GERMALLOY™ MOLD INOCULATION

Case Study

Reducing scrap rates via improved inoculation

After completing a thorough process review ASK Chemicals was able to drastically reduce scrap rates by introducing GERMALLOY™.

» Background

A large foundry located in the Mid-West USA was having high scrap rates on a complex ductile iron casting. They were producing a Flywheel Housing 65-45-12. Due to their failure to meet the specified physical properties they were incurring high scrap cost. The customer came to ASK Chemicals for a solution.

ASK Chemicals determined that the customers' metal microstructure was very poor, as well as failed properties. This was ultimately causing the high scrap rates. In fact, it was determined that twenty four castings were scrapped during a six month period. This resulted in a loss of $64,825. Considering this figure the projected annual lose total would be $111,000.

Customer Process: A closer look...

- Coreless induction melting
- No Bake molding (PEP SET™)
- MgFeSi used in a pour over practice
- Ladle inoculation (0.3% addition rate) used at transfer from the treatment ladle to the pouring ladle - Ultraseed
- Ultraseed is expensive and prone to fading
- The time it takes to process the metal results in both magnesium and inoculation fade
- The fade results in poor microstructure

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» Objectives

Pouring high value castings with an inadequate inoculation practice can result in significant cost for scrap. This was the problem at the customer's facility. In order to remedy this, however, a robust inoculation practice that would resist the effects of magnesium and inoculation fade would need implemented. In the end, it would be critical to improve the microstructure in order to help the mechanical properties and casting performance

Several items needed addressed to ensure the customer's process was fully optimized to its most efficient level:

- Reduce the overall scrap rate
- Improve the metallurgical microstructure
- Reduce magnesium fade
- Reduce inoculation fade

What is the ASK Chemicals Value Selling Approach?

"It's a truly collaborative effort, first-and-foremost. The ASK value-adding model leverages our extensive knowledge-base and foundry experience in order to enhance process efficiencies. Sometimes it's also referred to as "solution selling". Here, the supplier works hand-in-hand with the customer to address their specific needs. The eventual outcome is the efficient and successful completion of our customer's stated goals/requirements."

Solutions

ASK Chemicals would introduce their GERMALLOY™ inoculation into the process and see if it had a positive effect on the magnesium and inoculation fade. Furthermore, they performed a complete evaluation on multiple fronts looking at microstructure samples, as well as inoculation package options

- Optimize the inoculation practice
- Reduce, or replace the amount of current ladle inoculation
- Minimize inoculation fade by the addition of in-mold inoculation (GERMALLOY™)
- Evaluate and compare multiple DOE samples:
  - MgFeSi
  - Ladle inoculant types
  - Ladle inoculant addition rates
  - In-mold inoculation

Results

Since implementing the recommendations brought forth by ASK Chemicals the robust inoculation practice, over a three month period, revealed the scrap rate as a result of poor microstructure / failed properties was 0%. In addition, the inoculation process cost increased by 5%, but the projected annual savings was $111,000.

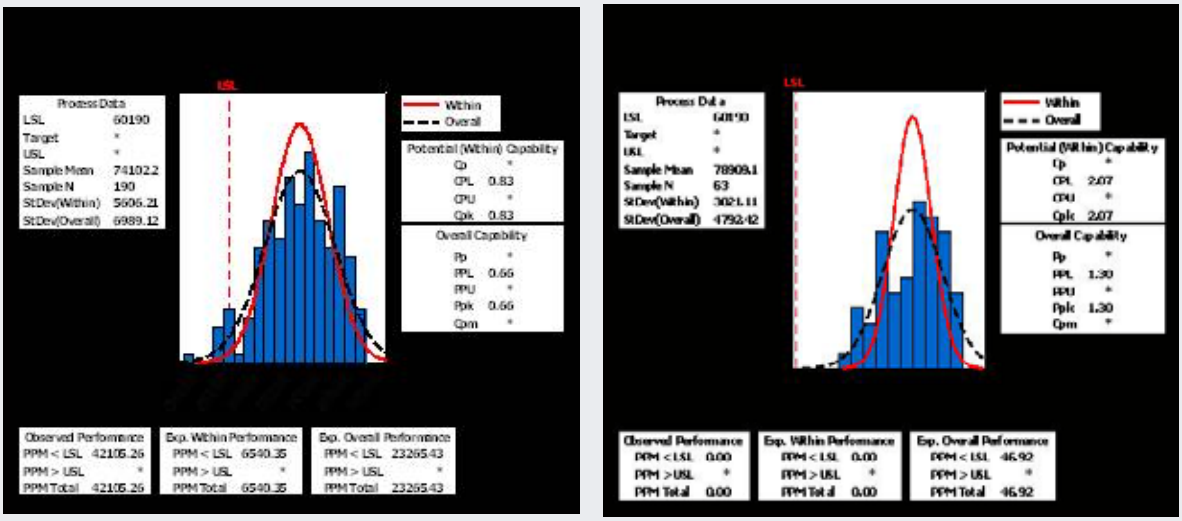
The following inoculation package was found most effective:

- 0.1% Ultraseed ladle inoculant
- 0.1% Foundry grade FeSi (Calsifur) ladle inoculant
- 0.1% GERMALLOY™ (K200 + P800) in the pouring basin

Microstructure evaluation proved positive and led to better overall metallurgical properties. Specifically, the mechanical properties improved while variation reduced:

- Tensile strength increased by 8%, Standard Deviation reduced by 35%
- Yield strength increased 3%, Standard Deviation reduced 30%
- Elongation increased by 5%, Standard Deviation reduced 52%

Process Capability (Robustness) Dramatically Improved



About ASK CHEMICALS

ASK Chemicals is one of the largest suppliers of complete solutions and tailor-made consultation services for the foundry industry. The core of our company's activity involves manufacturing all foundry consumables required for the production chain as well as providing optimum technical services in order to perfectly adapt our products to the processes on the customer's premises.

Our wide product range contains binders for all core manufacturing processes, coatings, additives, feeders, filters, release agents, metallurgical products including inoculants, Mg treatment wires, inoculation wires and pre-alloys for iron casting. Core production and prototype development as well as a wide range of simulation services round off what the company has to offer.

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