Molten Metal Filtration

Overview
Through a series of tests and experiments, the Team hopes to determine the validity and extent of the Filter Cake”, “Tailback” and “Deep bed filtration”. theories. In order to achieve success in this sense, the team hopes to design and carry out certain studies to show the effects of several variables on molten metal filtration in green mold sands.

Objectives
● Objective 1: Which theory prevails for the types of filters used?
  ○ Horizontal gating system with a horizontally placed filter
  ○ Vertical gating system with a vertically placed filter
● Objective 2: Investigate the metal stream’s varying amounts of turbulence (pre and post filter)
  ○ Horizontal gating system with a horizontally placed filter
  ○ Vertical gating system with a horizontally placed filter
  ○ Vertical water modeling
  ○ Computer simulation

Approach
• The team visited Buck and Donsco Foundries to get a sense of how a foundry operates.
• Initial designs were created for the two gating systems and was given feedback from sponsor.
• Once designs were finalized custom built patterns, flasks, and water modelling simulations were built.
• Once all supplies arrived, the team wasted no time in preparing to pour molten metal.
• Pouring 3 molds a day was crucial for time and use of facilities.
• The pouring was recorded with a high speed camera.
• The gating system designs were sent out to Donsco foundry to simulate effects on the gating system such as pressure, velocity and direction.
• Once the pouring was completed, the video was compared to that of the water modelling and computer simulation.

Outcomes
After concluding this project the team supports the ideas that:
• Videos support Tailback theory when using filters.
• Filters reduce turbulent flow pre filter.
• Post filter produces a laminar flow for better casting quality.