

Benefits

- ❖ Increased knowledge about the use of strip-cast material in conventional applications.
- ❖ Participant companies will gain insights into developing casting technology.
- ❖ Development of processing methods to optimize properties of strip-cast steels, leading to grade specification for strip-cast material.
- ❖ Potential to identify new grades of steel.
- ❖ Energy savings of up to 2.4 million Btu per ton of steel produced.

Applications

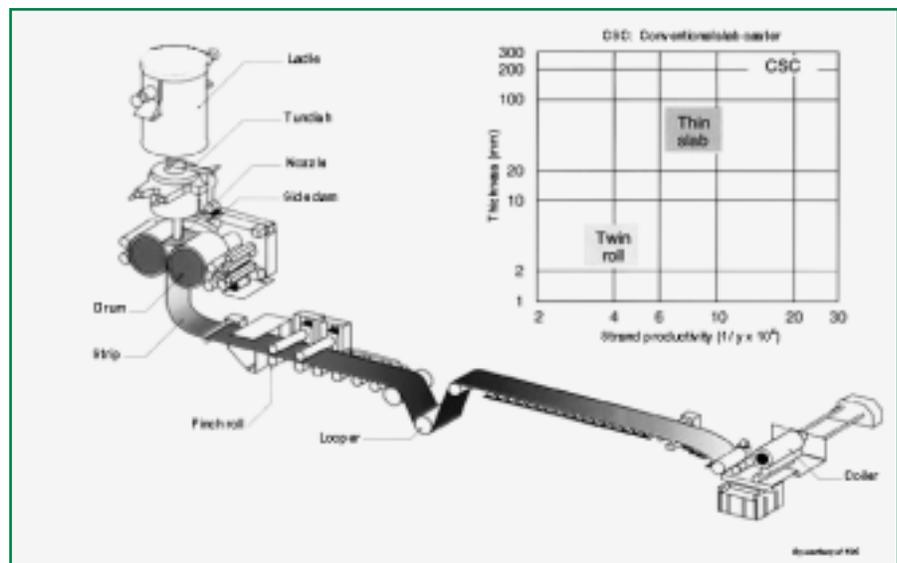
Strip casting could potentially reduce energy, process steps, manpower, investment, and operating costs while increasing productivity and quality in currently produced steel grades.

The technology might also be used to create new grades that were previously not produced as sheets due to difficulties during rolling; steel chemistries not amenable to current casting technologies; strip with optimized texture for electrical and magnetic applications; cleaner steels; and steel grades with higher residual contents than can be tolerated with conventional processing techniques.

Strip casting evaluation will help North American steel industry prepare for the future

The Department of Energy is partnering with the North American steel industry to evaluate the use of strip-cast material in conventional applications. The project will give partner companies direct experience with representative strip-cast materials to determine the processing steps necessary to ensure that the industry can use strip-cast material to produce competitive products. Strip casting has great potential to reduce the operating and investment costs for steel casting.

Strip casting on a commercial scale is now feasible for several grades of stainless steel, and a carbon steel strip caster will be commercially available in the near future. The U.S. is one of the few major steel producing nations without a major effort in this area. Because the technology is developing outside the U.S., the U.S. steel industry lacks data on processing and potential applications of strip-cast materials. Strip casting could become a niche market technology or a replacement for thick and thin slab casters. The program will help the steel industry obtain a critical understanding of how strip casting technology is likely to impact future competitiveness.



Strip casting has great potential to reduce the operating and investment costs during steel casting.

Project Description

Goal: To determine the potential of strip casting for the North American steel industry and to determine the fundamental knowledge necessary to allow the role of strip casting in the modern steel industry to be understood.

The project will have three major areas: casting, secondary processing, and characterization of as-cast and processed materials. Steel strip will be cast at a number of commercially available sites. Participating steel companies will process the strip to simulate cold rolling before batch and continuous annealing, temper rolling, hot band annealing; participating companies will also hot roll the as-cast strip and participate in the property determination. Work at Carnegie Mellon University will be aimed at developing a fundamental understanding of the effect of heat transfer in strip casting structure development, determining strip-cast structures, developing and characterizing microstructural development and determining the relationship between microstructural and mechanical property development.

The first part of the project will be aimed at developing a knowledge of the solidification structures developed by the pilot machines to determine their operating window and their relationship to the material produced by larger machines. Participants will then determine a baseline characterization of the material to assess appropriate processing conditions for strip-cast material. The last year of the program will be aimed at determining the future potential of strip casting for more novel and unconventional applications.

Progress and Milestones

- ❖ The project was initiated on April 2, 1998. Project completed on August 31, 2001.
- ❖ In progress are benchmarking studies using existing samples from existing strip casters. A project plan for characterizing cast properties and developing the various thermal and deformation cycles necessary to transform the cast product into strip product with desired properties has been formulated.
- ❖ The application of strip casting in the U.S. could save about 1.7million Btu/metric ton when compared with thin slab casting and about 2.4 Btu/metric ton when compared with conventional slab casting.
- ❖ The energy savings to the U.S. steel industry through 2010 will depend on whether strip casting becomes a small niche market or an outright replacement for thick and thin slab casting.

Total Project Cost/Duration

\$660,000/42 months.

Research Organization

Carnegie Mellon University
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Industry Participants

AK Steel Corporation
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