Cold-Formed Steel Wall Panels
Key Component in
Casino Makeover

The new Hollywood Casino at Joliet, IL. Courtesy of National Prefab Systems, LLC.

By Victor Carsello, S.E., P.E.

In March, 2009, while undergoing a $50 million renovation, a massive fire broke out at the Empress Casino in Joliet, IL, located 40 miles southwest of the city of Chicago. The fire destroyed the main pavilion building, which housed entertainment, dining, shopping and administrative functions. The main casino operations, which are housed on a permanently docked barge on the bank of the Des Plaines River, suffered only minor damage.

The Empress casino originally opened in 1992, with an Egyptian theme signified by two large Pharaohs flanking the main entrance and a pyramid feature on the roof. With the fire brought a new opportunity to rebuild and breathe new life in to the almost twenty year old facility. Penn National Gaming, Inc. made the decision to rebrand the casino as a Hollywood Casino, complete with a 1930s old Hollywood, art deco style motif.

At the time of the fire, the casino barge was also undergoing a major renovation. The casino was forced to close while the pavilion debris was being removed and a temporary entrance constructed. This temporary closure also provided an opportunity to speed up the casino renovations. After three months, the casino was reopened to smaller crowds which were not aided by the faltering economy.

New Pavilion Building

Rising from the ashes of the fire is a new 53,000 square foot state of the art facility with an old Hollywood feel. Expanded dining, entertainment and shopping, including a steakhouse, 200 seat buffet, sports bar, Rodeo Drive themed gift shop, and lush interior finishes were incorporated into the new facility with the hopes of luring back old patrons that had not yet returned after the fire, as well new ones that would be attracted to the upgraded facilities.

Figure 1: 45-foot tall wall panel being hoisted into place. Courtesy of Salamone Builders.

The new pavilion consists of a one-story steel frame structure built over the basement of the original structure. Adjacent to the new pavilion is a new four-story, 400,000 square-foot, 1,100 car precast parking deck.

In order to create the art-deco look, Urban Design Group of Atlanta, GA (the architect) used strong vertical elements consisting of two or three projecting 'fins' grouped into pilasters. These pilaster features were located intermittently along the front façade of the building and at corners, and grew progressively taller towards the main entrance.

Speed is Key

Because of the importance of the pavilion building in attracting people to the casino, getting the new facility up and running was critical. An aggressive 18 month design and construction timeline was established. One early decision which helped meet the demanding schedule was to use prefinished cold-formed steel wall panels.

Using the wall panels contributed in several ways to meeting the construction schedule. Fabrication of the wall panels could take place at the same time as the structural frame was erected. Scaffolding was not required for the installation of the exterior insulation finishing system (EIFS), to the benefit of a congested and very busy construction site. The unpredictable Chicagoland weather was taken out of the equation by reducing the possibility of weather related delays to only the short window of time that the panels were being erected. The building was enclosed significantly quickly, allowing interior finishes to start earlier.

Panel Design and Fabrication

The typical wall panel was 10 feet wide and varied in height from 25 to nearly 45 feet tall. The panels were designed to the 2003 *International Building Code* (IBC) to resist out-of-plane wind loads, which governed over the low seismic forces that develop in the lightweight panels.

LgBeamer software by Devco was used to design the cold-formed steel studs. The structural steel frame, designed by Structural Engineer of Record, Gregory P. Luth and Associates, Santa Clara, CA, provided HSS girts which limited the stud spans to typically no more than 25 feet. Stud depths ranging from 6 to 8 inches were used, with thicknesses ranging from 71 mils to 45 mils (14 to 18 gauge).

Wall panel fabrication began for the first sequence of panels at the facility of Chicago Panel and Truss (CPT), Aurora, IL during the height of a typical cold Midwestern winter. This first run of panels were located at the back side of the pavilion, in an area that linked the parking garage to the bridge that led to the casino barge. This served as a good starting point for the panel team as these panels were flat and windowless with simple horizontal and vertical reveals, unlike the highly ornamental front façade. They were also among the tallest

Figure 4: Main entry of pavilion after completion of prefab wall panel installation. Courtesy of Chicago Panel and Truss.

panels on the job, so it was a good point to reference for the panel erector, framing contractor Salamone Builders, Aurora, IL. The panels were checked for erection stresses and deflections as the panels were hoisted from a horizontal to vertical position, and lift points were established to keep these within specified limits (*Figure 1*).

After the panel team was able to work through the field connections and panel alignment with this first sequence of panels, attention was turned to the front façade, which contained more ornamentation and the pilaster features which helped define the art deco look. The pilasters consisted of projecting fins typically grouped together in twos or threes and running continuously up the building, reaching heights of over 50 feet tall. They projected horizontally up to 3 feet from the face of the main wall panels. The panel fabricator and framing contractor worked closely together to determine the best method for building these pilasters. Options included fabricating the pilasters separately from the main panels, field building them, or building the pilaster and wall panel as one monolithic piece. The latter was decided in order to limit the amount of field work and number of pieces, after it was determined that it was feasible to ship and erect a monolithic piece.

The pilasters were built and finished lying flat on a bed (*Figure 2*). The panels were then hoisted onto a flatbed for shipping. A typical pilaster took eight days from the time the panels were started until they were finished and ready for shipping to the job site. The corner pilasters panels, which were built with a 2-foot return (*Figure 3*), were finished and shipped on custom built racks. The tops of the pilasters were all finished with surface mounted light fixtures. Because access within the pilasters would not be possible after the EIFS finish was applied, conduit, electrical boxes and blocking for the fixture attachment were all installed prior to the application of the EIFS finish.

Erection of the panels proceeded swiftly, aided by careful preplanning by the framing contractor, including ensuring that there was a level foundation to set the panels on. A generous offset of the face of the exterior wall from the structural grid allowed for ample space to make connections to the structure. The typical panel-to-steel connection consisted of deflection clips fastened to the structure with powder actuated fasteners and a 6-inch, 56 mil (16 gauge) outrigger piece to bridge the gap between the wall panel and clip. Because there was no access to make the connection from the front side of the panels or above the roof deck, the generous structure offset was appreciated by the erectors.

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Figure 2: Pilaster element during the finishing process. Courtesy of Chicago Panel and Truss.

Figure 3: Prefinished corner element on pavilion building. Courtesy of Salamone Builders.

Parking Structure

The project also included the dressing up of the new parking structure, located adjacent to the pavilion and visible from the main entry. The garage is a four-story precast structure with exterior columns and spandrel beams. Pilaster features, very similar to the ones on the main pavilion, were located at the garage column locations. A canopy at the V.I.P. entry to the garage was constructed, along with a cold-formed steel wall panel with pilasters that increased in height towards the center of the entry. Wall panels were constructed in a similar manner as the main pavilion except that, because of the closer floor-to-floor spacing, smaller depth and thinner thickness studs could be used.

The corner features on the garage showcased the versatility of cold-formed steel. Because of the complex geometry, conventional C-shaped studs and connection techniques were not practical. The solution was to use a series of horizontal trusses spaced at 2 feet on center (*Figure 4, page 27*). Using the trusses simplified the creation of the required profiles, and the small changes in the geometry that occurred higher up the pilaster were handled with ease. The trusses were tied together with a continuous vertical spine of 6-inch depth studs.

Fast, versatile, and lightweight, prefinished cold-formed steel wall panels were an important element in rebuilding the pavilion after a devastating fire. Cold-formed steel framing was able to meet the architect's goal of creating a 1930s era art deco feel, while the prefabricated construction enabled the general contractor to meet a demanding schedule.▪

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Corner feature of parking structure ready for sheathing and finish. Courtesy of Chicago Panel and Truss.

Project Team

Structural Engineer of Record: Gregory P. Luth & Associates, Santa Clara, CA
Specialty Structural Engineer of Record for CFS Walls: Virgilio and Associates, Hawthorn Woods, IL
Owner: Penn National Gaming, Wyomissing, PA
Architect of Record: Urban Design Group, Atlanta, GA
Construction Manager: W.E. O'Neil Construction Co., Chicago, IL
Panel System Consultant: National Prefab Systems, LLC, Chicago, IL
Wall Panel Fabricator: Chicago Panel and Truss, Inc., Aurora, IL
CFS Framing Contractor: Salamone Builders, LLC, Aurora, IL