Cast Steel Connections in Steel-Timber Hybrid Construction

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CAST STEEL CONNECTIONS IN STEEL-TIMBER HYBRID CONSTRUCTION

23rd May, 2022 | CTBUH Steel-Timber Hybrid Buildings Conference
Jennifer Anna Pazdon, PE | Vice President
What is a structural steel casting?

Completed Case Studies

UMASS Amherst John W Olver Design Building

Vancouver International Airport (YVR) Pier D Expansion

Cast Studies In Construction

University of Victoria Student Housing

843 N Spring Street
BENEFITS OF CAST STEEL CONNECTIONS FOR STEEL-TIMBER HYBRID CONSTRUCTION

Freeform Geometry
- Flexible solutions for new construction typology with material-use efficiency
- Aesthetic quality for exposed structure unmatched by conventional steel fabrication

Improved Structural Performance
- Ductile and efficient LFRS for multi-story buildings

Simplification of Construction
- Minimized coordination between trades in shop and field activities

Overall Economy
- Turn-key solutions, pre-engineered, modularized and available off the shelf
DETAIL 2: TEC TO TIMBER

- TEC-8.75 with welded on knife plate and bolts
  - Tension and/or compression

- TEC-8.75 connected with glued-in rods and nuts
  - Compression only

- TEC-8.75 connected with screws
  - Compression only
OWNER: YVR Airport Authority
ARCHITECT: Kasian Architecture
STRUCTURAL ENGINEER: Bush, Bolman & Partners, LLP
STEEL FABRICATOR: Whitemud Ironworks Group
TIMBER SUPPLIER: FraserWood Industries
GENERAL CONTRACTOR: PCL Construction
The atrium roof is supported by ten tree structures characterized by a tapering trunk and 5 branch members. Glued-laminated timber members are framed between stainless steel castings.

The lateral system includes steel moment frames and steel concentric braced frames. Braced frame bays are architecturally exposed structural steel elements that include standardized cast steel components.
TREE COLUMN

Typical structural tree elevation

CUSTOM-DESIGNED COLUMN BASE

CUSTOM-DESIGNED COLUMN CAP

STANDARDIZED TIMBER END CONNECTORS™ (TEC)
BRACE BAY

STANDARDIZED HIGH STRENGTH CONNECTORS™ (HSC)

Typical braced bay elevation
WALKWAY

CUSTOM-DESIGNED CLEVIS KNUCKLES

Typical walkway elevation
UNIVERSITY OF VICTORIA STUDENT RESIDENCES
Victoria, BC
2022 expected

OWNER: University of Victoria
ARCHITECT: Perkins + Will
STRUCTURAL ENGINEER: Fast + Epp
STEEL FABRICATOR: George Third & Son Ltd.
TIMBER SUPPLIER: Seagate Mass Timber
GENERAL CONTRACTOR: Kalesnikoff
Figure 15: Cantilever Von Mises Stress Results
843 N SPRING
STREET
Los Angeles, CA

2022 expected

OWNER: Redcar Properties
ARCHITECT: Lever Architecture
STRUCTURAL ENGINEER: Glotman Simpson Consulting Engineers
STEEL FABRICATOR: Orange County Erectors, Inc
TIMBER SUPPLIER: Structurlam
GENERAL CONTRACTOR: Shawmut

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Special Concentric Braced Frame (SCBF) Basics

As a frame deforms beyond its elastic range, its brace members are intended to **yield in tension** and **buckle in compression**.

\[ R = 6 \]
HIGH STRENGTH CONNECTORS™

CAST CONNEX High Strength Connectors™ simplify and improve connections to round hollow structural section (HSS) brace members in seismic-resistant concentrically braced frames (SCBF, OCBF, MD-CBF or LD-CBF).

![Diagram of high strength connector and structural connections.](image)
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