New Product Spotlight...

Graphite Replacement in Extrusion Handling Systems

The aluminum extrusion industry is expecting robust growth in the 21st century, as more companies are predicted to bring production back to North America. With this growth, extruders are recognizing the need to improve product quality and plant working conditions. Albarrie Canada Limited, a leading manufacturer of technical needle punch felts, and partner to the aluminum extrusion industry for 30+ years, has determined how graphite’s usage on the popular walking beam handling system can be reduced (Figure 1).

**Problem:** Carbon graphite blocks and wood are used on the transfer, stationary, and/or walking beams of aluminum extrusion handling tables. These materials are used due to the extreme temperatures of aluminum extrusions after profiles have been extruded. The temperature of a profile exiting the press can range from 850°F to 1,100°F. The graphite blocks/wood slats range in thicknesses of ¼ inch to 2 inches. Carbon graphite blocks have been acknowledged by the industry to cause graphite deposits, ghosting marks, friction scratches, and may even be a health hazard in production facilities. Ghosting is caused by the difference in the localized cooling rate due to contact on graphite or wood affecting the size and distribution of the Mg2Si precipitate in that area (Figure 2). When characteristics of the Mg2Si change, the structural strength of the extrusion is compromised. (See “Defects Affecting Extruded Surface–Soft Spots,” Light Metal Age, December 2015).

It is easy to determine whether a facility uses carbon blocks by the amount of black dust found on surrounding surfaces. This may affect numerous systems such as optical sensors, motors, paint lines, and anodizing equipment, while hindering the overall cleanliness of the plant.

Historically customers have not been as concerned about profile finish as they are today. Aluminum is no longer hidden in the final product. Conversely, it has become a preferred architectural metal where the surface quality is critical. Graphite marking inflates overall costs for extruders; particularly in waste management and customer satisfaction.

A common concern amongst extruders is sourcing a product equivalent to graphite while minimizing changes to the handling system, e.g., dimensional characteristics and selecting a method to attach the material.

**Solution:** Kevlar® is a popular choice in handling systems because it has excellent heat dissipation, it is non-abrasive and withstands high operating temperatures. Kevlar pads have typically been manufactured in thicknesses of 10 mm to 12 mm. Previously, extruders employed wood either directly or in conjunction with a Kevlar-padded top to replace these thick graphite blocks. Initially, Kevlar protected the surface of the aluminum from scratching and denting, but ghosting still occurred due to the wood’s less than ideal thermal properties. Albarrie has engineered a new technology, created from soft Kevlar fibers into a wood-like, durable, rigid board, known as the Defender™ Durafiber Board (Figure 3). This product can be used as a direct replacement for graphite blocks matching thicknesses up to 2 inches. This allows for the removal of all other materials to make up dimensional differences, and also takes advantage of thermal properties to eliminate the common problems associated with graphite or wood.

The Defender Durafiber Board may be counter-sunk, profiled, chamfered, drilled, h-grooved, or vgrooved to meet installation requirements. Another significant advantage is that when one side is worn, it can be flipped to make use of the other side, which allows for a longer operating life.

Trials of the Durafiber Board proved successful with reduced ghosting, scratching, and abolished graphite transfer. This product had the same dimensions of the carbon it replaced and eliminated handling table recalibration. Scrap yields were significantly reduced, quickly justifying the cost variance between the Durafiber Board and graphite. Consequently, extruders observed an increase in customer satisfaction with the extrusions. After one year in service, employees were pleased with the elimination of carbon dust and the overall improvement in plant cleanliness.

**Conclusion:** The Defender Durafiber Board is a superior replacement for solid carbon blocks on walking beam handling systems. Several benefits were achieved in this trial, including: the elimination of graphite marking, a reduction in scratching and denting, minimization of discoloration/ghosting, and the elimination of carbon dust. All these advantages can increase plant cleanliness, and employee health and safety. It also required no table recalibration and offered easy installation.

In addition to working towards a solution for the aforementioned problems, Albarrie found that Durafiber did not crack or break during the trial period. Longevity was extended by turning the board over to utilize both surfaces. The overall weight reduction achieved by switching from graphite to the Durafiber Board is predicted to reduce wear and tear on the drive system of the table.
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