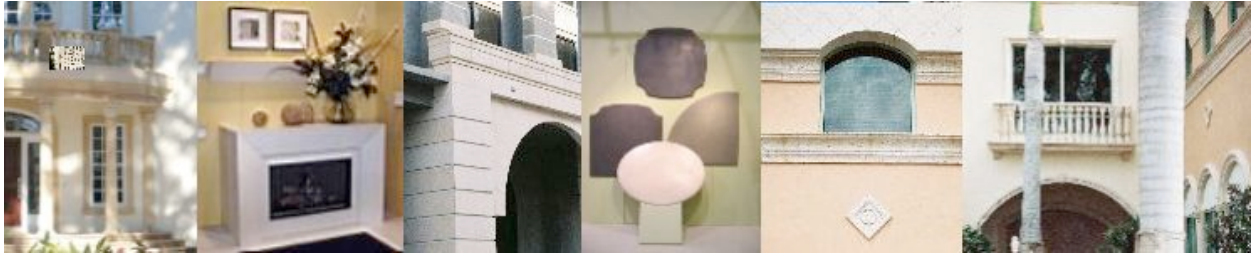


# carpenterstone™



## The Material Science

In order to best appreciate the principals of CarpenterCrete's technology, it is essential to understand the basic concepts and terminology of concrete. And, perhaps to remember that the science of concrete dates back, at least, to the time of the Roman Empire.

Although the terms, cement and concrete are often used interchangeably, these are two entirely different things. Cement is a powder that is one ingredient of concrete. Cement mixed with water, sand, and various sizes of gravel (aggregate) form concrete. Cement, water, and sand without any other aggregate is mortar. If you dilute mortar with more water, it is called grout. Other materials such as stucco, plaster, guinite, and shotcrete are additional cementitious (cement-based) materials that are merely variations on these same basic principals. In all instances, the aggregate (for example, sand and gravel) is bound together by "wetting" it with water and then "cementing" all of the ingredients together.

Over time, in an attempt to create an even stronger material, people began to include other ingredients, such as steel or fiber, in the concrete. This is often referred to as "reinforced" concrete.

Also, over the years, often in attempt to lighten the weight of concrete, many different types of aggregates (for example vermiculite, shale, and purlite – instead of sand and gravel) have been tried. However, these variations have resulted in mixtures that have not been able to achieve acceptable strength. The main reason that these lighter weight mixes have not been able to achieve sufficient strength is that the mix required too much water to "wet out" the aggregates. So, obviously, water is an essential ingredient in making any cement-based product. At the same time, however, if there is too much water, the concrete becomes weak.

To best understand this concept, it is important to remember that the combining/mixing of the cement, water, sand, and other aggregate is a chemical process that happens over time – not all at once. This is called "curing". During this time, water will evaporate from the mix allowing the mixture to harden. If the water evaporates too rapidly cracks will appear in the concrete, which, of course, weakens it.

So, just as has long been understood, the basic ingredients that can be combined to produce the various types of concrete, the basic principals of the actual process have also remained constant: To achieve a good concrete mix, you must successfully:

- Use the least amount of water necessary,
- Allow the concrete to cure for as long as possible
- Control the curing process.

When creating CarpenterStone, our goal was to create a cementitious material that was both strong and lightweight. In order to make the material lighter, the logic was to use various super, light-weight ingredients as the aggregate, instead of sand and gravel. However, as previously mentioned, in the past, when this strategy was employed, people had to use a significant amount of water to saturate the aggregate so that it would fully mix with the cement. This resulted in a material that was very weak. To overcome this problem, we created an advanced, proprietary chemical mixture that allows us to more completely saturate the aggregate using less water.

To strengthen the material, we chose to include fibers as reinforcement. Then, to further facilitate strengthening the resulting material, the chemical admixture was designed to increase the adherence of the cement to the fiber and the aggregate. And, finally, we also added chemicals that optimized the curing process by controlling the evaporation of the water.

This has now been expanded to include a portfolio of proprietary formulary based upon these concepts. In each, the chemical ingredients and the proportions of the chemicals and other ingredients are altered to achieve the specific properties and characteristics of the material desired to match the specific needs of the end product to be manufactured from the material.

As you can see, CarpenterStone is not some exotic, miraculous breakthrough. We have merely used the advanced material sciences available today to solve problems that have been around for hundreds of years. The innovation is in the dramatic improvement of the most commonly and universally used material in the history of man — and in creating an entirely new unique material with qualities and capabilities never before achieved.

CarpenterStone - The future is here today.