



## Concrete Grinding (part 1)

Your cup wheel diamond segment bond needs to match the concrete hardness.

The confusing thing is that soft bonds are for hard concrete and hard bonds are for soft concrete.

Sounds crazy, but this is the explanation...

The diamonds only cut well if they are exposed.

The diamonds are embedded in a molten metal called the bond (or matrix) and allowed to cool.

The final product is called a segment or diamond block and can be made in a variety of sizes and shapes then silver soldered or welded onto a plate, or cup wheel, or cutting blade for final use.

The size of the diamonds can vary and so can the wear of the metal bond around them.

- Here's what happens...

As you grind concrete the diamonds cut into it and scratch it away. During this process the diamonds break and wear down, but at the same time the bond metal is worn away by the sands of the concrete which allows more diamond to be exposed so that cutting can continue. When you grind concrete that is too hard for the bond (matrix) the diamonds blunt and break, but the hard matrix is not worn away so the new diamonds are not exposed, then the cup wheel stops working. The diamond block is then flattened, polished and gets very hot. At this stage you need to press harder and stay in the same spot longer until your temper starts to rival the heat of the diamonds.

- Grinding hard concrete:

To grind hard concrete use a soft bond cup wheel with larger diamonds around 20 grit size. When that fails to work a trick that often does the job is to wet the floor and allow the water to soak into the concrete, then grind again. The grinding dust will be moist and more abrasive which will open up the diamonds in the matrix again. This may have to be repeated for each pass.

Sands and bonds are the key elements. The sands produced by grinding the concrete wear away the surface of the bond which keeps the diamonds exposed. If there is too little sand or the bond is too hard for the hardness of the concrete, the diamonds will not continue to be exposed and will stop cutting. So for hard concrete you need a softer bond so that it wears away a little and for very hard concrete you need a softer, softer bond.

- What about soft concrete?

Just the opposite. You need a hard bond for soft concrete because it produces plenty of sands and they can wear the bond very quickly.

- What makes concrete hard to grind? This is the million dollar question.

Two main things contribute to concrete hardness - the ratio of cement & water in the mix and the type of aggregate used. We will not get technical here and talk about size of aggregate, slump, water retention, curing and all that other stuff. Hard concrete means a hard paste (the grey matter that we recognize as concrete). Hard aggregate means the hardness of the stones used in the concrete mix and there are very hard ones and quite soft ones used depending on the local supply.

- Grinding aggregate:

The unexpected variation comes when you have medium strength concrete (with very hard aggregate) which you grind easily at first, but as you get into the aggregate your speed slows down dramatically because there is possibly only 15% concrete paste now and 85% aggregate which is harder than the concrete. So then you may have to change to a softer bond (cup wheel) than the one you started with.

- Diamond size:

Generally speaking you use a larger diamond grit (low number) for faster removal of concrete and for harder concrete. Because larger diamond grits are more aggressive they are not as smooth to grind with which you will notice at 30/40 grit and below.

- Polished concrete:

To polish concrete you start with a coarse diamond and approximately double the grit number (halve the diamond size) with each new pass until the floor is polished.

For example, with a satellite concrete grinder use 30/40+40/50 Coarse for first cut, change to 100/80 Fine for second cut, then 200 Very Fine for the final cut as your metal bond grinding preparation before polishing. The concrete will not be polished but it will be very smooth, ready for resin bond pads to complete the polishing work using low speed hand grinders.

\*Note that a 9 in (230mm) angle grinder runs too fast for resin pads and grits above 80 mesh will quickly heat up the segments if the concrete is medium to hard strength. You then need to use a slow speed grinder or grind it wet.

- Polished concrete look using a clear polyurethane - Tuff Coat Concrete:

After using the very fine cup wheel you can get a polished concrete look by applying 2 coats of Tuff Coat Concrete polyurethane without the need to actually polish the surface.

Con-Treat Pty Ltd