



STEEL FRAMING INDUSTRY ASSOCIATION



CASE STUDY

STRENGTH AND CREATIVE FREEDOM IN A HYBRID STEEL STRUCTURE

COURTHOUSE SQUARE
CONDO BUILDING TWO
WHEATON, ILLINOIS

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OVERVIEW

PROJECT

Use

Luxury condominiums

Size

6 stories over 2 stories,
50 residential units

Opening

2008

PEOPLE

Owner

Focus Development,
Northfield, IL

Architect

Antunovich Associates,
Chicago, IL

Structural Engineer

Matsen Ford Design Associates,
Waukesha, WI

Cold-Formed Steel Framing

Subcontractor

RG Construction Services,
Elmhurst, IL

STEEL

Load-bearing cold-formed steel framing over 2-level precast concrete and steel parking garage



The hybrid combination of hot-rolled steel beams and cold-formed steel framing allowed Courthouse Square Condo Building Two's exterior to zigzag in and out.

Using Two Types of Steel Delivers Design Versatility

Courthouse Square in Wheaton, Illinois, is many things.

At the heart of the development is the landmark DuPage County Courthouse built in 1896. Updated in 2006, the red, terra-cotta and stone, Romanesque building and bell tower houses luxury condominiums fitted with bronze window screens, Wolf appliances and Kohler air-jet bathtubs.

But, it's "Condo Building Two" that's truly interesting. The eight-story structure was built with two types of steel — hot-rolled steel and cold-formed steel. The hybrid gives condo buyers what they want — spacious rooms, large windows, intriguing floor plans and the freedom to move their walls.

STEEL COMBINATION BRINGS FREEDOM

Courthouse Square Condo Building Two is a 2007 project from Focus Development. Focus' goal was to create a high-end residential community.

Patrick W. Ford, P.E., Principal, Matsen Ford Design Associates, Waukesha, Wisconsin, says the combination of hot-rolled steel (installed

by ironworkers) and cold-formed steel (built by a framing subcontractor) gave the architect and developer creative freedom.

"The cold-formed steel exterior walls are load-bearing C-studs," Ford says. "The floors are C-joists coming off of the [hot-rolled] interior steel grid. Because the exterior bearing was cold-formed, we could zigzag the walls in and out, as the architect wanted, without a problem. If we had tried to do the exterior bearing lines in hot-rolled steel, we would've needed either straight wall lines — or else get tricky with cantilevers to create the zigzag floor shape."

That's because hot-rolled structural steel is not so handy for fulfilling geometric design intentions. Other systems play that role. Poured concrete, for example, allows architects to sculpt interesting exteriors. So can cold-formed steel.

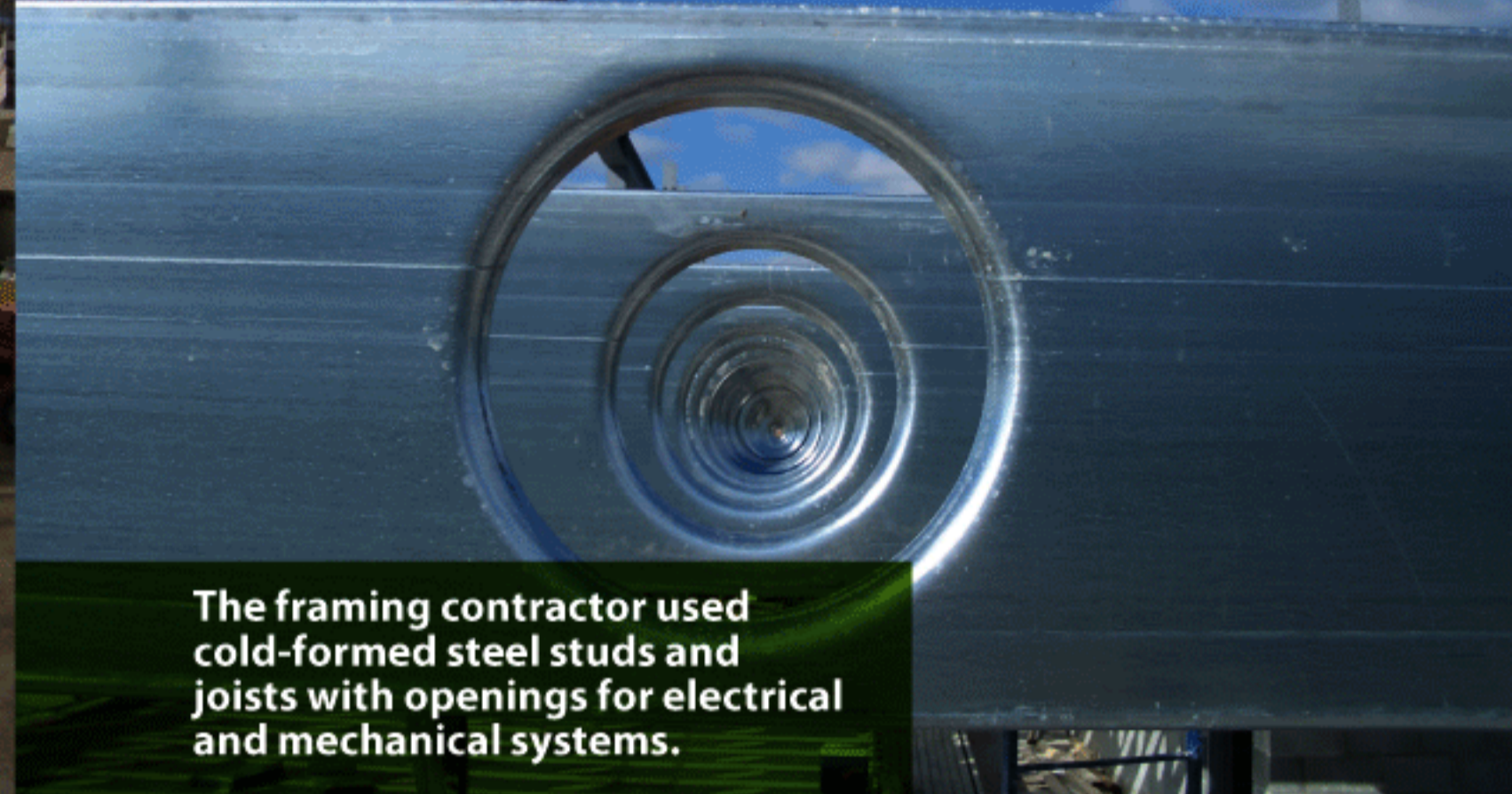
OPEN SPACES FOR THE OWNERS

Ford says much of the structural engineering for Condo Building Two was straight-forward.

"We used hot-rolled steel post and beam for the interior bearing lines," Ford explains. "We



Exterior roof gables integrated with structural cement floor panels.



The framing contractor used cold-formed steel studs and joists with openings for electrical and mechanical systems.



Framing crews built vaulted ceilings on the upper stories with cold-formed steel C-joists.

had to work with the parking grid layout. They were roughly 9-foot parking spaces, with a 27-foot typical bay. We lined up the lower parking structure columns, which were steel supporting precast planks, with the continuing hot-rolled steel structure above. This was the interior steel frame with exterior C-studs supporting C-joists.”

The interiors followed suit. Ford says the architect simply noted the hot-rolled steel column locations in order to coordinate the unit layouts. Most of the interior structural steel columns are hidden in the corners of walls and in closets.

“The hybrid design gave them architectural freedom,” Ford says. “Once the building was erected, the owners had these very open spaces in the upper stories. They could rearrange their units as they wished without impacting the cold-formed steel system from one floor to the next.”

IRONWORKERS AND FRAMERS COORDINATED THEIR WORK

Building the hybrid structure required coordination between ironworkers and stud framers.

“The coordination went well,” Ford says. “The ironworkers worked two stories ahead of the framers. We used a bridge beam

The coordination between trades on some projects gets complicated, and it often comes down to the structure’s engineering. The hot-rolled steel framing design for Condo Building Two was “clean.”

and cantilever type schematic to keep the depth of the beams shallow. The C-joists framed into the side of the beams, so it was a relatively shallow floor sandwich.”

The coordination between trades on some projects gets complicated, and it often comes down to the structure’s engineering. The hot-rolled steel framing design for Condo Building Two was “clean,” Ford says. The interference and interplay between one kind of steel and the other was minimal. The beam and column lines were simple, and because of that the construction among the steel trades proceeded briskly.

“The ironworkers would come out and do their thing for a day or so. They’d get two stories up, then get out of the way for awhile,” Ford says. “Then, the cold-formed steel framers would come and work. In the typical stories, which were repetitive, the cold-formed contractor got the framing in place at a pace of about one week per level — and it’s not a small building.”

“A NICE BENEFIT FOR DELUXE RESIDENCES”

Courthouse Square Condo Building Two is an example of how structures can be filled with both architectural features and interior layout flexibility.

“It’s a nice benefit for deluxe residences like these,” Ford says.

In Ford’s view, the hybrid option is affordable. Developers begin projects with preliminary designs and costs studies. When engaged, Ford’s firm reviews the initial architectural sketches and, generally, determines that a few systems, or combination of systems, would lend themselves to achieving the desired result.

“You might have half a dozen different building systems that would work, but you usually pare down to just two or three — the obvious best choices from a cost and efficiency standpoint,” Ford says. “Then, we do preliminary structural designs. The developer or GC does a preliminary cost workup, and we find out which is the best overall. What we did at Courthouse Square was the best way to go.

DETAILS

STRUCTURE

- Load-bearing, cold-formed steel framing over 2 levels of precast concrete floors
- 4,800 linear feet on-site fabricated wall panels
- 70,000 square feet cold-formed steel floor joists
- Structural cement floor panels

CLADDING

- 30,000 square feet exterior sheathing with weather barrier
- Primarily brick veneer

INTERIOR

- 180,000 linear feet cold-formed steel framing
- 425,000 square feet gypsum drywall
- 20,000 square feet mold-resistant gypsum drywall
- 25,000 square feet ultra mold-resistant shaft liner



Cold-formed steel framing crews fabricated their walls on site — in coordination with the ironworkers, who erected their structural steel a floor or two at a time.

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