Harris Equipment's recycling products such as this cardboard bailer require tapping extremely durable wear plate liners made from Hardox 450 steel (45 HRC). (All images provided by Harris Equipment)

HARRIS EQUIPMENT

Long-Lasting Taps Deliver 400 Hard Holes, 50 Percent Savings for Equipment Manufacturer

Recycling equipment manufacturer Harris Equipment Co., Cordele, Ga., saved 50 percent per job tapping Hardox 450 steel wear plates by switching to taps from Emuge Corp., West Boylston, Mass. The 45 HRC wear plates are used as liners in the interior of its recycling products, such as cardboard bailers.

The increasing number of delivery vehicles supplying an increasing number of boxes is generating a stream of cardboard, paper, plastics and metals that need to be handled and recycled. As a result, demand is strong from the recycling industry for Harris Equipment's recycling products, including small paper bailers, mega shredders and shears.

Harris, which has been an industry leader in manufacturing scrap recycling and processing equipment for over 100 years, is staffed by expert factory technicians, well-trained customer service representatives and knowledgeable employees at two state-of-the-art manufacturing and service facilities in Georgia. Harris' recycling equipment is highly regarded as trustworthy and exceptionally durable. The Harris engineering group has years of experience and employs the latest innovative cutting edge technology to design safe, cost-effective equipment.

"Our customers demand the highest quality equipment with performance that will outlast any of our competitors' products," said Heath Parks, industrial engineer/programmer at Harris Equipment. "We produce 55 percent of the recycling and waste equipment in the industry, so we need to continually ensure we are using only the best tooling, engineering and construction products."

To withstand the enormous amount of wear and friction that its recycling equipment must endure, Harris uses materials that are hardened and abrasion-resistant to build reliable, long-lasting, products. These materials are challenging to machine, in the 35-46 HRC hardness range.

An important part of the manufacturing process is machining holes with strong threads, which Harris has been producing on

horizontal and vertical CNC milling machines. Wanting taps that are long lasting and that could produce consistent results, Harris approached Emuge Corp. to see what improvements could be made in the thread making process.

"We were using budget-priced taps and were constantly breaking them, changing out the tooling and having to repair parts due to tapping issues," said Parks. "Emuge recommended performing a test with its tap compared with the incumbent tap in our challenging application, and the results have exceeded our expectations."

The CNC vertical machining center (VMC) parameters reveal just how challenging the test of the 45-HRC HARDOX 450 material would be. The feed rate was 6.6 ipm (0.16 m/min) and feed was 0.1000 ipr (2.54 mm/rev) with a 1.5" (38.1 mm) depth of cut, a drill diameter of 0.656" (16.7 mm) and a nominal diameter of 0.7500" (19.0 mm). The cutting speed was 13 sfm (3.9 m/min) and the spindle speed was 66 rpm. In the test, tool change time was five minutes and the cycle time per hole was 27.2 seconds.

Harris Equipment approached Emuge Corp. to see what improvements could be made in the thread making process. After a performance test, a single Emuge C-Ti Tap is getting 300-400 holes in Hardox 450 steel wear plates compared with 67 holes before tap failure with the incumbent tap.

Emuge National Accounts Manager Scott Lowe (left) and Harris Equipment Shop Leadman William Lee determined the Emuge C-Ti Tap is the right choice for making threads in the Hardox 450 steel wear plate.

With a single Emuge 3/4" (19 mm) – 10 3BX C-Ti style tap, Harris is now producing 300-400 holes on the huge Hardox 450 steel (45 HRC) wear plates. "Before using the Emuge tap, we were only able to thread up to about 67 holes at most without the tap failing," said Parks. "In fact, the Emuge tap still performs well after 400 holes," he said.

The Emuge C-Ti HSSE (high-speed steel) tap has 15° left-hand spiral flutes designed for tapping through holes in high tensile strength materials, including titanium alloys. TICN coating is applied to the tap for additional wear resistance. The taps produce a 3B tolerance thread form and have a form D chamfer length of 4-5P.

Now that the Emuge taps have been implemented, productivity has increased over 20 percent in the number of holes per tap, saving Harris 50 percent of its cost per job. Harris manufactures the liners in a wide range of sizes, from 6 x 10" (152 × 254 mm) to 32 × 84" (812 × 2133 mm) with an annual cost savings estimated at nearly $6,000 when using the Emuge taps.

Threading holes on hardened, abrasion-resistant Hardox 450 steel demands the right taps for a quality result.

"The Emuge tap is long-lasting, minimizing the need to perform tool changes. Now we have at least an extra hour every week to run more parts. You really do get what you pay for," said Parks. Even though the Emuge tap costs $50 more than the incumbent tap, it lasts much longer so that only 17 Emuge taps are needed for annual production of the liners as compared with 75 of the competitor's taps. Parks continued, "We haven't broken an Emuge tap yet." Harris Equipment is now testing more Emuge taps, including the larger diameter 1" (25.4 mm)–8 C-Ti style to see where more improvements can be made, including in even harder material ranging up to 50 HRC.

Emuge's Scott Lowe (right) and Harris Equipment Machine Operator Danny Bundrick review the Emuge C-Ti Tap's capabilities.

Parks has been pleased with the assistance provided by Scott Lowe, Emuge national accounts manager; Gene Cone, metalworking specialist for MSC Industrial Supply Co., the Emuge distributor for Harris Equipment; and Dylan Bowles from Emuge tech support. In addition to determining the right tap for the application, the Emuge team made important recommendations for proper speeds and feeds. "Emuge taps have increased the quality and performance of our machining process," Parks said. "Hand chasing threads and tap breakage are now a thing of the past."

Emuge is a leading manufacturer of high-performance taps, thread mills, drills, end mills and other rotary tools. The Emuge West Boylston, Mass facility has the capability to manufacture standard and custom end mills, as well as recondition carbide drills and end mills, reamers, and Emuge HSS-E taps. More than 10,000 types of Emuge cutting tools and accessories are stocked in West Boylston.

For information on Harris Equipment Co., visit harrisequip.com or call 229-273-2500. For information on Emuge Corp., visit www.emuge.com or call 508-595-3600.