

Pickling News

Steel job shops, fabricators discovering benefits of thicker-gauge pickled and oiled sheets

Steel job shops and fabricators have long understood the benefits of working with pickled and oiled sheets in gauges thinner than 1/2 inch. But the introduction of 3/4-inch pickled and oiled (P&O) sheets four years ago, and 1-inch pickled and oiled sheets in 2014 is introducing steel service center customers to the benefits of working with the thicker gauge P&O sheets.

Laser cutting, Computer Numerical Control (CNC) punching and tooling, welding, stamping and painting operations are all finding advantages to working with heavier-gauge P&O sheets. Stampers are discovering they can do stamping in one step with the heavier-gauge pickled and oiled material. Job shops are realizing they can eliminate the cost of maintaining a blaster by switching to the heavier-gauge P&O material, not to mention the benefit of not having the costs and time associated with the additional manufacturing process of blasting.

But perhaps some of the most interesting developments will be realized as the industry switches to more powerful lasers for cutting steel. "If you're laser cutting it, laser cutting is all about consistency and a good looking surface," according to Jeff Cupples, vice president of engineering and estimating at Cupples J&J Company Inc. in Jackson, Tenn.

And laser cutters are discovering they can get that "good looking surface" by using thicker-gauge pickled and oiled sheet.

Laser Cutting Thicker-Gauge Sheet

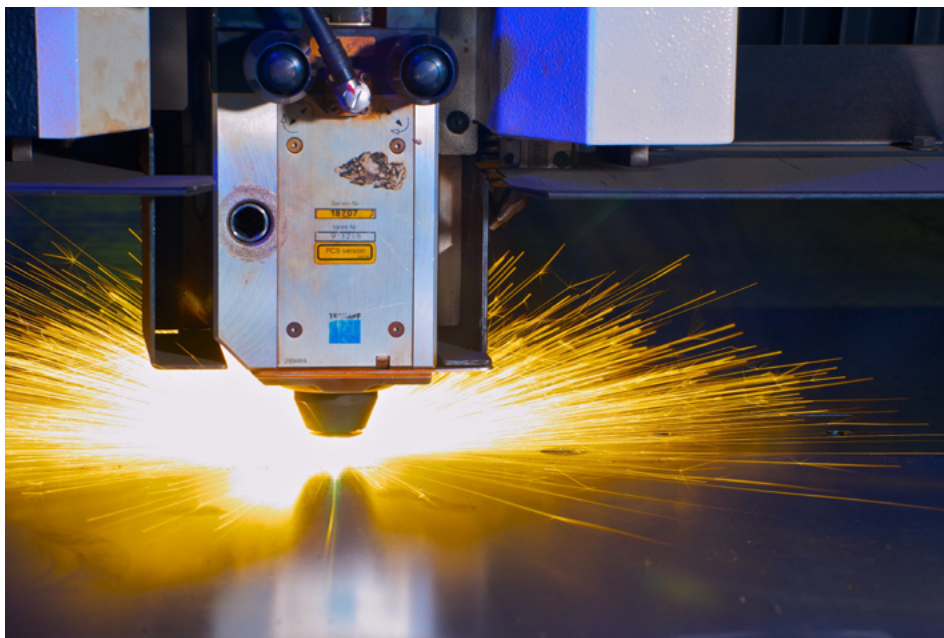
The emergence of thicker-gauge pickled and oiled sheet has proved a godsend for service centers and fabricators that laser cut product for end-use consumers.

Bill Bridenbaugh, engineering manager of Defiance Metal Products Inc. in Defiance, Ohio, said laser-cut quality with thicker plate is a real selling point. "When we get plate at 5/16 inch and above, it almost has to be pickled and oiled," Bridenbaugh said. "Blasted plate is better than mill scale, but still not as good as P&O."

With locations in Ohio, Arkansas, Pennsyl-

vania, and Wisconsin, Defiance and its 1,100 employees perform a wide variety of metal fabrication, through simple jobs to complex assemblies and stamping. Today, lasers do most of the company's cutting work. Defiance Metal no longer has blast capabilities, and most of their customers who used to do internal blasting abandoned the process because of the difficulty maintaining blast equipment in-house.

Bridenbaugh said that another advantage he sees with thicker-gauge P&O material is laser-cut quality. "When you get into thicker plate," he said, "it almost has to be pickled and oiled," adding: "Blasted plate is better than mill quality, but still not as good



as P&O. Before we could get P&O material in the thicker gauge, we used to take an oily rag and wipe the sheet down."

Another player in the industry, Rockford Toolcraft Inc., also sees numerous benefits to using laser cutting on heavier-gauge P&O sheets. "You get better cutting speeds and just overall cleanliness," according to purchasing manager Jeff Vance. "You're not having to go through additional operations for any type of cleaning."

The company, based in Rockford, Ill., operates two plants on the south side of the city, and employs about 360 people. It specializes in providing heavy-gauge, high-strength parts for the trucking and agricultural equipment industries.

"In our case," Vance noted, "the big advantage of using pickled and oiled material is being able to provide product with the surface expectations our customers require."

Another executive, Steven Smith, vice president of AccuBurn Inc., said his operators have noticed that little micro-imperfections from shot-blasted plate increasingly plague the laser cutting line. "You can't get the laser to cut," he said. "But the moment the oil is on the sheet, it starts cutting. The laser picks up on every imperfection on the surface, but if you start with temper-passed pickled material that has oil on it, it's best for cutting."

Williamsport, Ind.-based AccuBurn employs Mitsubishi Lasers in its Burn to Shape (BTS) and precision forming, and has been a proponent of thicker-gauge P&O material since it was first introduced. "We do a substantial amount of 16mm (millimeter) to 20mm work," Smith said. "We saw advantages with the pickled and oiled material in the speed and cutting edge for how smooth the material is."

That smoothness is what sold Smith and AccuBurn on thicker-gauge P&O material. "We really find it beneficial to have that extremely smooth surface with that light layer of oil on it, especially when you are working with 16mm and 20mm thicknesses," he said. "It's a long process to run the heavier-gauge sheets."

He noted that everything on that laser has to be right. "You'd better have the right product if you're cutting 5/8 inch and on up. If you don't have the right materials starting off, it can go bad mind-numbingly fast."

Smith said his operators prefer P&O material to blasted material. "There's definitely a difference," he said. "I'm running hundreds of thousands of pounds every month, and I can tell you the difference."

Don Wardrop, the corporate director of purchasing for Hol-Mac Corp. in Bay Springs, Miss., also weighed in. "When we blast, especially with heavy-gauge product, the laser lens run very close to the surface. You get little impressions that blasting creates, like many, many little mirrors," he said. He added that when the company first started with lasers cutting the shot-blasted material, those small inconsistencies caused problems. "We went to a pickled and oiled product, and eliminated all of those problems. Pickled and oiled gives us a much cleaner cut with less sparking."

Wardrop said Hol-Mac has nearly eliminated 3/8-inch to 3/4-inch shot-blasted material. "With the blasted material," he said, "the life of the lens on the laser is much less."

Ease of Painting

One of the major benefits fabricators and laser cutters attribute to pickled and oiled material in the heavier gauges is paint adhesion. Defiance Metal has seen the evolution of

painting in the past 15 years. The Ohio company has a major business in fabricating parts from 5/16-inch to 5/8-inch gauge.

Defiance Metal's Bill Bridenbaugh said, "Twenty years ago, we painted 20 percent of our steel products. Today, it's 90 percent. We're in the paint business in a big way."

The company used to have to blast parts or run them through an acid bath prior to painting. If the operators tried to paint over scale, the paint would all too often adhere to the scale and not to the base metal. Switching to pickled and oiled product made painting to the exacting specifications customers demanded all that easier.

Defiance Metal uses both E-coat and powder. The E-coat is electrostatically applied. The company works with a growing number of Class-A parts, which is anything that's visual on a piece of equipment. Laser-cut parts and the visual surface have to be perfect on a Class-A part. "If you powdered over blasted," Bridenbaugh said, "you can see through it, and you know it's blasted."

One contract fabricator in Alabama said paint just adheres better with a pickled and oiled material. "We powder coat, and we were experiencing adhesion problems with 1/2-inch plate," he said. "We switched to pickled and oiled, and solved the problem."

'Chewing Up the Dies'

The same Alabama fabricator said in doing press breaks, his operators prefer working with pickled and oiled material. "With blasted material," he said, "you get scale dust on the tooling, a little gritty residue. You see the same thing with stamped parts. It's just cleaner with P&O."

Hol-Mac's Don Wardrop agrees with his counterpart in Alabama. "Pickled material allows us a much cleaner product," he said. "You don't have to de-scale when you weld. When you shot blast, you're taking off a high percentage of the scale, but it still creates additional contaminants on the surface of the sheet, which tends to stick and fuse into the weld. That was the first thing that drove us to the use of pickled and oiled material."

Privately owned Hol-Mac is a heavy fabricator with business driven by Caterpillar Inc. Some 90 percent of Hol-Mac's heavy fabrication goes into the Peoria, Ill.-based heavy equipment manufacturer's heavy mining trucks as frames. Hol-Mac cuts material up to 3/4-inch, and Wardrop said "probably 99 percent of everything we cut on our lasers is a pickled product."



Wardrop added that even with lighter gauges, cleanliness of pickled and oiled material is paramount for customers. "In our lighter gauges," he said, "we produce fuel and hydraulic tanks. The cleanliness of that tank is one of the most important factors we sell."

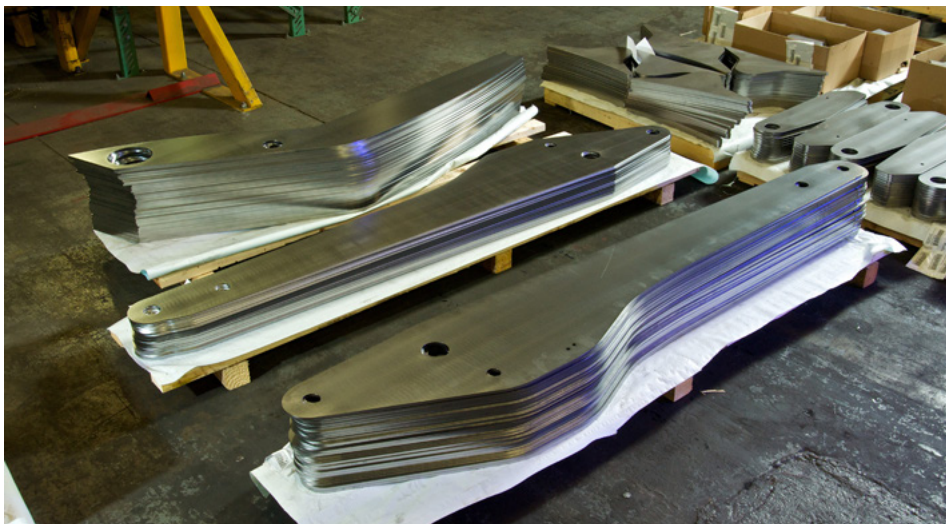
In tooling and stamping, that cleanliness factor is extremely important. Jeff Vance of Rockford Toolcraft explained that pickled and oiled material is less abrasive than shot-blasted material. "That produces less wear on the tooling components," he said, "and less costs for maintenance on dies used in our stamping operations, and they can be quite expensive."

One Southeast U.S. fabricator said his stamper operators don't like using blasted material "because it chews up the dies. They just find it's cleaner with the pickled and oiled material."

Steve Smith at AccuBurn said shelf life is another huge benefit of using P&O material. The Indiana precision-forming company sometimes goes through 2 million pounds of material a month, and appreciates that pickled and oiled sheet doesn't rust. "The laser doesn't like paint, and it doesn't like rust," Smith said. "They are a finicky beast accustomed to a smooth, smooth surface."

Getting the Industry to 1- Inch P&O

Steel Warehouse Co., AMM's winner of the Large Steel Service Center of the Year Award



in 2014, is on a mission to convince the industry that heavy-gauge pickled and oiled sheet from coil is the wave of the future. Dave Lerman and four of his brothers have transformed the small, South Bend, Ind., steel warehouse their father started in 1947 into a \$1.2-billion-dollar-a-year purveyor of hot-rolled coil, with 11 U.S. locations and more than 1,000 employees.

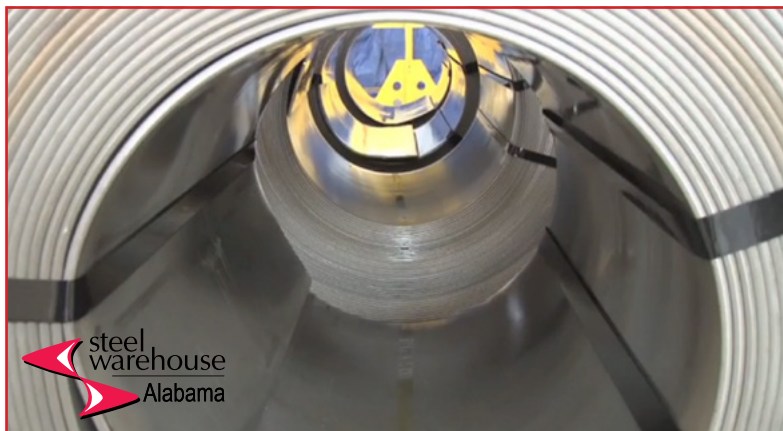
In 2013, the company built the world's first continuous steel pickler that could handle high-strength steel up to 1 inch in thickness at a Greenfield mill in Alabama. The company is in the process of building the same capability at its South Bend flagship operation.

Danny Lerman, marketing director for the family-owned company, said introducing pickled and oiled material in higher-gauge

steel is as much of an educational process as it is a sales pitch. He noted that many job shops and fabricators are committed to using shot-blasted material, even in the lighter grades. Others are convinced that discrete plate from a particular mill is the only acceptable material for laser cutting.

Lerman sees changing minds as an incremental process, with Steel Warehouse believing thicker-gauge P&O material will do the job for the vast majority of job shops. "What the metallurgist is telling us is that when they tweak the laser's burning parameters, they can get it to burn or cut as well as discrete plate with the advantage of custom sizes to reduce scrap," he said.

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Heavy Gauge Pickling: The Next Big Thing

Given today's big push throughout industry to cut costs whenever possible, it is not surprising that a growing number of manufacturers using heavy gauge (up to 1 inch thick) sheet and coil are turning to pickled steel vs. hot-rolled black or blasted plate.

Some industry observers say that such a switch could result in significant production time and cost savings at the same time as enabling them to achieve a higher quality surface with less scrap generation. It is estimated that converting to pickled material could save some companies 20 percent-plus in manufacturing costs and productivity.

"We appreciate the advancements that have been made in heavy gauge pickling,"

Jeff Vance, purchasing manager for Rockford Toolcraft Inc., Rockford, Ill., said.

"These advancements allow heavy gauge stampers such as ourselves to offer new options to customers who are looking to convert parts into stampings that might otherwise have not been possible."

One huge advantage of using pickled steel can be the elimination of production steps associated with pre-weld and pre-paint blasting. This may not only save time and money, but also reduce the possibility of damage during material handling.

Danny Lerman, marketing director of South Bend, Ind.-based Steel Warehouse Co., observed that scale often needs to be removed from steel before it is welded, usually by blasting or grinding. Often this is not necessary for pickled steel, which, in many cases, is able to go directly from welding to the paint line.

This not only eliminates one or more blasting or grinding steps, but also the need for associated material handling and storage. If the steel sits too long after blasting without being used, it can flash rust and require re-blasting or re-grinding.

A blasted substrate acts like a magnet to the adhesion of spatter, Joe DeWeese, quality manager at SFI, a Memphis, Tenn.-based fabricator, explained. Meanwhile, pickled and oiled steel has an electrostatically applied, microscopically thin layer of oil that does not interfere with welding or painting.

"But it does wonders for not allowing spatter to adhere to the surface."

The cost of blasting is often underestimated. This includes costs associated with having work-in-process inventory waiting for blasting, labor, the use of the material handling equipment needed to get materials blasted and returned to production lines, the time it takes to blast the material, cleanup, the space needed to store parts prior to blasting and proper disposal of the blasting media.

DeWeese observed that welders only spend about half of their time actually welding.

"But when they do not have to take as much time preparing the material, as is the case with pickled steel, it could increase that percentage to as much as 60 to 65 percent of their work day."

He said this saves companies

"an astronomical amount of money,"

more than offsetting the slight cost premium of pickled steel.

Lerman said that pickling also allows for faster, more accurate cutting, increased factory throughput and once the steel is painted results in a shinier, smoother, higher-gloss finish than would be achieved using blasted plate.

"Robotic welders really love pickled material,"

DeWeese asserted. The scale on hot-roll black or plate could interfere with the command and feedback loop that robots depend upon to produce a good weld.

"Having a pickled surface allows a higher-quality robotic weld with increased travel speeds," he explained.



"Pickling offers opportunities for both process and quality improvement,"

Lerman said, noting that many companies could decrease the amount of rework. An increased number of bad welds are possible when companies are welding on scale.

There are further advantages when buying pickled sheets from coil, as it enables customers to order custom widths and lengths, therefore maximizing material utilization during laser and plasma cutting.

Lerman noted that it has not always been easy to get heavy gauge pickled steel, especially in the high-growth Southeastern region. He said that is why Steel Warehouse, a service center that has been pickling steel in South Bend, Ind., for the past 60 years, started up a new plant in March 2013 in Calvert, Ala., which he said is the only facility worldwide that is capable of pickling 1-inch-thick steel coils. It is also able to pickle up to 130-psi (pounds per square inch) high-strength steel.

Lerman said his company, which offers pickled and oiled, dry lube and dry pickled products at its Calvert plant, also has a network of service centers that are able to further process heavy gauge coil up to 1-inch thick at their temper pass cut to length lines. This includes such locations as Memphis and Chattanooga, Tenn.; Houston; and Monterrey, Mexico; as well as at its Rock Island, Ill.; South Bend; and Cleveland facilities.



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