SCProbond™ in Mineral Processing

"The worn gas-nitrided steel cutter blocks were replaced *TWICE*, before the NBSiC had about 40% wear."

Mineral processing is one of several industries whose efficiency can be improved with proper use of silicon carbide liners. The refining of raw materials into usable product contributes to everyday processes around the globe that make up life as we know it. Trona is a raw material that can be refined into soda ash, and ultimately used to produce glass, paper products, baking soda/powder, and many detergents. **Trona is a harder, more abrasive substance compared to other mineral ashes and salts** and the equipment involved in it's refinement needs to withstand material velocities and volumes that create an extremely abrasive environment.

Part of the Trona refining process involves rotor blades accelerating the sorbent particles against the teeth of components called cutter blocks to break the particles apart. SCP provided custom cutter blocks made out of our SCProbond™ 'N', nitride bonded silicon carbide after previous materials could not meet run-time requirements.

From forged AISI 4140 gas-nitrided steel, to tungsten carbide cobalt coatings, to white cast iron cutter blocks, each provided some level of wear-protection, but the SCProbond™ cutter blocks had only 40% wear by the time the gas-nitrided steel blocks had been replaced twice. The advantage is in the combination of extremely hard SiC grains and the extremely strong bond provided by the nitrogen penetration during firing. The hardness of a grain will not provide long-term abrasion resistance if the bond holding it in place cannot also survive.

How long did the standard carburized cutter blocks last when exposed to Trona?
The gas-nitrided cutter blocks typically last an average of 5 million pounds.
The NBSC cutter blocks were only worn about 40% after 10.9 million pounds.

Since installation in 2018, the SCProbond™ cutter blocks have now milled **over 16 Million pounds of Trona** and they are still in service now in 2022. With the success of the Trona milling, our customer wanted to put SCProbond™ to the test up against a newly developed, finer and more abrasive, sorbent. As a finer blend of material, there were concerns that it may erode the bond between the silicon carbide grains.

"We installed (20) NBSC cutter blocks in each of two mills in series. After completing 5 days of testing, the NBSC cutter blocks milled over 495,000 lb of the silica-based sorbent and are worn less than 10%, as opposed to the standard cutter blocks which were completely worn out after about 50,000 lb."

-Customer & Senior Product Development Engineer

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