

# IHI R&D & MANUFACTURING FACILITY DELTA, BC

**RECENT ACTIVITY  
FEBRUARY, 2009**

## STEEL FRAMING OF IHI PANELS ALL OVER THE IHI FACILITY:

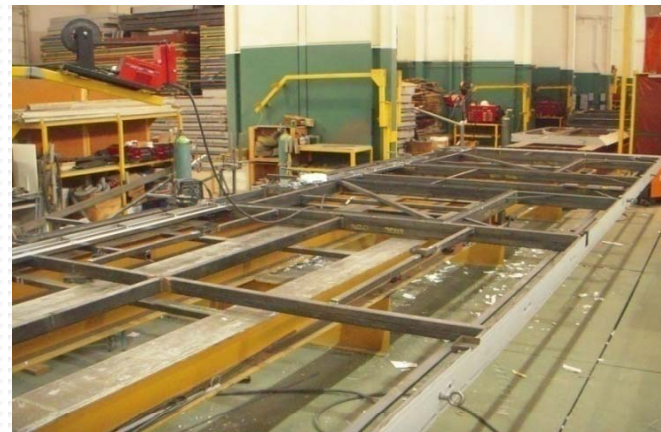
More delicate and Intricate framing of panels. With automated welding and jiggging system, no panel will be intricate to manufacture, specially since the heat induced into the frames will be a small fraction and the warping effect will be eliminated!



Panel with duct opening – in the annex building



With plumbing sleeve pipes & double sided bracket connection



In the central area of the main building showing the temporary bracing



## STEEL FRAMING OF IHI PANELS ALL OVER THE IHI FACILITY:



With the electric channels & temporary bracing in the central area of the main building



In the central East side of the main building showing 2" x 2" HSS frames



In the far East side of the main building



In the far North – East corner of the main building



## STEEL FRAMING OF IHI PANELS ALL OVER THE IHI FACILITY:



Again, in the central East side part of the main building with mitred panels & built-in electric channels.



2" x 2" HSS framed panels stacked on top of mitred 8" thick panel & built-in electric channels.



Adjacent to the Northern side of the defaulted GE/FANUC cell system



With multi-layers MEP channels



***In spite of the manual welding operation, the induced heat in the thin frames and the R&D mentality of steel fabrication, framing & welding, the accuracy was within IHI's tight tolerances***



Every measurement is fully documented under IHI's quality control procedure.



Slab to slab socket brackets – perfect alignment (bracket is not in yet)



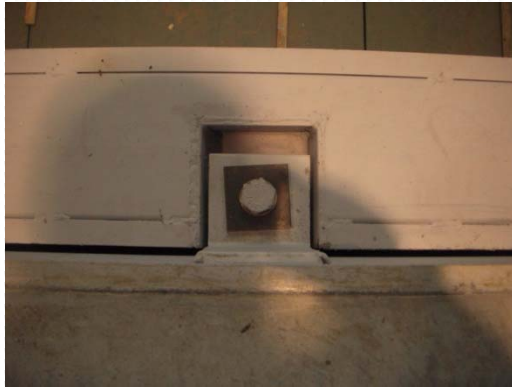
Ground floor wall to ceiling panel connection



Perfect mitred corner (top view)



***In spite of the manual welding operation the induced heat in the thin frames and the R&D mentality of steel fabrication , framing & welding, the accuracy was within IHI's tight tolerances***



Closer look of a concealed slab to wall ( top connection)



Good fit for the last floor panel of this section



Cross section showing the upper & lower (floor/ceiling) U channel separated by a rigid rubber strip for sound & water proofing. Moreover, it will be a great spare access for any future MEP alterations. This gap will be finally filled with plaster for fire resistance.



Again, perfect corner fit

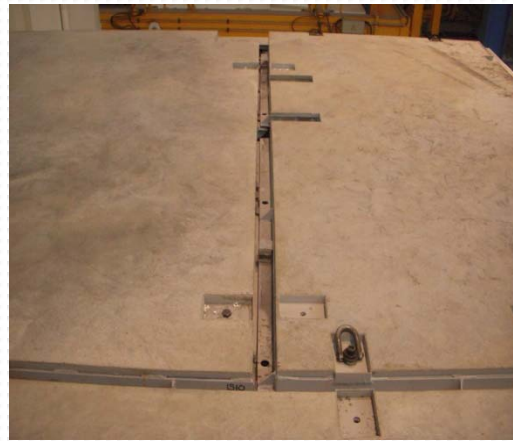
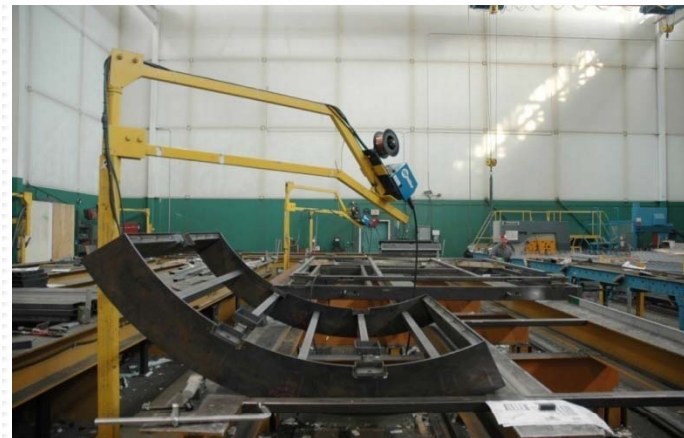
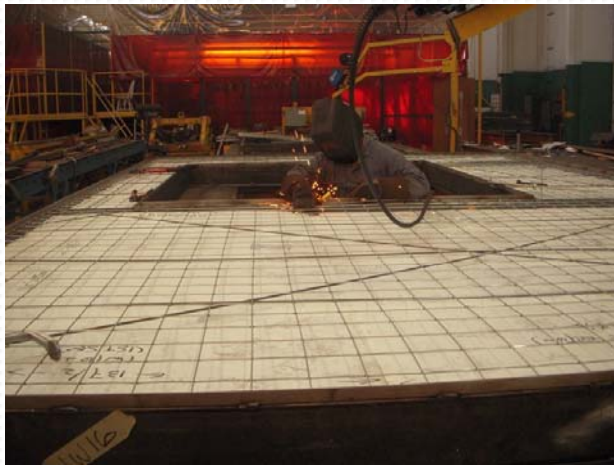


Photo shows perpendicular floor U channels intersecting each other with some floor interior wall sockets on the side

Framing of curved panels for the stair's walls. Perimeter plates will be heavily utilized with the new automated welding & cutting system, to optimize any shape & cut in a very fast manner







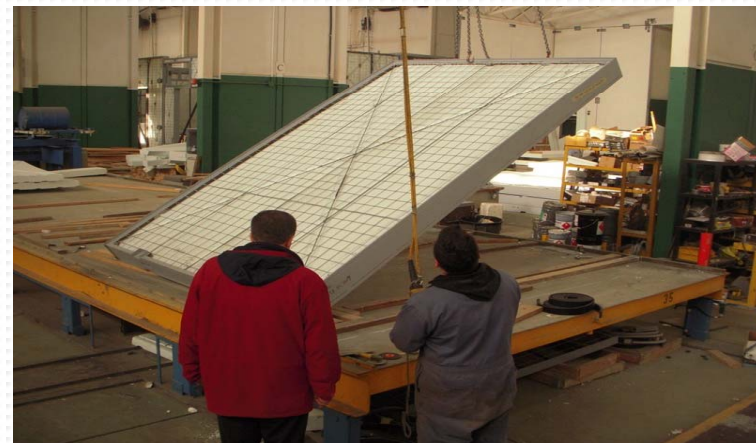
Efficient use of the windows to weld the mesh around



Placing the panel on its pallet in preparation for concreting



A typical 3.40 m x 10 m approx. interior panel with duct openings and very thin 2" x 2" x 1/8" HSS framing only



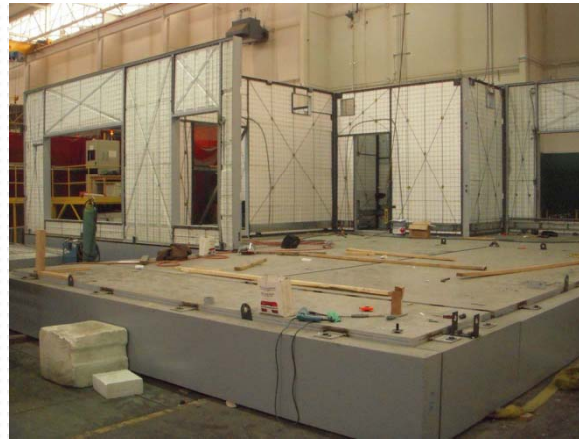
Imagine, if the majority of panels are similar to this 3.60 m x 3.60 m x 0.20 m panel without windows/MEP and relatively thick (much less warping) the production of panels would have been by far faster even with manual fabrication of steel. In Commercial/Industrial & social housing projects, such panels are very common.



All windows are designed to have optimal sizes, to allow for electrical raceways below ( and avoid tempered glazing), and electric shutters (built-in above). For door openings, conduits connect the low & medium voltage raceways together (over the door openings)



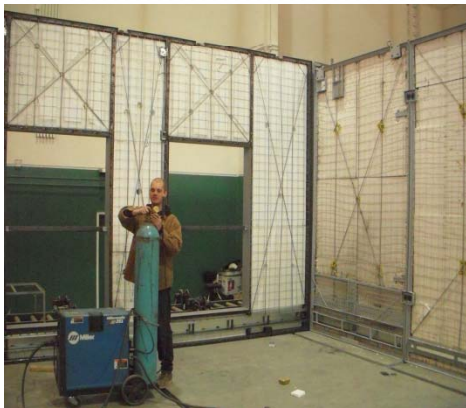
Angle view of windows



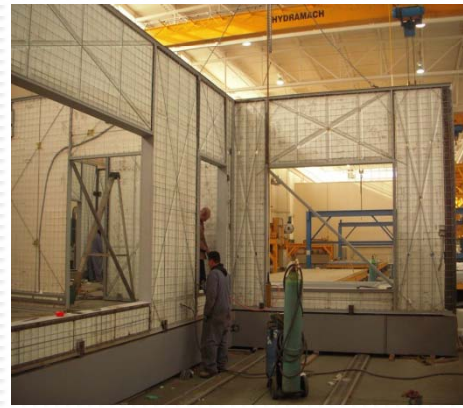
Closer view



Conduits over door openings



Interior view of dining room

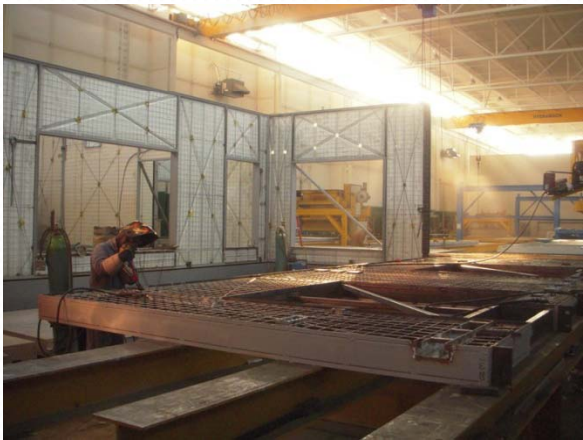


Exterior view of windows

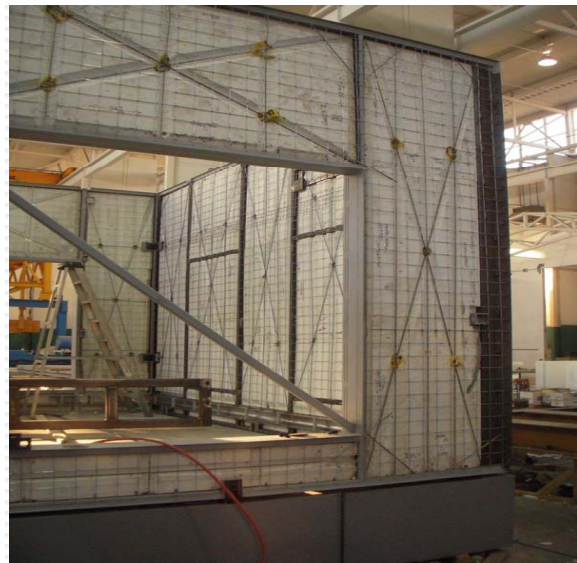




All windows are designed to have optimal sizes, to allow for electrical raceways below ( and avoid tempered glazing), and electric shutters (built-in above). For door openings, conduits connect the low & medium voltage raceways together (over the door openings)







Windows were changed during the design, however, flexibility was allowed for easy change in case of future re-orientation of the building



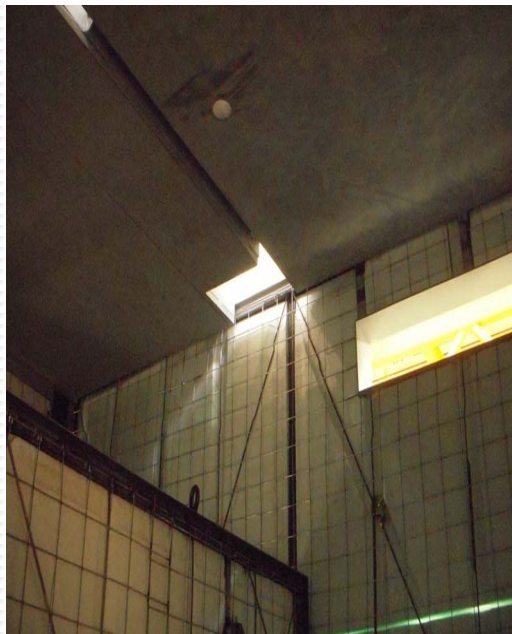
All thinly manufactured walls of bathrooms (100 mm thick), fit together nicely to form a 3D Module to be moved as one piece after the initial Show Home assembly and prior to moving the home to its permanent final destination.



Double mesh reinforcement is utilized behind the double layer channels that are above & back-to-back to the low / medium electric raceways (each channel is isolated from one another). What really induced the positive challenge is the client's introduction of the wall hung bathroom fixtures after all the steel frames in the building were fully cut.



After the completion of the Dry Run installation of the ceiling of the ground floor of this section of the Show Home, a temporary stair was installed to inspect the upper slabs that all fit as per design



Again, in spite of the fact of that IHI concrete slabs were installed on top of the IHI steel frame panels prior to concreting, and in spite of the fact that the tubes have a thickness of 3 mm only, no signs of wall buckling or any sign of deformation occurred even after 2 weeks. This test proves again the superiority of the IHI system and one can imagine what will be the strength of these interlocked 3-dimensional panels after 2 layers of 12000 psi (85 mpa) high-strength concrete is applied to each panel connected together not only by the steel tubes but also by 3 inch diam. high strength reinforced concrete cylinders. **This is totally foreign to any other system in the World including pre-cast and cast in situ.**

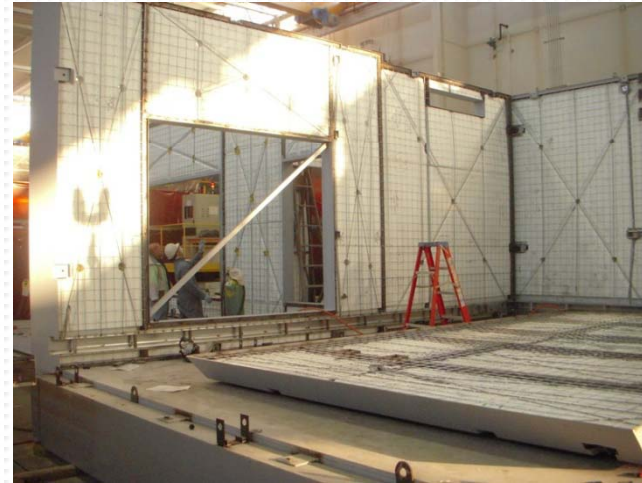
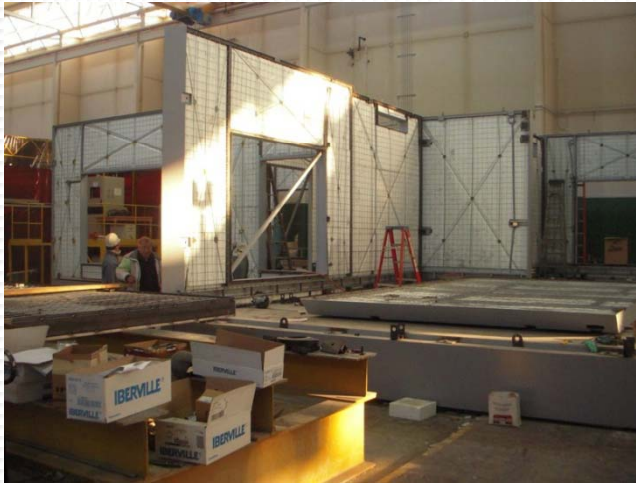




View of the section of the Show Home from the first level of the other section, showing wall panels ready to receive the ground ceiling panels

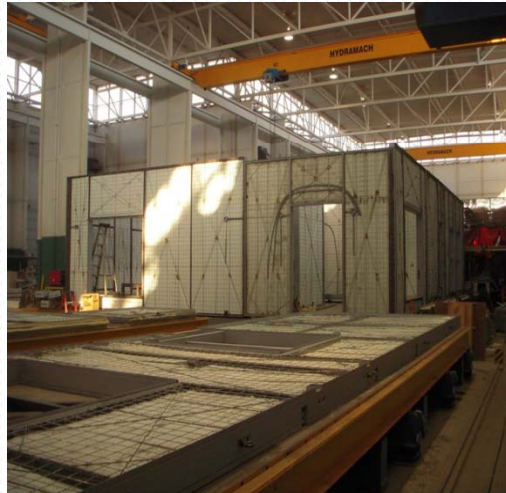


Panel ready to be installed for the Dry Run. The lifting procedure is always important & must be fully safe





Panel ready to be concreted with IHI's automated concrete, batching, placing and finishing equipment.

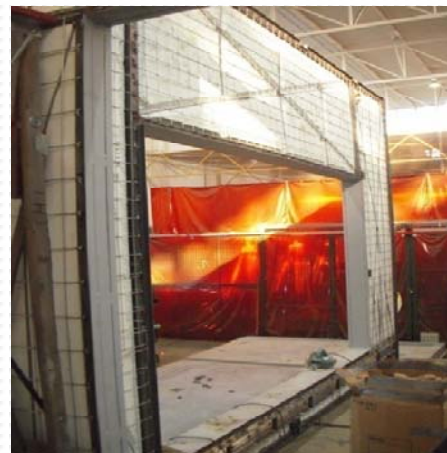
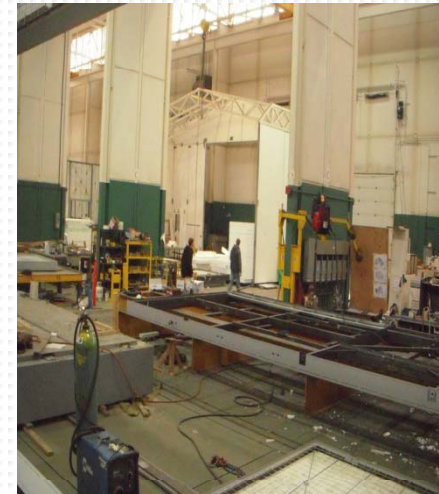


On going delegations visiting the IHI's manufacturing facility with IHI's management.





General view of the central portion of the main building of the IHI's manufacturing facility showing the GE/Fanuc supplied defaulted equipment caged and covered with the red plastic shield, ready to be hopefully removed and replaced by a performing automated welding & cutting system asap with fully automated jigs. Unfortunately, their presence now created a huge dead zone panel manufacturing flow !



Fully sealed and thermally and acoustically (air born and structurally) insulated building, with a unique and super 3D structural moment resistance space frame ductile building, with all MEP services/chases integrated, all covered with high strength IHI's 12,000 psi (85 MPA) concrete to give the building its high fire rating, stiffness (with flexibility) to make it virtually earthquake proof structure. In addition to a perfect automated strong architectural base for any automated architectural finishing's, separated by a naturally well drained medium (EPS) integrated with continuous weeping holes to create a perfect everlasting natural rain screen effect for generations to come. Above are just a few features that give IHI unique advantages over any known system in the world including precast and cast in-situ concrete!

























