The CERAMIC WELDING PROCESS was developed and originally designed for the situ repair of glass furnaces. In 1979 the technology was introduced to the United States as a method to repair coke oven walls in the steel industry. Since then the process has evolved to include other industries, primarily glass, aluminum, copper, foundry and cement.

**PROCESS**

Ceramic welding is applied during furnace operation by conveying a dry mixture of refractory aggregate and oxidizable particles together through specially designed water-cooled lances. Many different lance sizes and configurations can be utilized to reach damaged areas inside the furnace or vessel.

The oxygen rich stream of powder contacts the hot furnace refractory lining where the metals oxidize during a highly exothermic reaction. Enough heat is produced (between 1600-2200C) by the combustion of the metals to melt the surface area of the refractory particles in the mixture as well as the surface of the damaged refractory lining. This reaction creates a long lasting durable bond.

Ceramic welding does in fact provide a very similar weld mass compared to the substrate refractory being restored. Difficult repairs are better facilitated with the use of Fuse Tech's special water and air cooled furnace viewing equipment which allows technicians to view hard to see areas of interest. This equipment is capable of recording color or black and white video with audio.

Fuse Tech is also able to print on-site photographs of any area inside the furnace or vessel. This provides a useful tool to help gauge ceramic welding value by showing customers the before and after photos of the repairs.
BENEFITS

The key benefit of using ceramic welding is that it is performed while the furnace or vessel is at or near operating temperature. There is no need for shut down or cool down. The end result is no or minimal loss of production. With the sometimes staggering cost of even a partial rebuild or re line, ceramic welding becomes an attractive alternative to extending furnace or vessel life.

INDUSTRIES SERVED

Ceramic welding is utilized by most glass makers to prolong the life of their furnaces' refractories without production loss. This market includes: flat glass producers, container glass producers, fiber glass producers, sodium silicate producers and many other specialty glass producers.

Ceramic welding is utilized by most coke producers to prolong the life of their oven's refractories with minimal production loss. Taking ovens out of service to re-brick them has a major impact on the coke producers ability to keep up with production demands. Ceramic welding is an attractive alternative because the time the oven is out of service is greatly reduced compared to through wall or even an end flure repair.

Ceramic welding in the cement and minerals processing industries is becoming more popular with the advent of patent pending technology which allows Fuse Tech to attach stainless steel refractory anchors to the inside hot face of the kilns steel shell without shut down.

After anchors are attached to the shell, ceramic welding is utilized to repair the damaged refractory. Welding takes place directly onto the steel shell, directly onto and around the anchors, and is tied into the surrounding refractory that has remained intact.

The areas of application include: kiln nose ring, kiln burner pipe, cooler bullnose, cooler walls, preheater cyclones and riser duct, firing hood and precalciner walls and roof.

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Materials

Ceramic Welding Powder Formulations and Their Applications

HWC-AL-1
High Alumina Based Ceramic Welding Material
Primarily Used in the Repair of Cement Kiln Nose Rings, Cyclones, etc...

HWC-AZS
Based Ceramic Welding Material Primarily Used in the Repair of Glass Furnaces.

HWC- FC-1
Fire Clay Based Ceramic Welding Material Primarily Used in the Repair of Coke Oven Jambs.

HWC-S-1
Crystalline Silica Based Ceramic Welding Material Primarily Used in the Repair of Glass Furnaces and Coke Ovens.

HWC-S-2
High Purity Fused Silica Based Ceramic Welding Material Primarily Used in the Repair of Glass Furnaces and Coke Ovens.

Before

After