METHOD OF MAKING STEEL STRAPPING
AND STRIP

A NEW CONTINUOUS PROCESS PRODUCES HIGH-COMPONENT
STEEL STRAPPING AND STRIP FROM ROD STOCK PRODUCED
FROM SCRAP STEEL

There is a large movement in the American steel industry to utilize more recycled
steel. Recycled steel melted in the electric arc furnaces of mini-mills is being used
as the source of raw materials for an increasing number of products, largely due to
its lower price.

However, conventional processes for producing steel strapping and cold-rolled strip
steel restrict manufacturers from using more than 50% recycled steel. In addition,
steel strapping and cold-rolled strip steel traditionally require many production steps.
They are produced from primary steel that has been cast into slab, heated, rolled to
achieve the desired thickness, and slit to the desired width. The slitting process pro-
duces microcracks along the edge of the strapping or strip, which reduce tensile
strength.

A new continuous process produces steel strapping and 1/2" to 6" strip steel from the
rod and strip stock made from scrap steel in mini-mills. The new process creates
steel strapping and strip with improved strength and quality due to the absence of
microcracks caused by the conventional slitting process. The finished product is
cheaper because of the lower cost associated with using rod and lower conversion
costs. In addition, the higher tensile strength of the product allows for thinner
strapping.

APPLICATIONS
The process represents a new
approach to producing any steel
strapping used for bundling and
packaging items for storage or
transport. In addition, this innovative
new process can be used to produce
cold-rolled strip steel, a basic raw
material for automobile parts,
hardware, office equipment, and many
other products.

By using a continuous process to create steel strapping and strip steel, manufacturers will be
able to increase the amount of recycled steel in their products while also increasing product
strength.
Project Description

Goal: The project goal is to develop computer models to simulate strip cooling and to determine final cost estimates for the creation of a pilot plant.

The process rolls rod stock of proper diameters and strip of appropriate thickness directly into strapping or strip of a desired width or thickness. The rod or strip is heated using electric resistance, which passes an electric current through the rod using roller contacts to supply the current. This innovation leads to substantial savings over conventional furnaces.

After the rod or strip stock is heated to an appropriate temperature, it is hot rolled and heat-treated. One of a variety of heat treatments can then be chosen to cool the product to produce specific structural constituents, such as pearlite, martensite, or bainite. A variety of properties can be developed offering a range of tensile strength and ductility. After heat treatment, the product may be either coiled or cold rolled.

Robert Reilly & Associates is developing this new technology with the help of a grant funded by the Inventions and Innovation Program through the Department of Energy’s Office of Industrial Technologies.

Progress and Milestones

- Current efforts are focused on the development and fabrication of a pilot plant model to substantiate claims and to evaluate various sources of heating.
- Protected by U.S. patent 5,542,995.

Economics and Commercial Potential

The process offers the potential to completely replace the conventional method of steel strapping production, yielding a higher quality, less expensive product. It also offers the potential to produce and compete in the $1/2" to 6" width cold-rolled strip steel market. In addition to these markets, the inventor is evaluating the viability of supplying strip steel to reinforce pipelines and to armor fiber-optic cables.

Annual domestic production of steel strapping is between 500,000 and 600,000 tons. The total world market is 3 to 4 times this amount. Selling prices range between $800 and $1,000 per ton.

Approximately 1 million tons of strip to 6" width was produced in the United States in 1998, with prices ranging between $600 and $1,800 per ton.

The process has the potential to benefit the steel industry by increasing productivity, reducing product cost, and increasing the quality of steel strapping and strip. The major challenge now is to demonstrate the technology’s capabilities to the industry’s satisfaction. A plan for meeting this challenge has already been developed and initial steps are underway.

Industry of the Future—Steel

Through OIT’s Industries of the Future initiative, the Steel Association, on behalf of the steel industry, has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In March 1996, the industry outlined its vision for maintaining and building its competitive position in the world market in the document, The Re-emergent Steel Industry: Industry/Government Partnerships for the Future.

OIT Steel Industry Team Leader: Scott Richlen (202) 586-2078.