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# CASE STUDY: FALL RIVER FOUNDRY EXPANSION

**JERRY SENK**
President
Equipment Manufacturers International, Inc.

**ARTICLE TAKEAWAYS:**
- Expansion includes automatic match plate system to meet production & safety goals
- Robust custom design enhancements for longevity

## BACKGROUND

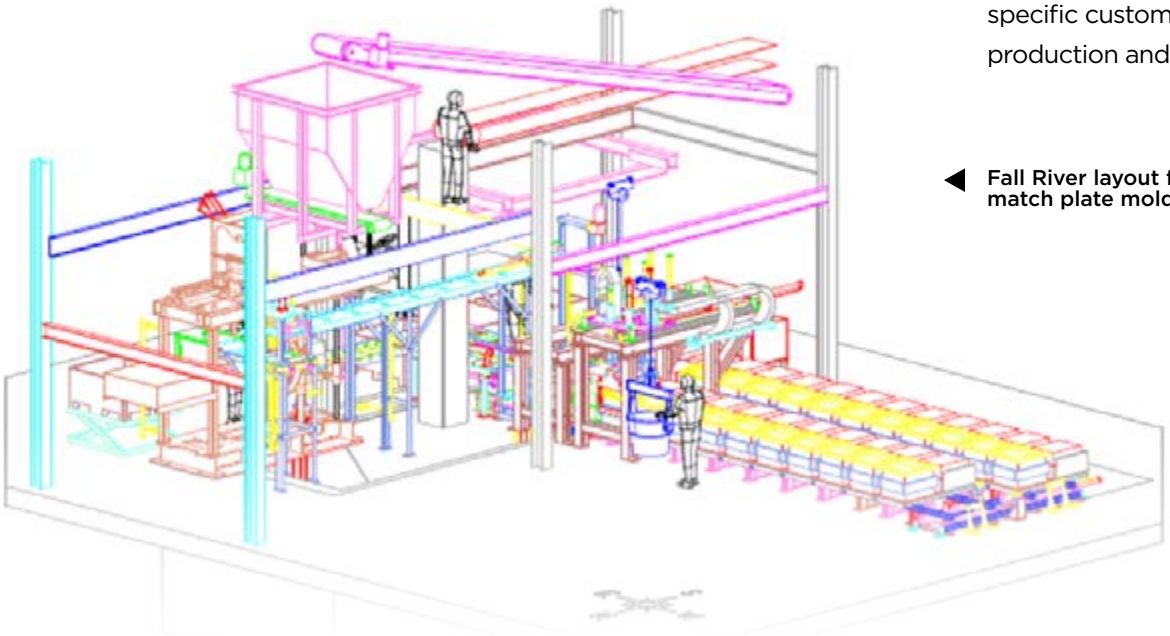
Fall River is a private, family-owned foundry that started in Wisconsin in 1953. They have a proven track record and have excelled in brass, bronze, and aluminum castings in a green sand production foundry. It is a truly first-in-class, vertically integrated foundry that can provide complete machined and assembled products.

EMI has had the opportunity to work with and support Fall River with foundry equipment, parts, and services for many years. This foundry is well-kept, well-maintained, and internally supported by a very talented team of employees.

Besides their manual molding machines, which feature Osborn equipment, they also have a very well-maintained Herman tight flask line. EMI's first project was a decade ago, when we supplied a new EMI 1419 match plate mold machine with a mold-handling, pouring, and cooling line.

## FOUNDRY EXPANSION

Fast forward, as Fall River's success continues, they needed to add additional foundry capacity with a larger 2024 match plate molding machine. At the very end of the green sand delivery belt was a manual, special floor molding area off to the side. After several iterations, we designed a layout that would replace that area with a modern and complete automatic match plate system with specific customizations to meet their production and safety goals.



◀ Fall River layout featuring automatic match plate molding & handling system

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**KEY CHALLENGES**

- We had to work around a very large electrical panel (read: “non-movable”), pick up enough sand to feed the system, and still avoid inhibiting the return sand.
- The height was critical to fitting a machine under the belt without a pit.
- The location and orientation of the machine was in close proximity to an Osborn 3191 RJW, and required a unique casting plow off solution, a specially designed lump buster, and a way to get the molds into the system
- Floor space was at a premium, and the panel location as well as the power unit location were notably remote compared to a typical installation.
- Required an upper deck to provide access to the sand storage silo as well as the elevated main power unit that serviced the machine and the mold-handling system.
- Floor-mounted HMI stations, on-unit J-box locations, remote I/O valve stands, and specially designed wiring harnesses for installation were all designed specifically for this system.
- Due to limited floor space, many of the hydraulic, electrical, and pneumatic runs were mounted on the units for ease of installation as well as future accessibility.

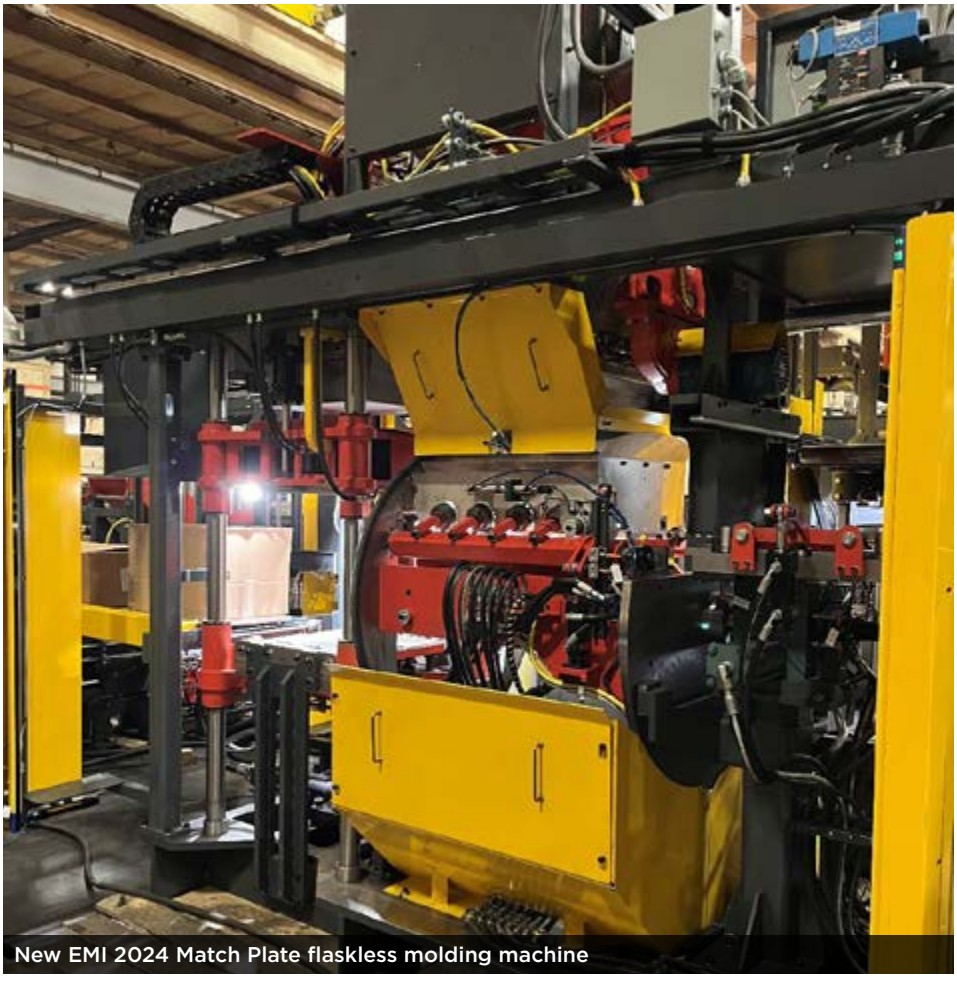
Match Plate 2024 with mold handling run-off at EMI

## PROJECT GOALS

- **Focus on safe guarding workers**
  Light curtains around the machine, fixed guarding, and barrier guarding were all coupled through a safety PLC. Fall River was especially proficient in providing guidance and input in these important areas.
- **Maintenance**
  A completely automatic heavy-duty system with straightforward design that would be easy to maintain.
- **Automatic System**
  Increasing foundry capacity to 60-70 molds per hour.
- **Mold Production**
  Higher quality mold production including excellent compactability for close-to-the-edge patterns.

## DESIGN IMPROVEMENTS

- Hardened chrome guide rods with replaceable Pacific bearings that require no lubrication
- Fixed roller bars for stripping of the drag flask and mold
- LVDT's for both the cope and drag positions
- Heavy-duty cope strip cylinders, providing additional head room for core setting
- Rotary actuator design for the roll over with mid position for operator interface with the drag flask, if required
- Vee-shaped hardened roll over ring sitting atop Vee rollers to eliminate sand abrasion
- New fork-type bottom board delivery system to assure even and accurate board placement in the drag every time
- External bottom board cassette storage to minimize the number of boards to lift
- Pressure-compensating hydraulic closing system with drag and cope cylinders to assure a positive close and strip of the mold halves
- Dual bearing support for VFD- controlled aerator shafts for long lasting, ease of replacement
- Dual rotary measuring hopper louvers to provide optimum sand fill across the flasks
- Newly designed cope-squeeze head with built in tuck strips for better mold quality.



New EMI 2024 Match Plate flaskless molding machine

## FLOOR & SPACE LIMITATIONS

The installation at Fall River was challenging—due to floor uneven elevations over the entire production floor. To accommodate for this, we provided at least 1" of variability in elevations using foot pads.

Space for mold accumulation between the machine and the mold-handling system was also limited. We could fit only about four molds between the mold push-on and the machine's exit position. To address this, we incorporated an elevated bottom-board return roller conveyor, which created clear access for core setting on both the back and front sides.

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Mold handling system

**MOLD HANDLING SYSTEM**

The mold-handling system selected can operate with any type of match-plate machine and features a solid, heavy-duty design that is not affected by normal sand buildup.

Our pallet cars are castings—not fabrications—and are equipped with replaceable graphite tops. They feature universal shafts and rollers that are bolted from the shaft ends rather than cantilevered. The weights and jackets are also cast, include venting slots, and use moveable top weights to accommodate different sprue locations.

The pallet cars run on 40# railroad rails, which are also used on all horizontal-transfer ancillary units, including the weight-and-jacket transfer and the plow-offs.

The weights and jackets are transferred with tapered clamps that center these accurately, with floating links to set smoothly onto the awaiting molds. They have extended pins and reverse-tapered holes on the pallet car tops to ensure no movement when set without molds. We offer weight and jacket cleaning stations that can separate the components and clean independently.

The mold plow-off is not just a blade but a complete box with a trailing wiper scraper. This ensures that the mold—carried on a double pallet car—remains fully contained as it moves into adjacent positions. We also added wings on the far side of the pallet cars to contain any sand breakdown after the weight and jacket are removed.

Using end-of-the-line transfer cars equipped with the same rails ensures smooth transfer. Pallet car alignment is maintained by large 10-inch-diameter rollers that keep the system precisely on track as it moves between the pouring and cooling lines.

This installation took place in a brownfield area of their plant, and all existing operations continued running throughout the process. In additional to managing the installation, Fall River also took a very hands-on approach with the electrical engineering. **“Fall River’s commitment to expanding production through modern automation and driving greater efficiency was truly exceptional, and EMI was pleased to work with such a talented team,”** said Jerry Senk, president of EMI.

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