FUSION-CRETE BASIC INSTRUCTIONS

Text and video links for instruction to cover most repair and resurfacing options follow. Fusion-Crete is a unique product so reviewing all the information will help familiarize the user the unique features of Fusion-Crete. After the first few applications the simplicity and versatility of Fusion-Crete becomes very apparent.

Viewing the **Fusion-Crete: Repair Options** video will help identify suitable repair subjects.

Below are the direct links to Fusion-Crete instruction videos.

Fusion-Crete: Long Term Concrete Repair Options
Fusion-Crete: How it Works
Fusion-Crete: General Repairs Part 1
Fusion-Crete: General Repairs Part 2
Fusion-Crete: General Repairs Part 3
Fusion-Crete Shallow Fills
Fusion-Crete: Finish Coating
Fusion-Crete Formless Curb Repair
Fusion-Crete: Optional Tool Information

PRODUCT FEATURES UNIQUE TO FUSION-CRETE:

- The **mortar can be mixed to any consistency** from dry pack to slurry using the Fusion-Crete "premix" only ("Premix" is Fusion-Crete mixed with water at the prescribed ratio for the application).
- Fusion-Crete kept in dry form in a closed container has **unlimited shelf life**. (Premix can be used for up to three months if kept from freezing in a closed container).
- Fusion-Crete is **very forgiving in mix design**. Most measuring of dry components (Portland cement and sand) can be done by shovel scoop.

IMPORTANT INDUSTRY STANDARD PRACTICES FOR CONCRETE RESURFACING, RESTORATION, OR APPLICATION OF OVERLAYS:

1. Proper surface preparation: Remove all loose or rotten concrete, dirt, and oil.

2. Always prime the surface: Never apply mortar to a dry surface. Prime the surface with premix (or water when using the finish coat mix design). When applying mortar for general repairs or overlays scrub some of the mortar into the premix primer on the surface before applying mortar (industry standard practice called "scrub coating"). This evens out the premix primer and creates the best bond layer possible. There is a link and time mark below for viewing scrub coating. (Scrub coating is not necessary when applying slurry for finish coating, but priming with water is necessary).

3. Maintain original control and expansion joint profiles: When applying overlays or mortar for deeper repairs always maintain control joint profiles upward through the repair.

4. Remove the original cause of the damage: When making repairs to damage that crosses a control joint it is good practice to place a saw cut in the control joint during preparation. This is because the concrete sections below the control joint are interlocking and often the damage at a control joint was caused by uneven movement of the two concrete sections. A minimum saw cut depth of two inches is recommended (7 1/4 inch blade on a circular saw).

Also, maintain the same control joint profile in the repair or overlay. This can be done by tooling the repair mortar while finishing or saw cutting after initial cure.

(IMPORTANT INDUSTRY STANDARD PRACTICES FOR CONCRETE RESURFACING, RESTORATION, OR APPLICATION OF OVERLAYS: continued)

5. Recognize damage caused by lack of expansion space between concrete sections: Damage at an expansion joint is often caused by inadequate space for expansion in the original concrete installation. The assure the permanent repair increase expansion space by saw cutting the substrate and maintain the same space in the repair or overlay.

6. **Minimum substrate temperature for application:** The minimum ambient substrate temperature for applying Fusion-Crete mortar is 50°F and air temperature rising during placement of mortar and initial cure (about 24-48 hours). During initial cure the mortar should be kept from freezing by covering with thermal blankets or applying artificial heat. Affecting repairs during periods of marginal temperature can be done by heating the substrate with a propane torch (weed burner) to about 120 °F, allowing substrate to cool to about 80°F, applying mortar, and keeping mortar from freezing for 24-48 hours. **Take care to protect your eyes while heating the substrate with a propane torch. Small pieces of concrete can pop from the surface and may cause eye injury if you are not wearing safety glasses!**

Instructions covering most repair options

Two mix designs cover most Fusion-Crete applications: **Basic Repair Mortar** and **Finish Coating Slurry** (which is also used for shallow spall filling by mixing the mortar to a more spreadable consistency).

Fusion-Crete mixed in water is called "premix". Premix is the mix liquid, the primer, and the finishing and feather edging agent.

A unique feature of Fusion-Crete modified mortar is that the user can mix the mortar as wet or as dry as is desired for a given application as long as **only Fusion-Crete premix is used for the mix liquid**. Fusion-Crete modified mortar has 45 to 60 minute pot life depending on air temperature and humidity. Re-temper the mortar during this period **using premix only**.

GENERAL REPAIR

Basic repair of damage over 1/4 inch deep and feathering out.

Basic repair mortar mix design:

Premix (Fusion-Crete in water)-- One part Fusion-Crete to six parts water.

Dry mix-- One part Portland cement (type I & II) to two parts sand.

REGARDING PORTLAND CEMENT: Use only regular Portland cement type I, type II, or type I & II. A portion of the cement content of a mix design can be Ordinary White Portland Cement to lighten the shade of concrete gray in a mortar mix. Maintain the prescribed ratio of cement to sand.

SAND AGGREGATE: Use any type of washed sand for the aggregate, including bagged all purpose sand, silica sand (various grades), and clean bulk masonry sand or stucco sand for larger volume repairs and overlays. Thin overlays and spall resurfacing mortar should have graded silica for sand aggregate content (see below).

REGARDING PREMIX: The **premix is used as the mix liquid, the surface primer, and the finishing and feather edging agent**. Fusion-Crete does not dissolve in water but is dispersed, so the **premix should be stirred before adding to dry mix to make mortar or a sprayer for priming and finishing**.

REGARDING PRIMIING: After surface prep is complete and mortar is mixed prime the surface with premix, **brush some of the mortar into the primer/premix to make a "scrub coat", and then place and compact the mortar on the scrub coat**. The scrub coat helps even out the primer in the bond layer. **Never place mortar on a dry surface.** Over-priming is better than under-priming, especially when applying a scrub coat to the substrate before placing and compacting repair mortar. The premix is also used as the tooling/feather-edging agent. We recommend using an inexpensive plastic garden sprayer for applying premix for priming and finishing. You can see examples of these sprayers in the **Fusion-Crete: Optional Tool Information** video.

The video **Fusion-Crete: General Repairs Part 2** at time mark 1:15 shows **priming and scrub coat** for evening out the bond layer with Fusion-Crete primer and Fusion-Crete modified mortar. The practice of applying a scrub coat for copolymer modified concrete repairs is an industry standard.

REGARDING PREP: Of course **prep is key to good repair**. If the substrate has good compressive strength the surface prep can be minimal. Remove loose concrete and oils and wash with water to remove dust and silt. It is not necessary to scarify or etch. Make sure all spalling is removed.

If the concrete has poor compressive strength or is rotten use mechanical force to expose a relatively intact substrate (hand held hammer, hammer drill with bushing head or wide chisel bit, etc.). Pressure washing is good, but not necessary if loose concrete is removed. Washing with a garden hose is usually sufficient to remove dirt and dust.

REGARDING CONTROL AND EXPANSION JOINTS:
Maintain control joint profiles upward through a repair, and if a repair crosses a control joint treat the concrete on each side of the repair as a separate structure, that is, don't allow the mortar on one side of a control joint repair to be in contact with concrete or repair mortar on the other side of the same control joint. When damage occurs across a control or expansion joint it is often the result of inadequate expansion space or the control joint path being very irregular below the surface and deviating from what would be a vertical plane below the control joint. To correct this condition place a vertical saw cut through the control joint to a depth of at least two inches,

remove any broken concrete pieces made by the saw cut, and make the repair with a clean vertical control joint by tooling before initial set or sawing after initial cure. Saw cuts can be made with an inexpensive 7 ¼ inch masonry saw blade on a hand-held circular saw or a 14 inch demo saw.

When addressing damage that spans to both sides of a control joint or expansion joint be sure to separate the two panels with a tooled or sawed joint. It is recommended to make a saw cut at least two inches deep in the control joint after initial set/cure about 24 hours after the repair. This is because damage on both sides of a control or expansion joint it is often caused by expansion. Increasing the expansion space between panels will assure the cause of the initial damage is removed. Depending of the climate the expansion space may be increased up to a total width of ¾ inch with a saw cut to protect the repair.

To summarize: If repair mortar is placed on both sides of a control joint (or on one concrete section at a cold joint) maintain separation between the concrete on each side of the joint. Always view concrete on either side of a control joint as a separate structure. Never allow repair mortar on one section of concrete to be in contact with another separate section of concrete. Maintain control joint profiles in repairs and overlays.

FINISH COATING AND SHALLOW SPALL FILL

Finish coating mix design is:

Premix **One part Fusion-Crete to two parts water**

Dry mix **One part Portland cement (type I & II) to one part sand**

Regarding silica sand: A combination of 70 mesh (fine) and 20 mesh (coarse) silica produces the appearance of newly installed concrete with a medium profile broom stroke finish. Using only 70 mesh silica is also acceptable.

Regarding Portland cement: Use only regular Portland cement type I, type II, or type I & II. Part of the cement content of a mix design can be Ordinary White Portland Cement to control the shade of concrete gray in a mortar mix.

Just be sure to maintain the ratio of cement to sand at 1:1. For instance, when measuring cement and sand into a mixing container take one scoop of 70 mesh silica, one scoop of 20 mesh silica and two scoops of Portland cement. The shade of concrete can also be controlled by using white Portland cement for part of the cement content of the mortar.

Finish coating slurry will often require "slaking" for mixing to desired consistency. Mix the mortar to a slurry consistency, let set in mix pail for about two minutes, add more premix, and re-stir. This is because high Portland cement based mixtures tend to stiffen rapidly after initial mixing. Finish coat slurry can be re-tempered at any time after mixing for up to one hour using premix only.

Applying a broom finish stroke on a spall over 1/4 inch deep is relatively difficult to achieve without dimpling. With deeper spalls we recommend a **two step method (see next page)**:

Step 1) For shallow spalling mix the mortar to a consistency that is spreadable, taking into account the substrate temperature and air humidity. Don't worry about small trowel lines when finishing. The finish should be close to flat and feathering into intact areas if not coating the entire area. Allow the mortar to cure at least overnight, scrape off small trowel lines and imperfections with the edge of a trowel, and clean the surface with a broom and/or garden hose.

NOTE ON SPALL FILL: For shallow spall fills (1/8 inch minus) use the finish coat mix design. With this mix design the polymer content is very high which allows for priming with plain water and misting water on the surface for tool release and applying broom stroke finish. With proper timing and technique this application can achieve an acceptable broom stroke finish in one pass. Achieving a spall fill with broom stroke in one pass requires **good timing, a very light touch**, **and a very slow pass** with relatively stiff bristles to avoid pulling mortar from deeper depressions. **Water mist** for release is important too. Otherwise allow the spall fill to cure overnight and perform step 2.

Step 2) Apply a finish coat (instructions and mix design below).

MATERIAL ESTIMATING:

Fusion-Crete U.S. provides a free material estimating form in Excel spreadsheet format with the purchase of Fusion-Crete or upon request. The form computes all components and costs for two mix designs: General Repair Mortar and Finish Coat Slurry.

ESTIMATING MATERIAL WITHOUT THE MATERIAL ESTIMATING FORM:

BASIC REPAIR MORTAR

To estimate the volume of dry materials (Portland cement and sand) for a desired volume of basic repair mortar multiply the desired volume of mortar by 1.3. For instance, if the desired volume of mortar is one gallon the cement and sand needed would be 1 x 1.3 = 1.3 or about 1.3 gallons. Then for 1:2 cement to sand dry mix add one gallon of Portland cement to two gallons of sand in the mixing container.

Medium consistency repair mortar requires about 32 ounces of 1:6 premix (one part Fusion-Crete plus six parts water by volume) for each gallon of dry mix.

FINISH COAT SLURRY

One gallon of 1:1 Portland cement to silica sand dry mix will require about 60 ounces of 1:2 premix for a slurry consistency for finish coating. The volume yield of slurry for this design is almost exactly the same as the total volume of dry mix components plus the volume of the premix.

SHALLOW SPALL FILL MORTAR

This is the same mix design as finish coat slurry but only enough 1:2 premix is added to get a "trowelable" consistency (like a thinset mortar for tile setting). The yield will be slightly less than the combined total volume of all the components (Portland cement + silica + premix).

REGARDING SHRINKAGE: High Portland cement content mortar, including Fusion-Crete modified mortar, tends to shrink in applications over 3/4 inch thick. However the shrinkage is not a bond performance issue with Fusion-Crete, but rather a cosmetic one. **NOTE:** Shrinkage is very unlikely in a dry pack repair of a vertical surface. The following information applies mainly to repairs and overlays on horizontal surfaces. There are a few different methods to address this issue.

1) Counterintuitive to regular Portland cement mixtures shrinkage can be reduced by mixing the mortar wetter using Fusion-Crete premix only (not applicable to vertical surface dry pack repairs).

2) Avoid shrinkage by misting the top of the overlay during initial set to slow down the cure rate. Also, applying overlays and deep repairs when the surface is shaded or when daytime temperatures are lower reduces shrinkage.

3) Allow the overlay to shrink and apply a finish coat after 24 hours cure time to correct the cosmetic issue.

4) Another approach to eliminate shrinkage in hot dry climates when placing thicker applications of mortar with very high Portland cement content is a Brazilian fiber mesh that is very inexpensive. The product is called Raditech AC60. Raditech AC60 is invisible in the mortar mix, reduces water absorption, and increases compressive strength. Raditech AC60 is available from Fusion-Crete U.S. in small quantities and larger quantities may be purchased from the U.S. distributor. We will provide contact information for the U.S. Raditech AC60 distributor on request.

USEFUL FACTS:

One five gallon pail of Fusion-Crete yields about 32 gallons of 1:6 premix.
One 5-gallon pail of Fusion-Crete yields 12.72 gallons of 1:2 premix.
One gallon equals 231 cubic inches.
One cubic yard equals 202 gallons.
One 94 lb. sack of Portland cement yields about 7 gallons.
One 100 lb. sack of silica sand yields about 7 gallons of dry material.

CONTACT INFORMATION
Fusion-Crete U.S.
Phone and fax
970.879.3445
Mobile 970.846.4290
Toll free 866.788.6790
www.fusion-crete.us
fusion.crete@gmail.com