Oilfield cements were originally designed to be pumped, develop strength, and then remain relatively undisturbed behind casing, thereby providing isolation and pipe support throughout the production cycle of the well.

Modern reservoirs require more complicated technology. Complex drilling programs call for bicentered bits, multilaterals or milled windows, and difficult sidetracks. Completions use larger perforations or higher perforation densities in ever-thinner producing intervals. Isolation in these situations is critical. It requires a stronger material with better tolerance to vibration and impact.

**DuraSTONE** advanced durable cement technology exceeds the performance of conventional cement under modern well conditions. It delivers all the conventionally desirable properties of production-quality cement while also improving resistance to stresses due to temperature and pressure cycles, as well as flexural stress, vibration, and impact. DuraSTONE technology improves zonal isolation in multilateral junctions, in window intersections, and across soft production intervals—even with high-density perforating and in wells that are subjected to stress cycles. DuraSTONE technology is 2 to 3 times tougher than conventional cements, which enables faster kickoff in less distance, even in hard formations.

**APPLICATIONS**
- Multilateral completions
- Reentry wells
- Hard rock formations where kickoff is required

**BENEFITS**
- Improves kickoff speed and distance
- Increases long-term zonal isolation under changing conditions by enhancing the tensile strength of the set cement

**FEATURES**
- Resistance to impact failure that is up to 20 times higher than normal portland cements
- Lower permeability than conventional set cement—indeedent of slurry density
- Broad density range (10 to 28 lbm/galUS [1,198 to 3,355 kg/m³])
- More tolerance to wellbore temperature and pressure cycles because of the tensile strength increase in the set cement
- Increased set cement flexural strength because of increased tensile strength
- Zonal isolation integrity across multilateral junctions
- Improved security against formation sloughing behind milled windows
- Better isolation in high-density precision perforating
- Isolation across soft production intervals

DuraSTONE technology is stronger and has better impact resistance and tensile strength than conventional cements, so it provides better isolation under rugged drilling and completion conditions.
Case study: Middle East kickoff time reduced by more than 75%

In the Middle East, the Bab-member and Shalaif formations presented challenges to successfully kicking off and building angle. The set cement plugs were frequently softer than the surrounding formation, even after long periods of waiting for the cement to set. Even when the set cement was harder than the formation, it would require up to 40 hours to set—while the rig sat idle. Then, average drilling time in the area for this operation was 22 hours. Two wells even required 34 and 23 hours, respectively, to drill successfully after long waiting-on-cement times.

The operator required new solutions to reduce the time involved in whipstock drilling. Schlumberger designed a plug using DuraSTONE technology, which was accurately simulated using CemCADE* cementing design and evaluation software. The drilling assembly was run after only 16 hours of waiting-on-cement time. Because of the higher solids content and tough secondary matrix, the DuraSTONE technology strengthened to more than 7,000 psi (51.7 MPa) in 24 hours at 225 degF (107 degC).

With an 8½-in [21.59-cm] tricone bit, the operator was able to kick off into the formation in only 5 hours and required only 17 ft [5.18 m] of the balanced DuraSTONE technology plug.

DuraSTONE technology is 2 times tougher than conventional cement for polycrystalline diamond compact (PDC) bits and 3 times tougher for tricone drill bits.

DuraSTONE technology improves drilling and impact resistance, and resistance to flexural failure as compared with conventional cement.