

ENGINEERED MATERIALS

TOUGHMET®

BRUSH WELLMAN

Brush Wellman's ToughMet® Alloy Handles "Pressing" Issues

By Brush Wellman

By replacing aluminum bronze, Brush Wellman's ToughMet® alloy is helping companies like H.C. Starck in Coldwater, Michigan reduce maintenance time and costs.

H.C. Starck is a producer of a unique assortment of refractory metal powders, including tungsten, molybdenum, tantalum, niobium, rhenium as well as their compounds (borides, carbides, nitrides, oxides, silicides, sulfides). Additional production focuses on thermal spray and advanced ceramic powders, nonferrous metals, such as nickel and nickel salts, as well as boron and boron compounds.

H.C. Starck's location in Coldwater, Michigan began manufacturing in 1958 and played an essential role in using the arc cast process. This process is still used to melt the highest quality molybdenum ingots. In the mid 70s, a 5,500-ton capacity horizontal extrusion press was installed for extruding arc cast molybdenum ingots. Through the years, the press has been expanded in scope to provide toll extrusion services for manufacturing a wide variety of shaped metal alloys.

Today, H.C. Starck's Coldwater facility provides molybdenum powders, extrusion services and molybdenum wrought bars for the glass melting, medical diagnostic, vacuum furnace, electronic and aerospace markets. The extrusion press offers toll conversion of refractory metals, superalloys, nickel base alloys, copper alloys, stainless steels, superconducting materials, and many other exotic and pure metals into rod, tubulars and near net shapes.



ToughMet®, an engineered alloy of copper, nickel and tin, combines lubricity and wear resistance to extend maintenance cycles and increase equipment reliability.

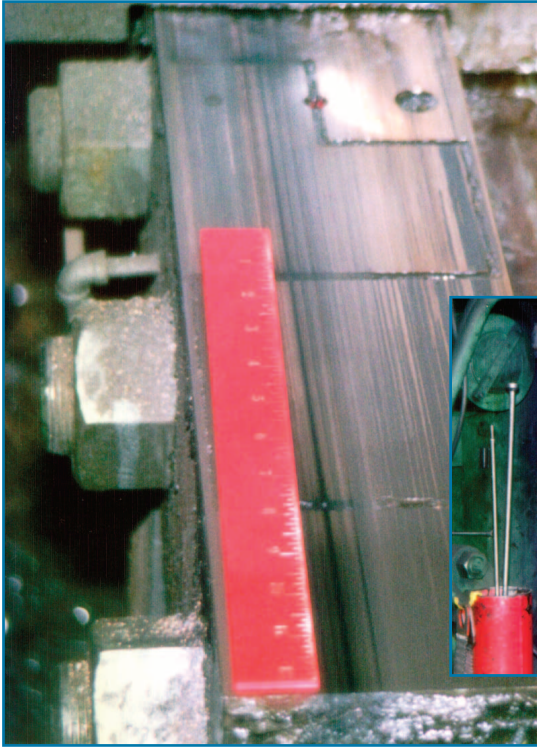


Reliable operation of an extrusion press is essential for a rod or tube mill.

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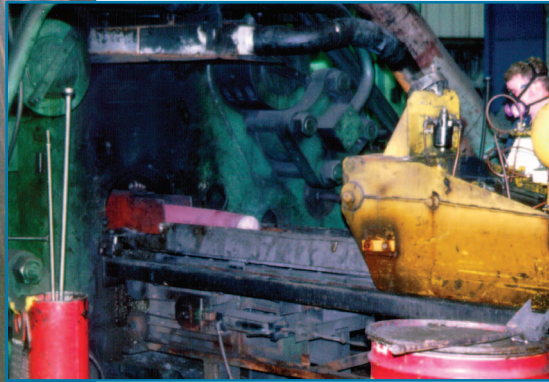
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ALL WORN OUT



ToughMet ways provide better wear resistance and less friction as compared to aluminum bronze.

A few years ago H.C. Starck began exploring options to increase up time by extending the life of the ways that support the 30,000-pound hardened steel container on the extrusion press. The container holds the billet against the die during the extrusion process. Approximately 300 times per day, the container slides along the ways allowing operators to lubricate, clean and change the die between extrusions.



As the ways wear, operators must re-align the container and die, requiring the press to be down for about 1 to 1½ hours. When the ways have worn out, H.C. Starck must shut down the press to remove and replace them. Surfaces of ways made from C95400 aluminum bronze typically

showed about 0.060" of wear after one year of service and required replacement after about two years.

To combat the wear problem, H.C. Starck replaced the C95400 container ways with Brush Wellman's ToughMet® 2

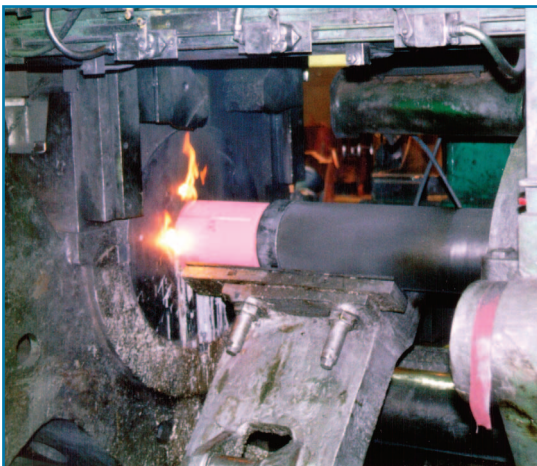
CX90. Fifteen months after installation no evidence of wear was found. ToughMet lasts at least twice as long as C95400, saving about one day per year in lost production.

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"We've been using ToughMet

for about four years and have not seen any appreciable wear since its installation," said Jim Wodyka, Extrusion Process and Development Engineer for H.C. Starck. "ToughMet has only been replaced 2 times since it was installed."

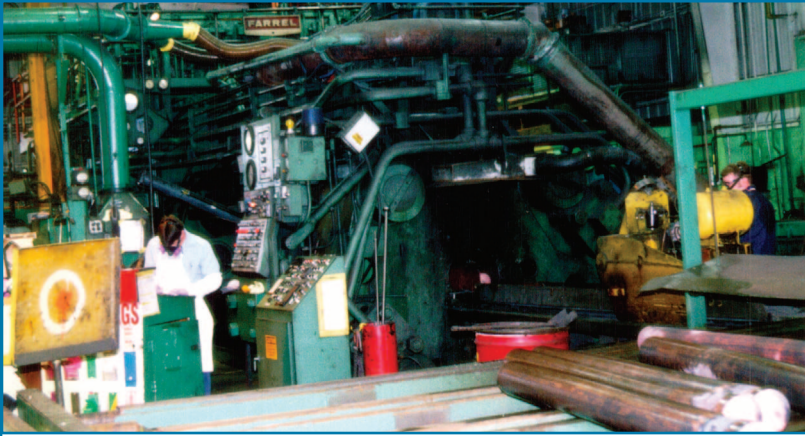
A HARSH DAY'S NIGHT



Excessive erosion of wear pads can lead to misalignment of the press, resulting in further wear or tooling damage.

Adding to the already harsh environment in the H.C. Starck plant is the use of a high-temperature lubricant, such as graphite and powdered glass, which can fall and solidify as a particulate on the ways causing abrasive wear in softer materials. These extreme conditions have been no match for ToughMet.

"ToughMet's ability to perform in harsh environments has been extremely impressive," adds Wodyka.



Rod and tube mills now use ToughMet® in downstream components like forming rolls, guide bars and pivot bushings.

ToughMet® is a spinodally hardened copper-nickel-tin alloy that combines high strength, lubricity and wear resistance under severe loading conditions. In comparative sleeve bearing tests against a hardened steel shaft, ToughMet shows unprecedented performance for a metallic bearing material.

NOW IT'S OUR TURN

After documenting the success of ToughMet on the extrusion press at H.C. Starck, the alloy was installed on Brush Wellman's own extrusion press in Elmore, Ohio. The die slide is supported by wear pads, which push the slide back and forth during extrusion. These wear pads were originally made from C95900 (aluminum bronze) and would wear about 0.015" – 0.020" every six months requiring that the die slide be raised to compensate for the wear. Since replacing the aluminum bronze with ToughMet, the wear pads have already

lasted at least twice as long (at the time of publication), and are still going strong.

"ToughMet's ability to perform in harsh environments has been extremely impressive," adds Wodyka.

"A typical shutdown for preventative maintenance takes at least three days," said Jim Stein, Production Supervisor at Brush Wellman's Elmore plant. "We are essentially eliminating our 6-month shutdown by analyzing the alignment once a year instead of twice and have increased our capacity by 180,000 pounds per year."

ABOUT BRUSH WELLMAN

Brush Wellman, a subsidiary of Brush Engineered Materials Inc., is the world's leading supplier of high performance alloys, providing high reliability copper beryllium and spinodal alloy products with unparalleled global service.

Brush Wellman's ToughMet is an engineered alloy of copper, nickel and tin. It has the strength and hardness of titanium and the low friction typically associated with bronze. Like steel, ToughMet boasts great wear resistance as well as freedom from galling against any material, including itself. Additional benefits of ToughMet include: resistance to corrosion and excellent machinability (3 times as fast as tool steel). Additionally, ToughMet is lead-free.

ToughMet derives its unique characteristics from a hardening mechanism called spinodal decomposition. Achieved by a proprietary heat treatment process, spinodal decomposition creates a fine, homogeneous microstructure with ultra-microscopic strengthening, which is a key aspect of advanced bearing technology. Using the patented EquaCast™ process, Brush Wellman can offer ToughMet in a wider range of shapes, sizes and tempers than would be available through conventional casting and metalworking processes.

To learn more about ToughMet, visit www.ToughMet.com or call 800-375-4205.

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