

Look Who's Making Ultra-Smooth, Ultra-Clean Steel Sheets

Thanks to this Tennessee toll processor, metal fabricators in the Southeast now have ready access to ultra-clean, flat and smooth sheetmetal blanks, ideal for worry-free laser cutting, welding and painting.

Metal fabricators that operate laser-cutting machines know that smooth, clean base-material surfaces are key ingredients to efficient, quality cutting. One service center that recently learned this, and is passing it on to its metal-fabricator customers, is Layhill Processing, Loudon, TN. Warren 'Chip' Gerber, president of Layhill Processing, recently set up a new toll-processing service to provide SCS (Smooth Clean Surface) steel to distributors and users in the southeast United States. The SCS process was invented and patented by The Material Works, Ltd., a toll processor in Red Bud, IL, offering slitting, blanking, cut-to-length and stretching services, as well as providing SCS material. The SCS process takes hot-rolled black steel and gives it a clean, rust-inhibitive cold-rolled sur-

face ready for fabrication, painting or intermediary processing.

"I don't think you'll find another sheet-steel product that's so optimized for laser cutting and so reasonably priced," says Gerber.

SCS Allows Stacked-Sheet Cutting

Layhill's particular version of SCS is the product of two unique pieces of equipment—a stretcher-leveler and an SCS sheet line, both built by Red Bud Industries, Red Bud, IL. As part of an integrated cut-to-length line, the stretcher-leveler takes coils of hot-rolled black steel and produces panel-flat blanks. These blanks feed into the SCS sheet line where they emerge ultra-clean with a surface as smooth as prime cold-rolled steel. This combination of

flat, clean and smooth lets laser- and plasma-cutting machines move into overdrive.

"Laser-cutting speeds typically increase by 20 to 40 percent when switching from sheets of pickled and oiled sheet to SCS," explains Gerber. "SCS also can let fabricators do what many laser-machine operators say is impossible: laser-cut two stacked sheets at once and get two parts from a single cut."

While a conventional roller-leveler can get the steel sheets to appear flat, roller leveling won't remove residual stress that gives the sheet shape memory, according to Layhill Processing officials. And it is shape memory that causes the sheet to spring back when cut. If, instead, the process can place the sheet in plastic deformation throughout its

entire cross section, all shape memory can be removed, eliminating spring-back after shearing, punching or laser cutting. That is what the stretcher-leveler does.

One of Nine in the United States

To launch his SCS initiative, Gerber allied with a relatively new owner of a stretcher-leveler, Olympic Metals, also of Loudon. Olympic installed its stretcher-leveling cut-to-length line, one of only nine operating in the United States, in 2004. It can process material as wide as 72 in. and 0.312 in. thick.

Since stretcher-leveled sheets don't spring back when cut, they don't strike and damage expensive laser heads. But do they necessarily let you laser-cut faster? Not if they carry a film of oil, grit

or soot. These surface impurities can cause diffraction of the laser beam and degrade cutting performance. That's where the Layhill SCS sheet-line technology, operating in conjunction with Olympic's stretcher-leveler at Olympic's facility in Loudon, comes in—it uses rolls covered with an engineered abrasive and spinning at 1000 rpm to brush away dirt, grit and all but an infinitesimal layer of scale from the hot-rolled sheets. The resulting surface is smooth and clean, closely resembling prime cold-rolled.

Layhill's Red Bud SCS sheet line can process blanks as wide as 75 in. in lengths to 20 ft. and thicknesses to 0.500 in. Red Bud supplied the line with a closed-loop water-filtration system, exit conveyor, drop stacker, stack table and end-discharge rollouts, along with a

The Red Bud Industries SCS sheet line operated by Layhill Processing at the site of Olympic Metals in Loudon, TN, includes an exit conveyor, drop stacker, stack table and end-discharge rollouts, along with a robotic loading system.

robotic loading system. The discharge system can handle pallets of material weighing as much as 20,000 lb.

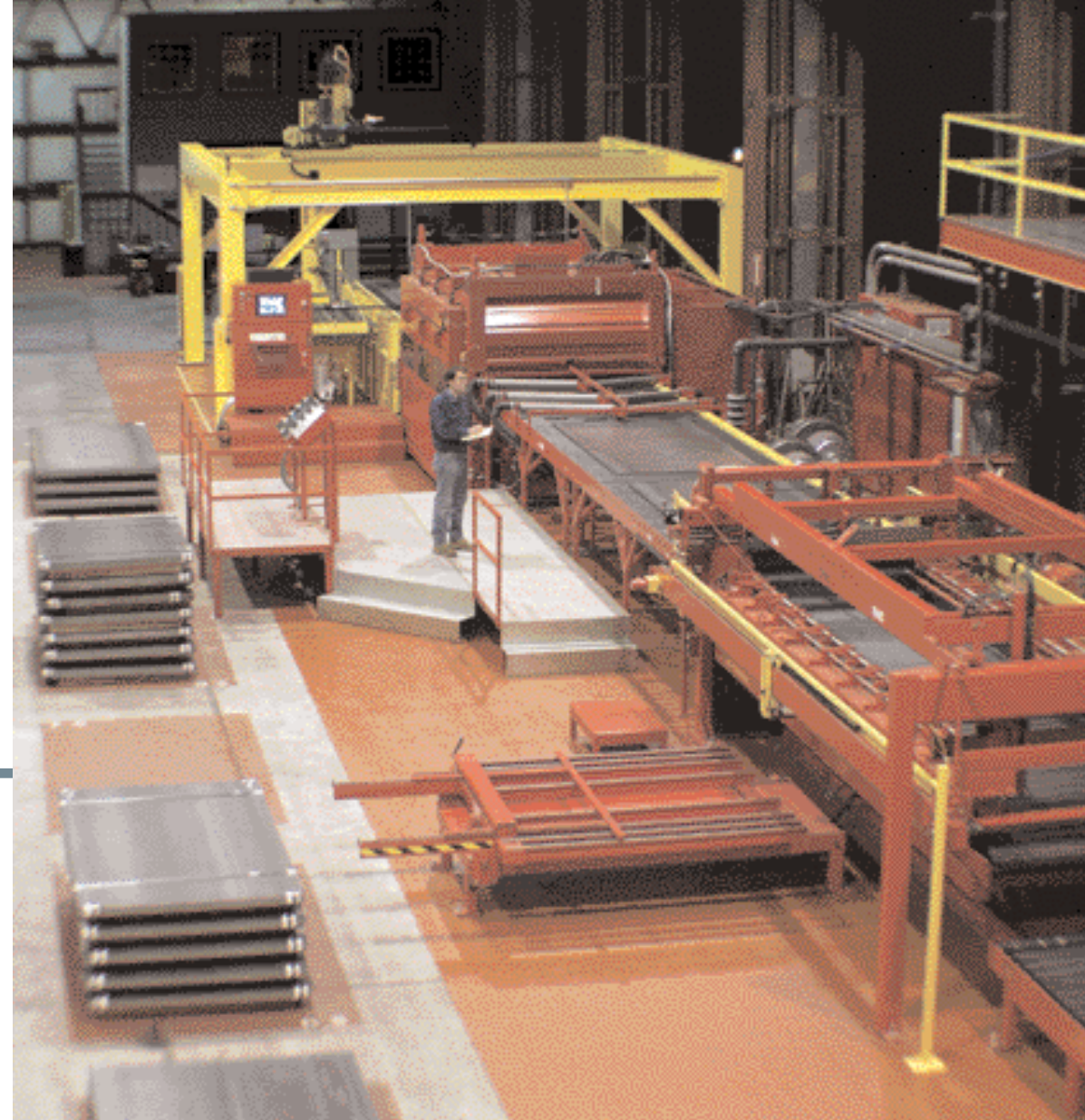
Laser Shop Testifies

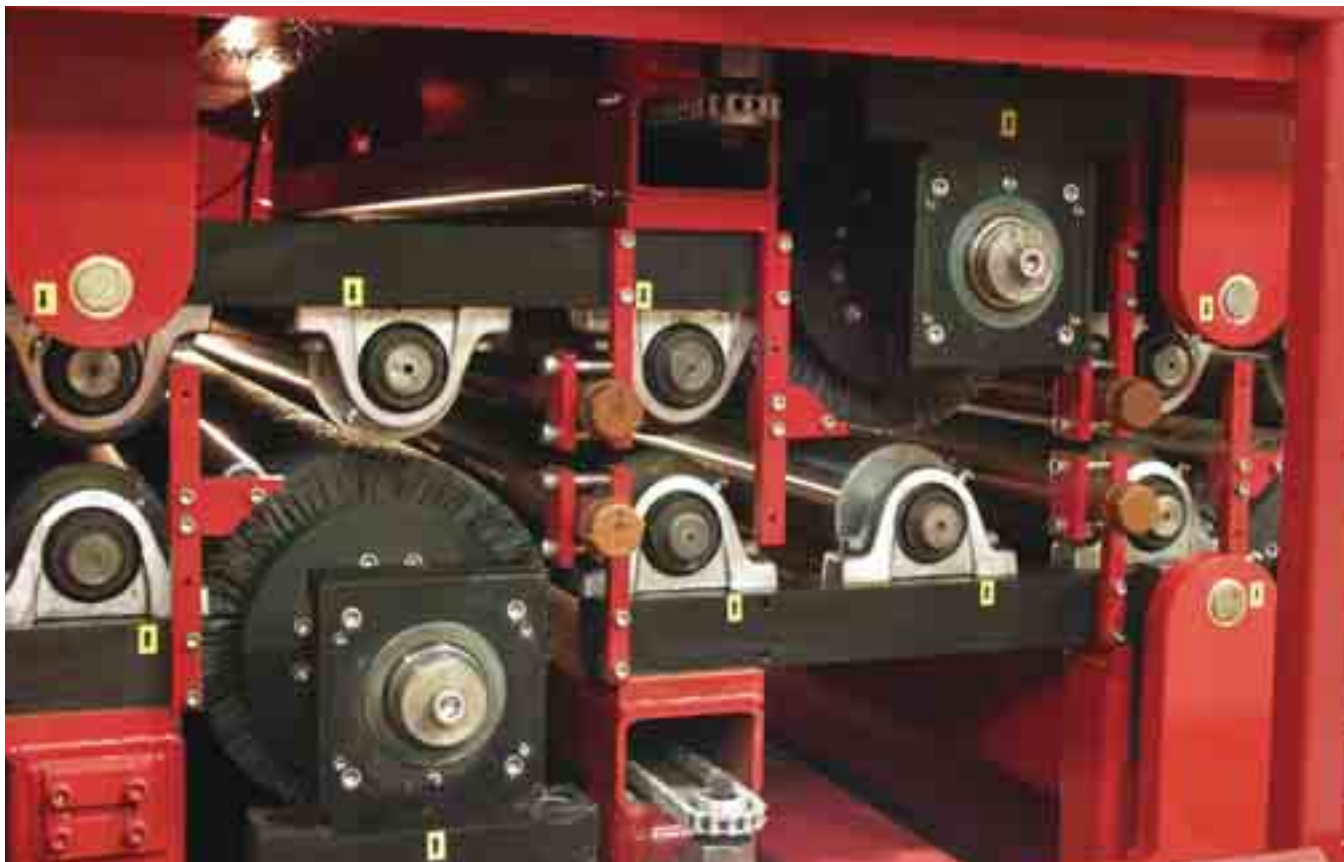
"That uniformity of shape and surface is what allows us to boost laser speed," explains Todd Berry, president of laser job shop Precision Laser Manufacturing, Peoria, IL. Berry first learned of SCS two years ago when asked to cut a few SCS samples. Since then he's run several controlled tests with stretcher-leveled SCS where he varied only a few parameters, most notably laser-nozzle diameter, and followed the recipe developed to show how to cut SCS sheets faster than pickled and oiled stock. That recipe is available to all users of SCS material.

"The recipe is pretty simple," states Berry, "but increases in speed are dramatic." In recent tests conducted in the lab of a laser-machine OEM, SCS sheets cut anywhere from six to 32 percent faster than the OEM's fastest benchmark speeds for pickled and oiled sheets.

SCS sheets also allow Berry to do something he'd never succeeded at doing with other steels: cut through two sheets at once while producing high-quality parts. "When laser cutting two sheets, you set the machine as though you were cutting one sheet of equivalent total thickness," Berry says. "That means you must cut slower than you would with a single sheet. Still, you're producing two parts at this speed, so I figure the net gain in output is another 20 percent over the fastest single-sheet cutting we achieved."

Impediments to laser cutting stacked sheets are shape and surface. Gaps between the sheets, caused by trapped





dirt, nonflat surfaces or other factors, cause the laser-cut parts to hang up in the blank remnant. When cutting pickled and oiled sheets, small parts tend to stick together. So, if the laser successfully cuts through the two blanks but the parts cannot be easily and automatically removed, laser cutting two sheets is pointless.

Rust Resistance

“While the laser-cutting benefit of

stretcher-leveled SCS is compelling,” observes Gerber, whose line entered production in March 2006, “there are so many other benefits to the SCS process that I sometimes think use of the nickname ‘laser steel’ is a disservice.”

The biggest benefit Gerber refers to is the rust resistance that SCS material exhibits. Under normal dry storage and handling, SCS sheets do not rust despite the fact they lack a protective coating or special packaging. The SCS brushing

To manufacture SCS sheets, the SCS sheet line powers sets of brushes loaded with engineered abrasive that remove dirt, mill scale and rust from the sheet surface.

removes all but a microns-thin layer of scale, leaving a clean, polished surface with rust-inhibitive properties. Another benefit is the material’s weldability. “With SCS, our customers don’t have to weld through the oil that coats pickled and oiled sheets,” says Gerber, “so they get more uniform and stronger welds. Also, burning through oil creates fumes, not an issue with SCS.” With no oil to remove, paint prep is simplified. For example, metal fabricator Custom Cabinets and Racks, Topeka, KS, replaced all of its pickled and oiled sheets with SCS-processed sheets. As a result, its iron-phosphate wash solution in paint prep lasts five times longer than it used to and it attains improved paint quality with fewer blemishes and rejects. **MF**

Stretcher-Leveling and SCS Processing Defined

During the stretcher-leveling process, coil feeds in a stop-start sequence between two sets of grippers. The grippers clamp down on the material, and then move apart to stretch the material beyond its yield point and equalize stresses across the material. This process permanently removes edge wave, buckle and camber with no reduction in gauge. When the grippers relax and are unclamped, stretched material is sheared into blanks or recoiled.

To manufacture SCS sheets, the hot-rolled stretcher-leveled sheets feed into an SCS brush machine where rolls treated with an engineered abrasive brush away dirt, mill scale and surface rust. SCS sheets emerge dry and polished to a matte cold-rolled finish.

Information for this article provided by Layhill Processing, Loudon, TN, 865/458-9899; www.layhillprocessing.com.