



01 What is UHPC, and how does it differ from normal concrete used in bridges?

Ultra-high performance concrete, or UHPC is a special class of concrete that combines a high cement content, low water-cement ratio, optimally sized particles, and steel microfibers to drastically improve the performance of the concrete.

UHPC is different from traditional concrete in many ways: it's more fluid than normal concrete when green and stronger than normal concrete when cured. Compressive strengths above 21 ksi, tensile strengths near 1 ksi, and high crack, freeze-thaw, and corrosion resistance can be expected when using UHPC. Including steel microfibers reduces the amount of traditional reinforcing steel bars needed, possibly eliminating them altogether.

02 How is UHPC being used in roads and bridges? What are some examples?

According to the FHWA, the first bridge in the United States to use UHPC was built in 2006. Since then, UHPC has been used in more than 200 bridges across the US with dozens more constructed each year. UHPC also has a long history of successful use in European bridge construction.

A few of the bridges in the US use UHPC in the main girders that carry the traffic; however, most of these bridges use UHPC in field-cast connections between prefabricated bridge components. Some examples include link slabs, deck overlays, and joint fills. The UHPC binds the prefabricated parts of the bridge together, making connections easy to install and just as strong (if not stronger) than each of the prefabricated pieces.

03 Why are the Federal Highway Administration and many state and county Departments of Transportation using UHPC in their accelerated bridge construction projects?

Accelerated bridge construction, also known as ABC, has gotten more popular in recent years because it reduces the amount of time that a road or bridge must be closed during construction. DOTs don't want to inconvenience their taxpayers due to road closures and traffic disruptions, ABC offers a solution by reopening roads and bridges much faster than traditional bridge construction.

UHPC plays an important role in ABC projects. Bridge decks can be mostly prefabricated off site, then joined with UHPC in a joint fill or overlay on site. UHPC's accelerated strength gain means the deck will achieve drivable strengths in as little as 3 days, so the road or bridge can be reopened quickly.

Another reason DOTs are utilizing UHPC is for its excellent performance under extreme conditions, such as exposure to harsh salts in coastal areas. SMARTUP UHPC can help protect other bridge elements by resisting corrosion much better than traditional concrete, extending the life of any road or bridge project.

04 If UHPC is so great, why not use it everywhere?

As of right now, the simplest answer is cost. According to the FHWA, normal concrete costs a few pennies per pound while UHPC can cost half a dollar per pound. UHPC is more expensive because of its ingredients, such as finely ground aggregates, increased amounts of cement, and specialty admixtures.

However, the cost of UHPC is justified. UHPC can be used only in critical project locations, reducing the overall volume of UHPC needed. Also, the high initial cost is compensated for by the extra long service life and low maintenance costs compared to normal concrete.

05 How will using SMART^{UP} UHPC change my formwork requirements or installation?

The most important thing with UHPC formwork is that it must be water tight. UHPC is highly flowable and can escape through small gaps in formwork. Ensuring the formwork is tightly sealed will make sure no product is lost during pouring and setting.

Testing the formwork by filling it partially with water is a great way to see that the SMART^{UP} UHPC will be contained when poured.

06 As a bridge contractor, what portion of the project should I plan to staff?

You should plan to have staff for the placing and forming procedures, much like you would for a traditional on-site mixing concrete project.

When you hire the SMART^{UP} team, we handle the delivery and storage, mixing, and QC testing of the product. Our goal is to make your experience pouring SMART^{UP} UHPC as comfortable and hassle-free as using a ready-mix company.

07 Why should I choose SMART^{UP} for my next project involving UHPC?

SMART^{UP} UHPC has been proven in the marketplace through its years of use in various projects. SMART^{UP} has been successfully used in joint fills, overlays, piers, bridge deck panels, repairs, and more. Our team wants to meet the growing demand for UHPC in the United States and educate contractors or other potential clients on the great investment that UHPC will make in their projects.

Besides getting a quality, proven product, choosing SMART^{UP} also brings you the expertise of our entire team. The SMARTUP team is committed to providing support throughout the project. Our product experts can assist with bidding, product delivery and storage, mixing, pouring, and QC testing - all with the goal of making your experience with UHPC as smooth as possible.

