

Industry Update

The decline of the residential market by nine percent last year provided continuous challenges for the house building industry. Despite the drop in timber prices the steel framing industry managed to sustain housing market volumes.

Steel Frame industry growth can also be attributed to the increasing use of steel framing in non-residential building such as schools and hospitals.

Occupational health and safety

Working at heights continues to be an issue for the whole housing industry. Certain states have introduced prescriptive regulations or codes of practice to limit the spacing in trusses which may have an effect on the competitiveness of steel framing. The National Association of Steel Framed Housing (NASH) is working with the Australian Safety and Compensation Council (ASCC) and the various state WorkCover authorities to develop guidelines for working safely at heights.

Training

A new TAFE apprenticeship course (BCG03) for carpentry apprentices was implemented in 2004. This course incorporates steel framing into appropriate modules such as sub-floors, wall framing, and trusses.

Previous courses dedicated to steel framing will be updated and accredited for specialised training such as upgrading the skills of carpenters and steel erectors. Apprentices who started their training prior to the commencement of the new curriculum will complete the old course.

The introduction of Continuing Professional Development (CPD) for building trades is providing opportunities for the steel frame industry to improve skills in the building industry. The program is compulsory in New South Wales and voluntary in Victoria with other states investigating introducing CPD programs.

NASH Chapters have been active in the development of local training initiatives across Victoria, Queensland and Western Australia.

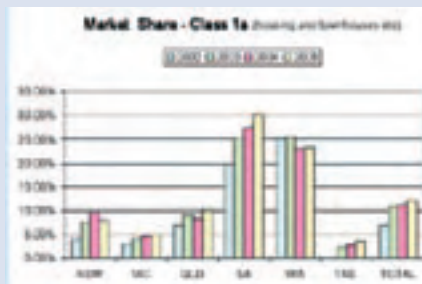
Residential Construction Market

The total number of dwellings commenced during 2004 to 05 dropped by nine percent to 156,162. The number of detached houses represented 67 percent of the total dwelling market. The steel framing market is largely targeted at Class 1a buildings that include detached houses, row, and town houses. Class 1a buildings represented 82 percent of the total dwelling market (NSW 72 percent, Vic 89 percent, Qld 78 percent, SA 94 percent, WA 92 percent, TAS 99 percent).

The number of steel frames supplied into this diminishing market has remained the same and consequently the market share has increased to 12 percent.

Steel framing is being increasingly used for non-load bearing walls in multi-level unit developments.

Information courtesy of NASH



New NASH standard

The National Association of Steel-Framed Housing (NASH) has released a new NASH Standard – *Residential and Low-rise Steel Framing Part 1 Design Criteria* which sets minimum standards for the design of low rise steel framed buildings. Steel framing currently represents over 10 percent of new housing.

The *Public Review Draft* of the Standard was distributed widely and resulted in comments from different sectors of the industry.

Some of the major features included in the NASH code are:

- Both residential and commercial low-rise buildings using traditional framing techniques
- Limit state code in line with the latest AS/NZS 1170 housing code series

- Serviceability criteria
- The assessment of the design criteria may be undertaken by calculation and/or testing. Prototype testing of full size members and sub-assemblies can be very beneficial and is generally used in the development of new systems.

NASH followed the Australian Building Codes Board (ABCB) Protocol for the development of BCA reference documents in their development of the Design Criteria.

The NASH Standard – *Residential and Low-rise Steel Framing Part 1 Design Criteria* will be referenced in the 2006 edition of the Building Code of Australia. It can be purchased through the ABCB's web site at www.abcb.gov.au

Innovation in floor design

Heavenly escape

creatively designed and constructed cottage in the Grampian mountains of southwest Victoria has showcased the durability and versatility of steel in various environments.

The holiday home called Heavenly Escape is a five star single bedroom unit including a state-of-the-art kitchen and generous living area with an atrium spa bath that overlooks the National Park.

According to Trevor Price who designed and built the holiday home, the unit is constructed in steel because of the high risk of bushfires in the area.

Trevor explained that: "As well as the bushfire risk we also had to consider the unevenness of the site which has a slope of 600 millimetres to 2400 millimetres. We needed a steel sub floor that was adjustable and could be easily erected. We chose the OneSteel DuraGal® Flooring System because it also allows for the wider spacing of bearers and piers, and because it's steel, there won't be a problem with white ants."

In an innovative approach, Trevor also used the flooring system as balustrades for the front veranda. "By using it as the sub floor and then continuing it through to the veranda we have turned the flooring system into a design feature that looks good from inside and outside the cottage."

The cottage has achieved several design and construction accolades, including the award for the Most Innovative Use of Steel 2001 by the Housing Industry Association.



Subtlety of form and material strength

The Cape Schanck House

The Cape Schanck house bears testimony to the benefits of using steel in housing. Structural steel was used because it best facilitated the desired expressive form. The various applications of steel allowed the synthesis of structural, environmental and aesthetic design intentions.

This house is located in an area near rugged coastline subject to strong prevailing winds and sits within an expanse of native tea tree. In this project the analysis of dynamic forces such as wind energy and wind turbulence have informed the modeling of the building envelope.

Throughout the house the use of steel facilitated the required combination of subtlety of form and material strength. The angled planes of the bedroom wing walls were enabled by steel wall beams and cranked circular hollow section columns.

Awnings over the south windows throughout the wing act both as wind scoops and sun shades trapping summer southerlies while providing shade from the afternoon sun. The lightness of these forms was made possible with square hollow section galvanised steel.

In the living room the ceiling wraps down to an internal bulb-shaped water tank. All of the rainwater collected from the living room roof is expelled into the bulb tank, which cools air temperature of the living room during summer,

supplies rain water, and structurally carries the roof load.

Separate hemispherical, conical and cylindrical sections were welded together and the joints were ground for the bulb tank. Outlets and over flow pipes were welded internally to re-route rainwater to a secondary tank as well as allowing for storm water overflow. The entire bulb tank was hot dip galvanised, the surface was blasted and the interior was coated with Amercoat CC56, a coating similar to that used in milk tankers. This treatment is important to avoid the growth of organic matter over time. The exterior was coated in an epoxy paint finish.

The tank was fabricated with legs and lifted into place onto a pad footing, 600 millimetres lower than the adjacent concrete slab. The remainder of the slab was then poured after installation of the bulb tank.

Engineer Doug Turnbull of TD&C and steel fabricator Jack Engineering worked closely with Paul Morgan Architects to achieve a synthesis between architecture and structure, resulting in expressive forms, long spans and a feeling of structural lightness.

Architect Paul Morgan Architects

Structural Engineer TD&C

Steel Drafting PH Drafting

Structural Steel Jack Engineering



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Flexibility of design

The Peters Residence

The Peters residence, built by Freedom Homes, emphasises the appeal, versatility and the strength of steel in a modern home built to withstand surrounding environmental conditions.

The large four bedroom rural family home features galvanised steel flooring systems, wall frames, and roof trusses. Fully welded frames coupled with integrated bracing and a special stiffened top plate section provide a product that gives load bearing walls the capability of supporting extra weight. Each frame is manufactured in the Freedom Homes factory and its rigid construction means the frame remains true and does not suffer from twisting, warping or shrinkage.

The flexibility of steel during the design and construction stages was beneficial to the project for owner and designer Noel Peters; "I designed the home without considering the framing material. Freedom Homes had no difficulty accommodating the plans in a steel frame. The steel frame also allowed for changes and minor design alterations during construction just as easily as a timber frame would have," Noel said.

Steel has the advantage of covering large internal open spans which improves flexibility and allows for unusual design. Steel frames also allow for ease of construction because they are light weight and have pre-punched holes for installation of plumbing and electrical services. The pre punched holes are rolled to eliminate cutting or scoring of cables and pipes as they are roughed in and are also aligned in the framing studs to provide straight runs of services.

The house is surrounded by rural bushland and so the decision to use steel frames provided many advantages. Noel explained that "We chose to build in steel because the property

is located in a white ant prevalent area with bushfire threat. We felt that a steel frame system would safeguard the main structure providing longevity and a way for us to avoid these problems." www.freedomhomes.com.au



Steel frames also allow for ease of construction with pre-punched holes for installation of plumbing and electrical services.



This feature combined with the use of Colorbond® roofing allowed for wide spans for the steel roof trusses thus providing an economical and durable structure.

Aesthetics, creativity and innovation

The Sulinski Booth Residence

The Sulinski Booth residence, situated in the Samford Valley in the outskirts of Brisbane, is a clear example of innovation in the use of steel in housing. The house was short listed in the 2005 ASI Queensland Steel Awards in both the Architectural Steel Design Award category and the Metal Building Product Design Award Category.

The intent of the design was to create the sense of a holiday retreat that was highly responsive to the views and breezes.

The steel framing on a standardised 3.6 metres grid allows clear, open plan spaces and reflects the desire for architectural and structural simplicity. The elevated steel frame maximises the views, minimises site disturbance and provides effective low cost termite control.

The large skillion roof creates a generous sheltered outdoor area and high internal ceilings. The roof has ventilation slots to allow convection cooling to the roof cavity.

The connections have been kept simple and are repeated and standardised.

External cladding involves a marriage of Zinalume® corrugated sheeting on the roof and rollformed Stramit Longspan® stainless steel on the walls with infill areas of timber and painted plywood.

Zinalume roof cladding is supported by steel top hat sections and timber roof beams to create a striking and rich contrast. The linear form is one room deep to allow for cross ventilation and has captured the views from every room.

The steel was used for essential structural purposes only. Decorative steel design elements were eliminated through the design process to achieve a pared back, honest structure without compromising the expressiveness of the steel. The 120 deep steel top hats, used as roof purlins were easy to install on site by carpenters. Direct fixing to the timber roof beams avoided the need for cleats and brackets.

There is honest, direct and simple detailing in the residence which provides a finer grain of elaboration and expression particularly at the steel to timber connections.



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Project Team

Architect: Anne Sulinski & Peter Booth

Engineer: Brian Stanway

Building Contractor:

Bielby Master Builders

Steel Fabricator: Northside Steel Industries

Steel Detailer: Anne Sulinski & Peter Booth

Lowering cost, maximizing efficiency

The American barn

This American barn style home in the Hunter Valley demonstrates the various benefits of steel in housing.

Located in a rural setting in the lower Hunter Valley, this home reflects the rural lifestyle of the region whilst blending in with the local environment.

Already familiar with the advantages of steel in construction from previous projects, the owners explored the opportunities of using the benefits and cost efficiency of lightweight steel construction for their new residence.

The result was a residence constructed on a concrete slab with high strength roll-formed galvanised steel sections used for wall and roof framing. The use of pre-engineered sections compliant with Australian Building Codes assisted in reducing the overall cost of the residence. A mezzanine "loft" is also



In the American style barn the mezzanine loft is also constructed from steel sections.

constructed from steel sections. The external walls and the roof are clad in Colorbond® steel in the traditional corrugated profile. Internal walls constructed from galvanized steel stud framing have been lined with Zinalume® corrugated cladding in conjunction with stained timbers and the ceilings lined with plaster board and painted. Insulation was used for both roof and walls to improve the energy efficiency of the residence.

The dwelling is an attractive example of the use of steel to achieve lower cost construction than the use of traditional building materials in the housing industry.

The building was constructed by AllGal Residential and Rural Steel Frame Buildings. For more information please visit www.allgal.com.au

Maximising comfort through creative design

Brooks Beach House

Brook's beach house is a strand of pavilions perched on the rim of a very steep rainforest slope some 150 meters above the ocean in North Queensland. The use of steel in this fragile rain forest habitat of the critically endangered cassowary has helped to minimise environmental impacts.

The two owners required specific built features to accommodate their contrasting physical needs. One owner wanted a space to practice circus and aerial routines, while her partner required ease of access with minimal steps.

Steel features prominently throughout the house in the structural framework with custom-made steel frame doors providing natural light to bathroom areas. The bathroom walls were lined with flat Zinalume® sheeting. The home also has a steel framed performance tower for circus and aerial routines. The tower is a stand-alone feature visually supported by a galvanised tank stand and water tank and provides an observation deck with 360 degree views of the rainforest and sea.

Tropical passive design principles drive the house. The steel framed pavilions are one room deep to maximise transparency and cross ventilation. Small compartmentalised steel framed living and working areas allow for efficient cooling of the house if required. Steel framed tropical rooftops catch and direct the prevailing south easterly sea breezes through to doors and windows. A steel framed rainwater tank and stand provides rainwater for drinking and bathing when the power goes off.

A combination of masonry and lightweight steel construction ensures that the house works for its owners in terms of comfort, ease of use, maintenance, repair, safety, and cost. Substantial anchorage, bracing, and continuity are essential in the cyclonic region. For this reason, masonry blade walls were oriented east west down the slope to anchor the building and support the steel roof beams above. These walls continue as lightweight steel framed walls towards the sea. Steel posts support the beams so that the single skin lightweight walls address the seaside. Bracing walls separate spaces and corners of walls. A continuous twisted purlin roof is anchored to the blade masonry walls and steel posts.

Project Team

Architect: Insideout Architects

Engineer: Steve McKenzie
Consulting Engineer

Building Contractor: King and Hickerton Builders

Steel Distributor: Tonkins Steel

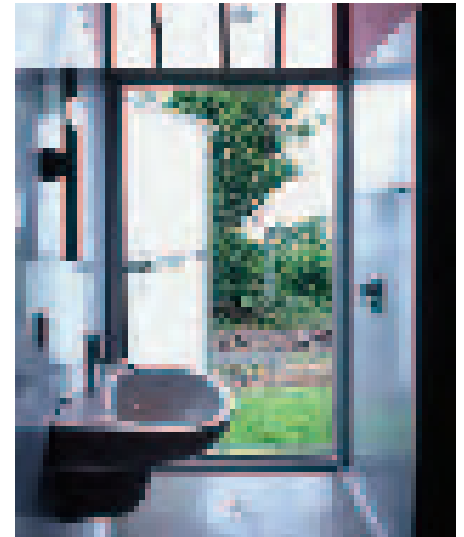
Steel Fabricator: Khun Steel Fabrications

Steel Detailer: Noel Trap Drafting Service

Coatings Supplier: Pollards



The performance tower is a stand-alone feature visually supported by a galvanised tank stand and water tank.



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