

CONCRETE CHATS

A MONTHLY NEWSLETTER OF BOMETALS, INC.

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Concrete Components

We have spent a lot of time on concrete slabs during and after placement, particularly with regards to load transfer and water containment. What about concrete as a material? After all, the name of the newsletter is “Concrete Chats” so let’s spend some time over the next few installments talking about various aspects of concrete and what makes it one of the most versatile and functional construction materials available. At its most basic, concrete is often described as a mixture of sand, rock, water, and cement. It has been that way for thousands of years although some of the materials have evolved. Modern Portland Cement was patented approximately 200 years ago and brought with it improvements in properties like early age strength and set times. Improvements in cement manufacturing over the last 100 years or so, increased use of Supplementary Cementitious Materials (SCMs), advancements in admixture chemistry have also made significant contributions to concrete as we currently know it.

Aggregates: Aggregates (sand and rock) make up approximately 65% of a concrete mixture by volume. Of that, coarse aggregate, often #57 stone, is about 40% and fine aggregate, sand, is about 25%. In addition to benefitting concrete strength, proper proportioning of aggregates also has positive impacts on shrinkage reduction and overall durability of a concrete mixture.

Cement: Cement and water combine for approximately 30% by volume of the concrete mixture. It is the reaction between cement and water, known as hydration, that drives the setting of concrete and turns it from a plastic state to the rigid state we see in floors, sidewalks, walls, and other elements.

Supplementary Cementitious Materials (SCMs): SCMs are materials that react with one of the byproducts of hydration (calcium hydroxide). This secondary reaction contributes to long-term strength gain and durability while offsetting some challenges, like high heat generation during hydration, related to mixtures using straight cement.

Admixtures: Chemical admixtures help to moderate or control aspects of concrete as it sets or long term. For example, water-reducing admixtures help make concrete easier to place and finish without detrimental impacts of too much water. Admixtures that entrain (add) air help improve concrete durability and resistance to damage from Freeze-Thaw cycles.

Characteristics of each component class as well as the interaction between them can have significant impacts on how the concrete behaves as it is being installed and how it performs over the life of the structure.

QuicTip▶ While [BoMetals Inc.](#) doesn’t manufacture concrete, the solutions offered by many of our products also include offsetting challenges that arise from concrete behaviors during construction.

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