

This case study was written at the time when OneSteel was part of BHP. In that context, in some instances within this case study, reference may be made to BHP.

Gay Constructions

and Spaceframe Buildings brighten up Brisbane

Lytton Road, Morningside, an enclave of light industry nestled between the Brisbane River and suburbia on Brisbane's east side, has been hit by a striking new addition at Number 360. In a region of architectural adversity characterised by the public works functionality of the 1950's style local high school, to the visual starkness of cold stores and high-tension transmission lines and pylons (steel trussed) paralleling the road, this new office and workshop complex adds colour and style to the landscape.

The facility, which comprises a 4000sqm workshop building and a 1000sqm two storey office building, satisfies the aesthetic and functional requirements of a modern steel fabrication shop and office. It was designed and constructed by Brisbane company, Spaceframe Buildings Pty Ltd, as a home for both themselves and steel fabrication company, Gay Constructions Pty Ltd. Werner Raspotnik, Managing Director of both companies, said that the new premises provided an opportunity for the companies to showcase their steel design, fabrication and construction talents. Gay Constructions, a prominent Brisbane steel fabrication company, has completed the steelwork for such major Brisbane projects as the grandstand roof at ANZ stadium and, more recently, the grandstands at Suncorp Stadium and the Gabba Cricket Ground.

Design and construction of the steel portal framed workshop and the two storey steel framed office building suited the skills of Spaceframe who specialise in design, fabrication, shipping and erection of pre-engineered steel-framed buildings. The new premises were necessary because of rapid expansion of Spaceframe's export activities which have seen them provide abattoirs and bakeries in Siberia and Russia, a 2.8ha factory building in Hong Kong, and numerous industrial buildings in China.

According to Spaceframe, the decision to construct the office building frame in structural steel was simple. The synergy derived from having one major steel contract for both workshop and office, and the opportunity to minimise the number of



different types of construction on site, provided cost and construction time benefits to the contract. Although in this instance the two buildings are separate, Spaceframe consider that similar benefits exist in the situation where a two storey office is incorporated within a factory or industrial building.

Fabrication workshop

The 91m long portal frame building has an eaves height of 9m and has two 18m spans with a central row of columns (below). Bay spacing is 7m and a typical portal frame comprises 460UB67 exterior columns, 530UB82 interior columns, 460UB67 rafter haunches at both interior and exterior columns, and 410UB54 infill rafter sections (15m long). Column, haunch and infill rafter lengths were chosen to suit BHP standard section lengths, reducing wastage and material cost. Frame design utilises straight members which minimised fabrication cost. Straight haunch sections are shop welded to the top of the stiffened columns and have a



bolted end plate connection to the infill rafters.

The workshop has six 5 tonne, 18m span overhead travelling cranes which operate in a down-shop direction and one 5 tonne, 14m span overhead travelling crane which



operates in a cross-shop direction at each end of the shop. It also has two 1.5 tonne slewing cranes. The building's roof and walls are clad in Stramit Industries "Monoclad" Colorbond "Off-White". Natural lighting is enhanced by the inclusion of one sheet of translucent fibreglass roof sheeting in each bay. Both the walls and roof have an off-white Colorbond finish to reflect heat and to present a low maintenance finish.

Office building

The 46m long by 11m wide office building is detached from the factory but linked by a covered steel-framed walkway. A strong theme pervades the office building from the structural frame, internal partition framing, ceiling and wall cladding, to the stairs, pot plant stands, and even the board room table and riveted steel entry doors.

Steel moment frames, two storeys high, comprise the main structure of the office building. The frames are generally spaced at 3.5m or 4m centres and have a central row of 150x150x5.0 SHS columns at the lower level



and two storey, 310UB40 exterior columns which are exposed outside the wall line. 150mm thick reinforced concrete slab on "Condeck" profiled steel decking comprises the floor structure which is in turn supported by continuous 360UB45 beams over the internal support. Beams are composite with the slab and are spaced at 4m maximum centres. The floor slab is reinforced with an 1800mm wide strip of F818 fabric top reinforcement over the beams and F62 fabric generally throughout.

The office roof comprises a gable of 26 degrees pitch with strikingly shaped eave overhangs which are unlined to express the steel structure, and also feature a large tubular steel gutter which has a concave, curved profile in both plan and elevation (below left). Roof overhang is a maximum of 3.4m at each end of the office building and a minimum of 1.1m at a point midway along the building. The gutter is fabricated from a split 273ODx4.8 CHS section and is hot dipped galvanised. Downpipes are also constructed from similar galvanised steel tube. The roof is braced by M20 cross rod bracing at each end of the building.

Rafters consist of a 310UB40 straight haunch section which is rigidly connected to the column by a shop welded joint. The haunch has a variable length eaves overhang to suit the curved gutter and has a bolted end plate connection to a 200UB25 rafter section at a distance 2.5m from the column. Lateral stability is provided to the building in a cross direction by rigid frame action and in the longitudinal direction by exposed 125x125x4.0 RHS diagonal wall bracing members which are located at each side of the building in the end bays.

Featured architecturally in the upper storey is a continuous skylight and series of ridge vents at 3.5m centres above a 3m high central atrium. The atrium is created by a dropped ceiling and bulkheads either side of the

central passageway. Continuous skylighting allows natural light infiltration into the office areas and, in conjunction with a series of suspended timber decorative panels of undulating profile, provides an attractive light and shade effect. The wave effect of the timber panels is complimented by the ripple pattern of the Stramit corrugated, perforated steel sheeting used to line the ceiling. Perforated steel sheeting is also pressed into shape and used as fluorescent lighting battens throughout the office. Acoustic insulation is provided above the ceiling sheeting.

In addition to providing permanent formwork and reinforcement to the suspended concrete slab, the Condeck steel decking forms the lower storey ceiling lining. Decking soffit was etch primed and painted to increase light reflectivity and enhance performance of artificial lighting.

The building has continuous glazed windows at both upper and lower storey levels. Lower storey windows and upper storey gable end windows are shaded by steel sunhoods. The sunhoods are constructed from 2mm thick steel sheet which is pressed into a ribbed profile enabling the section to span a maximum of 4m between 75x75x4.0 SHS sections which cantilever from the exterior columns. Sunhoods are powder coated with Dulux "Wizard Blue" which provides a lively splash of colour around the building. The colour theme is continued in the external steel-framed stairs, exposed steel columns, and door and window frames as well as workshop awnings and roller shutters. External office walls are clad in Stramit "Corrugated" Colorbond "Off-White" sheeting and have the ribs horizontal whilst the gable ends are similarly clad but have the ribs vertical.

Fire resistance of the steel frame

Under the Building Code of Australia, the two storey office building is classified as Class 5 and is therefore required to be of Type C construction. In accordance with these requirements the boundary walls and external exposed columns, being at least 3m from any fire source feature, are not required to have a Fire Resistance Level (FRL) and the internal columns, beams and roof framing are not required to have an FRL, irrespective of the proximity of the external wall to any fire source feature.



Project participants

Design and construction: Spaceframe Buildings Pty Ltd
Fabrication and erection: Gay Constructions Pty Ltd