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SCNZ STEEL CONSTRUCTION NEW ZEALAND

STEEL FUTURES

# REBUILDING CHRISTCHURCH: THE ROLE OF THE STEEL CONSTRUCTION INDUSTRY

In just over a decade the capacity of New Zealand's steel construction sector has doubled thanks to significant investment in new fabrication technology and workshops. This technology has increased not only productivity, but also the quality and precision of the fabricated product.

These features, combined with the material's many other attributes, mean the steel construction industry is well placed to play a significant role in the rebuild of Christchurch. In fact, the work has already begun: in the immediate aftermath of the Canterbury earthquakes the local steel construction industry was busy helping to stabilise unsafe buildings.

Steel structures have, on the whole, performed very well in both earthquakes. A surprising aspect has been the resilience of eccentrically braced frame construction (EBF) when cast integrally with concrete slabs. The two tallest examples in Christchurch, the 22 storey Pacific Residential Tower and the 12 storey HSBC Tower, have suffered only minor seismic damage and have both been passed fit for reoccupation without requiring structural repair to the seismic load resisting systems. In fact the HSBC Tower, according to newspaper and television news items, is the first central city high rise building to be reoccupied after the February 22nd Lyttleton earthquake with tenants JBWere returning to work in the building on Monday 30th May 2011.

*HSBC building under construction. Eccentrically braced frames in foreground. (John Jones Steel)*

So unexpected was this high performance that the University of Auckland has proposed a research project into the beneficial effect of the concrete slab on the performance of eccentrically braced frames, and the overall post-earthquake building displacements.

The good seismic performance of the steel structures in Christchurch is a credit to the expertise of the structural engineers involved and the quality workmanship of local fabricators.

That said, one of the unfortunate outcomes of the recent earthquakes has been the loss of confidence in multi-level construction with many calls, particularly from the non-engineering community, to limit the rebuild to four storeys. While this approach may allay psychological concerns over multi-level construction, it does not address the economic damage caused by earthquakes.

What is required is a paradigm shift in terms of building design philosophy. The traditional approach to seismic design, known as ductile design, has been to engineer buildings for controlled damage during a major earthquake. Ductile design's sole aim is to protect lives and, admirably, it has contributed to saving many. Its inability to minimise structural damage, however, has resulted in significant economic loss.

If there is to be any silver lining in a very dark cloud, it is that the high cost of the earthquake-induced building damage will drive widespread uptake of new low damage seismic-resisting technology. These systems can withstand major earthquakes and require no major post-earthquake repair.

Several good examples of smart low damage structural steel systems such as sliding hinge joints for steel moment resisting frames and rocking steel frames have been developed in New Zealand by researchers such as Dr Charles Clifton and Wellington based Structural Engineers Aurecon. Over $2.5 billon of new steel structures built in the last few years in New Zealand use this technology.

Notably, low damage seismic-resisting

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## ALSO IN THIS ISSUE



## UPCOMING EVENTS

| | |
|---|---|
| **2011** | |
| **16 June** | **SCNZ Executive Council meeting** |
| **September** | **SCNZ AGM** |
| **October** | **Steel Structures Seminar Series: Spring** |

*Continued from page 1*

technology does not come at a significant cost premium. Take the award-winning Te Puni Village, Wellington, for example, which won a prestigious Institution of Structural Engineers award in 2009. The additional cost of applying low damage systems in lieu of a conventional approach was just over 0.5% of the total building cost. As a result of this paltry premium the Victoria University has a building that can be used as a post-earthquake emergency site in the event of a nearby fault rupturing.


*(a) (MJH Engineering)* *(b) (Aurecon)*
***Te Puni Village Low damage systems a) rocking braced frame, b) sliding hinge joint***

Multiple research programmes into low damage steel-framed seismic-resisting systems are currently underway, or in the pipeline, at Auckland and Canterbury universities. Consequently, new systems will emerge to complement the existing sliding hinge joint and rocking frame systems used on Te Puni Village.

On that note, we join with the chorus of voices advocating that the choice of building materials for the rebuild of Christchurch be left to the technical advisors to the Canterbury Earthquake Recovery Authority (CERA) and the building owners. There will clearly be opportunities for all building materials; crucially, however, the choice of construction material for any given project should be based on its technical and economic merits.

It is predicted that the Christchurch rebuild will be a very slow process, and our thoughts are with the city's people who have suffered such devastating human and economic loss. Yet, while this will plainly be frustrating for many, the upside is that a slow and considered rebuild will allow decisions to be made based on solid facts, not emotions.

*For a more detailed description of the performance of steel structures in the recent Christchurch earthquake, visit the New Zealand Society for Earthquake Engineering website (www.nzsee.org.nz) . SCNZ will, in due course, disseminate some of the design lessons learnt from these recent Canterbury events.*

# METALS NEW ZEALAND CONFERENCE

Delegates from New Zealand's metals based industries gathered in Wellington in April for the Metals Industry Conference. The theme for this year's bi-annual event was Driving Productivity and Innovation.

Metals New Zealand was officially launched by Minister for Economic Development Hon. David Carter at the conference. A highlight of the morning plenary sessions was the keynote speech by Dr Rick Boven of the New Zealand Institute who outlined the reasons for New Zealand's relatively poor economic performance and left industry leaders with practical advice on how to improve this situation. All main speakers' presentations can be found on the conference website of www.metals.org.nz


***The MC for the occasion was Jim Hopkins***

The Steel Construction New Zealand sessions featured Tony Smale, Peter Farley and Dr Stephen Hicks of HERA. In his presentation entitled "Making Money from your Businesses Hidden Opportunities", Tony encouraged members to recognise the significant value of the intangible assets they possessed in their business such as systems, knowledge and expertise which do not appear on the company's balance sheet. Peter Farley, an expert in fabrication technology discussed the factors required to achieve optimal productivity utilising modern fabrication equipment. One of the interesting observations made by Peter was that new fabrication equipment had been developed to suit low volume operations. This new equipment was now far more affordable for small companies while offering significant gains in productivity.

Dr Stephen Hicks rounded out the SCNZ sessions with an overview of the Bridge Development Groups (BDG) activities. The activities of this group had been instrumental in raising the number of steel-concrete composite bridges constructed in New Zealand.

# SCNZ WELLINGTON REGIONAL GET-TOGETHER

The gathering of SCNZ member's in Wellington for the Metal's New Zealand Conference afforded the opportunity to get together with Wellington based members for a dinner at the Amora Hotel.

The event which was attended by approximately 30 members was a good opportunity to introduce SCNZ's newest Councillor Craig Taylor of OneSteel NZ Ltd. SCNZ Manager Alistair Fussell briefly outlined some of the key activities either in the pipeline or underway for the organisation.

Thank you to Wellington based members Malcolm Hammond of MJH Engineering and Scott Miller of Silvester Clark for helping plan and promote the event and to New Zealand Steel for helping subsidise the cost of the event.

# THE SCNZ EXCELLENCE IN STEEL CONSTRUCTION AWARDS

Auckland-based D&H Steel Construction Ltd took top honours in this year's SCNZ Excellence in Steel Construction Awards, capturing two of the four steel constructor trophies. In the Buildings Up to Three Storeys, D&H Steel won with The Pride: Lion Brewery, East Tamaki, while its Deloitte Centre entry won the Buildings of More than Three Storeys category.

In the Bridges & Infrastructure Category, the winning steel constructor was Tenix New Zealand Ltd, with the Waikato River Bridge, and in the Special Structures category, the winning steel constructor was Stevensons Structural Steel (1978) Ltd with its entry, The Rock at Wellington Airport.

The awards were presented at a gala dinner closing the Metals New Zealand Industry Conference held in Wellington in April. This year there was a total of 14 entries.

SCNZ Manager Alistair Fussell was delighted with their quality. "The objective of the competition is to celebrate New Zealand's excellence in the field of steel construction by identifying projects that demonstrate best practice in co-operative teamwork, the application of sustainable principles, safety management and innovation. The focus is on steel structures built by New Zealand steel constructors using New Zealand-fabricated steelwork. The buildings entered had to have been completed and ready for occupation during the period from July 2008 to December 2010."

A panel of independent judges representing steel construction, building, architectural and structural engineering interests was appointed by the SCNZ Council. In order to recognise that each winning entry depended on successful teamwork, the judges also awarded certificates to the builder, the structural engineer, the steel modeller and the architect, as well as the developer/owner.

The presiding judges were: representing the architects, Bradley Wynn of Woodhams Meikle Zhan; representing the engineers, Craig Stevenson of Aurecon; representing the Steel Constructors, Tim Watkins, formerly of Auckland Steel; and representing the Builders, Tim Jones of Hawkins Construction. SCNZ Manager Alistair Fussell was the non-voting chair. The awards were presented by SCNZ Chairman, Chris Kay of New Zealand Steel.

***Holding the cup for the Up To Three Storeys category, Mike Sullivan, Managing Director of D&H Steel Construction Ltd. Left to right: Mike Turner, Mainzeal Construction; SCNZ Chairman, Chris Kay of New Zealand Steel; Mike Sullivan; and Hamish Brookie, Beca.***

***Managing Director of Stevens Structural Engineers (1974) Ltd, Evan Kroll, has a two-handed grip on the cup for the Special Structures category. Left to right: Peter Freebairn and Peter Van Der Made, both of Stevensons; Evan Kroll; SCNZ Chairman, Chris Kay and Peter Lowe, Mainzeal.***

***Grant Archer of Tenix proudly holds the cup for the Bridges & Infrastructure category. Left to right: Dr Rob Presland, Holmes Consulting Group; Grant Archer; Tim Watterson of SKM; and SCNZ Chairman, Chris Kay.***

***Collecting the Judges' Merit Award on behalf of John Jones Steel Ltd is Dave Anderson (left). The award was presented by SCNZ Chairman, Chris Kay.***

The judges made it known that, in the course of their deliberations, they often came across projects that, while not clear winners in terms of scale, showed great merit. So they introduced the Judges' Merit Award, awarded for the first time to John Jones Steel Ltd of Christchurch, for its use of jacks instead of cranes to lift the roof of Nelson Technical Hangar No.1, while the airport remained fully operational.

The venue for the ceremony was the five-star Amora Hotel. SCNZ Manager Alistair Fussell said: "Our Excellence in Steel Construction awards have been designed to encourage the raising of standards through healthy competition and strong teamwork. These are just part of the value obtained when developers use the local supply chain. Not only are SCNZ members equipped with the latest technology and high plant capacity, they also bring the advantage of being on the spot to adapt to design changes and improvements, something not readily available to those who shop for prefabricated steel in international markets. A good price is often not a good deal when the project requires changes or improvements and the steel is already on the high seas and the fabricator is in the other hemisphere."

The conference saw the official launch of Metals New Zealand as a pan sector organisation representing member-based associations and corporates with a shared vision of engaging with Government to promote the metals industry in the interest of the national economy and for the benefit of all who work in the metals sector. The unveiling of the Metals New Zealand plaque was performed by the Acting Minister for Economic Development, the Honourable David Carter, who acknowledged that the country's metals sector has a need to improve its profile. "My door will always be open to you," said the Minister, "because I applaud your vision of improving productivity through innovation. Like you, I want to see that vision become reality."

**Would you like to become a SCNZ member?**
For an annual subscription of only $100 + GST you can enjoy the benefits of belonging to an association dedicated to the advancement of steel construction. Please fill in the details below and fax back to 09 263 5638.

☐ **Yes, I would like to become a SCNZ member.**

***Company name: ..... Contact Name: .....***

# STEEL INDUSTRY FORMS SUSTAINABILITY COUNCIL

Steel is arguably the most sustainable of the major structural materials. It has numerous sustainability benefits, which are guaranteed to be realised whenever steel is used. They include: low waste; flexibility; offsite manufacture; speed; resource efficiency; adaptability; demountability; long lasting appeal; safety; reusability; and recyclability. Although these attributes are well-known overseas, and a great deal of international data has been amassed (Worldsteel, whose members produce approximately 85% of the world's steel, has been undertaking Life Cycle Inventory work since 1996), there is a general lack of awareness of these benefits in New Zealand. In response to this issue, the Sustainable Steel Council (SSC) was formed in 2009 whose membership consists of the major steel producers; manufacturing industry associations; coatings industry; supply chain distributors; contractors and builders; and research and development organisations.

SSC commissioned PE International (one of the leading experts in sustainability, who also produce the GaBi Life Cycle Assessment software), to develop a 5-year plan and has been forging links through meetings with, among others, the Australian Steel Institute (ASI), Worldsteel and the British Constructional Steelwork Association (BCSA). One initiative that has been completed through establishing links with these international bodies has been the subject of thermal mass (more correctly called fabric energy storage). Most of a building's mass is in the floors and this is the part of the structure which is usually exposed, by removing the suspended ceiling, to take advantage of this heat storage capability. Through a collaborative study between the Heavy Engineering Research Association (HERA) and BCSA, it has been shown that over a typical 24 hour cycle, the maximum value of admittance for a slab exposed from underneath may be achieved with only 100 mm of concrete. This means that, where heating and cooling takes place over a daily cycle, a floor thickness of 100 mm (typical of steel-concrete composite construction) will provide the maximum amount of fabric energy storage possible. If more mass is provided, it will not be utilised and is therefore a waste of resources.

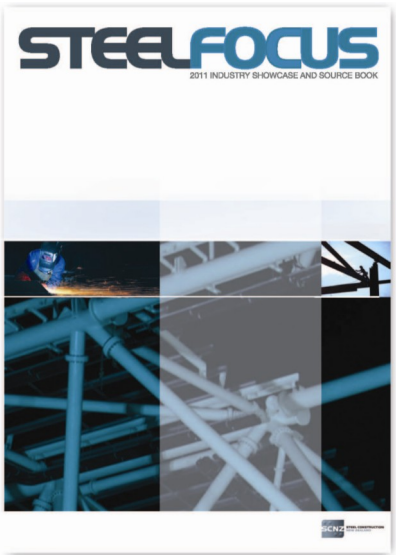
This initiative demonstrates that the steel industry is committed to developing steel as a sustainable form of construction in terms of the triple bottom line objectives of economic viability, social progress and environmental responsibility.

The commitment of the steel construction industry to sustainability is further demonstrated by SCNZ's sponsorship of the Sustainability category in the NZIOB Awards for Excellence in the Building Profession. The presentation diner will be held on Friday 26th of August 2011 at the Pullman Hotel Auckland. Tickets for this event are available at www.nziob.org.nz.

(Article by Dr Stephen Hicks, HERA Manager of Structural Systems and Chairman of the Sustainable Steel Council.)

# STEEL FOCUS ABOUT TO LAUNCH

For the past year, SCNZ has been publishing monthly case studies in ***Building Today***, reminding our members' market of the advantages in using steel. Right now, ***Steel Focus*** is being readied to showcase the very best of member projects. When distributed throughout New Zealand's design and construction sector, this annual source book will have an active desk-life of at least a year. It will be packed with information that developers, architects, quantity surveyors and people in Government will find useful when making decisions about construction materials and methods.




The list of contents for ***Steel Focus*** includes:

- our Members' Directory
- SCNZ's role and membership services
- our Steel Constructors' Capability Matrix
- The performance of structural steel in the 22 February 2011 Lyttleton earthquake
- what's new in steel
- steel's environmental credentials
- sources of useful information
- questions and answers
- strong editorial

Thank you to those members who have taken the opportunity to advertise their company in SCNZ's latest publication.

***Steel Focus*** will show that SCNZ members are more than just an association of like-minded people. We are one of New Zealand's strong economic assets. Look out for your copy of ***Steel Focus*** at the end of June!

# SCNZ MANAGER SPEAKS AT 2011 NASCC

An invitation to speak at the recent 2011 North American Steel Construction Conference (NASCC) afforded the opportunity for Steel Construction New Zealand Manager Alistair Fussell to attend this major steel construction industry event hosted by the American Institute of Steel Construction (AISC). This event which was held in Pittsburgh over three days, the original home of the United States steel industry, attracted over 3000 attendees involved in the steel construction industry including structural engineers, researchers, steel fabricators and detailers, steel manufacturers and merchants and trade exhibitors.

The recent Christchurch and Japanese earthquakes prompted the NASCC organising committee to add a report on these devastating events to the conference programme. The 90 minute session also included Professor Gilberto Mosqueda of the University of Buffalo who was a member of a North American reconnaissance team to Japan. The New Zealand report focused on the performance of steel structures, which overall was very good, and also some of the lessons learnt from this event. The session was streamed live by webinar (8am EST, midnight NZT) and is now hosted on the AISC website (www.aisc.org). For those interested in viewing the session click on the NASCC button on the homepage.

*Trade exhibition—2011 NASCC*

The programme includes 2 keynote addresses, and over 80 papers covering technical (structural engineering and sustainability), fabrication, construction, marketing and contractual aspects of steel construction. Of particular interest given the recent events in the Canterbury region was the session on "Self Centering Seismic Steel Frames: The High Performance Option Coming to You Soon" . A number of research programmes have been undertaken in North America looking at moment frames, braced frames and rocking frame systems that sustain minimal damage and are operational quickly after a major earthquake event. A research programme is also underway looking at self centering steel plate shear walls that restore the vertical alignment of the structure to post construction tolerances at the end of the earthquake. The powerpoint presentations and audios of all the sessions will be made available on the AISC website in the near future. Aside from the learning aspects of the conference, one of the key benefits to Steel Construction New Zealand is the opportunity to learn from the initiatives of the American Institute of Steel Construction and to develop a network of contacts within the organisation for future co-operation and the sharing of expertise and ideas. The AISC which was established in 1921 and with a staff of approximately 70, has a long tradition of effectively serving the steel construction industry and promoting steel solutions in the United States. They have played a significant role in technical developments in structural steel design and the preparation of design standards. These design standards have influenced the provisions in our own Steel Structures Standard. This visit has identified a number of areas SCNZ can be more effective in their activities, the intention is to incorporate these, subject to SCNZ Executive Council approval into the work programme of the organisation.

# ANNOUNCING SCNZ'S NEWEST COUNCILLOR

At the recent March SCNZ Executive council meeting a resolution was passed to accept Craig Taylor as the replacement for Steel Manufacturer position vacated by Brendan Smith formerly of OneSteel Market Mills.

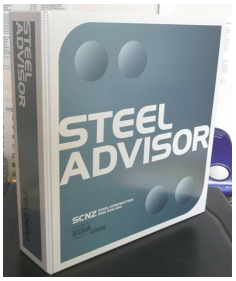
Craig is the recently appointed OneSteel Market Mills NZ Sales Manager. He has spent the last 12 plus years working in the construction industry in sales and marketing related roles in both Australia and New Zealand. He has worked for a number for a number of companies including CSR Building Products and the James Hardie Fibre Cement business. Craig was educated in Christchurch and is a graduate of the University of Canterbury with qualifications in engineering and business.

*SCNZ Councillor, Craig Taylor*

# STEEL ADVISOR LATEST ISSUE

The latest Steel Advisor issue contains two articles prepared by SCNZ Engineer Alistair Fussell. The first article is entitled Light Brace Cleat Connections for Braced Steel Frames. The second article is entitled Heavy Brace Gusset Plate Connections for Braced Steel Frames. Both papers present design concepts, models and discusses sources of design guidance for the design of cleat connection to braced steel frames in a New Zealand context.

The Steel Advisors articles are available for subscribers at www.scnz.org/steel-advisor



# SCNZ HOST ISCG EVENT

SCNZ had the privilege recently of hosting the International Steelwork Contractors Group (ISCG) meeting in New Zealand at the end of March 2011. The ISCG comprises the English speaking steel construction associations (American Institute of Steel Construction, Australian Steel Institute, British Constructional Steelwork Association, Canadian Institute of Steel Construction, Southern African Institute of Steel Construction and Steel Construction New Zealand). The event attracted 18 international delegates plus partners and 8 local delegates.

***The ISCG were entertained by a local Maori cultural group at the welcome dinner.***

The event which was held over four days consisted of two days of meetings in the Bay of Islands, sight seeing and a fabricator workshop and site visit in Auckland. D & H Steel Construction's new state of art fabrication facility in West Auckland was the venue for the work shop visit and the soon to open Marine Event Centre (Viaduct Basin) was the venue for the site visit. These visits left a positive impression of the local steel construction sector on the visiting delegates.

The principal driver for the ISCG group concept was the opportunity for the various steel construction associations with a common interest in promoting steel construction in their own countries to achieve some form of synergy through the sharing of ideas and resources and to identify areas of common interest for future co-operation. The ISCG is an extension of what is now formerly happening between SCNZ, HERA and the Australian Steel Institute with at least yearly meetings to discuss upcoming work programmes with a view to co-operating where possible on matters of common interest. This co-operation makes sense due to the commonality of our respective country's building regulatory environments.

***The ISCG delegates partners enjoying lunch at the Copthorne Resort Bay of Islands***

This years meeting covered topics such as sustainability, imported fabricated steelwork, product compliance, marketing, and new technical developments.

Aside from the formal meetings, one of the valuable outcomes is the development of a network of key international steel industry people. There have already been instances where people met at the event have been subsequently contacted to provide assistance on technical and marketing matters.

***Delegates visiting the Marine Event Centre.***

# PRELIMINARY STEEL BRIDGE ESTIMATING TOOL NOW ON SCNZ WEBSITE

The likely cost of steelwork is an important consideration in feasibility studies for a bridge project as well as in planning and budgeting for the construction. Very little guidance is published on the cost of bridge steelwork because it is difficult to generalise for the wide range of bridge types and configurations. The price a client pays for the steelwork in a new bridge covers the cost of many activities and services as well as the basic cost of materials used and the direct workmanship in fabrication and erection.

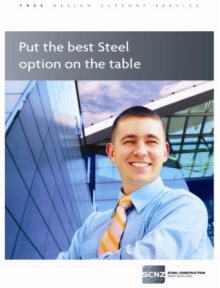
SCNZ have developed a simple method for bridge designers to quickly develop preliminary estimates for bridge superstructure steelwork costs. The bridge estimating tool is limited to traditional multigirder and ladder deck bridges. The bridge estimating tool is suitable for spreadsheet application. The bridge estimating method, including rates, and example templates can be downloaded from the SCNZ website, www.scnz.org/bridge-estimating.

The estimating rates are based on feedback from steel bridge constructors. Elemental rates are given for various steelwork activities. Some rates are bundled to enable ease of preparing preliminary estimates. When preparing final estimates, it is recommended that rates be confirmed with a suitable steel constructor.

# SCNZ FREE DESIGN SUPPORT SERVICE – CHRISTCHURCH REBUILD

In the aftermath of the recent devastating 4th September 2010 and 22nd February 2011 Lyttleton earthquakes, there are many badly damaged buildings requiring replacement. The design of these buildings will place considerable demand on building designers.

To aid busy design professionals at the concept phase of a project, SCNZ offers a free design support service to help them explore the potential of steel solutions for their projects. Working alongside design teams, we prepare costed preliminary structural designs that involve the efficient and cost effective use of structural steel.




For more information on this free service please refer to the attached brochure, or download a copy from the SCNZ website, www.scnz.org.