

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.

# Runaway

The recently opened indoor sports centre at Sports Drive, Runaway Bay on Queensland's Gold Coast is a fine example of structural steel construction meeting a tight budget whilst at the same time satisfying the aesthetic and functional requirements of a modern, multi-use indoor sports facility. The single level complex contains four combination netball / basketball / volleyball courts, change rooms, offices, canteen and meeting rooms. The project also includes road works, on-ground carparking, and landscaping.

Located within a 24 hectare reserve (administered by the Gold Coast City Council (GCCC)) it contains cricket ovals, netball courts and tennis courts. Resulting from a Council initiated sports strategy and development plan formulated in 1989, a steering committee was constituted which comprised local sporting associations, schools and businesses. The committee was subsequently incorporated as the Runaway Bay Sports Complex Association Inc. and saw the construction of the complex over a period of 35 weeks, completed in October 1995. Cost and funding details are as follows:

<b>Costs:</b>	
Consulting Fees, Legals etc	\$207,000 □
Construction - Building, Carpark, □	
Landscaping	\$1,959,000 □
Service Alterations, Contract □	
Supervision & Contingencies	\$129,000 □
<b>Total Cost:</b>	<b>\$2,295,000</b>
<b>Funding:</b>	
GCCC	\$1,495,000
Federal Government Grant	\$200,000
Queensland Netball Association	\$600,000



Leased to Queensland Netball Association Inc., it is managed jointly by national sports facility operator, Recrosport Pty Ltd, and local company Day By Promotions Pty Ltd, aimed at promoting a healthy and active life style for all, rather than at the elite level of sports.

The GCCC commissioned the Life. Be in it Australia organisation to design and

document the project - the first Queensland example of a standard indoor sports centre. Design and documentation management was carried out by local architect and development consultant, Roger Bylett of Projects International Pty Ltd. Detailed architectural design and documentation was undertaken by Graham Courtney and Associates Pty Ltd of Melbourne in conjunction with Recrosport Pty Ltd.

The complex incorporates four netball or basketball courts and permits duplication of court use for volleyball and other sports. Spectator seating for 500 people is provided. The sports hall occupies 3145 sqm and the amenities area occupies 485 sqm. A glass wall separates the administration and leisure area from the courts, whilst permitting spectator viewing and surveillance. The basketball courts conform to Olympic standards for area, clear height and run-off, and the netball courts conform to Australian Netball Association requirements for court dimensions and run-off areas. Minimum clear roof height over the courts (to the underside of the steel rafter) is 7m and the maximum clear height is 9m.

Constructed by F W Curley Pty Ltd of the Gold Coast, the complex comprises a steel portal frame structure incorporating curved portal frame elements across the entire roof span. This minimises the apparent bulk of the building and creates a more elegant appearance than is normally achieved by a traditional straight pitch roof. The 85m long sports hall is located adjacent to a residential area and the visual impact of the building was an important consideration in its design.



# Bay *Indoor sports centre*

Upper walls are clad in BHP Building Products "Spandek" steel sheeting whilst the roof is clad in BHP's "Trimdek" cladding and is curved over a radius of 90m. Two expansion joints are included at equal spacings across the 39m wide sports hall roof. Joints were created by raising the purlin cleat height by 45mm across the joint and overlapping the sheeting a minimum distance of 250mm. Both the walls and roof have an off-white Colorbond finish to reflect heat and to present a low maintenance finish to the harsh coastal environment. The walls and roof are insulated with bulk fibreglass and perforated painted sarking supported on wire mesh. This construction form has numerous benefits, in particular:

1. it provides thermal insulation to the building
2. it acts as an acoustic element to minimise reflected sound inside the hall
3. it provides a uniform and visually pleasing finish to the interior of the hall
4. the white painted sarking maximises performance of artificial lighting.

The sports hall is enclosed by a 2.5m high precast concrete wall which is positioned inside the inner flange of the portal column. A steel-clad wall seals the space above the concrete wall and is positioned outside the outer flange of the column. The building is mechanically ventilated by the inclusion of horizontal vents around the perimeter of the building between the lower level precast concrete wall and the upper level steel-clad wall. Air is drawn from the ventilation slots on one side of the hall and into the mechanically exhausted ventilation system

on the opposite side of the hall. Vents are vermin proofed with galvanised steel mesh.

The sports hall floor consists of a sprung, tongue and grooved timber floor which is structurally isolated from the main building and is supported on rubber bearing pads.

## Structure

The 37m clear span portal frame structure was designed by consulting engineers, Meinhardt-Axon Pty Ltd, and features BHP's new welded sections, having 800WB146 portal frame columns spaced at 8.5m centres and 7.5m overall height. The portal rafter typically consists of three segments, firstly an 11.5m long segment which is connected to each column face by a bolted moment end connection and secondly, a 15m long curved 530UB82 central infill section with bolted end plate connections. The 530UB82 was cold rolled to a 90m radius by Brisbane company Rollpress Pty Ltd. The 11.5m segment comprises a 7.5m long haunch (curved to a 37m radius) which is butt welded to a 4m length of 530UB82 (rolled to a 90m radius).

The 7.5m long haunched rafter section has a maximum depth of 1030mm at the column face and a minimum depth of 530mm at the splice point and is fabricated from a 10mm thick web plate (profile cut to a curve) and two 210mm wide x 16mm thick flange plates. It has a 32mm thick end plate which is connected to the stiffened column by 8 No.M30 8.8/TB bolts.

Intensity of structural steel in a typical portal frame bay (excluding wall and roof bracing and mullions) is 20kg/sqm, and total tonnage of structural steelwork in the

building is 89 tonnes. Steel portal columns are supported on a reinforced concrete plinth and headstock over two raking piles. In order to minimise ground vibration, steel tube piles filled with reinforced concrete were used with each pile being designed for a maximum working load of 235kN in tension and compression. A concrete raft slab was chosen for the floor of the amenities area.

## Fabrication and Erection

Structural steel fabrication and erection was carried out by D A Manufacturing Pty Ltd of the Gold Coast. Steel erection commenced with the braced end bays which are located towards the ends of the sports hall and progressed towards the centre of the building. Rafters were pre-assembled on site, on the ground, and lifted into position in one 37m length by two 30 tonne mobile cranes. Total cranes utilised for steel erection comprised three 30 tonne mobile cranes. The third crane was used to lift steel bracing members whilst the main frames were erected.

An innovative safety technique, which was developed by D A Manufacturing and trialled on a previous project, was employed during roof purlin installation. The technique involves the use of a static line attached to 75x75 SHS posts which, in turn, are temporarily clamped to the top flange of the rafter. The static line assembly is attached to the rafter prior to erection. Once steel erectors are attached to the static line by a safety harness, they are free to walk along the rafter top flange when installing purlins. On completion of the purlin installation, the static line and posts are removed by scissor lift.

Structural steel shop detail drawings were prepared by DKL Drafting Pty Ltd.

## Protective Coating

The columns are hot dipped galvanised and are also painted over a 2.6m height where exposed outside the building. Rafters were power wire brushed and prime coated with a zinc phosphate coating.

## Project participants

Design:	Projects International
Architect:	Graham Courtenay & Associates Pty Ltd
Construction:	F W Curley Pty Ltd
Consulting engineer:	Meinhardt-Axon Pty Ltd
Fabrication & erection:	D A Manufacturing Pty Ltd

