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ADVANTAGE STEEL

NO 51 WINTER 2014/ 2015



IN THIS ISSUE

From the President *Ed Whalen, P.Eng.*

FEATURES

| 20 | CISC and SSEF join forces David MacKinnon |
|----|--|
| 22 | Playing with steel: Canada's Architectural Student Design Competition Loraine Fowlow |
| 26 | Winner takes all: Talent and skills on display at NSSBC Andrew Brooks |
| 32 | Championing steel design and construction: Research projects receive CISC support Maura Lecce |
| 36 | The Engineering and Architectural Educator's Conference |
| 40 | Supporting student excellence: The Geoffrey James Jackson Fellowship Stig Skarborn |
| | |
| 12 | Technical Column Alfred F. Wong, P.Eng. |
| 14 | Seismic Corner: Ductile brace-end rotation Alfred F. Wong, P.Eng. |
| 18 | For Green's Sake: Comina together on the international Green Construction Code |

News and Events 42

Tareq Ali, RPM

Member and Associate Products/Services Directory 50



By Ed Whalen, P.Eng. President



A provincial government's fight for foreign dumping — what's next?

ike a page from *The Strange Case of Dr. Jekyll and Mr. Hyde*, my message comes to you this time as somewhat of a mixed bag – and for good reason.

First, Dr. Jekyll...

On a positive note, there are several things to share with you: firstly, the inclusion of the Structural Steel Education Foundation within CISC, which took effect this past October. The new Education and Research Council is assisting CISC in steering a new course for the betterment of the steel construction industry. To showcase the activities and all the exceptional initiatives of the CISC Education and Research Council, this winter edition of *Advantage Steel* is dedicated to its activities and successes.

Secondly, CISC has increased its engineering staff in an effort to better support our industry, bringing more design aids to market and increasing our services in CISC Project Solutions. For those consultants who have yet to hear about CISC Project Solutions, this service within the CISC Solution Centre works as your cost consultant. Do you have the resources to do costing for every project? Do you have the costs for all the different framing methods that would best be suited for your project? If the answer to some of these questions is "no," then we have a complimentary service that could be of benefit to you and your design team.

And now, Mr. Hyde...

Those who know me would say I have been known to go on a rant every once in a while. In fact, as the New Year approached, I was thinking about banning rants as one of my resolutions. Well, I was doing pretty good sticking with this resolution until recently.

The B.C. government's endorsement of the act of dumping into Canada is what has set me off. It comes on the heels of the Prince Rupert scandal, where a new port will be built on Canadian Crown Land with Buy America restrictions excluding Canadian steel supply. This situation proves that governments are being outwitted and out-gunned by other countries when it comes to imports and exports.

While other countries blatantly protect and subsidize their industries, our industries are told to be globally competitive. The lack of global knowledge by our politicians will lead to the end of Canadian manufacturing by the hands of our own, when in fact we could easily compete in a global market on a fair and level playing field.

As we near the end of the tendering process for the port, and the Alaska Department of Transportation and Public Facilities threatens to make every stick of steel American, the B.C. government released a statement stating its intent to fight against the steel industry's trade case on dumped rebar into Canada. The Independent Contractors and Businesses Association of B.C., the general contractors, stated they would also fight in favour of dumping because, as they say, without it the costs for public infrastructure projects increases. Translated, the general contractors want cheap, dumped rebar so they can outperform local businesses. Of course, they will fight this.

Does anyone out there know or understand the word dumping?! Clearly, the B.C. government does not. Do they not understand the negative impact that dumped rebar has on other construction materials, including structural steel and wood? Do they not know or care that Canadian jobs are being lost and manufacturing industries obliterated from dumping efforts by other countries? Do they not know or care about the negative effects purchasing offshore has on the country's GDP and trade balance? Do they not understand why manufacturing does not have a bigger footprint in B.C., considering its advantageous location on the coast and access to world markets.

If governments are going to throw Canadian manufacturers under the bus, at least let it be a Canadian one!

Happy New Year.

ADVANTAGE STEEL

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articles. Visit us at www.cisc-icca.ca or Tel 905-946-0864, Fax 905-946-8574 CHAIRMAN Jim McLagan, Canron Western Constructors Ltd MANAGING EDITOR Tareq Ali, CISC PUBLISHER MediaEdge Publishing Inc. 33 South Station Street North York, ON M9N 282 Toll-Free: 1-866-480-4717 ext. 229 robertt@mediaedge.ca www.mediaedeeublishina.com Professional engineers, architects, structural steel fabricators and others interested in steel construction are invited to inquire about CISC membership. Readers are encouraged to submit their interesting steel construction projects for consideration for inclusion in this publication by contacting CISC.

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By Alfred F. Wong, P.Eng. Director of Engineering

CISC provides this column as a part of its commitment to the education of those interested in the use of steel in construction. Neither CISC nor the author assumes responsibility for errors or oversights resulting from the use of the information contained herein. Suggested solutions may not necessarily apply to a particular structure or application, and are not intended to replace the expertise of a professional engineer, architect or other licensed professional.

Question 1: What is the correct fatigue 'Detail Category' for a coped beam detail? S16-14 shows Category E1 whereas W59-13 and S16-09 show Category B.

Answer: Category E1 should apply to re-entrant corners of copes having a minimum radius of 35 mm and ground smooth as stipulated in S16-14. Category B should not be used unless the design stress range is amplified with an appropriate stress concentration factor, which is a function of the size of re-entrant corner radius and finishing.



BEAM WITH A COPE DETAIL

Question 2: How is the shear resistance for gross section of gusset plates determined – should I use Clause 13.4.3 of S16-09 on webs of flexural members not having two flanges or Clause 13.11 on block shear? They give very different results.

Answer: Neither. Clause 21.12, Connected elements under combined tension and shear stresses, a new clause introduced in CSA S16-14, covers this.

Question 3: The resistances for bolts in tension and shear have increased significantly from those tabulated in the Handbook that I received in 2000. Are the modern high-strength bolts produced to a higher strength or have more recent research and testing substantiated the increase in resistance?

Answer: The difference in bolt resistances for the ultimate limit states you noted reflects the increase in the resistance factor for bolts. When the first limit states design standard for design of steel structure, CSA S16.1-74, was introduced in 1974 only two resistance factors were adopted, for simplicity – 0.90 for steel members and 0.67 for welds, bolts, concrete in composite beams and shear connectors. Research studies based on tests and statistic analyses suggest that the resistance factor for highstrength bolts can be increased to 0.80, as documented in Guide to Design Criteria for Bolted and Riveted Joints, Second Edition (available via this link: http://boltcouncil. org/files/2ndEditionGuide.pdf.) This increase was first introduced to the Canadian Bridge Design Code when CAN/CSA S6-00 took effect; the change was adopted in \$16 when \$16-01 was released.

Questions on various aspects of design and construction of steel buildings and bridges are welcome. They may be submitted via email to faq@cisc-icca.ca. CISC receives and attends to a large volume of inquiries; only a selected few are published in this column.

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Ductile brace-end rotation

vielding and buckling of the braces. When a compression brace buckles, local bending or plastic hinging occurs in three locations – the ends and the mid length, as shown in Figure 1. In order to allow plastic hinging at the ends, either the connections or the body of the brace near the ends should accommodate the hinge rotation and load reversal without fracture.

S16 requirements

The end connections of the braces in moderately ductile concentrically braced frames (Type MD CBF) are required to be proportioned and detailed for ductile hinge rotation. Alternatively, these connections may be designed with larger flexural resistance than the brace (as capacity-protected elements), thereby forcing plastic hinging in the brace. These requirements also apply to limited-ductility concentrically braced frames (Type LD CBF) except where the specified short-period spectral acceleration ratio is less than 0.55 and the brace slenderness ratio exceeds 100. In any case, they do not apply to braced frames in conventional construction.

Design process

The designer of the structure selects the brace section and cross-section orientation, which determine the Several factors, including the connection size and configuration, affect the actual brace length, which should be taken to be the design brace length

governing plane of buckling. The governing plane of buckling, outof-plane or in-plane, dictates the brace connection configuration and details. Conversely, several factors, including the connection size and configuration, affect the actual brace length, which should be taken to be the design brace length. Hence, the structural designer must estimate the approximate size and configuration of each end connection before arriving at the design brace length. The plane of buckling and the corresponding brace length, among other things, must also be specified so that the connection designer can provide an appropriate connection design.



FIGURE 1 BUCKLED SHAPE (OUT-OF-PLANE) OF AN HSS BRACE COURTESY: A. KORZEKWA

Alternatively, the connections may be designed with a larger flexural resistance than the brace instead of a ductile hinge zone. This approach is quite onerous when out-of-plane buckling governs the design

Now, what are the connection configurations, details and their options?

HSS braces

Since HSS are the most popular choice for braces in Type MD and Type LD frames, we will focus on connections for HSS braces. Typically, a hinge zone is provided (a) in the gusset plate when out-of-plane buckling governs the design of the brace, or (b) in a knife plate when in-plane buckling governs (see Figure 2). The hinge zone must be free to rotate without hindering brace buckling in the governing buckling plane. Stiffeners and other objects that may restrict this free rotation, including the floor slab, must be kept clear of the hinge zone. NEHRP provides a detailed description for three connection configurations in its publication, Seismic Design Technical Brief No. 8.

Out-of-plane buckling

Figure 2a shows the most popular approach, which has been adopted from the research work reported by Astaneh-Asl et al (1986). In this configuration, the hinge zone is a band that runs perpendicular to the axis of the brace. The width of this linear hinge zone should be equal to or greater than $2t_g$ where t_g is the gusset plate thickness. In order to provide this unrestrained hinge zone, the brace must be shortened, resulting in a larger gusset plate - especially when a rectangular gusset is used.







The extended gusset and the unstiffened hinge zone also lead to the need for a thicker plate for compressive resistance.

Recent studies by Roeder et al (2011) suggest an alternative detail, which features an elliptical hinge zone that is 8t_g wide, as shown in Figure 2b. Other restrictions also apply. This detail allows the use of smaller and thinner gussets. Block shear (pull out), instead of buckling of the gusset, usually controls the design. The elliptical hinge connections behaved well in the tests reported by Roeder et al.

In-plane buckling

Figure 2c shows the configuration that features a knife plate, perpendicular to the gusset. The hinge zone in the knife plate is located within a band having an unrestrained width of three times the knife plate thickness. This detail allows the brace end rotation required for in-plane buckling.

Alternatively, the connections may be designed with a larger flexural resistance than the brace instead of a ductile hinge zone. This approach is quite onerous when out-of-plane buckling governs the design.



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By Tareq Ali, RPM Director of Marketing

Coming together on the International Green Construction Code

Landmark agreement signed to align greenbuilding codes, standards, regulations and rating systems

Five major U.S.-based standard development organizations announced an important partnership this past summer to collaborate on dramatically streamlining the current patchwork of greenbuilding codes, standards and regulations in use around the world.

The International Code Council (ICC), ASHRAE, the American Institute of Architects (AIA), the Illuminating Engineering Society of North America (IES) and the U.S. Green Building Council (USGBC) signed a memorandum to collaborate on the development of Standard 189.1, the International Green Construction Code (IgCC) and the LEED green building program.

The unprecedented cooperation aims to create a comprehensive framework for jurisdictions looking to implement and adopt green building regulations and codes and/or provide incentives for voluntary leadership programs such as LEED.

The agreement outlines the development, maintenance and implementation of new versions of ANSI/ASHRAE/IES/ USGBC Standard 189.1, Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings, and the IgCC, which will be combined into one regulatory tool. This agreement also endeavours to align the LEED program with the new code to ensure a streamlined, effective set of regulatory and above-code options for jurisdictions.

Under the new agreement, a new three-part system will be developed as follows:

• An updated version of ASHRAE 189.1 (full name: ANSI/

ASHRAE/IES/USGBC Standard 189.1, Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings) will provide baseline metrics and other technical requirements that align with LEED prerequisites and the IgCC. The standard will likely draw some technical requirements from LEED, but will maintain its own consensus process under ANSI.

- The IgCC (for which 189.1 is already an alternative compliance path) will cease being developed as an independent system and will instead become an adoptable, code-enforceable version of 189.1.
- LEED, while remaining a voluntary rating system, will interface with the new code in two ways: IgCC will serve as an alternative system of prerequisites for LEED, making it easier for project teams to move from the baseline green code toward LEED certification; and selected LEED requirements will likely be cycled back into 189.1 as new versions of each are developed and approved. LEED credits will still be developed independently, but certification will readily serve as a stretch goal for projects in jurisdictions where the IgCC has been adopted.

To help ensure seamless integration, ASHRAE, USGBC and IES will become sponsors of IgCC, and ICC and the AIA will become sponsors of 189.1. A steering committee will oversee the integrated development process.

This agreement should simplify the processes and criteria for sustainable design and construction and should lead to more rapid adoption of sustainable design approaches by designers, builders, developers and a host of other building industry groups.

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EDUCATION & RESEARCH

CISC and SSEF join forces

David MacKinnon, CISC Director, Education and Research

STEEL TEACHING AID AT THE UNIVERSITY OF OTTAWA, MAY 2012



tructural mechanics and design has been taught at Canadian universities and colleges since the Ontario School of Practical Science was first established at the University of Toronto in 1873. At that time, the leading steel designers and constructors were spawned from the engineering offices and construction sites of the big steel fabrication companies – companies like Dominion Bridge, Canron, Frankel, Marshall and others. However, downturns in the North American economy in 1980 and 1990 proved to be the demise of those large firms and the training grounds they provided.

The Steel Structures Education Foundation (SSEF) was founded in 1985 by a group of forward-thinking steel suppliers, fabricators and erectors who saw the change coming and wanted to provide a comparable steel education experience at Canadian universities. The foundation was formed to provide financial support and education opportunities for undergraduate and graduate students in engineering and architecture so they could learn modern steel design and construction technology. It also aimed to provide continuing education opportunities for practising engineers, architects, contractors and educators to upgrade their knowledge of the practical and economical application of steel design and construction technology.

Eventually, the Canadian Institute of Steel Construction (CISC) became one of the

CISC and SSEF worked closely together towards a common goal, and in the almost 40 years that SSEF fostered and improved steel education in Canada, many great programs were created

major contributors to SSEF on behalf of all of its steel fabrication members. CISC was primarily interested in continuing education, educational publications for students and practising engineers, and regional scholarships. With SSEF's help, CISC was able to greatly expand its portfolio of courses and seminars and use the Jackson Fellowship as a model for CISC Regional Scholarships of the same calibre.

CISC and SSEF worked closely together towards a common goal, and in the almost 40 years that SSEF fostered and improved steel education in Canada, many great programs were created. These include engineering and architectural scholarships, competitions, research opportunities, short course development, teaching aids, as well as forums for both engineering and architectural educators to meet, learn about innovations in steel construction, compare notes and network.

Several years ago, after CISC's mission and vision broadened to embrace all aspects of steel construction – education in particular – the governing bodies of both CISC and SSEF felt that the best way to work together and be one voice for steel in Canada was to join together.

Once a few details were sorted out, SSEF transferred all programs to CISC and was dissolved in October 2014. One of those details was the formation of a special CISC committee to oversee existing education and research programs from both organizations and to develop new ones. Furthermore, so that their experience and expertise wouldn't be lost, all the members of the SSEF Board of Governors joined the newly created CISC Education and Research Council.

In this special education and research edition of CISC Advantage Steel, we

have articles on many of the programs created by SSEF and now overseen by the CISC Education and Research Council. The next step, already well underway, is for the council to feed directly into the CISC strategic planning process for new programs that you will no doubt hear about in the near future. In the meantime, please enjoy our short trip through some of the excellent education and research programs offered by CISC.



Playing with steel

Celebrating 12 years of Canada's first Architectural Student Design Competition

By Loraine Fowlow, MRAIC

aunched in 2001-02 by the Steel Structures Education Foundation, the Architectural Student Design Competition was the first of its kind in Canada – the only design competition for students in Canadian accredited programs of architecture.

Based loosely on the design competitions sponsored in the U.S. by the Association of Collegiate Schools of Architecture (ACSA), the Architectural Student Design Competition challenges architecture students to conceptualize a small-scale structure primarily using steel.

The competition is intended to provide students of architecture in Canada with a unique opportunity to enter into a design process that brings together concept and reality. Students are challenged to conceptualize and realize, in detail, a single span space, and are encouraged to work with steel fabricators to design a structure that is as realistic as possible.

The initial foundation for the competition was laid at a 2001 meeting of architectural educators sponsored by Steel Structures Education Foundation (SSEF). This discussion provided the educational framework for the competition, which included encouraging educators to include the competition as a required element in their design and structures courses. Knowing that time for extracurricular activities is scarce for architectural students, the educators agreed that embedding the competition within the curriculum would encourage as many students as possible to enter. Although not required, many educators have chosen to include the competition within their courses.



ARCHITECTURAL STUDENT DESIGN COMPETITION



2014 AWARD OF MERIT: LONGBOW CROSSING

The theme for the competition changes each year, and is chosen to provide as much flexibility for educators as possible. The theme for the first year of the competition was "Bus Shelter," which attracted 20 entries. Looking to broaden the appeal of the competition to students and educators, the theme for the second year was "Bridge," which brought in double the participants of the first year, with 40 entries. Since then, the themes have included: Gas Station, Tower, Cantilever, Tension, Biomimicry, Curvature, Recycle, Pop-Up and Span.

Winning schemes have been as varied as the themes, with one team cleverly designing a bridge that is only complete when it freezes in winter, and another winning scheme designed portable, pop-up shops that can easily fit into a parking space. While pure imagination and creativity fuel these designs, it is uniquely steel that provides the opportunity to make them a reality.

Since its inception, more than 760 teams from almost every architecture program in Canada have been entered into the competition. Given that most entries are comprised of teams of two or three students, this total number translates into more than 1,500 students who have participated in the competition. This represents over 1,500 future architects who have been exposed to, and immersed in, designing in steel by exploring the potential of steel to give architectural form and expression. More than designing abstract form, the students are required to understand how to build their designs and demonstrate how to realistically detail and build.

The educator perspective

While hundreds of student teams have entered the competition, there is only one architectural educator who has the distinction of producing winning designs each and every year that the competition has run.

Professor Terri Meyer Boake of the University of Waterloo has been a supporter of the competition from its outset, providing input and feedback throughout the years. A past president of the Building Technology Educators' Society, and author of the books Understanding Steel Design and Diagrid Structure: Systems, Connections, Details, Meyer Boake is the de facto Canadian architectural education expert in steel design.

ARCHITECTURAL STUDENT DESIGN COMPETITION

2014 AWARD OF MERIT: CIRRUS



Asked to provide her views on the Architectural Student Design Competition, and the role that it has played in her teaching, Meyer Boake reflected:

"The use of 'a design competition' has been a core pedagogical objective of my teaching in building construction. It has always been important to impress upon students that the technicality of building construction, in this instance structural steel design, is an aspect of design that requires meaningful integration into their project work. Materiality and good construction detailing will greatly improve their design work over that which uses a less developed palette. It is insufficient for them to limit their knowledge of construction and materials to rote facts or statements of best practices learned from a textbook. Architecture is about design, and this necessarily involves a great deal of thought and drawing. Not always having the opportunity to ensure the integration of fact and best practices into their studio work, the use of the SSEF Design Competition has provided a compelling means to encourage students to aim for a higher level of understanding and ability in their construction learning.

"The SSEF Design Competition has always served as the terminal project for a required course in building construction. Although the students are not mandated to actually enter the competition, the net result has been a fairly high rate of entry. They are assessed for the course based on the assumption that they will have developed and graphically presented the project with an intent to enter, so the majority will do so after spending the extra effort required to reach this goal.

"We have also had upper-level students undertake the competition as part of an independent study, having had such a positive experience with the competition during their first-year course. As (the) competition topic changes

It has always been important to impress upon students that the technicality of building construction, in this instance structural steel design, is an aspect of design that requires meaningful integration into their project work

ARCHITECTURAL STUDENT DESIGN COMPETITION

each year senior students are permitted to enter again. However, if you examine the majority of our winning entries it is remarkable to notice that most have been completed by undergraduate students at the end of their first year of architecture school. These students are barely a year out of high school and yet have managed to develop skills in design, structural understanding, and digital drawing of a level to compete with much older and more experienced students.

"The various courses in an architectural curriculum are always competing for student time and attention. Technical courses are often not given the priority that they deserve. The use of the SSEF Design Competition has elevated the level of attention and performance in our technical courses and provided the students with the incentive to produce some of their best work.

"The University of Waterloo has a cooperative education model. Our students embark on their first work term at the end of the first four months of second year. The SSEF Design Competition entries form a core part of their design portfolios and are often used as their means of securing work - competing now with each other to impress future employers. Feedback from the co-op employers regarding the skill level in their entries has always been highly positive. It undoubtedly also serves to demonstrate the commitment of SSEF and CISC to promote architectural education."

With educators such as Meyer Boake seeing such a tangible benefit for their students, the Architectural Student Design Competition will continue to encourage excellence in architectural design while exploring the potential of steel.

Loraine Fowlow, MRAIC, is an Associate Professor of Architecture with the University of Calgary. The use of the SSEF Design Competition has elevated the level of attention and performance in our technical courses and provided the students with the incentive to produce some of their best work



Winner takes all

Teamwork and professionalism, in addition to engineering skills, are the real winners at NSSBC

By Andrew Brooks

ompetition is a fact of life. But while the word is often taken to mean "winner takes all," competition can also be managed in a way where everyone involved derives benefit. That's the goal of the National Student Steel Bridge Competition (NSSBC), an event that brings together university and college engineering student teams from across North America to test their bridgebuilding skills.

The 2014 NSSBC finals were held May 23 to 24 at the University of Akron in Ohio. This was the 23rd anniversary of the competition, which is sponsored by the American Institute of Steel Construction (AISC) and the American Society of Civil Engineers (ASCE).



2011 LAKEHEAD UNIVERSITY'S STEEL BRIDGE TEAM

Forty-seven student teams – some 600 students in all – from the United States, Canada and Mexico participated this year. They vied for awards in six categories: Construction Speed, Stiffness, Lightness, Economy, Display (aesthetics) and Efficiency.

Leading up to the finals, no fewer than 208 teams from the three countries competed in 18 regional or "conference" competitions for the right to enter the finals. Just getting past this stage is a major achievement. To reach the finals, a team must place among the top two or three schools in a regional competition.

Taking top honours at the finals this year was the team from the University of California, Davis, followed by the Massachusetts Institute of Technology and the University of California, Berkeley. This was the second win for University of California, Davis, which also won in 2005.

CISC is an event co-sponsor, and Canadian participation is extensive. Canadian teams have taken part for years and have won more than their share of honours. This year Canada was represented at the regionals by the following six teams, and three competed in the finals.

- École polytechnique de Montréal;
- École de technologie supérieure (Montreal, Quebec);
- Lakehead University (Thunder Bay, Ontario);
- University of British Columbia;
- Université Laval (Quebec City, Quebec); and
- University of Manitoba (Winnipeg, Manitoba).

The team from Lakehead University took second place in the Display category. Lakehead has an excellent record, having won the finals in 2011. It also became the first Canadian school to enter the NSSBC in 1998. The university regularly places in the top ten, and has missed qualifying for the finals only twice over the years.



2013 TEAM ESUL (ÉQUIPE DE STRUCTURE DE L'UNIVERSITÉ LAVAL) LOADING THEIR BRIDGE AT THE UNIVERSITY OF WASHINGTON, SEATTLE, WASHINGTON.

Rules of the game

A statement in the competition rules lays out the objectives: "The Student Steel Bridge Competition increases awareness of realworld engineering issues such as spatial constraints, material properties, strength, serviceability, fabrication and erection processes, safety, aesthetics, project management, and cost. Success in competition requires application of engineering principles and theory, and effective teamwork. Future engineers are stimulated to innovate, practice professionalism, and use structural steel efficiently."

Michael F. Engestrom, Technical Marketing Director with Nucor-Yamato Steel in Weston, Florida, has been personally involved with the NSSBC since the mid-'90s and now serves on the Rules Committee. His company is also a co-sponsor. He says the development of the rules each year is a major undertaking. "We start to develop next year's set of rules on the first day of the annual competition, when the Rules Committee meets for several hours, followed by another meeting on the day after the national competition to fine-tune the new rules for a first draft," Engestrom says. "There are several drafts of fine tuning until the new rules are published on the AISC website in August."

NATIONAL STUDENT STEEL BRIDGE COMPETITION

While the bridges are smaller-scale models of the real thing, their construction must be detailed and realistic. And NSSBC replicates the conditions an engineering and construction team would face on real-life projects. "One thing I really like is that they change the rules every year," says Dr. Antony Gillies, Assistant Dean and Associate Professor, Faculty of Engineering, Lakehead University in Thunder Bay, Ontario. Gillies has been a faculty advisor to Lakehead's teams since the university first entered.



2012 ÉTS PONT D'ACIER HERCULE



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George Third & Son 604-639-1708 gthird.com "It's not a case of taking last year's bridge and entering it again this year," Gillies says. "Every year they change the rules in such a way that you start with a blank sheet of paper and you don't know whether or not you've got the best solution to the problem. Over the years l've been involved, they've tried just about every combination possible."

The rules for the 2015 NSSBC describe a fictitious African country divided by a major river. The government wants to bridge the river and has invited companies to submit proposals. The problem statement in the rules mentions the difficulty of transportation and scheduling. The site is accessible only by trails during the dry season and loads must be transported by ox cart. The "foundation" funding the project has recommended a steel bridge to minimize the weight of material to be transported and erected, and also to enable prefabrication, reducing the time required for on-site construction. All of these factors have to be taken into account by the student teams during design and fabrication - and of course during the finals, when they construct the scaled models under the watchful eyes of the judges.

Maxime Drouin, Captain of the École de technologie supérieure (ETS) team, is a Project Manager in Engineering Services for Socotek Experts-Conseils in Ste-Julie,

NATIONAL STUDENT STEEL BRIDGE COMPETITION

Quebec. He became involved with the ETS team in its first year of competition in 2010. His skills as a machinist proved invaluable, especially in work on connections, and he became more closely involved in the building and design process, finally assuming the role of captain this year.

Drouin is a firm believer in the educational value of the NSSBC. "Being on the bridge team is the best school for a civil engineer, and others too," he says. "You learn by trial and error. You take what you learn in your courses and you get the chance to test that knowledge."

Modelling software also plays a big part, Drouin adds. "We can really see how the structure acts, and figure out what to do and what not to do. It helps us investigate what are the best connections and structure for the rules in force."

The competition is also a great way to hone the human skills required for an engineering career. "The best way the student can benefit is in teamwork skills. No one can win alone," stresses Drouin. "The best that each team member can offer has to be brought to the contest to get an optimal product. I think the experience they gain here will help them be better engineers. Of course the travel to the regionals and the finals is the icing on the cake!"

On schedule

For ETS, the 2014 competition started with the release of the competition rules the previous summer. The design and conception phase lasted until the Christmas break, after which the actual construction started, with students working after school and on weekends. Practice building sessions started in mid-February, with two or three practices a week. All of this work has to be managed between regular classes and exams. On top of that workload, some team members will usually need to acquire specific welding, machining and design skills. In addition, the ETS team signed up sponsors and is financially independent of ETS.

Nucor-Yamato Steel's Engestrom says that the quality of entrants is uniformly high, and that the experience at the finals amounts to some great entertainment. "The entrants are all unique and noteworthy. It's a great spectator sport because you see and feel the excitement of the individual bridge teams (as they) act together toward creating and demonstrating a winning steel bridge solution."

The 2015 NSSBC finals take place May 22 to 23, 2015 at the University of Missouri in Kansas City.



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It's Our Nature."



Championing steel design and construction

Five research projects receive CISC support through its Education and Research Council

By Maura Lecce

ISC is committed to supporting research programs at leading Canadian universities as part of its mandate to champion the development of expertise, knowledge and innovation in steel design and construction. The University Research Grant Program – of the former Steel Structures Education Foundation – is now overseen by the CISC Education and Research Council. The council held its inaugural meeting on October 2, 2014, at the CISC Annual Conference in St. John's Newfoundland.

The objectives of the CISC University Research Grant program are to support the research needs of the structural steel industry as they relate to building structures and bridges, and to foster excellence in steel education in Canadian schools of civil engineering. It does the latter by supporting the research of faculty and graduate students.

Areas of research include the behaviour of steel components and systems as they relate to maintaining safe and cost-effective codes and standards; advancing the sustainability of structural steel construction; improving design methodologies; and exploring innovative structural solutions that will keep steel construction competitive with other forms of construction.

Topics for research come from codes and standards committees, stakeholders in steel construction, and from the Canadian research community.

Since 1995, more than 100 grants have been awarded, with a total grant amount of approximately \$100,000 per year. CISC recently awarded five research grants totalling \$101,400 for the 2014-2015 academic year. The research projects that began in September 2014 are described on the following pages.

2014 H. A. Krentz Research Award

The H. A. Krentz Research Award is made in appreciation of the contributions made by Hugh Krentz to the engineering profession, the development of codes and standards, the education of engineers, and to the development of the Canadian steel industry.

The award, made in addition to the research funds granted to the recipient through the CISC University Research Grant Program, is presented annually to the researcher whose project has special merit and interest with promise that it will make a significant contribution to understanding the behaviour of steel structures, advances in the economy, safety, or reliability of steel structures. A gift of \$5,000 is part of this notable award.

The recipient of the 2014 H. A. Krentz Award is Dr. Tony T. Y. Yang, Assistant Professor, Department of Civil Engineering at the University of British Columbia, for his research on "Development of High Performance Modular Steel Structures." CISC granted Dr. Yang \$23,400 of funding for this research. He was presented with the H. A. Krentz Award at the CISC Annual Conference on October 3, 2014, in St. John's, Newfoundland.

To learn more about the H. A. Krentz Award and past recipients of the award, please visit the CISC website.

CISC UNIVERSITY RESEARCH GRANT PROGRAM

RESEARCH TOPIC:

Development of High Performance Modular Steel Structures

RESEARCHER:

Dr. Tony T. Y. Yang, Assistant Professor, University of British Columbia, Department of Civil Engineering **DESCRIPTION OF RESEARCH:** This research project is aimed at developing high-performance sustainable modular steel structural systems in Canada and worldwide. Modular construction is a novel construction technique that pre-fabricates the structural components in factories and assembles them on-site. This provides significant improvements in construction speed and reduces the need for skilled steel construction workers on-site.

The project will be accomplished through advanced analytical simulation and experimental testing to validate the seismic behaviour of modular steel structures (see Figure 1 for a schematic of the hybrid simulation test). Once the usability has been established, detailed cost and construction time benefits of using the modular structures will be compared to the conventionally constructed structures common in Canada. The result of this study will be used to develop practical design guidelines for modular steel structures in Canada and worldwide.



FIGURE 1: SCHEMATIC OF HYBRID SIMULATION TEST (IMAGE COURTESY OF YUANJIE LI AND TONY T.Y. YANG)

RESEARCH TOPIC:

Effective Weld Properties for Connections of Round HSS

RESEARCHER:

Dr. Jeffrey A. Packer, Bahen-Tanenbaum Professor, University of Toronto, Department of Civil Engineering **DESCRIPTION OF RESEARCH:** Currently, the design of welds in round HSS-to-HSS connections is invariably performed using a design philosophy whereby welds are proportioned to develop the capacity of the connected branch member walls, which could lead to inefficient and costly connections.

The goal of this research project is to determine the effective lengths of fillet welds in round-toround HSS T-, Y- and X-connections under branch axial loading. A set of fillet-welded, isolated connection tests – designed to be weld-critical – will be performed, with variations in the principal influential parameters: the weld size, the branch-to-chord width ratio (β), and the chord member wall slenderness (D/t). This experimental program will be highly indicative of many other trusstype connections, it will evaluate the utility of existing AWS D1.1 guidance, and it will enable calibration of the proposed fillet weld design procedure to currently expected safety index levels.

The long-term objective of this research is to generate general design procedures for welds to round HSS chord (or "through") members, based on actual branch forces (rather than member or connection capacity) and using specific effective lengths (or effective properties), in a similar manner to that done for welds to rectangular HSS.

CISC UNIVERSITY RESEARCH GRANT PROGRAM

RESEARCH TOPIC:

The Increasingly Common Case of Weak-axis End Moments – Eliminating Unnecessary Joint Stiffeners

RESEARCHER:

Dr. Robert G. Driver, Professor, University of Alberta, Department of Civil and Environmental Engineering

RESEARCH TOPIC:

Reducing Construction Costs by Improving Seismic Performance: Controlled Rocking Steel **Braced Frames**

RESEARCHER:

Dr. Lydell Wiebe, Assistant Professor, McMaster University, Department of Civil Engineering

DESCRIPTION OF RESEARCH: This research program targets a very common detail, most prevalent in industrial structures, where connection design forces include weak-axis moments from the adjoining member that most often necessitate the addition of stiffeners to the frame joint. The overarching objective of this research project is to provide a simple and widely applicable method for optimizing the design of joints where the loading includes biaxial flexural demands at the ends of contiguous members, by accounting for the flexibility of the supporting member.

To achieve the research objectives, a combination of full-scale frame-joint sub-assemblage tests and comprehensive numerical frame simulations will be conducted that include a variety of frame and connection geometries and loading conditions. Based on these complementary components of the research, design recommendations will be made with a generalized format to address a broad range of possible design scenarios. Finally, a case study based on an existing industrial structure will be developed that demonstrates the application of the design recommendations.

DESCRIPTION OF RESEARCH: Controlled Rocking Steel Braced Frames (CRSBFs) are an emerging new seismic force resisting system. Through the selection of post-tensioning and energy dissipation technologies, a CRSBF can be designed to avoid structural damage and to return the structure to the initial plumb position. The objectives of this project are to quantify the performance of CRSBFs when elements yield or buckle and develop practical details for the connection between the CRSBF and the floor diaphragm.

Following an extensive literature review, this project will involve developing computer models using OpenSees, a program for advanced nonlinear dynamic analysis. Experimental validation is planned for a future phase of the project.

The long-term goal of this research project is to develop CRSBFs into a cost-competitive seismic force resisting system that can be codified in a future edition of \$16.

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CISC UNIVERSITY RESEARCH GRANT PROGRAM

RESEARCH TOPIC:

Design of Partial-Length Cover Plates to Strengthen Steel Columns

RESEARCHER:

Dr. F. Michael Bartlett, Associate Professor, University of Western Ontario, Department of Civil and Environmental Engineering **DESCRIPTION OF RESEARCH:** This research project will investigate the inelastic behaviour, strength, and design of steel columns reinforced with partial-length cover plates. The specific objectives of this research are to: (1) develop a numerical analysis model to determine the capacity of a short, intermediate or long steel column strengthened with partial-length reinforcement plates; (2) validate the numerical analysis model experimentally with tests of reinforced steel columns; (3) conduct a sensitivity analysis to relate capacity and optimum reinforcement lengths based to the yield strengths and lengths, etc., of the plate and member, using the validated model; and (4) develop an accurate simplified method, suitable for Design Office use, to compute the critical minimum reinforcement length and, based on this value, proportioning near-minimum-cost reinforcement.

Ultimately, the goal of the research is to develop practical design recommendations for steel columns reinforced with partial length cover plates.

Since 1995, the research that has been funded (or partially funded) by CISC has led to the development of design guidelines, innovation in structural steel solutions, and maintaining safe and cost effective codes and standards. To learn more about the CISC University Research Grant Program and research projects that have been supported in the past, please visit the CISC website.

Maura Lecce is Professor of Civil Engineering Technology at Seneca College of Applied Arts and Technology.



Rekindling educators' enthusiasm

University instructors brush up on their knowledge of steel construction at the biennial Engineering and Architectural Educators' Conference



very two years, 50 university educators in engineering and architecture are invited to a two-day conference combining knowledge exchange sessions, workshops, networking, site and shop tours, and visits to significant steel structures.

The meeting is hosted by the Canadian steel industry to rekindle the educators' enthusiasm for steel construction, update them on new trends and innovations, and give them an opportunity to network and discuss educational issues. Additionally, the meeting is designed to let them see for themselves the various stages in the manufacture and construction of steel framed buildings and bridges by partaking in events such as the Walking Tour of finished and occupied structures which occurs at the end of the conference. The Steel Structures Education Foundation (SSEF) created this conference in 1985 for engineering educators, and experimented first with yearly meetings and then biennial meetings. Since the SSEF's goal was to also connect with architectural educators, the schedule shifted to meetings for engineers and architects on alternate years, presumably since their interests were so different. However, the educators liked what was being done for the other group, so they suggested a joint biennial meeting, which became the standard.

In 2006, the Educators' Conference was held in Montreal, marking the first foray outside of Toronto. It was so successful that the SSEF governors felt it should be in Toronto only half the time and venture east and west on alternating years. Travel costs ebb and flow as a result, however the educators benefit greatly from fresh skylines and local talent. Although the format has evolved over the years, the first day of the two-day event is a mini-conference-style joint session that kicks off with a keynote speaker. This is followed by themed presentations on current steel topics and projects – all of which are delivered by experts who can relate to both groups.

The objective of the event is to educate and inspire the educators in steel, who in turn can reflect their experiences in their research and teaching. The second day of the conference is devoted to teaching and research-related topics in their peer groups. Recently, however, a joint education keynote session or panel discussion was added to the schedule to lead off the second day before attendees break out into disciplines.

Themes

Every program has a number of themes. For example, in Vancouver in 2010, Olympic Structures was a theme along with Sustainability, AESS and Seismicity – topics that are very relevant to the time and place. These themes often follow into the field as well, usually thanks to the local CISC members involved in the projects being showcased.

In Vancouver, the educators were treated to a backstage tour of several Olympic venues. When the event was held in Montreal in 2006, two of the themes were The Circus and The Making Of, which were also locally inspired and followed up with a tour of Le Chapiteau and supper at L'École nationale de cirque.

In 2008, Toronto had been blessed with a large number of iconic steel structures created by rock-star architects, thereby inspiring the themes of AESS, Castings and Amazing Steel Structures, which followed through the presentations and the Walking Tour.

Although the SSEF created and ran the conference until its merger with CISC in October 2014, CISC mill members, fabricator members, associate professional members and regional committees were all very involved in the program committee, sponsoring events, co-sponsoring the travel costs of their local educators, co-presenting project case studies, opening their shops to the educators, and arranging visits to construction sites and completed structures. The new CISC Education and Research Council has pledged to support and grow this program.

Including keynote speakers in the program began in 2006. Thanks to well-connected educators, SSEF governors and CISC members, the list has been impressive:



ENGINEERING AND ARCHITECTURAL EDUCATORS' CONFERENCE

| 2006 | Chris Wilkinson | Wilkinson Eyre Architects | London, England |
|------|-----------------|---------------------------------|--------------------|
| 2008 | Henry Bardsley | RFR | Paris, France |
| 2010 | Jon Magnusson | Magnusson Klemencic Associates | Seattle, WA |
| 2012 | David Scott | Arup | New York, NY |
| 2014 | Paul Kassabian | Simpson, Gumpertz & Heger MIT | Boston, MA |

The joint educational session, which leads Day 2, was implemented in 2010 and in itself has inspired both groups to reflect on their own teaching philosophies and to learn from the others.

The table below shows how the session was used in the past three conferences.

| 2010 | Teaching Creativity in Structural Design | Edward Allen | Architect, Author and Educator |
|---|---|---|--------------------------------------|
| 2012 THE "CSI" FORENSIC APPROACH: Re-visioning Steel Education to Enable Creative 3D Thinking (Panel Discussion) | Terri Meyer Boake | University of Waterloo - Architecture | |
| | Robert Driver | University of Alberta - Engineering | |
| | | Holly Jordan | B+H Architects |
| | | Neb Erakovic | Halcrow Yolles |
| 2014 | Steeling The Undergraduate Mind | Pieter Sijpkes | McGill University |

Throughout the meeting, plenty of opportunity is provided for the educators to socialize and network. The goal is to develop collaborations, facilitate interdisciplinary interfacing, and introduce rookies to the veterans who then act as mentors. It starts with coffee and lunch breaks, and continues with competition demonstrations, the official reception, a dinner hosted by the local CISC Region, and the Site & Shop Walking Tours. Recently, the 2014 Educators' Meeting was held on Friday, February 28 to Saturday, March 1, 2014 at the Hotel Manoir Victoria in Old Quebec City. In addition to the historical charm of the area, the draw for the location was its proximity to Structal-Bridges, a major steel bridge fabricator; the new Coliseum ice hockey arena; and Le Musée national des beauxarts du Québec.

Themes for the joint Friday sessions and shop tour were Steel Bridges and Intricate Fabrication. On Day 2, Competitions as a Learning Tool was a major theme and the engineers had members of the very successful Laval Student Steel Bridge Team speak on the benefits of their competition.

The 2016 CISC Educators' Conference is tentatively scheduled for February 26 to February 27 in Calgary, Alberta. The numerous multi-storey steel framed buildings, walkways and pedestrian bridges in Calgary will inspire the themes and tours for the conference.

Venue selection is underway, site and shop tours are being planned, and the program committee will soon be formed. Calgary 2016 promises to be yet another fascinating Engineering and Architectural Educators' Conference.





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Supporting student excellence

The Geoffrey James Jackson Fellowship encourages excellence in students pursuing a steel education

By Stig Skarborn

he \$20,000 G. J. Jackson Fellowship is an annual award named after Geoffrey James Jackson, a leader in the Canadian steel fabrication industry and a driving force in establishing the Steel Structures Education Foundation (SSEF), which was the predecessor to the newly formed CISC Education and Research Council. Students with an interest in steel structures are strongly encouraged to apply.

The Fellowship is available to a student who is a Canadian citizen or permanent resident of Canada who will be admitted in the following academic year to a first to fourth year of full-time graduate studies in structural engineering at a Canadian University, with a major emphasis on the study of steel structures.

Candidates for either a master's degree or a doctoral degree are eligible to apply. Detailed instructions for applying for the Fellowship are available on the CISC website or by contacting the CISC office. Applications are due mid-January and the recipient is announced within two weeks.

2014 scholarship winner

The first recipient of the Fellowship was Gilbert Grondin, University of Alberta, in 1998 with Dr. G. L. Kulak as advisor. For 2014, the unanimous choice by the selection committee was François Leprince from Université Laval, whose research topic is the "Study of Resistance to Fatigue of High Performance Steel Connections of a Hybrid Girder Bridge in the Canadian Context," under the supervision of Professor Josée Bastien.

The research program involves experimental tests on welded connections between high-performance steel and conventional steel to assess fatigue strength and to assess the viability of hybrid high-performance steel girders. Leprince's studies are jointly supported by Université Laval and SNC-Lavalin.

Leprince not only has an impressive academic record and work experience, but he also demonstrates strong leadership skills and a great passion for steel structures research. He was assistant captain on the 2011-2013 Laval Student Steel Bridge Team and is currently a CISC-ICCA Student Ambassador. He continues to work for SNC-Lavalin as a junior bridge engineer and researcher while working full-time on his master's degree.

Previous years' recipients include students from universities across Canada, with representatives from the two Canadian linguistic communities, men and women, and foreign students. Many now have successful careers in the steel industry and academia.

A complete list of fellowship recipients can be found on the CISC website.



Geoffrey J. Jackson

Geoffrey James Jackson was born in Stamford, Lincolnshire, England, on February 25, 1929. After receiving a diploma in civil engineering in 1954, he emigrated to Canada. He was devoted to the improvement of the structural steel industry and served on the Canadian Institute of Steel Construction's Board of Directors from 1962, and as Chairman from 1976 to 1978. He was also a longtime member of the Canadian Steel Construction Council Board: Chairman of the Interim Board of Governors of the Steel Structures Education Foundation: and he served on the CISC Board until his death on August 31, 1986.







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News and Events

Continuing Education Courses

CISC is pleased to present a new French language course in the winter of 2015 that leads to CISC Accreditation as a Steel Inspector – Buildings. In addition, two new webinars are scheduled: Low Storey Height Steel Framing Solutions and Steel Erection Estimating, as well as a repeat of Part 3: Innovation of the popular Architecturally Exposed Structural Steel series.

CISC is now offering self-paced, online education that qualifies for Continuing Education Units (CEUs) using previously recorded material packaged with tutoring and examinations where applicable. Please watch the Education pages on the CISC website for the two recently added webinars: Steel Design for Low Seismicity and Budget Pricing of Steel Structures.

For full course and seminar schedule, information, online registration, and the latest updates, please visit the CISC website at www.cisc-icca.ca/courses, or request a copy of the course calendar.

Inspection of Steel Building Structures – Accreditation Program –

This 3½-day course will prepare inspectors, designers, building officials, fabricators, erectors, and other specialists for the inspection of steel-framed buildings in the field. A course participant who achieves an 80 per cent grade on the optional three-hour final exam on the final day will be designated by CISC as an Accredited Steel Inspector - Buildings.

Applicable sections of the National Building Code of Canada, CSA S16 plus referenced material, product and quality standards, CISC Code of Practice, and CISC Certification guidelines will be addressed. Typical structural, erection, and shop drawings for steel-framed buildings will be explained. Material identification, tolerances, bolting and welding processes and procedures will be reviewed. Included are OWSJ, floor and roof deck, shear studs, surface preparation, and coatings.

Course Leader: Robert E. Shaw, Jr., PE, President, Steel Structures Technology Center, Inc.

| Calgary, AB | 1:00 pm, Feb. 23 to 12:00 pm, Feb. 27 |
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Inspection des structures de bâtiments en acier - Nouveau cours : Programme d'accréditation -

Ce cours de 3 ½ jours préparera inspecteurs, concepteurs, agents du bâtiment, fabricants, monteurs et autres spécialistes à inspecter sur le terrain des bâtiments à charpente métallique. Un participant qui obtient une note de 80% à l'exam final facultatif de 3 heures offert la dernière journée sera désigné par l'ICCA comme un inspecteur accrédité – Bâtiments en acier.

Les sections applicables du Code national du bâtiment du Canada, la norme CSA S16 ainsi que le matériel référencé, les produits et normes de qualité, le Code pratique standard de l'ICCA et les lignes directrices de certification de l'ICCA seront abordés. Les dessins typiques de structure, de montage et d'atelier pour les bâtiments à charpente d'acier seront expliqués. Les processus et les procédures d'identification du matériel, des tolérances, du boulonnage et le soudage seront examinés. Les poutrelles, le tablier de plancher et de toit, les goujons de cisaillement, la préparation de la surface et des revêtements sont inclus.

Conférencier: Danilo D'Aronco, M.Ing., ing., Associé et directeur de l'ingénierie, DPHV

Single Storey Building Design - Live Online Course -

This course focuses on practical and economical solutions for framing a single-storey warehouse building with attached office area to the requirements of the 2010 National Building Code of Canada and the pertinent provisions of CSA Standard S16-09.

Practical steel framing concepts and integration with architectural and mechanical features will be discussed. The presenters will highlight major changes in NBCC 2010 and CSA S16-09.

Topics include ponding of rainwater, snow drifting, companion load combinations, wind and seismic loads, notional loads, P-delta effects, selection of deck and joist systems, design of Gerber girders, design of interior and exterior columns, girts, base plates and anchor rods, selection and design of braced frames and roof diaphragm, fire protection issues, steel fabrication considerations, material selection, and economics.

Course Leader: R. Mark Lasby, B.Sc., P.Eng., Principal Structural Engineer, Fluor Canada Ltd.

Webinar Format (4@2hrs) May 12-13, 12:00 - 2:00 p.m. and 3:00 - 5:00 p.m. ET



The Quebec region inspires industry leaders

Once again this year the Quebec Region of the Canadian Institute of Steel Construction held the 6th Quebec Steel Conference, and their 16th edition of the Design Awards for Excellence in Steel Construction. at the Palace Convention Centre in Laval. These notable signature events have inspired industry leaders and dedicated professionals across the province. This year's theme for the day conference was premised on the importance of "The Contribution of the Steel Industry to the World of Transportation" and the significance of the steel industry to the Quebec economy.

For the Design Awards this year, an unforgettable thematic evening was planned: "A Testimony of Perseverance Redefined." It included a tribute highlighting the beauty of steel and how architects, engineers and developers can best utilize steel to improve their projects.

Full coverage and details of the events will be presented in the next edition of *Advantage Steel*.



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EVENTS

CISC Ontario Regional Meeting

CISC Ontario Regional Meeting will take place on March 12, 2015 at the Delta Meadowvale in Mississauga.

CISC Alberta's Design Awards of Excellence

CISC Alberta will be hosting the Steel Design Awards on April 16, 2015 at the Shaw Conference Centre in Edmonton.

CISC Ontario's Design Awards of Excellence

CISC Ontario will be hosting the Steel Design Awards on April 23, 2015 at the Steam Whistle Brewery in Toronto.

CISC British Columbia's Design Awards of Excellence

CISC British Columbia will be hosting the Steel Design Awards on May 28, 2015 at the Fairmont Waterfront Hotel in Vancouver.

SteelDay 2015

Mark your calendars: SteelDay 2015 will be held on September 18, 2015.

86th Annual CISC Conference

Save the date: The 86th Annual CISC Conference will be held from September 23-25, 2015 at The Palace Hotel in San Francisco.

New CISC Members and Associates (Since October 1, 2014)

MEMBERS

Fabricator: Avanti Steel Fabricators Ltd. 715 Dewdney Ave East Regina, SK

George Third & Son 6010 Trapp Ave Burnaby, BC (Transitioned from Associate Fabricator to Fabricator Member)

Detailer:

Vet Dessin 3156 Joseph Monier Terrbonne, QC

ASSOCIATES

Associate Fabricator: Show Canada 5555, rue Maurice-Cullen Laval, QC

Supplier: CANSTUD Welding and Supply Inc. 120 - 7350 72nd Street, Delta, BC (2 Regions - BC/AB) AkzoNobel Coatings Limited 132 Field St., Lively, ON (Switched from 2 Regions [Devoe – AB / Peinture – QC] to National Listing)

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Consultant Company:

Read Jones Christoffersen Ltd. 500- 1816 Crowchild Trail NW Calgary, AB

Professional Individual: Joel Hampson, P.Eng. North Berkeley Design & Construction Vancouver, BC

B John Green, P.Eng, J.M. Giffin Engineering Inc. Amherst, NS

Gordon Debbert, P.Eng Debbert Engineering Inc. London, ON

Kent LaRose, P. Eng. Morrison Hershfield Ltd. Burnaby, BC

WHEN IT COMES TO STEEL FABRICATION... THINK FICEP





Common Codes and Standards for Design and Construction of Steel Structures Current Status and Future Publication Targets

| CODE/STANDARD/ SUPPLEMENT/COMMENTARY/ REFERENCED DOCUMENT | CURRENT EDITION | NEXT EDITION/ REVISION | PUBLICATION TARGET |
|--|--|--|--------------------|
| National Building Code of Canada (NBC) | NBC 2010 | NBC 2015 | Late 2015 |
| NBC Structural Commentaries (Part 4 of Div. B) | NBC 2010 Str. Comm. | NBC 2015 Str. Comm. | 2016 |
| CSA S16 Design of Steel Structures | CSA \$16-14 | ТВА | |
| CISC Commentary on CSA S16 (Part 2 of CISC Handbook of Steel Construction) | CISC Handbook 10th Edition ¹ | CISC Handbook 11th Edition ² | Nov. 2015 |
| CISC Moment Connections for Seismic Applications | 2nd Edition | ТВА | |
| CSA S6 Canadian Highway Bridge Design Code | CSA \$6-14 | S6-19 | ТВА |
| - Supplements to CSA S6 | | None planned | |
| CSA S6.1 Commentary on Canadian Highway Bridge Design Code | CSA S6.1-06 | S6.1-14 | 2015 |
| - Supplements to CSA S6.1 | CSA \$6.1\$3-13 | None planned | |
| CSA G40.20/G40.21 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel | G40.20-13 G40.21-13 | TBA | |
| CSA W59 Welded Steel Construction (Metal Arc Welding) | CSA W59-13 | ТВА | |
| CSA W47.1 Certification of Companies for Fusion Welding of Steel | CSA W47.1-09 | W47.1-15 | 2015 |
| CSA S136 North American Specification for the Design of Cold-Formed Steel Structural Members | CSA \$136-12 | TBA | |
| CSA S136.1 Commentary on CSA S136 | CSA \$136.1-12 | ТВА | |

¹CISC Handbook of Steel Construction - 10th Edition includes CSA \$16-09, its Commentary, CISC Code of Standard Practice - 7th Edition, and design and detailing aids in accordance with CSA \$16-09 ²CISC Handbook of Steel Construction - 11th Edition includes CSA \$16-14, its Commentary, CISC Code of Standard Practice - 7th Edition, and design and detailing aids in accordance with CSA \$16-14



A tribute to Dr. John L. Dawe



DR. JOHN L. DAWE WILL BE REMEMBERED FOR HIS SIGNIFICANT CONTRIBUTIONS TO STEEL RESEARCH

Dr. John L. Dawe passed away in September 2014, and his contribution to steel research and the steel fabrication industry in Canada should be remembered.

Dawe completed two graduate degree programs at the University of Alberta under the supervision of Dr. Geoff Kulak, for research on local buckling of W shapes and on eccentrically loaded weld groups. This work has been incorporated in CAN/ CSA S16.1 and the CISC Handbook of Steel Construction.

Dawe continued with steel research at the University of New Brunswick during his long tenure as professor in the Department of Civil Engineering. He and his graduate students received funding from the Steel Structures Education Foundation (SSEF), Natural Sciences and Engineering Research Council (NSERC), International Committee for the Development and Study of Tubular Construction (CIDECT), and many steel fabricators such as CANAM and Ocean Steel & Construction Ltd. They performed laboratory testing and analysis of structural steel components, including open web steel joists, standard beam connections in shear and tension, and hollow structural section connections. Most of this work has been published in the Canadian Journal of Civil Engineering and the ASCE Journal of Structural Engineering.

For his excellence in steel research, Dawe received two noteworthy awards: the Casimir Gzowski Gold Medal from the Canadian Society for Civil Engineering (CSCE) and the Moisseiff Award from the American Society of Civil Engineers (ASCE). Dawe's students have also gone on to excel in the steel community: in consulting, with steel fabricators, as educators, and with CISC.

Together, Dawe and his students completed many forensic studies of notable structural failures, including the Fredericton water tower collapse in 1991. Furthermore, he broadened his horizons by teaching at universities in Hong Kong and Bangkok during his sabbaticals.

Dawe will long be remembered by those who knew him, both for his intelligence and his wry sense of humour.







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| Price Steel Ltd. Edmonton, AB www.pricesteel.com | 780-447-9999 |
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| (Division of Myer Salit Li Niagara Falls, ON www.salitsteel.com | mited) 905-354-5691 |
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| www.wilkinsonsteel.com Misc. structural shapes, hot rolled bars and p angles, flats, beams, channel, plate | lates. Strucurals- |
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| A.J. Braun MFG. Limited www.ajbraun.com | 29 |
| Abesco Ltd. www.abesco.ca | 58 |
| ACL Steel Ltd. www.aclsteel.ca | 49 |
| AkzoNobel Coating Ltd. (Canada) www.akznobel.com | 55 |
| Altitube Steel www.altitube.com | 49 |
| Apex Structural Design Ltd. www.apexstructural.ca | 58 |
| Applied Bolting Technology www.appliedbolting.com | 45 |
| Atlas Tube www.atlastube.com | 5 |
| Benson Steel Ltd. Inside Back of www.bensonsteel.com | cover |
| Canam Group Inc. www.groupecanam.com | 57 |
| Commercial Sandblasting & Painting L www.csbp.ca | .td.41 |
| Daam Galvanizing Ltd. www.daamgalvanizing.com | 21 |
| Empire Iron Works Ltd. www.empireiron.com | 15 |
| Eskimo Steel www.eskimosteel.com | 44 |
| Fabricating Machinery Solutions www.fmscanada.ca | 45 |
| Ficep Corporation www.ficepcorp.com | 45 |
| George Third & Son www.geothird.com | 28 |
| Hodgson Custom Rolling Inc. www.hodgsoncustomrolling.com | 6 |
| IKONA Drafting Services Inc. www.ikonadrafting.com | 57 |
| Infasco www.infasco.com | 17 |
| International Paint www.akzonobel.com/international | 55 |

| Island Industries Ltd. | 27 |
|--|----------|
| Lincoln Electric of Canada LP www.lincolnelectric.ca | 9 |
| M & G Steel Ltd. www.mgsteel.ca | 41 |
| M-Tec Drafting Services Inc. www.mtecdrafting.com | 37 |
| McCann Equipment Ltd. www.mccannequipment.ca | 10 & 34 |
| Moore Brothers Transport Ltd. www.moorebrothers.ca | 49 |
| Nucor Yamato www.nucor.com | 30 & 31 |
| Ontario Erectors Association Inc. www.ontarioerectors.com | 35 |
| Ontario Iron Workers Council www.ironworkers.org | 25 |
| Pacific Bolt Manufacturing Ltd. www.pacbolt.com | 38 |
| Peddinghaus Corporation www.peddinghaus.com | 13 |
| Price Steel Ltd. www.pricesteel.com | 48 |
| Provincial Galvanizing Ltd. | 21 |
| Prodevco Industries www.prodevcoind.com | 43 |
| Pure Metal Galvanizing, A Valmont Cor www.puremetal.com | mpany 19 |
| Russel Metals Inc. | 4 |
| Steel 2000 Inc | 56 |
| Supreme Group LP www.supremegroup.com | 3 |
| Vicwest www.vicwest.com | 10 |
| Voortman Corp. Inside Fro www.voortmancorp.com | nt Cover |
| Waiward Steel Fabricators Ltd. www.waiward.com | 49 |
| Walters Inc. Outside Ba www.waltersinc.com | ck cover |



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