

# STEEL

## Project Fact Sheet



## METHOD OF MAKING STEEL STRAPPING AND STRIP

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

#### Benefits

- Could save 12 million kWh/year for a line producing 35,000 tons of strapping
- Could save over 169 million kWh/year industry-wide
- Improves the tensile strength and quality of steel due to the absence of microcracks
- Reduces conversion costs and costs associated with using rod produced from scrap steel
- Allows for thinner strapping and lower material costs
- Reduces processing and capital costs compared with conventional production
- Offers wide variability in the finished products' range of tensile strength and ductility

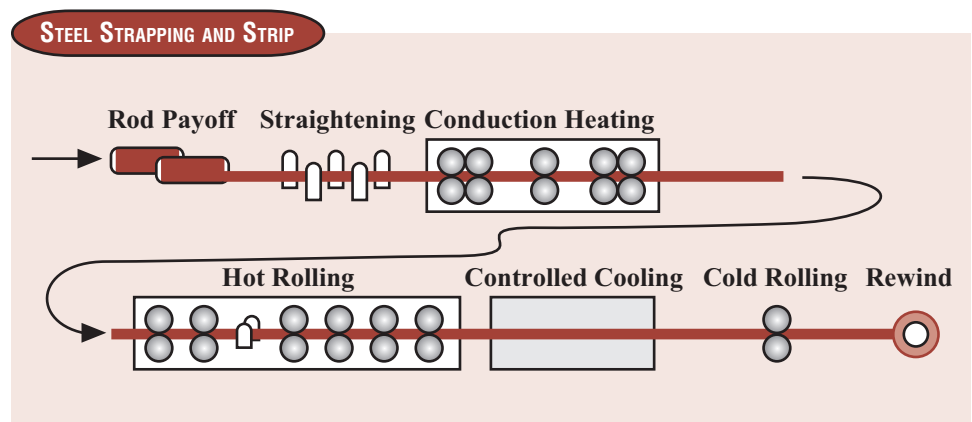
#### Applications

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.

There is a large movement in the American steel industry to use 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. Steel strapping and cold-rolled strip steel, which traditionally require many production steps, 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 produces 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 because it eliminates the microcracks caused by the conventional slitting process. The finished product is cheaper because of reduced rod and conversion costs. In addition, the higher tensile strength of the product allows for thinner strapping.



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



## Project Description

**Goal:** The project goal is to confirm the technical viability of the process.

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. After the rod or strip stock is heated to an appropriate temperature, it is hot rolled and heat-treated. After heat treatment, the product may be either coiled or cold rolled. The National Institute of Standards and Technology recommends further development and commercialization of this technology.

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

## Progress and Milestones

- Current efforts are focused on developing a pilot plant at North Star Steel in Texas.
- Efforts are supported with a marketing study and a metallurgical evaluation using recycled electric furnace steel.
- 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. It also offers the potential to produce and compete in the 1/2" to 6" width cold-rolled strip steel market. The inventor is also 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. This process lowers conversion costs by \$200 per ton and reduces energy use from 662.5 kWh per ton to 325 kWh per ton. A line producing 35,000 tons per year of strapping would save 12 million kWh per year. This rate could result in an industry-wide savings of 169 million kWh per year if applied to the production of 500,000 tons of steel strapping. The process also eliminates the use of environmentally unacceptable molten lead pots used in current production of strapping.

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 industry satisfaction. A plan for meeting this challenge has already been developed and initial steps are underway.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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Order # I-ST-719  
December 2001