

Technical Note #4- Surface Preparation

For the flooring contractor hired to apply or repair a coating on a concrete floor, the range of tools and possible techniques available for surface preparation can be extensive. Surface preparation methods can include anything from detergent scrubbing to acid etching to mechanical abrasion. Proper surface preparation is critical to a successful and long lasting coating job, and the key to preventing call backs. This article provides an overview of the most commonly specified surface preparation methods used on concrete floors: detergent scrubbing, acid etching, shot blasting, scarifying and concrete grinding. Tips for how to select the most appropriate surface preparation method (or methods) for a job are offered:

1. Detergent Scrubbing
2. Acid Etching
3. Shot Blasting
4. Scarifier
5. Grinding

DETERGENT SCRUBBING

Typically, Detergent Scrubbing is only conducted on a new slab which is quite open. It is used when the environment does not allow the use of acid etching. Food preparation, steel works or sensitive inventory. A high pressure 3000psi scrubber is used to wash the surface and vacuum up excess water. A small amount of detergent is used to remove any grease. The high pressure will remove surface efflorescence.

Tips for achieving a successfully detergent scrubbed floor:

1. If a floor is soaked with grease or oil, clean it first with concentrated industrial detergent.
2. Test a small test area first to ensure that the desired result is achieved.
3. Do small manageable areas vacuuming up excess water as you go.

Acid Etching

Acid etching helps to open the concrete to allow adhesion of the coating. It is best done on a clean surface. Fortis do offer an all in one cleaning and acid etching solution (FORTIS CCA). The acid is applied over the surface of the concrete. A visible reaction of gasing should be prominent across the surface. Prior to any coating

ensure the surfaces has been well washed down with clean water. This treatment should not be done if the surface is to be acid stained.

Tips for achieving a successfully acid etched floor:

1. Ensure a good coverage of dilute acid is used.
2. Clean acid and salts off with clean water.
3. Allow surface to fully dry before the application of any coatings. No surface salts should be present. If so wash further with water.

SHOT BLASTING

Typically, shot blasting is one of the cleanest and fastest methods of mechanical abrasion. In addition to a "typical" coating job (if there truly is one), shot blasting can also be used for floors in sensitive areas that are otherwise "off limits" to other methods. Food preparation or manufacturing areas, clean rooms, working around sensitive inventory or machinery, or simply areas where chemical-free, dustless methods are required are all candidates for shot blasting. The recycling wheel blast technology found in most shot blasters works by throwing steel shot or grit at a high velocity onto the surface being cleaned (such as the concrete floor).

This is achieved through centrifugal force by a wheel with removable paddle type blades that revolve at a high speed.

Abrasive travels along the radial length of the blade and is thrown at a high velocity in a predetermined and adjustable direction. Once the abrasive impacts the surface, it dislodges the coating and/or debris, thereby cleaning the surface. The abrasive and debris rebound into a reclaim chamber where it is recycled. The reusable abrasive is separated from the dust and debris and is transported into a storage hopper for recirculation. Air flow transports the dust and debris through a hose to a dust collector.

Tips for achieving a successfully shot blasted floor:

1. Remove chewing gum, sticky adhesives or other soft materials from the floor that will prevent the surface from being evenly shot blasted.
2. If a floor is soaked with grease or oil, clean it first with an industrial detergent. If not cleaned first, the heat generated during the shot blasting process will bring the oil to the surface.
3. Make sure the surface is dry. A shot blaster will not work properly on a wet floor.
4. Shot blast a small test area first to ensure that the desired result is achieved.
5. Plan the travel route for your shot blaster so that you achieve a consistent pattern over the entire surface.
6. Use the smallest steel shot size possible that still provides the desired results. Smaller shot provides better coverage and higher production.
7. Monitor the level of the shot in the hopper. Keeping the hopper full will help achieve a more consistent blast pattern.
8. Vary the travel speed of the machine as needed to address areas of softer or harder concrete.

Common shot blasting mistakes:

1. Stopping a blast machine with the control valve open, which can

- cause the machine to blast deeply into the substrate.
2. Using the wrong shot size.
 3. Incomplete removal of curing compounds and laitance layer due to too light a blast.
 4. Attempting to remove too much material at once, clogging the storage hopper and vacuum filters.
 5. Poor planning of travel route, resulting in overlapping or crooked passes.

SCARIFIERS

Scarifiers are versatile, surface preparation tools used for concrete, asphalt and even steel surfaces. Scarifiers use steel or carbide tipped cutters (in various shapes, depending on application) that are loaded on shafts placed around the perimeter of a cylindrical drum. As the drum rotates, the cutters impact the surface at a high speed, fracturing the coating and/or contaminants and abrading the concrete surface. The tools are used to remove contaminants, coatings, adhesives and paint. They are also very useful for preparing problem areas on concrete slabs: burned areas, high spots, curled joints, excessive trowel marks, trip hazards, etc. Many models can be connected to dust collection systems.

Tips for achieving a successfully scarified floor:

1. Match the cutter type to the substrate (concrete, asphalt or steel) and the "problem" to be solved. Is a coating being removed? If so, what type? What contaminant is being removed? Are high spots being fixed?
2. Match the machine to the size (square footage) of the job.
3. Consider the final desired result. Cutter types, cutter spacing and the speed of the machine all impact the appearance of the surface after scarification.
4. To achieve greater depth make several passes over the same area instead of trying to take off the material in one pass.
5. Vary the travel speed of the scarifier to address areas that have more or less coating, or harder/softer concrete.

Common Mistakes When Scarifying:

1. Not inspecting the drum frequently. Cutters and spacers wear out and need replacement.
2. Using the wrong type of cutters.
3. Setting the cutter depth incorrectly.
4. Trying to remove too much material at once.

GRINDING

Grinders are used for concrete cleaning, planing or coating removal. A diamond grinding disk is recommended as many types of abrasive disks may not offer the profile required for coating application. Depending on the type of abrasive wheel used on the grinder, it can be used to lightly prepare the surface (especially useful when applying thin coat coatings). Some abrasive disks are designed to quickly remove mastics, epoxies, urethane, paint and thick coatings. Special types of multi-headed grinders can be outfitted with carbide tipped slicers to quickly cut through heavy, built-up adhesives, elastomeric coatings, waterproof membranes and more.

When these multi-headed grinders are fitted with diamond polishing plugs, they can smooth and flatten a floor, removing minor imperfections in the concrete slab.

Tips for Concrete Grinding:

1. Move the grinder in a random motion during operation to minimize swirl marks and uneven grinding.
2. Ease the grinder through material that is being ground. Don't try to force it.
3. Check and empty the dust collector frequently so that the system operates properly.
4. Wear appropriate safety gear, including a dust mask and knee pads.

Common Grinding Mistakes:

1. Putting too much weight on the tool, particularly hand-held grinders. This can cause the motor to burn out.
2. Operating the system with the improper dust collector. Standard industrial vacuums do not have the filtration capacity of specialized dust control units.
3. Using diamond tools on edge. Using a grinder properly will result in longer tool life as well as a better finished, more consistent surface.

HOW TO PICK A SURFACE PREPARATION METHOD

Each of the surface preparation methods discussed can be used to prepare a concrete floor. While there may be no single "right" method, most jobs do have characteristics that can point you towards a method (or in some case a combination of methods) that will provide better results than others.

1. Look at what coatings, if any, are on the surface now. The thickness and nature of the coating can help determine the type of equipment needed for surface preparation. Rubbery or sticky coatings for example, call for scarification or grinding with special abrasive disks.
2. Consider the type of coating that will be applied to the prepared floor. Thin coatings and sealers are not appropriate over a floor that requires moderate to heavy shot blasting or scarification. Concrete grinding is typically more appropriate for situations requiring the use of thin coat or staining products.
3. Ask your coating manufacturer for recommendations. Many manufacturers specify the method of surface preparation that is most applicable for their coatings.
4. Perform a test patch, in a variety of locations on the slab if needed, to help determine if one surface preparation method performs better than another.
5. Consider a mix of tool types to address the specific needs of the floor and to address the type of coating or surface that is being removed. Scarification followed by shot blasting or a combination of light shot blasting in open areas and hand grinding for corners and edges, are two possibilities. In many restoration projects, it is very common to use several types of surface preparation tools.