

### **Arcelor**Mittal

des

SPRING 2013 VOLUME 45 NO.

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### steeldesign

SPRING 2013 VOLUME 45 NO. 1

#### PROJECT SUBMISSIONS

Do you have a project using sheet steel that you would like to see in *Steel Design*? The editor welcomes submissions of completed buildings – commercial, institutional, industrial, recreational and residential – using components made from steel, including cladding, steel decking, light steel framing, steel roofing, steel doors, steel ceiling systems and steel building systems.

> The Editor, Steel Design 1039 South Bay Road Kilworthy, Ontario POE 1G0 E-mail: davidfollis@vianet.ca

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COVER PHOTO: The Eastern Ontario Christian Senior Housing Co-Op, Ottawa PHOTOGRAPHER: Gerry Morin



#### transforming tomorrow

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Inc. to construct a 3,345m<sup>2</sup> (36,000 sq. ft.) addition that wouldn't clash with the stonework of the original building. The new space would be used for a community centre and classrooms. Construction began in the summer and was completed in the Fall.



#### 8 Milton Sports Centre, Milton, ON

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#### 10 EcoTerra™ House, Eastman, Quebec

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Christian Senior Housing Co-Op, Ottawa, ON

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#### Eastern Ontario Christian Senior Housing Co-Op Ottawa, Ontario

The Eastern Ontario Christian Senior Housing Co-Op on Viewmount Drive in Ottawa is a good showcase for the use of steel. That's the opinion of the project's Structural Engineer, Colin Davies, of Cleland Jardine Engineering Ltd., who noted that steel was the obvious solution to the building's design and construction challenges.



## Eastern Ontario Christian Senior Housing Co-Op All cold form steel frame construction

"Construction like this (balloon framing and TSN's shear post system) hasn't been used in Ottawa," says Colin, explaining that the City has stringent design codes and recently introduced strict, seismic residential building standards. Ottawa sits on a known fault line and is ranked third for earthquake risk among Canadian urban centres. "The heavier the building, the higher the risk for earthquakes," says Colin, noting that light-weight steel has an advantage over concrete material because it helps reduce both the weight of the building and thus the seismic loads.

The five-storey, 4,924m<sup>2</sup> (53,000 sq. ft.) housing Co-Op consists of an all steel frame, steel cold formed "C" section floor joists for the floors and light steel framing for the walls. Bailey Metal Products Limited supplied studs for the first three floors and Steelform Building Products Inc. for the top two floors and the roof.

Morin Bros. Building Supplies Inc. supplied the balloon



#### Eastern Ontario Christian Senior Housing Co-Op Ottawa, Ontario

framing for the steel structure. "It is a proven system with back-up testing for sound and fire rating," emphasizes Gerry Morin. "It is a light weight system that is easy to frame with no welding. The floor system weighs less than 9.07 Kg (20 lbs.) per square foot and provides an STC of 58+. We were able to reduce the weight of the structure by a minimum of 771 metric tons (1,700,000 lbs.) which saved a lot of money on the foundation work due to the soil conditions."

The Steel Network supplied the shear post system for lateral loads. Explaining the advantages of this system, Gerry says, "The product is engineered to work in steel stud structures and is easy to install, supports the fire rating

#### MATERIALS USE FOR THE FLOORS AND THE ROOF

ROOF:

46.000 ft.<sup>2</sup> floor deck Canam P3012 16.000 ft.<sup>2</sup> roof deck Canam P3615 Floor and roof joist - both Bailey and Steelform 13000 LF 12" x 2" x 54mil

28000 LF 12" x 2" x 68mils 7000 ft.2 9 1/4" x 1 3/4" x 54mils WALLS:

52,000 ft.<sup>2</sup> of studs of various sizes 362S16248mils, 362S16254mils 362S16268mils, 400S20068mils 600S16243mils, 600S16254mils 600S16268mils, 600S20068mils 600S25068mils

and lowers the cost overall for installation. It also helps to maintain the STC rating of walls because there is no double or triple stud posts. The high strength posts can be roll formed to 10 gauge. This system was important to the structural engineer in the quest to meet severe seismic code requirements and also save 45,359 Kg (100,000 lbs.) of steel."

Colin Davies agrees. "The skeleton is very efficient and the use of steel allows us to put the load bearing walls in the right places. Another positive factor is that a large percentage of the steel is recyclable so, at the end of the day, it saves material. Steel was an economical choice for a building of this nature. This building shows what can be done with the use of steel and it's something we expect to see more of in the future."





This system was important to the structural engineer in the quest to meet severe seismic code requirements and also save 45,359 kg (100,000 lbs.) of steel.





![](_page_4_Picture_1.jpeg)

The skeleton is very efficient and the use of steel allows us to put the load bearing walls in the right places. Another positive factor is that a large percentage of the steel is recyclable so, at the end of the day, it saves material.

Typical Floor connection to demising wall. The floor system weighs less than 9.07 Kg (20 lbs. sq. ft.) and provides an STC of 58+.

![](_page_4_Picture_4.jpeg)

![](_page_4_Picture_5.jpeg)

![](_page_4_Picture_6.jpeg)

The shear post system is engineered to work in steel stud structures and is easy to install, supports the fire rating and lowers the cost overall for installation. It also helps to maintain the STC rating of walls because there are no double or triple Aligning shear post no. 2 stud posts.

![](_page_4_Picture_8.jpeg)

connectors.

#### DESIGN AND CONSTRUCTION TEAM

#### ARCHITECT:

Christopher Simmonds Architect Inc. 613-567-7888

STRUCTURAL ENGINEER:

Cleland Jardine Engineering Ltd. 613-591-1533

**GENERAL CONTRACTOR:** Warlyn Construction Ltd. 613-729-8300

STEEL STUD CONTRACTOR: Durabuilt Construction Inc. 613-565-9276

STEEL STRUCTURE SUPPLIER: Morin Bros. Building Supplies Inc. 613-224-9980

STEEL STUD SUPPLIERS: Bailey Metal Products Limited 1-800-668-2154 Steelform Building Products Inc. 877-245-7073

STEEL FLOOR AND ROOF DECK: Canam Inc. 1-800-463-1582 or 1-800-361-3510

SHEAR POST SYSTEM: The Steel Network 1-888-474-4876

PHOTOGRAPHER: Gerry and Hubert Morin

![](_page_5_Picture_0.jpeg)

![](_page_5_Picture_1.jpeg)

The Brunswick Street Baptist Church was feeling some growing pains. It was no longer large enough to accommodate the needs of its parish. In 2009, the Fredericton church hired exp Architects Inc. to construct a 3,345m<sup>2</sup> (36,000 sq. ft.) new addition that wouldn't clash with the stonework of the original building. The new space would be used for a community centre and classrooms. Construction began in the summer and was completed in the Fall.

## Prepainted steel presented economical and aesthetic advantages

"We were challenged by trying to put a modern structure next to an older landmark," says Brent Stewart, Manager of Architectural Services for exp Architects Inc. "Whenever you have to put a new building next to an older structure, you have many design issues that need to be taken into consideration."

"What I like about this job is it's the old meeting the new," says Don Anderson, Manager of Building Products, Atlantic Region for Agway Metals Inc. in Nova Scotia. "All the colours blended together very nicely with the old construction. We had two different colours blending in with the old stone."

The architect used Agway Metals HF-12NF 305mm panels in Tan QC18315 and HF-6NF 305mm panels in Beige QC18021 for the walls and 4-150 914mm panels in Tan QC18315 for the Canopy roof panels. Colours are from ArcelorMittal Dofasco's Perspectra Series. The installation was completed by King Construction of Fredericton.

"King Construction helped make this such a successful job. It looks wonderful," Anderson says. "It's normally a

tricky installation to run panels horizontally. This is the nicest horizontal install I've ever seen." According to Stewart, the use of steel was a starting point for the project because of its economical and aesthetic advantages.

"We knew we were going to use some stone to match the existing stonework on the original building, but we were able to do the detailing and composition by using steel," he says. "The steel did a lot to compliment the arrangement of the windows – we got it lined up quite nicely. The panel alignment and trim work we used to accompany it were achieved in an economic manner. Between the glass, aluminum framing and three profiles of steel, the materials all worked together to complement the existing building."

"The new construction blends seamlessly with the heritage building," adds Anderson. "The client was very happy," he says. "The renovation resulted in a very nice construction."

#### DESIGN AND CONSTRUCTION TEAM

CLIENT: Baptist Street Church, Fredericton, NB

ARCHITECT: exp Architects Inc 506-452-9000

GENERAL CONTRACTOR: King Construction 506-452-7712

STEEL CLADDING SUPPLIER: Agway Metals Inc. Atlantic Region 902-693-3052 or 800-268-2083

![](_page_5_Picture_16.jpeg)

![](_page_6_Picture_1.jpeg)

We were able to do the detailing and composition by using steel, the steel did a lot to compliment the arrangement of the windows *II*. Brent Stewart, exp Architects

![](_page_6_Picture_3.jpeg)

![](_page_6_Picture_4.jpeg)

![](_page_6_Figure_5.jpeg)

The new addition, incorporating a community centre and classrooms, is clad in stone and prepainted galvanized steel, which compliments the character of the original church structure.

#### NORTH ELEVATION BRUNSWICK STREET SIDE

- Agway Metals HF-12NF .76mm (.0299"),
  305 mm (12") coverage coloured Tan QC18315
- 2 Agway Metals HF-6NF .76mm (.0299") 305 mm (12") coverage coloured Beige QC18021

#### Milton Sports Centre Milton, Ontario

![](_page_7_Picture_1.jpeg)

Getting fit just got a little easier for the community of Milton. Architects Tillman Ruth Robinson, in a partnership with BBB Architects and Ball Construction, recently finished an addition to the Milton Sports Centre in southern Ontario. The new structure added 12,820m<sup>2</sup> (138,000 sq. ft.) for two more ice pads, a larger basketball gymnasium and a swimming pool. The renovation also resulted in a refurbished café and snack bar, enlarged corridors as well as a sizeable changing room for families.

## Steel contributes to contemporary, modern look

"With this building we provided additional recreational space for a very fast-growing town. Milton is one of the fastest growing populations in Canada. Lots of young families are moving into the community," says Scott Robinson, Principal and Director of Design for Tillmann Ruth Robinson Architects. "We wanted to provide a functional yet inspirational facility."

The use of steel for the corrugated metal façade of the building (the architects used Galvalume steel by Vicwest with a 22.225mm (7/8") profile) allowed the architectural team to create a contemporary, modern look.

The contractors used a single ply membrane for the roof of the pool and standing seam roofing panels for the new ice pads.

"Steel allowed us to speed up the construction process. It's a cost-effective material that allowed us to satisfy the budget and achieve the aesthetic elements we were looking for," Robinson adds. "The steel siding made a visual connection to what was already there. We wanted the addition to stand on its own while still having a relationship with the existing structure."

The centerpiece of the facility is the new swimming pool, which can be partially seen from outside the complex. The roof over the pool was constructed of membrane on

![](_page_7_Picture_10.jpeg)

![](_page_8_Picture_1.jpeg)

Viewed from the parking lot – the new structure added 12,820m<sup>2</sup> (138,000 sq. ft.) for two more ice pads, a larger basketball gymnasium and the swimming pool, which is the centerpiece of the facility.

DESIGN AND CONSTRUCTION TEAM

ARCHITECTS (JOINT VENTURE): architects Tillman Ruth Robinson 416-595-2876 and BBB Architects 416-591-8999

GENERAL CONTRACTOR: Ball Construction 519-745-7365

STEEL CLADDING SUPPLIER: Vicwest 1-800-387-7135

STRUCTURAL ENGINEERS: Halcrow Yolles 416-363-8123

MECHANICAL: Dordan Mechanical 519-662-9900

ELECTRICAL: Birnie Electric Limited 905-569-1818

CIVIL: Stantec 519-645-2007 LANDSCAPE: Stantec

The use of steel for the corrugated metal façade of the building (the architects used Galvalume steel by Vicwest with a 22.225mm (7/8") profile) allowed the architectural team to create a modern, contemporary look.

exposed T&G wood deck and large glulam beams, while the interior cladding is exposed architectural block and ceramic tile.

"The pool became the jewel of the complex. You can get a glimpse of it from outside – we were cautious about the amount of glass used in the pool area, there's a balance of controlled views and privacy. We didn't want people in the pool to feel like they're in a fish bowl," explains Robinson. "We also used a generous amount of glass to allow natural light into the common areas as well."

The renovated common areas make for a much more welcoming entrance experience to the building. This and the enlarged corridors allow for chance meetings and for people to socialize without feeling like they're in the way of the hockey players.

"It's quite an active building that works to sustain both the physical and social health of the community. We provided lots of visual connectivity between programs in the building, so people may get the inspiration to try another activity while they're there."

The addition was built to Facility Accessibility Design Standards and won a Grand River Construction Association Building Excellence Award. Architects Tillmann Ruth Robinson is currently working on another addition on the gymnastics facility on the north side of the site.

Robinson says. "It's nice to be able to provide these additional amenities to the community, creating places for play, friendship and camaraderie."

![](_page_8_Picture_19.jpeg)

#### EcoTerra<sup>™</sup> House Eastman, Quebec

![](_page_9_Picture_1.jpeg)

When Quebec-based Les Maisons Alouette designed a zero-energy home for the Canada Mortgage and Housing Corporation (CMHC) EQuilibrium Sustainable Housing Demonstration Initiative, it chose a combination of solar power, passive solar heating and geothermal energy to reduce the energy requirement of the house. Les Maisons Alouette was one of 12 CMHC EQuilibrium competition winners country-wide.

## Steel decking and steel roof in an energy-efficient home

The company built the factory-built, pre-engineered home in Eastman, Quebec and demonstrated it to the public for two years before selling it to a private owner.

The two-storey home has a footprint of  $82.5m^2$  (888 sq. ft.) and  $141m^2$  (1,517 sq. ft.) of interior space. There is a living room, dining room, kitchen, bathroom and laundry on the first floor and two bedrooms, an office and a bathroom on the second floor.

Les Maisons Alouette chose pre-painted galvanized steel standing seam roof, coloured QC6068 Black, of which 57.2m<sup>2</sup> (616.7 sq. ft.) is south-facing, to comply with a subdivision covenant. That requirement, however, was well-suited for the solar array, manufactured by Michigan, USA-based UniSolar: The three kilowatt, thin-film photo-

DESIGN AND CONSTRUCTION TEAM

ECOTERRA HOME BUILDER: Les Maisons Alouette 450-539-3100

DESIGNER: Les Maisons Alouette 450-539-3100

PROJECT PARTNERS: Concordia University, Natural Resources Canada, Société d'habitation du Québec, Hydro-Québec, Les Boisées de l'Héronnière, BASF, Geonergy, Matrix Energy and Régulvar

STEEL ROOF SUPPLIER: Vicwest 800-387-7135

STEEL DECK SUPPLIER: Canam Inc. 1-800-463-3510

voltaic array is laminated to the south-facing roof and is almost invisible. The result is a nearly seamless integration of the solar panels with the house.

Heat from a cavity beneath the metal roof is recovered for the clothes dryer, to help heat the hot water and to passively heat the basement floor space through a ventilated slab. To heat the 4m by 11m (13' by 36') room, the air in the roof cavity, which reaches 75°C (167°F) in the summer and 55°C to 60°C (131°F to 140°F) in the winter, is blown through Canam's P2436 profile 0.7mm (.0275") galvanized steel decking in the floor.

First, insulation, polyethylene sheets, polystyrene insulation and expanded metal grating was laid down, then the decking was laid down and covered with 125mm (5") of concrete. The cold formed steel decking acts as a hollow core for the heated air to blow through. The grating creates turbulence to give the air better contact with the steel decking, another innovative use of cold formed steel in residential construction. (Also see: Eastern Ontario Christian Senior Housing Co-Op article on page 3)

The solar array can generate up to 3,420 kilowatt hours (3,420,000 watt-hours) a year. The array and the other energy efficient features of the house, which requires only 17% of the energy of the average Canadian home, result in a net energy consumption of nearly zero.

![](_page_9_Picture_17.jpeg)

![](_page_9_Picture_18.jpeg)

![](_page_10_Picture_1.jpeg)

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#### Cargolux Aircraft Maintenance Centre Findel Airport, Luxembourg

![](_page_11_Picture_2.jpeg)

Located in the southern portion of the Findel airport site, 500m (1,640 ft.) from the runways, the building rises from the landscape like a massive ship, light in colour with the exception of the "Cargolux red" bays of the north façade. The hangar consists of two identical bays, which can accommodate two large and several small aircraft in the northern part. A future extension to three or four bays is integrated into the site plan.

## Made entirely of steel, the structure and envelope are ideally suited to the scheme An Industrial-scale project – a human-scale layout

The dimensions of the hangar are designed for maintenance of the Boeing 747 with the ability, in future years, to service the Airbus A380 aircraft and even the Antonov.

The complex, with a surface area of 34,000m<sup>2</sup> (365,972 sq. ft.), comprises the maintenance centre itself, hangar, workshops and offices, 200m (656 ft.) long, 140m (459 ft.) wide and 42.5m (139.4 ft.) high at the ridge. Its annexes include a "guest house" incorporating access from the two-storey car park, the cogeneration unit that provides a portion of the building's energy requirements as well as

-Brookus

the staff restaurant. The entire structure is designed to take not only climatic loads into account, since wind loads are very high in this region, but more specifically, service loads. Thus, the overhead cranes with spans of 23m and 46m (75.45 ft. and 150.9 ft.) are suspended from the roof structure.

In addition to the architectural approach adopted, selection of materials and contractors made it possible to minimize construction work annoyance to the neighborhood, transport distances, as well as nuisance arising from the operation of the building.

The double hangar appears as a succession of interlocked volumes, with the north façade "box with doors" and then the three saw-tooth roofs of increasing height. The translucent polycarbonate glazing changes direction and becomes vertical on the side walls.

#### SPRING 2013 13

![](_page_12_Picture_1.jpeg)

#### DESIGN AND CONSTRUCTION TEAM

CLIENT: Cargolux Airlines International S.A. ARCHITECT: Jean-François SCHMIT, Architects (s.a.r.l.) 01 44 06 61 00 email: contact@jf-schmit.fr

STRUCTURAL ENGINEERING FIRM: RFR

ENGINEERING: groupe SNC Lavalin

CONTRACTOR: cooperation of Donges and Queck Stahlbau

STEEL CONSTRUCTION: Donges and Queck Stahlbau

PHOTOGRAPHER: Gaston F. Bergeret Atelier Jean-François Schmit and Eve Jouannais

![](_page_12_Picture_9.jpeg)

![](_page_12_Picture_10.jpeg)

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Cargolux Aircraft Maintenance Centre Findel Airport, Luxembourg

![](_page_13_Picture_2.jpeg)

The east and west façades are covered in prepainted white steel cladding specially manufactured by Arcelor/Mittal with a more prominent profile in conjunction with standard profiles, highlighting the angled installation of the corrugations aligned with the slope of the saw-tooth roofs.

On the first floor, the light workshops are directly linked to a 1,500m<sup>2</sup> (16,145.9 sq. ft.) technical mezzanine floor positioned at a height of 5m (16.5') at the back of the hangar, while the open-plan offices are located along the south façade. As architect Jean-François Schmit specifies the layout design "seeks to bring people closer to the aircraft, their core business."

![](_page_13_Picture_5.jpeg)

![](_page_13_Picture_6.jpeg)

The hangar is designed so that an aircraft can enter either forwards or in reverse. This determines its dimensions, as well as the arrangement of the equipment throughout the hangar. The free volume of each half of the hangar is incorporated within a square with sides of about 100m (328') and it is covered at a height of 29m (95') by a steel roof structure whose height increases with that of the saw-tooth roofs so as to preserve a planar horizontal layer. The central support is distinguished by the Y-shape of one of the box columns.

![](_page_14_Picture_2.jpeg)

#### Granite<sup>®</sup> Deep Mat organic coated steel

Granite® Deep Mat is a textured low-gloss pre-coated steel designed for roofing (non-vertical) and sidewall (vertical) applications, in the construction market. The flexible coating allows for a variety of profiles to

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PAINT CHARACTERISTICS:

- The exposed surface shall have a dry film thickness of 30 microns (1.2 mils).
- Unexposed (reverse side) dry film thickness will vary in accordance with customer requirements.

PROCESSING:

- Granite<sup>®</sup> Deep Mat's paint system is resilient to cracking and crazing during forming due to its high flexibility.
  PERFORMANCE:
- Granite<sup>®</sup> Deep Mat's film integrity is designed for 40-year performance.

For more information on Granite® Deep Mat: http://www.dofasco.ca/bins/doc.asp?rdc\_id=334874

![](_page_14_Picture_13.jpeg)

#### SOLANO<sup>®</sup> the new generation of organic pre-finished steels for industrial buildings in harsh climates

![](_page_14_Picture_15.jpeg)

#### ADVANCED PAINT TECHNOLOGY:

SOLANO<sup>®</sup> is a new generation of plastisol organic pre-finished steels for roofing and cladding suitable for more aggressive industrial applications in harsh, corrosive environments.

LIGHTER ENVIRONMENTAL FOOTPRINT:

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A RANGE OF APPLICATIONS: SOLANO<sup>®</sup> is designed for

sidewall (vertical) as well as roofing (non-vertical) applications in construction. It is suitable for aggressive atmospheric or industrial exposures

![](_page_14_Picture_22.jpeg)

where corrosion protection is a primary concern. For more information on Solano® http://www.dofasco.ca/bins/doc.asp?rdc\_id=334875

#### Highland Valley Copper Mines

In regard to the Highland Valley article in the Fall 2012 issue, Triodetic Canada, the Dome builder, prefabricated the domes at their plant in Arnprior, Ontario and then assembled them at the mine site. The steel domes, which cover and beautify the stockpiles, measure 100m (328') in diameter each and in total cover an area 100m x 400m (328' x 1,312.34').

![](_page_14_Picture_26.jpeg)

![](_page_14_Picture_27.jpeg)

#### St. Kitts Biological Research Foundation

The St. Kitts Biological Research Foundation, in the West Indies, is a project to create a science facility that weaves together a brand new modernist building (designed by Sander Architects) with pre-existing vernacular and historical buildings on the site.

A 300-year-old cotton storage building has been repurposed with modern insertions designed by the firm to enclose the roof and create interior spaces destined to become study and living areas for the scientists. The new construction links this building to a lab, built in the local vernacular, and provides a variety of spaces required for the science facility.

The roof systems use Sander Architects' hybrid house technology using prefabricated steel frame, skin and roof. This design withstands the exigencies of extreme weather (hurricane winds and torrential rain.) The 1,022m<sup>2</sup> (11,000 sq. ft.) \$40/sq. ft. estimated construction cost – reflects low local building costs.

![](_page_14_Picture_32.jpeg)

#### EDITORIAL INQUIRIES

#### We would like to hear from you!

If you have comments about this issue or a project you would like to see in an upcoming issue of *Steel Design*, please send a description of the project, including photographs, to:

The Editor, Steel Design 1039 South Bay Road Kilworthy, ON POE 1GO. Or email: davidfollis@vianet.ca

![](_page_15_Picture_0.jpeg)

![](_page_15_Picture_1.jpeg)

![](_page_15_Picture_2.jpeg)

![](_page_15_Picture_3.jpeg)

![](_page_15_Picture_4.jpeg)

![](_page_15_Picture_5.jpeg)

![](_page_15_Picture_6.jpeg)

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## transforming

![](_page_15_Picture_13.jpeg)

![](_page_15_Picture_15.jpeg)