

Efficiently designed in structural steel, Biztek is a steel showcase designed as a stimulating and harmonious work environment.

BENEFITS AT A GLANCE

- Architectural flexibility
- Reduced self-weight of structural steel frame for difficult site conditions
- Faster construction path enabled by “jump starting” of the upper floors
- Elimination of propping added to speed of construction and reduced site congestion
- Fire Safety Engineering solution enabled Bare Steel Construction to assist with speed of construction and reduced fire protection costs.

BIZTEK BROOKVALE NSW

A SHOWCASE FOR STRUCTURAL STEEL DESIGN

Designed for the Orlani Property Group by Stephen Nordon of Nordon Jago Architects, the layout fosters social and business interaction among its occupants.

The design caters for maximum flexibility for future leasing requirements, where the floor area of a tenancy may be reduced or increased within each compartment without affecting the fire safety strategy for the building.

Constructed at a cost of \$13.5 million over 14 months Biztek is located on a 3000 square metre site on the west side of Pittwater Road, Brookvale on Sydney's northern beaches peninsula.

Built primarily of exposed structural steel and aluminium with horizontal shaped panel glass walls, Biztek is E-shaped in plan and has two communal atria. There are two levels of basement carpark, a ground floor level and two storeys above. A discrete mezzanine level has been designed into the roof on the northern third of the building.

Stephen Nordon said that: “The tenancy spaces are arranged around two open, three level atria, a design device used to present the tenancies and to create a dynamic working environment. The steel

and glass aesthetic of the building was pursued to enhance the building's sense of technological enterprise.”

Each of the two entry awnings has been hung from the bracing beams and are further supported by overhead pre-tensioned steel rods which connect back to the centre of the cross beams. Upward curving OneSteel 300PLUS® 230PFC channels, hung from the cross beams, frame the awnings, the under side of which are bronze alucabond sandwich panels.

The ground floor offices are reached from the atrium courtyards. At the half way point open mesh steel-tread stairs angle at 10 degrees in plan to the first level gangways. Level two is accessed by a further set of stairs, forming a zigzag.

Two passenger goods lifts, a loading bay, access for deliveries and an internal café complete the complex. The lift core is reached from the rear passageway that runs the full length of the building at the rear.

Space efficiencies were achieved by the structural steel system compared to typical concrete construction.

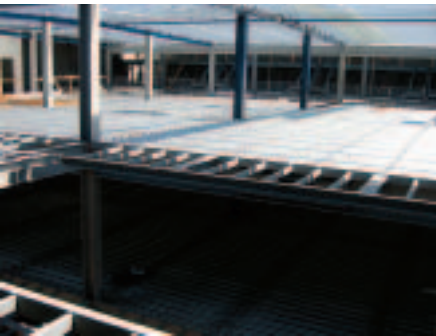
On the façade tapered steel beams support adjustable mesh awnings that are strung on guyed wires. The exposed structural steelwork provides a frame for the glass walls adding to the hi-tech feel. The exposed exterior column and beam supports are recessed.

The finished building belies the site difficulties. Ray Kusturin of Henry & Hymas, the Structural Engineer on the project said that: "This Brookvale site has a very high water table four metres below ground level, so a building construction technique was devised to meet the twin objectives of managing the water table while at the same time producing a building with the desired hi-tech presentation."

"Considering the depth of excavation that was required for the basement car park the only practical means of construction for the below ground works was to develop a design based on top down construction."

“ As a design team we decided that the best, most cost effective material to achieve the architectural requirements for the upper floors would be to use structural steel ”





The composite steel floor framing typically consists of OneSteel's 300PLUS® 530UB82 universal beams as primary members spanning approximately eight metres with 300PLUS® 310UB40 universal beams as secondary beams at third points on the primary beams.

The floor-to-floor height is 3.6 metres. Mechanical services for the building were run through penetrations that had been pre-cut through the floor beams.



The long street frontage is broken by two courtyard voids defined by strong steel beam bracing, shaped in an elongated cross constructed from OneSteel's 300PLUS® 200UC46 universal column sections.

Biztek – Fire Safety Engineering Solution enabled Bare Steel Construction.

“As a design team we decided that the best, most cost effective material to achieve the architectural requirements for the upper floors would be to use structural steel in combination with the structural decking slabs and concrete tilt-up wall panels for the three walls not facing the road.”

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This in turn led to a significant reduction in the extent of substructure and geotechnical works to the site, and the associated timeframe for these works – when compared with traditional concrete construction

“Once structural steel had been adopted for the framing of the upper floors it became apparent that a number of economies could be achieved due to the simplicity of building with steel,” Ray Kusturin said.

To save construction time, the large two storey basement car park was built after the upper structure.

The above ground structure of the fire safety engineered, unprotected steel (see boxed text) was prefabricated off-site. At the same time preliminary excavation was started and perimeter curtain piling was commenced to contain the ground water, without the need for ground anchors.

Once the ground water dam was in place one metre diameter piles were then bored at the column locations and steel stanchions lowered into the wet concrete.

Next the post-tensioned ground floor transfer slab was laid on top of the one metre diameter piles. At the same time, the superstructure was being erected and fitted out above the transfer slab while the basement was excavated to its full depth, the low strength concrete scraped off the steel column supports and an intermediate basement floor was poured.

This way the critical path through the construction process, which was the excavation and construction of a water-logged basement, was bypassed.

Mike Berkery, Project Manager of Berem Industrial, the builders on the project said that: “Once we got the tilt-up panels erected the steel structure just flew up.

“We used relatively simple connections for the steel to concrete panels and we were able to work on a number of fronts simultaneously.”

“Because the super-structure was constructed of structural steel it was possible to install the unpropped decking steel formwork system at the same time as the structural steel which saved more time. The shear studs were stud welded on site through the pan and erection of the roof sheeting was completed prior to pouring the 150mm thick slab.”

Gian Callegaro, Universal Steel Constructions' Manager who fabricated the job, reinforced Berkery's comments saying: “The simple connection design adopted by the design team made fabrication of the structural steel very easy. This simple but extremely efficient approach to steel design also had benefits when erecting the structure.

As the main supporting columns were continuous from the ground floor all the way up to the roof, we were able to complete two floors plus the roof simultaneously. Once the southern part of the structure was erected, we were able to immediately start laying the structural decking as well as roof sheeting."

"The site constraints and the E shape design meant that the perimeter steel was erected and completed and then the centre section of the building erected in stages. We worked from ground to roof from the rear of the building out to the road."

The exposed steelwork has been protected with inorganic zinc silicate and top-coated with a Ferreko finish.

Biztek is a steel showcase designed as a stimulating and harmonious work environment with ample parking. The project was efficiently designed and built in structural steel employing a clever construction technique to overcome the site constrictions for the basement levels.

Homes Fire & Safety undertook a fire-safety engineering study and adopted an unprotected steel primary structural system for the building. Beven Jones from Homes Fire & Safety said that: "The study looked at the various collapse mechanisms exhibited by steel exposed to fire and the performance of structural steel in a sprinkler protected building, with consideration of sprinkler redundancy. The design utilised the inherent fire resistance of steel, protection afforded by proprietary non-fire-rated inter-tenancy walls and natural separation provided by the building design to achieve an acceptable structural system.



The fire engineering study found that the design benefits to the project included:

- Compartmentalisation localises the possibility of structural collapse to a small portion of the building in the event that the sprinkler system fails to control a fire within a tenancy
- Services were able to be run through the steel framing in prefabricated holes without affecting the fire resisting performance of the element
- Vertical separation was provided by the floor slabs accompanied by the sprinkler system, which in turn provided lateral restraint to the unprotected columns
- Structural beams are contained within concealed ceiling spaces of non-combustible linings where they are protected from direct flame impingement and radiant heat flux exposure during the early stages of a fire
- Sprinkler protection allowed shop fronts to be full height glazing with minimal obstruction by the structural system
- No proprietary fire rated systems were required to protect the structural system, thereby significantly reducing costs and time associated with the labour intensive task of fire rating structural elements
- The provision of sprinkler protection allowed full height glazing to the shop fronts with minimal obstruction by the structural system
- The unprotected steel structure formed a major part of the external and internal architecture of the building

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FIRE ENGINEERING

Holmes Fire and Safety Limited

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