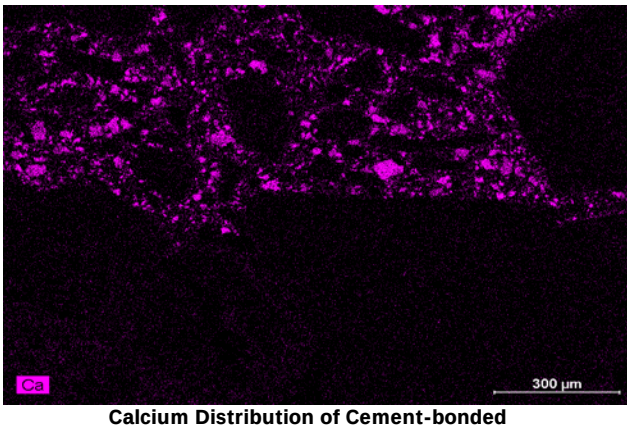
THE STELLAR BINDER SYSTEM™

The Stellar Binder System™ (SBS) is a patented mono-phosphate bonding technology that involves a two-component mix of dry aggregate and powders plus a phosphoric acid liquid activator. Both Thermbond® Refractories and Phoscrete® Concretes utilize variations of the Stellar Binder System™.

THERMBOND® AND PHOSCRETE® PRODUCE HIGH-STRENGTH CHEMICAL BONDS

Cement-bonded materials form only a mechanical bond at ambient temperatures. These conventional materials adhere because of their rough surface. As a result, cement-bonded materials have far less strength at ambient temperatures and can be weak during heat-up and when exposed to thermal stresses.

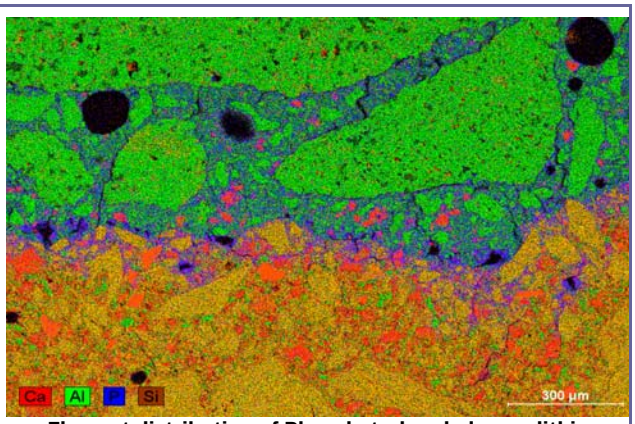
Thermbond® Refractories and Phoscrete® Concretes chemically bond both to themselves and to existing substrates. During the exothermic reaction between the dry aggregate and the liquid activator, ***ionic-bonding*** occurs to form metal-oxide phosphates. This high-strength chemically-bonded compound insures both coherence and adherence and is therefore extremely durable in high stress environments.



Calcium Distribution of Cement-bonded monolithic material. (Conventional Refractory)

60% alumina LCC castable on 60% brick

The Calcium Distribution demonstrates that the calcium aluminate cement does not penetrate the surface of the brick. Cement hydration occurs only at the interface forming only a mechanical bond.



Element distribution of Phosphate-bonded monolithic material (Thermbond® Refractory)

90% alumina phosphate-bonded castable on 40% alumina cement castable

Phosphate is roughly 100 microns infiltrated in the cement-bonded material and reacts with calcium from the cement to form calcium phosphate.

The Slant Shear Bond Test demonstrates that upon impact, materials made using the Stellar Binder System™ stay bonded to the existing substrate and do not slide off at the bond plane. Instead the entire casting breaks directly through the bond line!

The Bolt Pull-Out Test: a core was drilled into a block of concrete and then filled with an SBS-bonded material. A steel bolt was set deep into the repair material prior to set. When stress applied on the bolt reached 72,650 PSI, the concrete block actually broke in half and the SBS material remained bonded to the concrete block!