

# Engineering Solutions to Concrete Crack Repair

Concrete cracks and selecting the best repair method is important. To be successful, you must choose a procedure that addresses the cause of the fracture and present condition of the slab.

Although epoxy injection is often used, significant cracks caused by settlement or other changes need to be stabilized with a structural *concrete crack repair* process, otherwise they can continue to grow. For substantial and significant cracks, the objective is to provide adequate reinforcing to inhibit future movement in the slab. Methods considered integrity repairs restore the tensile strength across the crack will be considered herein.

## Concrete crack repair objectives commonly include:

- Restoring the structural soundness or integrity of a concrete member,
- Stopping water leaks and sealing, and
- Improving the appearance of the cracked area.

## Structural crack repair options include:

- Doweling
- Epoxy Injection
- Adding Reinforcement
- Post Tensioning and Compression
- Anchor Stitching

### Doweling

Anchor doweling consists of drilling holes and anchoring straight steel dowels across the crack. The straight steel is anchored to solid areas of reinforced concrete.

### Epoxy Injection

Epoxy injection is a rigid, full-depth repair where the injected crack will be stronger than the adjacent concrete. If active cracks are injected, expect other cracks to form next to or far away from the repaired crack unless you have sufficient amounts of reinforcing crossing the crack.

### Adding Reinforcement

Cracked reinforced concrete has been successfully repaired by inserting reinforcing bars. *Concrete crack repair* by this option is done by drilling holes across the crack plane at about 90 degrees. The reinforcing bars are placed across the crack to fill the drilled holes. This technique can be employed in slabs 8-inches thick and greater.

### Post Tensioning and Compression

Post-tensioning is a good *concrete crack repair* solution when a major portion of a member must be

strengthened or when cracks must be closed. Pre-stressing strands or bars are used to apply compressive force to the ailing member. This calls for adequate anchorage for the pre-stressing steel, and balancing the effect of the tensioning force and eccentricity on stresses in the structure. Anchor stitches can be engineered for post-tension and compression for concrete crack repair.

### **Anchor Stitching**

In the past, contractors often glued metal “U” clips or pins (called stitching dogs) around the crack. Often times this method was not successful and the fracture reappeared. Concrete crack repair by anchor stitching restores tensile strength across major cracks. Where there is a water problem, the stitch should be properly coated to prevent corrosion. This method involves drilling holes on both sides of the crack and grouting in engineered anchor stitches that spans the crack. The anchor stitch system works by tightening down the anchor wedge to post-tension the stitch, inhibiting the crack from expanding and getting larger. The system is engineered to transfer load away from the fracture, thus creating a long-lasting fix. Anchor stitching is considered very effective method of *concrete crack repair* in slabs.

### **In Summary**

Integrity repair methods restore the tensile strength across the crack. For significant fractures, adequate reinforcing across the crack can inhibit future movement in the slab. The **SlabStitch**<sup>®</sup> Structural System for **Concrete Crack Repair** involves a combination of options (adding reinforcement, post tensioning and compression, anchor stitching, doweling, and epoxy injection) and is engineer recommended to restore the structural soundness and integrity of a concrete member. **SlabStitch**<sup>®</sup> anchor stitches are highly recommended as the best solution to restrain future movement in slabs. For more information, call 754-333-0877 and visit [www.SlabStitch.com](http://www.SlabStitch.com)

### **About the Author**

Mark Weber PE, is a Licensed Professional Engineer that specializes in Mechanical and Civil Engineering. Our Civil Engineering services include design of structural repairs, concrete restoration, and fracture stabilization. Our Mechanical Engineering services include product evaluations, testing, and inspection; and Aquatic services include swimming pool code compliance, design, and structural crack repair. We pride ourselves on high quality, technical expertise, and excellent customer service. For more information, please visit <http://MwEngineering.net>

References: ACI 224.1R-93 “Causes, Evaluation and Repair of Cracks in Concrete Structures” reported by ACI Committee 224 in the Journal of the American Concrete Institute, May-June, 1984, (Reapproved 1998), American Concrete Institute, Farmington Hills, MI.