

Partnering for Hardfacing

When end users, OEMs and hardfacing manufacturers collaborate, more efficient results are achieved

Frequently, end users of wear-resistant machine components are at the mercy of resources they do not possess. Hardfacing materials, welding processes and alloy selection sometimes appear to be insurmountable challenges. End users' chief enemy is downtime during component changeouts and hardfacing procedures to prolong component life, and they need expertise in a number of areas to keep these challenges at a minimum. Partnering with OEMs and hardfacing manufacturers can reduce end users' unexpected problems and financial woes.

OEM material selection traditionally involves an incisive choice of steels and castings that are compatible, cost effective and competitive. Some OEMs have taken further steps to understand and provide aftermarket components that are wear resistant and affordable. Others choose to allow the aftermarket entities, such as the hardfacing industry, to supply customer needs in the form of stick electrodes, cored wires and procedures to combat wear. On the surface, the OEM and end user relationship appears to satisfy each entity. However, a closer look illustrates that a better alliance between all parties, including the hardfacing manufacturer, could have prevented chaos.

Missing links

Abrasive environments, which include hoppers and chutes, are OEM fabricated using up to 300 BHN hardness, ASTM A514 quenched and tempered steels. Because these are modestly abrasion resistant, the customer can request something better than A514, and frequently AISI 4140 or AISI

4340 quenched and steels tempered to 350 to 450 BHN are selected. While incrementally better, they eventually wear and hardfacing is required. Immediately there is a problem; 4140/4340 have very good hardenability, which means they can easily be hardened during arc welding. Unless special precautions are made, such as preheating at 500 degrees Fahrenheit and slow cooling by preheating at 50 degrees

Fahrenheit per hour, the weld deposit heat affected zone will rise exceedingly high, putting the structure at risk for premature and possibly catastrophic failure. A popular choice for the hardfacing product would have been chromium carbide alloys, which produce a multitude of stress-re-

lieving cracks. They provide exceptional wear resistance, but the application over easy hardenable 4140/4340 steels, severely limits their use. In this case, it's clear collaboration between OEM, the end user and the hardfacing manufacturer was needed.

ASTM A-532 Nihard castings for grinding have been a mainstay in the coal, brick, rock and sand industries. One of the popular features of these grinding mill components is the ability to hardface worn grinding rolls and bowls (tables). Frequently in today's market, an unsuspecting purchaser of new grinding mills may inherit high chromium white iron rolls and bowls, and their chemistry defies any attempts at hardfacing. Worn rolls or bowls are replaced by new high chromium iron components at the expense of any economic advantage the end user might have had with hardfaced Nihard components. Again, collaboration between OEM, the end user and the hardfacing manufacturer was needed.



The rewards of collaboration

Collaboration, or the art of partnering, is demonstrated by a venture into underground rock crushing in a coal mine. The coal mine wore out a set of crusher hammers in four weeks. Postle Industries and the OEM were contacted to advise about how to extend the hammer life. All entities contributed to the base material selection, welding process and the hardfacing consumables. After consensus was reached and testing with Postle's new Inlay hardfacing process, the hammer life was extended 300 percent (16 weeks). In addition to a happy end user, the OEM is now considering additional components to their equipment line. Their product depth has the potential to separate them in the industry.

Hardfacing consumable manufacturers, such as Postle Industries, are willing to participate in this type of prudent partnering. Postle's engineering and metallurgical resources can input valued information such as:

- Base material selection based on weldability, wear resistance, hardness, crack resistance, weld strength and other metallurgical considerations;
- Hardfacing products and procedures based on OEM and aftermarket requirements;
- Expected component life;
- Cost effectiveness; and
- Consumable availability.

In a true partnership, each entity brings its own expertise and resources—laboratory, engineering or financial information—to the table for all to examine and discuss. In the end, the end user benefits by extending component life and minimizing downtime. The OEM benefits by having complete control over the integrity and longevity of its products and more importantly, a happy customer and potentially a reorder possibility. The hardfacing manufacturer benefits by directing how the consumable is used and what products are used for a specific application. **FFJ**

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