



Coils of hot-rolled black on the in-feed of JDM's SCS line are transformed to clean, rust-resistant steel on the out-feed.

# Smoothing out the **process**

BY SUE ROBERTS

## Smooth clean steel surfaces in Chicago

“It’s an educational process. You have to work with a customer in his plant to try this new product and convince him that it’s a better way to go,” says Rich Merlo, president of JDM Steel, a small, independent service center in Chicago Heights, Ill. “It’s hard for people to change to a new product when they’ve been using pickled and oiled products for all these years.”



Steel goes through shape correction before entering the SCS cleaning process.

Merlo is talking about the smooth, clean surface (SCS) of the steel at the rewind end of his new processing line. A coil of “down-and-dirty” hot-rolled black steel loaded on the in-feed side of the line is transformed into a coil resembling cold-rolled on the re-wind side. During the process, the steel is leveled, trimmed, cleaned, dried and rewound into a coil that will stay rust-free without further processing as long as it’s stored in a controlled environment.

From the humidity and temperature-controlled facility, cut-to-length sheets from 16 gauge to ½-inch are shipped to manufacturers of railroad tank cars, electrical boxes, farm implements and any company with an application calling for hot-rolled sheets. Typically working with contract customers, JDM purchases and stores coils until the cut-to-length sheets are needed. A 72-inch cut-to-length line, rebuilt and upgraded in 2005, gives

the company the edge needed for servicing tight-tolerance markets.

#### **New option**

Adding the SCS line gives JDM another market edge as the first service center in the Chicago area to offer the process. SCS-processed steel has proved to be highly cost-effective in a multitude of applications. Its clean, workable surface gives manufacturers a viable option to hot-rolled black, pickled and oiled, temper pass, pickle dry and other processes.

Merlo watched as the process technology, developed by The Material Works Ltd. (TMW), a toll processor in Red Bud, Ill, developed from a sheet-only process to being incorporated into coil lines.

“About four years ago, we saw some sample pieces and were pretty amazed. Here was a pretty, shiny, hot-rolled sheet that didn’t rust. So we started investigating it and learned about the

process,” Merlo explains. “We waited until the coil-to-coil process was perfected.” A year and a half ago, that capability was introduced.

#### **Clean, rinse, dry process**

For the SCS processing to work effectively, the surface must be flat, which demands shape correction for coil before it goes through the SCS cleaning process.

TMW partnered with two machine tool builders for key elements of the line: Butech Inc., Salem, Ohio, provided a cassette-style precision roller leveler and Red Bud Industries, Red Bud, Ill., built the SCS brushing machine.

As the coil feeds into the line, 50,000 pounds of tension are applied to the strip throughout the line, enhancing the roller leveler’s ability to shape correct. This form of tension leveling removes bow, edge wave and center buckle, providing the required flat surface for the cleaning. Flatness is typically 15 micro-inches better than standard pickled and

oiled or hot-rolled black sheets.

Moving on to the SCS process, leveled steel passes through a series of six Scotchbrite brushes, three on the top and three on the bottom, that spin against the material surface at 900 revolutions per minute while a 180 gallon per minute water spray washes away scale and leaves a polished surface. Three pairs of air knives dry the material as it approaches the recoiler. The resulting material surface is extremely clean and highly rust resistant.

JDM's line processes 0.030-inch to ¼-inch material at 150 feet per minute, accommodating up to a 74-inch coil width and a coil weight of 60,000 pounds. The line has the capability of processing 20,000 tons a month running six days a week, three turns a day.

#### More advantages

Merlo views the addition of the new process as "a huge leap of faith"; however, the leap was made after thorough research.

As he investigated the SCS process and talked with manufacturers, Merlo gauged that 99 percent of them used oiled steel strictly to prevent rust. But sometimes the oil becomes problematic. "Oil is something they have to wash off," he says. "It gets on their skin and irritates it. It's something they have to laser-burn through that creates smoke, something they have to weld through that makes good welding practices more difficult. And sheets stick together."

Then you have the added processes and expense of oil removal when working with pickled and oiled steel. Using SCS-processed material eliminates the steps, solvents and environmental concerns involved with stripping the oil from the material before finishing.

Costs of running a coil through the two processes, pickling and oiling and SCS, are about the same, according to Merlo. For JDM's hot-rolled customers, there is some additional expense, but Merlo expects they will see



**The 60,000-pound clean, processed coils are stored in a climate-controlled facility until being cut to length.**

increases in their production speeds that will justify the difference in material investment.

Merlo points out that theoretically, with the "leveling under tension" process within the SCS line, the coils could be directly cut to length and still have a good shape, but in his operation he chooses to put the material through another corrective leveling process before cutting. Even with this additional step, he found that the SCS line provides an advantage. The cut-to-length process is more efficient.

"With the shape improvements of the material characteristics from the coil-to-coil line, the fact that it has a corrective leveler, a heavy-duty Butech leveler with two cassettes, one for light duty and one for heavy duty, we are basically duplicating what we do on the cut-to-length line," he says. "We have the ability to correct shape in coil form. When we take

it to the cut-to-length line, it's easier to get the steel flat because we've already worked it considerably."

Merlo adds, "We also have an edge trim on the SCS line, similar to what we have on the cut-to-length. Certainly, if we edge trim over there, it makes our process on the cut-to-length line run a lot more efficiently."

Most JDM customers are within a comfortable shipping radius of about 300 miles, but since the service center handles specialty products, such as higher carbon and alloy steels, it has captured accounts as far away as California. A manufacturer in California provides JDM's first SCS success story.

"We have a saw blade manufacturer on the West Coast that has been using pickled and oiled for a long time. They agreed that oil didn't do much for their laser processing," explains Merlo. "They



SCS self-contained water filtration system recirculates water after removing iron oxide scale.

took one truckload of SCS and wanted to see how the product worked for them. They were so convinced with their first truckload that they were interested in switching to SCS.”

#### Production advantages

The SCS process has been in commercial production since March 2003, but TMW continues to work with manufacturers to test it as a replacement for pickled and oiled, hot-rolled black and even cold-rolled. Reported results continue to be positive in a wide range of applications:

- The lack of oil on the sheet surface and the smooth, flat finish allow laser cutting at 15 percent to 50 percent faster speeds and reduce or eliminate material springback.
- Welding improvements are seen in the strength of welds. SCS welds tested 20 percent stronger than pickled and oiled welds in shear strength tests. Savings of 30 percent in filler wire usage were also reported by some users.
- Pretreatment processes can often be significantly reduced prior to painting. For many applications, a two-stage rinse was all that was

needed for paint preparation.

- Successful tube trials have yielded tubing that is considered ready-to-weld and ready-to-paint right off the shelf.

Researchers are also looking into commercial applications for the iron oxide scale collected in the filtration system.

#### Looking to grow

With the addition of the SCS line, Merlo looks forward to increased business and company growth. “If we just convince our pickled and oiled customers to switch over, it’s a home run. If the process really catches on, if we can take just a small percentage of the pickled and oiled market, it will be a home run.

“Many manufacturers have 30 to 60 days of parts on their floor before they are painted to resist corrosion. The SCS corrosion resistance is a really big selling point,” says Merlo. “It’s not stainless, but if you keep it in a controlled environment, it stays forever—or at least for four years like the samples we’ve kept!” ■

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