

TOUGHMET® APPLICATION:
EXTRUSION PRESS WAYS

Profile: HC Starck

By replacing aluminum bronze, Materion Brush Performance Alloys' ToughMet® 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.

ALL WORN OUT

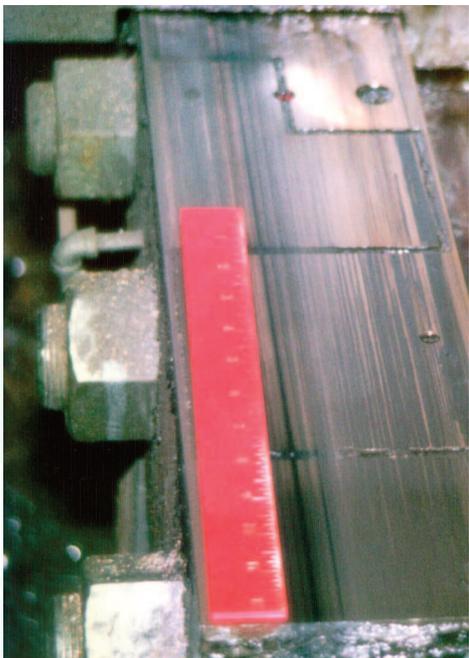
A few years ago H.C. Starck began exploring options to increase up time by extending the life of the ways that support the 30,000-pound hardened steel container on the extrusion press. The container holds the billet against the die during the extrusion process. Approximately 300 times per day, the container 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 1 1/2 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.

(cont.)



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



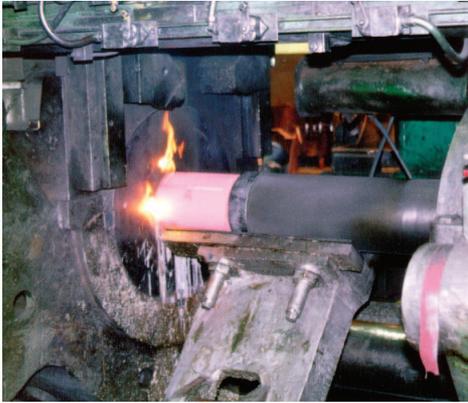
ToughMet® ways provide better wear resistance and less friction as compared to aluminum bronze.

TECHNICAL INQUIRIES

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



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

To combat the wear problem, H.C. Starck replaced the C95400 container ways with Brush Performance Alloys' 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. "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

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.

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 Performance Alloys' 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. "A typical shutdown for preventative maintenance takes at least three days," said Jim Stein, Production Supervisor at Brush Performance Alloys' 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."

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