DPN
DESIGN PRODUCT NEWS
January/ February 2007
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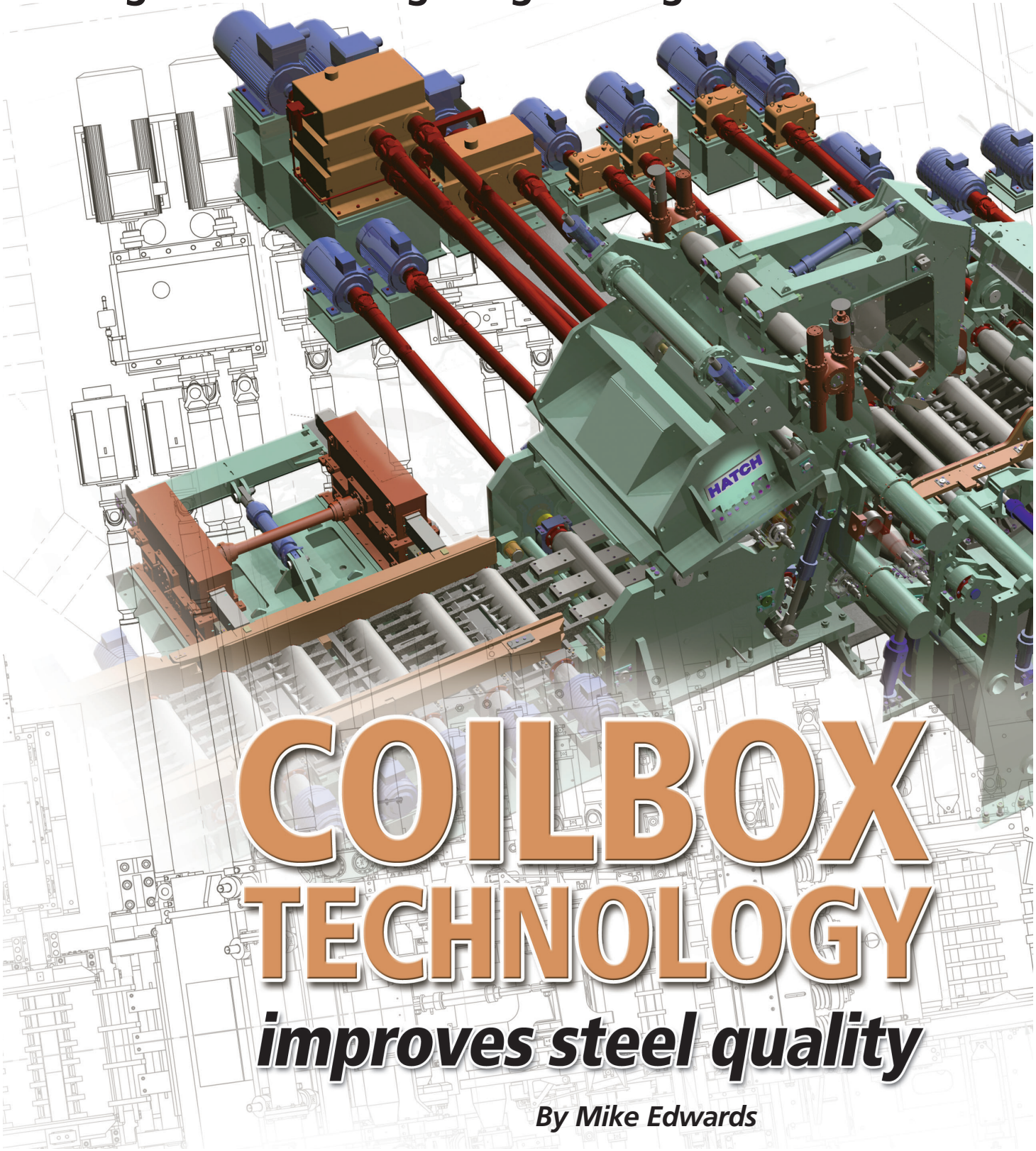


COILBOX TECHNOLOGY improves steel quality

By Mike Edwards

Solid Edge software helps Hatch generate Coilbox design variations

Between a rock and a hard place pretty much sums up the position of the Coilbox in a steel hot strip mill.

Located between the roughing mill and finishing mill stages, Coilbox technology from Hatch (hatch.ca) of Mississauga, ON, plays a key role in maintaining a high quality production process for flat steel products, all in a very aggressive environment. The Coilbox is exposed to "water, scale, high thermal and impact loads, and some unpredictable operating conditions," according to Darryl Metcalfe of the Hatch Technologies engineering department.

A Coilbox is a mandrel-less coiler that coils and uncoils steel transfer bars for metallurgical reasons, said Metcalfe. Transfer bars coming out of the roughing mill can be up to 100 m in length and rapidly lose heat due to their large surface area; this causes difficulties during the finishing process. By coiling the steel, the surface area and accompanying heat loss is greatly reduced.

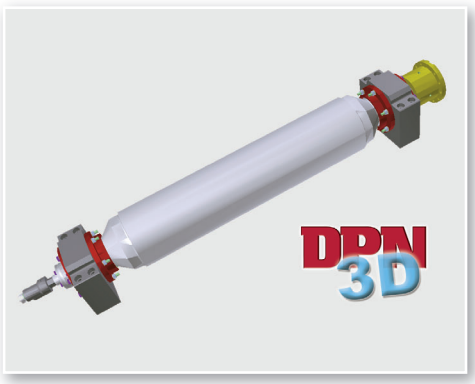
By permitting simultaneous engagement with the roughing mill, the Coilbox reduces the distance needed to handle long transfer bars. "There is a space advantage using a Coilbox," said Metcalfe. Since the technology shortens the length of a hot steel mill line, it consequently reduces the overall length of the mill, he added. Similarly, installation of a Coilbox in an existing mill can accommodate longer products to increase the product range.

Other Coilbox process advantages include:

- Provision of a nearly constant temperature into the Finishing Mill to: save cost with fewer finishing stands, require less finishing mill power; hold coils in coil form up to 5 min; and, accommodate the different process times in the roughing and finishing sections, enabling techniques such as balancing rolling load and end-less rolling.
- Assistance with rapid removal of material from the finishing mill in the event of a stoppage or cobble.
- Permits insertion of reheated coils.

Coilbox installations date back to the late 1970s through the Steltech division of Stelco in Hamilton, ON. Hatch purchased the division 14 years ago and has continued to refine the technology and expand their role into design, first using 2D CAD tools and now the 3D mechanical CAD program Solid Edge (solidedge.com) from UGS.

With turnkey multi-million dollar Coilbox systems being sold and commissioned around the world by Hatch, the 50,000-part designs, including 2000 unique parts, have to be accurate and not present assembly or interference surprises out in the field. Projects have been completed for Liawu Steel (China), Tangsteel (China), Hyundai Steel (Korea), Zaporozhstal (Ukraine), Ansteel (China) and Corus (UK).



The approach table to transfer steel bars into the Coilbox is made up of multiple roller assemblies (3D sample shown). Bar can be held in the coiled form up to 5 minutes.

Hatch prefers to specify components and subsystems that can be serviced by vendors with an international presence. Preferred suppliers include Parker and Bosch Rexroth for hydraulic components, SKF for bearings, Johnson for drive shafts and MTS Sensors for Temposonic LVDT sensors. Hatch's biggest technology differentiator on the Coilbox design lies in related process knowledge and machine design expertise.

Hatch mechanical designer John Matthews said, "we've used Solid Edge to design and detail six different Coilboxes.

"Solid Edge is a powerful 3D parametric feature based CAD software system that can be used throughout the entire product lifecycle." The stages include concept, detail design and review, through to documentation, manufacturing (CAM), assembly and revision management.

Hatch also exploits most Solid Edge add-on applications, including Xpress Route, Standard Parts, Sheetmetal and Weldments. Critical load-bearing segments are examined using Ansys FEA software. "Xpress Route helps with piping, a useful feature considering a Coilbox requires about 600 grease points."

In addition to the metallurgical sector, parent company Hatch (hatch.ca) of Mississauga, ON, also supplies process and business consulting, information technology, engineering, and project and construction management to the mining, manufacturing, energy and infrastructure industries. Hatch has used Solid Edge to create electrode columns for electric arc furnaces, the drive system for a Major League Baseball stadium retractable roof, and a variety of plant process equipment.

For drafting, Solid Edge provides Hatch with multi position drawings, simplified assemblies (dumbed down models), simplified parts, exploded views, linked borders and symbols, 2D parametric layouts, embedded Excel spread sheets, multi sheet drawings, drawing conversion to AutoCAD and Microstation, batch print and PDF tools.

Matthews added that file management capabilities include Revision Manager for file renaming (useful on large assemblies) and a 'Where Used' search tool to identify parts which may be impacted, as well as an Updating Links feature for updating models linked to assemblies or draft files. The Property Manager provides Hatch with title block information updates on multiple drawings at once (useful for drawing issuing) and Propseed Text ensures consistent terminology is used and typos are avoided, while Solid Edge Administrator sets permissions for different users and tools.

Published in *DPN (Design Product News)*, January/February 2007.