9757 Enhanced Inclusion Removal from Steel in the Tundish

Benefits

- Improved properties and quality of steel by significant reduction or elimination of inclusions.
- Reduced steel production costs through reduced pouring nozzle clogging and improved hot working capability of steel.

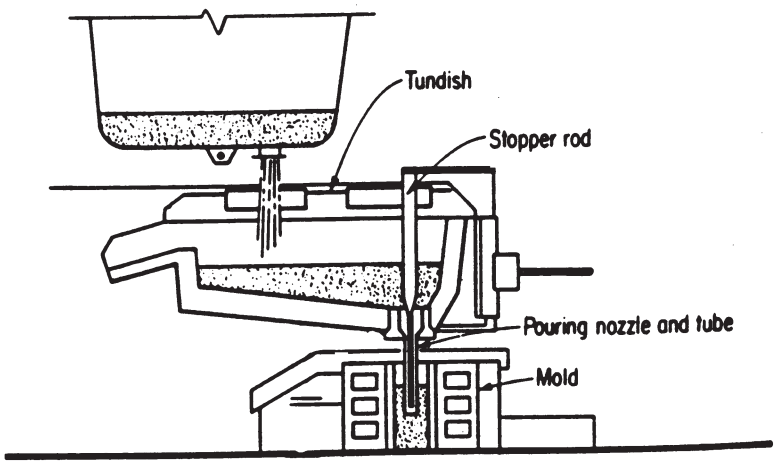
Applications

The technology has the potential for application to the 100 million tons/year continuous casting operations through a retrofit modification of the currently used tundish designs. Even a small improvement in the quality and cost of steel could result in major overall benefits.

Development of an inclusion filtering system will help the North American steel industry prepare for the future

The U.S. Department of Energy is collaborating with the North American steel industry to develop an effective filtering system for significant reduction in the inclusion content, both in terms of size and amount, of the steel exiting from the tundish. The successful development of the system and its application to the continuous casting operation in the steel industry would result in improved steel product and better productivity from the continuous casting operation.

The application of the concept to high tonnage steel production operations requires many challenges to be overcome. The innovative filter system that is being investigated by this project relies on physical and chemical phenoma that occur in the tundish. The filter channels will be made of spinel, which is a refractory material produced from a combination of magnesia and alumina.



Liquid steel flows from the ladle into the tundish.

Project Description

Goals: To determine the potential for delivery of molten steel with significantly reduced inclusion content from the tundish to the continuous casting mold.

The project will have three major areas of investigation: 1) modifying a commercially available Computational Fluid Dynamics (CFD) code for the specific flow conditions of the project; 2) modeling dispersed liquid metal/particle turbulent flow in corrugated channels; and 3) preparation of corrugated channels and their evaluation at laboratory scale and field testing in sponsoring steel companies' tundishes.

Progress and Milestones

- Project began on May 17, 1998.
- Data on the specific flow conditions of the project is being developed through laboratory experiments.
- A commercial CFD code has been acquired for follow-on modification. Two graduate students have been assigned to the project.
- Plant scale testing is planned for second and third quarters 2002.

Total Project Cost/Duration

$788,000/five years.

Research Organization

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Industry Participants

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