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Mighty jawed cutter chews tungsten heavy alloys

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Aerojet Ordnance Tennessee, a wholly owned subsidiary of aerospace and defense contractor Aerojet General, fabricates parts from tungsten heavy alloys and other refractory metals for defense-related products, including ammunition, warheads and electronic shielding. Tungsten heavy alloys are among the densest metals produced with a density 2.5 times that of steel.

The alloys and other refractory metals Aerojet works with are like ceramics in that they do not melt, but are compacted from powder into shapes and sintered to full density, after which they are machined and finished. Scrap is generated as a result of compaction, of sawing of large blocks and other processes.

Reclaiming fabrication scrap was difficult and costly, prompting Aerojet to sell the scrap at significantly lower prices than it was worth as a recycled and reusable material. "If we can reuse the material it's worth two- to three-times more to us than selling it as scrap," said Tim Brent, project engineer at Aerojet. "But, we couldn't reuse the material without an effective means of size-reduction."

Aerojet experimented with techniques to reclaim tungsten heavy alloys scrap; however, none of the methods was efficient or produced consistently sized particles. Aerojet finally decided on an SCC 15 Screen Classifying Cutter from [Munson Machinery Co. Inc.](#) "The design is simple and stands up to the tungsten heavy alloys," says Brent.

The cutter downsizes hard materials like tungsten heavy alloys into controlled particle sizes with few fines and no heat buildup. Key to its efficiency is a helical rotor with dozens of tungsten carbide-tipped cutter heads attached to an array of interconnected parallelograms that, with each turn of the rotor, creates a steady and even cutting action against a pair of bed knives.

The rotor generates six times greater force per inch with each cut than conventional knife-type cutters of equivalent horsepower, contributing to uniform size reduction and reduced energy use. The rotor efficiently moves material to take full advantage of the screen area, preventing hot-spotting.

The cutter has a 10.5-in. (26.7-cm)-wide helical rotor with 30 knife-holders, each with two chiselshaped, tungsten carbide-tipped cutting heads for a total of 60 cutting tips that maintain sharpness longer than tips of conventional tool steel to reduce maintenance and downtime. The teeth slide onto each machined holder and screw into place, speeding changeover. The two hardened toolsteel bed knives are reversible: when one edge wears down, the other edge can be used; when both edges become dull, they can be resharpened.

"We manually batch-feed about 100 lb (45.4 kg) of scrap through the cutter per hour, although the machine can do much more than that, and remove it by hand," Brent said. "The cutter sees surges of several pounds over a matter of seconds as feeding is intermittent. The downsized material occasionally



Helical rotor (top) with dozens of tungsten carbide-tipped cutting heads. (second and last), the SCC 15 downsizes tungsten heavy alloy scrap into power for reuse.

several pounds over a matter of seconds as feeding is intermittent. The downsized material occasionally requires finemilling, but in some applications we can go directly from the cutter to the compaction process.”

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