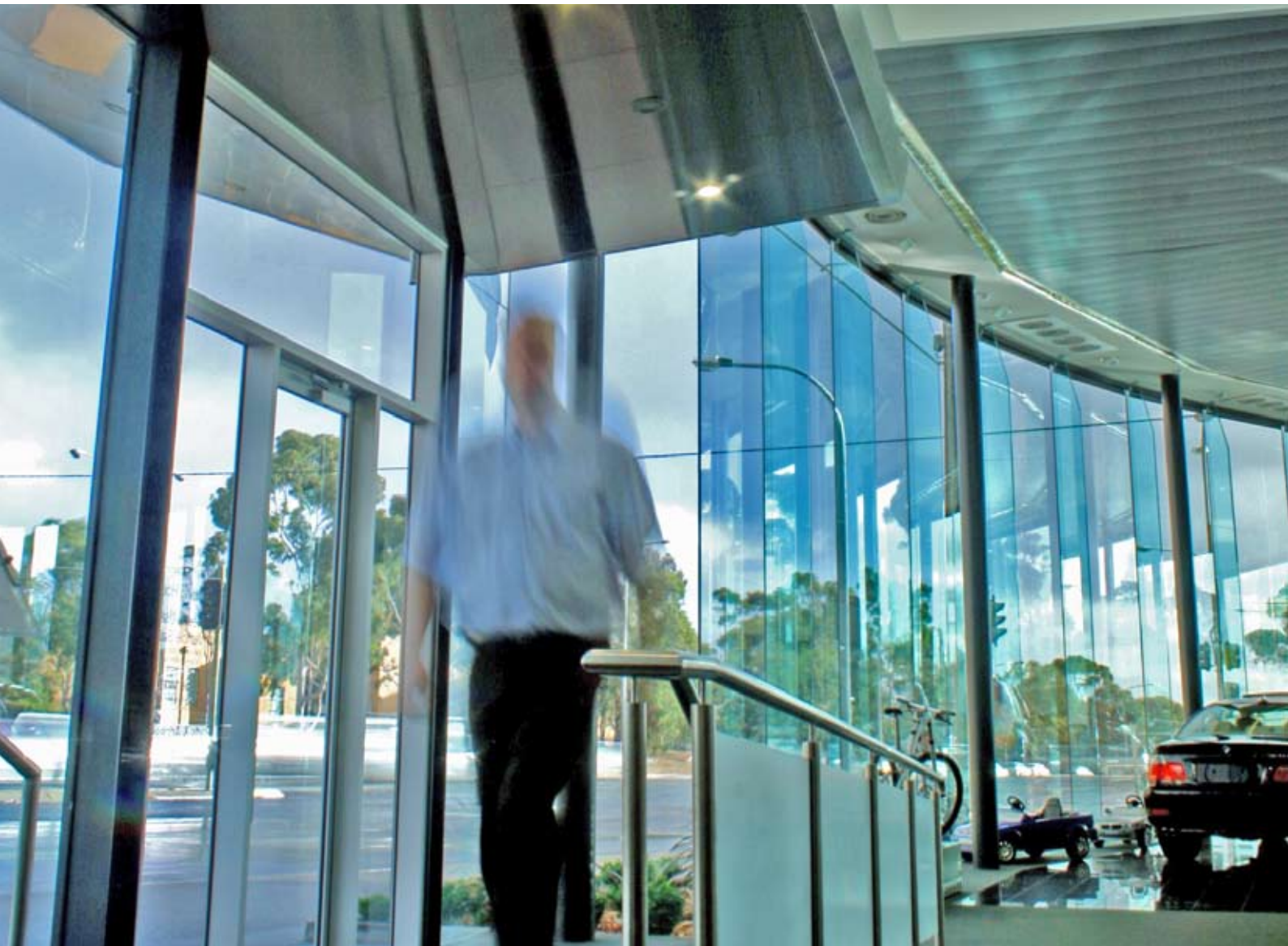
There's 150 kilonewtons, or around 15 tonnes of tension on every single one of the 14 rods around the perimeter and that is hanging off a quite slender roof. Our structure had to then support that weight of around 300 tonnes hanging off that very slender roof less than a half-metre deep.

So the rods are post-tensioned in place?

We took each rod, tensioned it up to pull the roof down. If you imagine rope hanging from the roof, the more you tighten the rope when you push on it the less it deflects and so that is really the concept of using tensioned rods. The patch fitting were fully customised and the rods themselves cost around \$11,000 each but there are a lot of smarts in the connection to allow for the big issue of ordering all of the glass off the shop drawings. We had to then stress the rods and the roof deflects at different points and so we had to preset each patch fitting before we stress the rods and roof. Those settings had to be exactly in the right spot. Also there was the load in the bar, the 15 tonne all within plus or minus 2mm.

The margin for error is almost non-existent.

There was a critical tolerance margin of plus or minus 2mm which meant that if our calculations weren't precise, all of that pre-ordered, pre-cut glass would have been useless. We had projections to the north and west and so dealing with heat loads was critical. Specially selected interlayers and hard-coated systems provide daylight transmission efficiency yet shield solar loads.



It's easy to underestimate just how extreme an environment it is here.

Adelaide has the highest solar loads of all Australia's capital cities. The only consolation is that we have low humidity. But the actual load that enters a building can be extraordinary.

Apart from the Low E glass and interlayers, how else do you address the problem?

The cantilevered roof works for most of the day and it works in conjunction with an under-floor distribution system. This operates via 900mm water-pipe ducts beneath the slab and these distribute cool air around the internal glazing perimeter through customised grates. Cool air is fed along the length of the glass walls all of the way up the façade. The mezzanine floor is set-back about 600-700mm off the façade so the air circulates the entire height. We have a 7m double cantilever and a 4m double cantilever right at the corner so there are four columns holding up 600sqm.

You want a reasonable longevity so how do you future-proof this kind of work.

Yes you do. We've tried to avoid fashionable elements. Everything is pared and has a purpose and that approach tends to contribute to longevity because you have such a functional environment. There is a glass car hoist with fully frameless glass doors for instance that takes vehicles to the top level and that was added for elegance instead of ramping. And this we understand is probably the largest such lift in Australia at 1.6m wide by 4m tall just sitting on a little pivot.

How difficult was it to reconcile the climate/thermal load issues yet ensure the glass provided the necessary clarity? Heavy tinting would be self-defeating.

That is one of the real tests because you need to satisfy the performance requirements. We had to computer model the proposed building and façade and then satisfy the services and then establish

an energy load back to the reference building established by portions of section J of the BCA. You have to understand the technologies of glass. We had to balance thermal performance with spanning ability and the stress profile of glass at the four corners in relation to wind load. Thickness of the glass is important because that affects solar heat gain and the clarity and so it's a very delicate balance of glass and the correct interlayers. The optimum balance of all of those issues is very complicated and testing.

What support was Viridian able to provide?

We have a very good relationship and there is a solid history. They were helpful in that understanding of the performance parameters and possibilities of glass and that expertise is especially important on a project where the parameters are really at the limits.



Is there a project highlight?

The opportunity to design such a project rather than simply contribute to, or calculate, someone else's design. Architectural engineering is another way to design such projects. Given that glass is so central to the design, it made sense that the lead designer was someone who understood that philosophy to integrate architecture and engineering. Engineers are often seen as boring guys who sit in the corner twiddling on calculators. I've worked hard at overcoming that perception for years. We can definitely add value to the process.

And feedback?

Some of the feedback from architects has been very supportive - that we've done a great building. They're aware of features such as the vertical sliding glass door that leads to the showroom and three level glass vehicle lift hoist fully customised from scratch.