

# **Atchison**

Atchison Casting Corporation  
Atchison Kansas

## **Smart Pump Case Study**

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## Smart Pump

### Introduction

Atchison Casting Corporation (formerly Rockwell) has been in continuous operation for over 100 years. They specialize in large steel castings for heavy industries. Their facilities can produce up to 120 tons of castings per day. As shown below, they utilize several technologies in all areas of their casting production.

### General Foundry Information

Product Line:	Locomotive truck frames, steel armor for defense market, large valve bodies and stems, Caterpillar gear housings and frames, aggregate and turbine markets.
Casting Metal Type:	<ul style="list-style-type: none"> <li>• Steel (to 80,000 pounds)</li> <li>• Stainless Steel (to 30,000 pounds)</li> </ul>
Melting Facilities:	<ul style="list-style-type: none"> <li>• Electric Arc Furnaces</li> <li>• (7, 15, 15 &amp; 25 ton furnaces)</li> <li>• AOD</li> <li>• (5, 12.5 &amp; 25 ton vessels)</li> </ul>
Sand Facilities:	<ul style="list-style-type: none"> <li>• Core Process Phenolic Urethane No-Bake (90% reclaim)</li> <li>• Molding Processes Green Sand 15% Phenolic Urethane No-Bake (85% reclaim)</li> </ul>
Cleaning Facilities:	<ul style="list-style-type: none"> <li>• Room Blast</li> <li>• Grinding Stations</li> <li>• Cleaning Booths</li> <li>• Table Blast</li> <li>• Automatic Riser Burn Stations</li> </ul>
Heat Treating:	<ul style="list-style-type: none"> <li>• Normalize</li> <li>• Quench and Temper</li> <li>• Stress Relieve</li> </ul>
Pattern Shop:	<ul style="list-style-type: none"> <li>• Produce Wood, Metal,</li> <li>• Urethane Patterns</li> </ul>

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### General Foundry Information

#### Machining

- Complete Machine Shop Facilities
- Capability to machine all castings produced

### Project Objective

The objective was to get control over their No-Bake sand mixing. A goal of 5% binder reduction was set. Second, they wanted to add facing/backing sand capabilities. Finally, it was improvements in sand quality repeatability would minimizing mold scrap due to chemical and pump mechanical problems.

### Original Problems

- Continuous maintenance problems with existing chemical addition system
- Inaccurate and inconsistent chemical additions
- Addition of extra chemical to compensate for pumping fluctuations
- Resin and labor costs associated with daily calibrations of pumping system
- Scrap molds due to fluctuations in chemical delivery

### Solution

They installed the MT Systems SMART PUMP Resin Control System on thirteen of their continuous mixers. This was done in six stages over a period of four years. The basis for the design was to give them the repeatability and reliability over chemical percentages and ratio's with the objective of reducing resin levels by at least 5%.

To accomplish the above goals, each mixer was outfitted with the following hardware:

- SMART PUMP panel containing flowmeters, motor controllers, motors, magnetically coupled pumps, diverter valves, and controllers
  - Mixer electrical controls were altered to accommodate the SMART PUMP systems
  - Alarm lights were mounted at mixers
  - All existing piping was replaced and upgraded with tubing
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### **Solution**

Their production flow is as follows:

The operator begins filling a mold with the high/low binder switch in the high setting. Once the face of the pattern is covered, he switches to the low setting. When the mold is filled, he turns off the mixer and switches back to the high setting.

If, for any reason, the chemical levels can not reach their set point and SMART PUMP is unable to compensate, the system alarms and turns on alarm lights or shuts the system down until reset. The system fully compensates for line restrictions, chemical viscosity changes, pump wear, and head/suction pressure changes.

### **Results and Benefits**

- Reduced average chemical levels up to 18% depending on the mixer
- Reduced maintenance downtime and maintenance expenditures
- Reduced mold scrap by 5% Main bay and 7% in No-Bake
- Reduced casting scrap from .6% to .49% (18% reduction)
- Reduced casting cleaning time from 10 MH/T to 6 MH/T
- Increases productivity by making the job right the first time
- Reduced binder cost on certain castings by 21%
- Better shake out due to reduced resin levels
- Reclaim sand LOI held under 1.2%
- Reduced sand reclamation needed through their scrubber, They reduced the number of passes through the scrubber from 2 to 1 pass. This in effect doubled the reclamation capacity and reduced scrubber maintenance.

### **Monetary Savings/Pay Back**

Atchison sums up their pay back as follows:

“Pay back and cost justifications on each of the 13 SMART PUMP installations was originally projected at 2 years. Actual pay back was less than 6 month with all future savings going to the bottom line. SMART PUMP’s have lowered future manufacturing costs and improved our competitive position in the market place.”

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### **Other**

Atchison Castings has seen very dramatic results with SMART PUMP. The Foundry Vice President has even said “SMART PUMPS have had one of the single biggest impacts that he has ever seen in a foundry.”

Overall the project has had a greater impact than originally thought. To sum up, they are “very pleased and feel the project was a huge success!”