Molten Metal Filtration Project

Overview
Currently there are four theories of filtration of molten metal. Using a variety of experiments these theories are to be tested and scrutinized. From these experiments final recommendations will be given for further investigation of the four theories of filtration.

Objectives
The objective of the metal filtration project is to research, test, and analyze the four different theories behind the use of pressed and foam ceramic filters for gray and ductile iron. The results of this project will bring conclusions on which theory(s) explains how the filters work during the pouring of metal. The results will also allow recommendations to be made for future tests and analysis to be conducted by another research team.

Approach
- Use water modelling table to examine the gating system and the turbulence created by the filter.
- Design pattern plate and flask for quartz glass window test
- Use a quartz glass window to view metal flowing in a real gating system with a filter
- Pour metal into multiple variations of a sand mold to examine how slag is captured by the filter.
- Examine strength of different types and sizes of filters by performing a 3 point bend test and a 2 point rod test.

Outcomes

Water Modelling Table
- Noticeable Difference in turbulence before and after the filter
- Large particles build up on face of filter
- Air vortices form at high speeds

Double Filter Vertical Mold
- Filter cake is minimally present on ceramic filters, non-existent in foam filters
- Deep bed filtration is prevalent in foam filters, non-existent in ceramic filters

Quartz Glass Window Test
- Filter cake in ceramic filters
- “Deep bed” in foam filters
- Some tailback in quartz window test