

**Modular Precast Cells for Correctional Facilities**

**WWR Saves Up to 25% on Overall Reinforcing Costs and Takes Half the Time to Fabricate and Place When Compared to Rebar**

Welded Wire Reinforcement (WWR) saves up to 25% on overall reinforcing costs and takes just half the time to fabricate and place compared to rebar. The details are in the following case histories reported to us from some of the modular precast concrete manufacturers. First, the latest developments in the industry . . .

There are a number of quality manufacturers that have over 50 years experience in precast modular concrete construction. During the history of these precast manufacturers there have been many changes that have modified and enhanced the manufacturing systems. Some of the changes are in the fabrication of the reinforcement cages, the efficient assembly of components and the automation of the manufacturing process. The changes will be addressed throughout the text and explained in more detail on specific projects.

**Teamwork and Service Are the Precaster's Success**

The "teamwork" approach is essential and is characteristic with the precast manufacturers. Faster service and flexibility are key to satisfying customer's schedules. Larger areas of reinforcement can be rapidly fabricated and installed when welded wire reinforcement (WWR) is specified, thus reducing time and cost of labor. Teams take pride in providing the highest quality products and service available, therefore, assuring the success of their customer's projects.



**High Strength Reinforcing Adds to Cost Savings . . .**

Correctional facility modular cells usually have 5000 psi compressive strength concrete and are reinforced with high strength structural reinforcement.

High strength structural welded wire reinforcement (WWR) is used almost exclusively. It is a different product from the usual welded wire fabric that architects, engineers and contractors generally identify with crack control and lighter weight concrete reinforcement. Structural WWR is produced with larger diameter wires (3/16" to 7/16" diameter, and some manufacturers can go larger).



WWR allows the designer to vary the spacing, frequency and pattern of wires to meet exact cross-sectional steel areas for specific applications. Specifying high strength WWR will save up to 25% of the weight of conventional reinforcing, therefore providing significant cost savings on the final project.

Cost savings is a key issue today in the construction of correctional facilities. The precast modular industry's main goal is to reduce project completion time by significantly lowering on-site labor costs. High strength welded wire reinforcement (WWR) assists the precast manufacturers in meeting that goal. High strength steel wire up to 80,000 psi yield strength provides the most economical in-place cost reinforcement. The high strength WWR cost benefits assist the precast manufacturers and contractors in meeting their goal of providing quality and efficiency for their customer's projects.

**Repetition is the Key to Quality and Economy**

Rigid steel molds are used to maintain very tight tolerances usually required by design and construction professionals. Molds are designed to hold dimensions to -1/4" +1/8" a typical industry standard. Do you

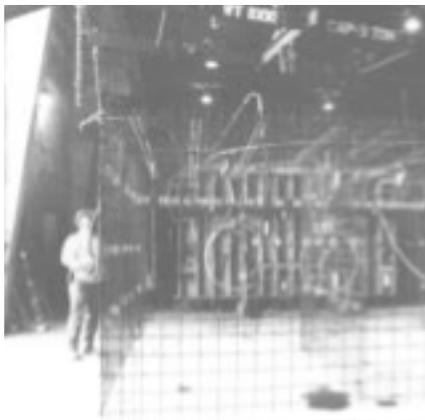


specify industry standards and tolerances? The key to precast concrete's value is taking advantage of its ability to replicate one form many times. For economy purposes the design should

have lots of repetition to avoid extra molds. Each cell module is identical to the others, with none specifically designed for left or right sides, up or down, inside or outside corners, or other configurations. Try to limit alterations and different cell sizes for more efficient production.

When necessary, the industry utilizes adjustable forms which allow for different cell sizes and heights and for single or multiple

stories. The adjustable forms provide for the variations between minimum, maximum and super maximum security cell construction.



**Construction Time Schedules Are Met or Reduced with Precast Modules**

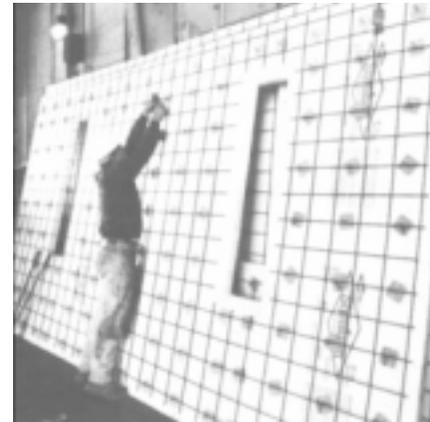
Coordination of onsite trades is simplified with precast modules. Finished units will require less contract administration and supervision by the owner and contractor. Normal construction turn around times can be

reduced and many times contractors report that the time can be cut in half.

**A Typical Correctional Facility Modular Cell Project Will Follow These Manufacturing Process Steps**

High Quality modules are normally a 5-day cycle.

Prior to production of the modules, the welded wire reinforcing cages are pre-assembled. Sheets of WWR are formed and tied together in a jig.

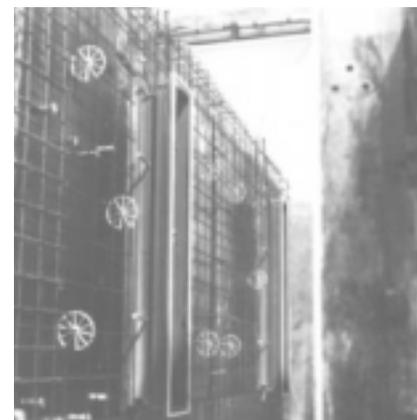


Either loose wire or rebar

is sometimes added to provide more exact areas of steel when standard sheets of WWR are used. Precut electrical conduit runs are tied into the cages.

**Day One**

- The WWR reinforcement cage is placed on the mold.
- Windows, doors, plumbing carriers and other optional items are installed onto the mold.
- The form is closed.
- Concrete is placed and properly consolidated and cured.



## Day Two

- The module is removed from the mold.
- The interior of the module is sand blasted.
- The inside of the module walls are rubbed with a masonry block filler by hand to provide a uniform smooth surface.
- Block fill is cured.
- Work in the mechanical chase areas begins.

## Day Three

- Work in the chase areas continues.
- Interior surfaces are painted with a high build, high bond anti-graffiti, epoxy paint.

## Day Four

- Plumbing and electrical fixtures are installed and tested.
- Pull strings are placed in empty conduits.
- Furniture is installed using security fasteners.
- Grills and Mirrors are installed.
- Doors and security glass are installed.

## Day Five

- Modular units are inspected and placed in the yard ready for shipment.

## Project Case History I

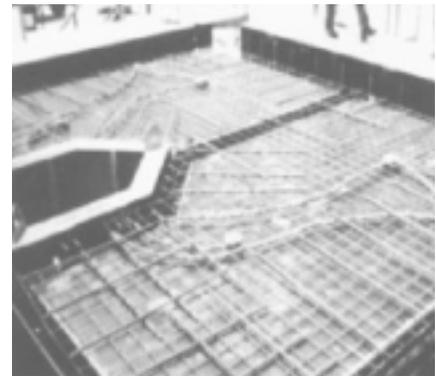
On a project designed by DMJM Engineers, Tallahassee, Florida and being built by Jack Gibson Construction near Youngstown, Ohio, the Project Manager Rory Monk of Rotondo Precast, contractor for the cell units, agrees that welded wire reinforcement is the way to go.



The welded wire reinforcement over the long run saves money in set-up time and labor. The super maximum security prison is the first of its kind in the area. The 512-cell project is right on schedule and will be completed in less than one year.

## Project Case History II

On another Case History project, Pueblo State Correctional Hospital, Colorado Springs, Colorado used a creative, innovative and cost effective pro-



duction process for its prison cells. Joe Miller, Project Engineer of Stresscon Corporation, Colorado Springs, Colorado said "the conversion of areas of steel reinforcement from rebar to welded wire reinforcement (WWR) significantly reduced assembly time, which allowed us to cycle the form daily." It was estimated that 15 - 20 manhours of labor were cut from the assembly of reinforcing for each unit using welded wire reinforcement. Some rebar was used to supplement the exact area of reinforcing required. The rebar supplements were tied to the WWR cages. This typically is done when it is desired to order one style WWR sheet (this project utilized 4 x 4-W4 x W4 WWR sheets).

Special WWR sheets for each wall and ceiling section were prefabricated and bent in advance by the WWR producer. The bent panels could be placed in the forms easily and quickly. Control of steel area and spacing were built into each panel at the plant. The only field control check was on the concrete cover once placed in the form, since the correct wire area and wire spacing were provided by the WWR producer.

More about the Pueblo State Hospital Project—there are 120 double-cell units and four (4) partial units. All units have 11' ceiling heights (8 to 8.5' is the norm). Concrete was 5000 psi compressive strength. Stresscon Corporation turned the forms on a daily basis - versus every other day, when one additional full day would have been needed if tied rebar had been used.



## Project Case History III

This Adult Detention Center expansion/renovation project in Fairfax County, Virginia, was designed by Hellmuth, Obata & Kassabaum, Inc., Washington, D.C. A Pre-Release Center was designed by Hayes, Saey, Mattern & Mattern, Inc., of Rockville, Maryland, and was constructed by Blake Construction Company of Washington, D.C. The original jail was built in 1800 and burned down in 1884.

In 1885, a new jail was built. That building remains and is on the National Historic Register. The expansion which is nearing completion, at this



writing, is a 330,479 square foot building that includes 768 precast concrete cells, new kitchen and laundry facilities, personnel support spaces, offices, warehouse, loading dock. Other renovations to existing facilities and an addition to the prerelease center were also needed.



The new building and additions are a combination of precast and cast-in-place concrete components. Exterior finishes consist of architectural precast panels and brick similar to existing build-

ings. The new addition is nine (9) floors, plus basement and penthouse levels. Bill Woody, Vice President of the Shockey Companies, manufacturer of the precast modules and architectural precast units, said high strength welded wire reinforcement is used almost exclusively (rebar is added to the WWR



cages to provide the exact area of steel required). Shockey finds that WWR provides the economy for the owner and at the same time the WWR has equivalent or greater strength than Grade 60 rebar reinforcing.

**The Wire Reinforcement Institute, its WWR producing members and associate members join with the precast modular cell industry in providing utmost ingenuity of quality products with cost savings benefits for the overall success of new correctional facilities.**



**The Case History information was provided by the following companies:**

ROTONDO PRECAST/OLDCASTLE PRECAST EAST, INC.  
Telford, Pennsylvania

STRESSCON CORPORATION  
Colorado Springs, Colorado

THE SHOCKEY COMPANIES  
Winchester, Virginia