By **Tim Triplett,** Editor-in-Chief

Ahead of the AHSS Curve

Taylor Steel is successfully processing the most advanced high-strength steels made today on its new hybrid slitting line in Stoney Creek, Ontario.

Steel processors all over North America are pondering when and how they must upgrade their equipment to handle the latest advanced high-strength steels. Taylor Steel is doing it today.

Taylor invested $8.5 million in a hybrid slitting line from Herr-Voss Stamco, Callery, Pa., which went into production earlier this year at the company's No. 7 plant in Stoney Creek, Ontario, about an hour from Toronto. Taylor executives claim the line can process steels over 250,000 psi tensile strength or roughly 1,740 megapascals. In fact, it is designed to slit third-generation steels still in development that will top 300,000 psi. Such advanced high-strength steels are used mostly by the automotive industry to lighten vehicles and improve fuel efficiency.

"We are doing the highest strength steel slitting for automotive right now and are getting business from all parts of the U.S.," says John MacDonald, president and CEO of Taylor Steel. "We are making nine cuts in one pass on 1,740 MPa steel at 1.5 millimeters thick with superior edge quality. There is no material the mills can make that we can't slit."

Taylor Steel is a large toll processor and service center with 600 employees and two million tons of annual processing capacity. It operates out of 1.35 million square feet of warehouse and office space at its Stoney Creek and Lordstown, Ohio, facilities. Sixty percent of its volume comes from the automotive industry, and the other 40 percent from residential and commercial construction, oil country tubular goods, appliance and office furniture, among other markets.

For a toll processing operation to be efficient and profitable, it must operate at high production speeds. Using conventional slitting equipment, processors often must run high-strength

An operator watches high-strength coil exit the looping pit on Taylor Steel's new slitting line. The line can make nine cuts in one pass on 1,740 MPa steel.

Taylor Steel's new slitting line in Stoney Creek, Ontario, uses the latest High-Strength Slitting Technology from Herr-Voss Stamco. *(Photos courtesy Taylor Steel)*

coils through the line twice, because it does not have the horsepower to do all the needed cuts at once. Such multi-pass slitting takes extra time, adds extra cost, and produces extra scrap. Quality suffers, from poor edges to loosely wound mults.

"We decided 2½ years ago that simply retrofitting our equipment was not going to cut it," MacDonald said. "To struggle along at 30 or 40 feet a minute slitting high-strength steel was simply not an option for us."

For competitive reasons, Taylor executives were reluctant to share all the details of their new line. Rather than a single new technology, the line combines familiar components that are specially engineered to work together in a hybrid way—a strategy dubbed High-Strength Slitting Technology or HS²T by equipment supplier Herr-Voss Stamco. "How we set the line up is our own recipe. We feel it is unique for us," said MacDonald. He credits the collaboration with engineers from Herr-Voss Stamco for much of the project's success.

Randy Smith, vice president of operations at Taylor Steel,

describes the line: On the entry end, threading such stiff material is a challenge. A heavy-duty uncoiler feeds the steel into what looks like a standard Herr-Voss roller leveler. Actually, it is a multi-roll precision flattener with a drive train, roll sizing and frame specially designed to withstand the enormous separating loads of advanced high-strength steels. It can handle high-strength coils from 0.020 to 3/16th inch. "It is a critical piece in terms of getting that first 50 feet into the slitter head," Smith said. "You could not just throw any leveler on this line."

A worker at Taylor Steel readies the tooling on the company's new high-strength slitting line. The arbors for the tooling are an oversized 12 inches in diameter to prevent deflection during the slitting process.

The strip is pushed through the leveler to the entry crop shear, which squares it off. A scrap chopper, sourced from Butech Bliss, Salem, Ohio, reduces the scrap and conveys it away for recycling.

Next the material passes through the slitter, which can be set up to slit 74-inch coils into as many as 35 mults. The number of mults that can be slit is dependent on the material's tensile strength and gauge. For example, a current production automotive part slit on Taylor Steel's AHSS line requires nine slit mults, 1.5 millimeters thick, in over 1,700 MPa steel. The line is equipped with a three-head quick-change injector slitter system so workers can set up the tooling for the next couple jobs while the line is running. Readied slitter heads can be swapped out in less than 10 minutes for quick changeovers.

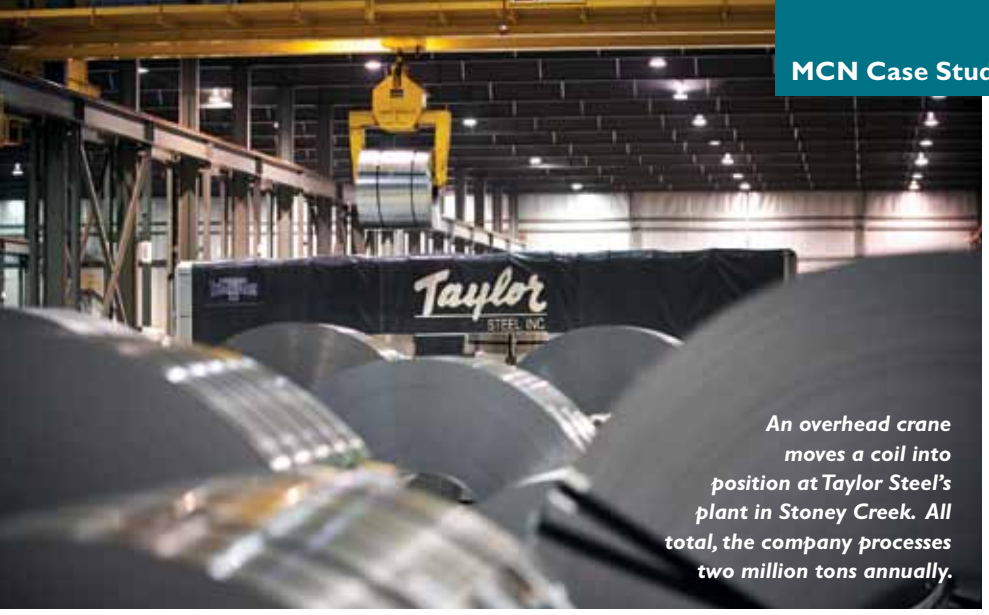
Notable on Taylor's high-strength slitting line are the large, 12-inch diameter arbors that hold the tooling. Normally, a light-gauge slitter would not need such heavy-duty arbors. But because AHSS has such a high tensile strength, even at its typically thin gauges, the big arbors are needed to prevent deflection.

The tooling that goes on the arbor is also different. Taylor sources its slitter knives from Asko Inc., Homestead, Pa. Asko has put a lot of R&D into the metallurgy for knives that can hold up to the rigors of slitting advanced high-strength steel. "We've been working with several mills and service centers to develop these grades over the last 10 years. We know it's coming [higher-strength alloys] and it's only going to get worse from a tooling standpoint," says Al Zelt, Asko's director of sales and marketing.

Taylor Steel President John MacDonald (back) and Vice President of Operations Randy Smith examine a coil sealed tight against the elements for shipment. The material is destined for a surface-critical automotive exposed application.

The challenge is to develop knives that are wear resistant enough to be cost effective yet not so tough they will chip. "We have tool steel chemistries that are melted specifically for our slitter knives. It's pretty proprietary stuff," he says, declining to elaborate.

Critical to the success of the slitting operation is the horizontal clearance between the tooling and the material. The clearance on a conventional



An overhead crane moves a coil into position at Taylor Steel's plant in Stoney Creek. All total, the company processes two million tons annually.

slitting line is normally 10-12 percent of the material's thickness. The clearance on Taylor's line is also proprietary. The slitter design effectively decreases the rake angle of the knives hitting the material for a more gradual cut, which has a positive effect on the cut-edge quality and the life of the knives. "The nuance of how you set up the equipment and adjust those heads is something we have engineered and perfected through much trial and error," Smith said.

Advanced high-strength steels require more tension to wrap into tightly wound coils, which is why the line is equipped with multiple tension devices, including a tension stand, a 40-foot looping pit and a Herr-Voss Strand Extensioner that steers the slit mults into the recoiler. Typically, a slitting line with a Strand Extensioner would not need a looping pit, but with AHSS, the weight of the steel in the pit provides extra back tension to assure a tight wind of each strip, Smith explains.

Coil that has been uncoiled and leveled for slitting tends to fight the recoiling process. With high-strength steel, the battle is even tougher. Thus the line has more heavy duty hold-downs to prevent a coil from springing free before it can be safely banded.

Obviously, the whole process takes a lot more horsepower, but company executives declined to offer further specifics on the motors, drives, hydraulics or other details of the engineering, which they consider to be their own intellectual property.

Taylor's workforce has stepped up the challenge of learning new procedures for this high-strength slitting line. "It takes specialized training above and beyond a normal slitter," Smith says.

Companies that think they can just run high-strength steel on their existing heavy-gauge lines will find they are seriously mistaken, says MacDonald. "That is one of the fallacies. You can't just take this light-gauge high-strength material and, because it requires more horsepower, put it on a heavy-gauge line. It is not that easy."

The industry is facing a steep learning curve when it comes to processing the new high-strength steel alloys, MacDonald says, and Taylor Steel is ahead of the curve, "AHSS is a different animal. When I started in this industry, 50,000 psi was a big deal. Today it's four to five times stronger. It affects nearly every aspect of the way you process steel. When the third generation of high-strength steel comes out in four to six years, we'll be ready for that, as well."

"It has been an interesting process to work with Taylor's engineers to develop this technology," says Greg Santillo, director of sales and engineering at Herr-Voss Stamco. "We believe the industry will have a strong need for HS²T in the next 10 years as automotive manufacturers continue to use more high-strength materials." ■

"There is no material the mills can make that we can't slit," claims Taylor Steel President and CEO John MacDonald.