



WHAT IS DIAMOND GRINDING?

SELECTION OF THE DIAMOND TOOLING

This is the most important decision when beginning a diamond grinding project and often it is determined by trial and error. With experience you may often be able to make an informed guess as to which disc is going to be right for any different slab.

There are some simple statements that can be asserted before we go on:

- Even the best or biggest machine won't look good if the incorrect tooling is installed.
- There is really no such thing as a faulty diamond disc. It is always "whether the disc is right for that particular concrete". There will always be a 'right' slab for every disc.
- No two slabs are the same, even on the same project. Indeed, a slab can vary from one section to another on the same slab poured on the same day.
- There is no such thing as 'one diamond disc is right for every type of concrete floor'.
- The 'mpa' of a slab may have little to do with how hard it is to grind. (See para. 1 Below).
- Premium discs will operate satisfactorily over a broader range of different concrete hardnesses.

Budget discs as a rule will work over a narrower band of hardness's. Premium discs have higher concentrations of diamond grit in them too, and have different ratios of natural to synthetic diamond grit.

1. WHAT DO WE MEAN BY 'HARD CONCRETE'?

When discussing how hard concrete is to grind, many people confuse HARDNESS and STRENGTH. Strength is measured in MPa and is a measure of compressive strength. It is true that high compressive strength can be harder, but not always. This because the aggregate and sand in high MPa concrete is likely to be the same in low MPa concrete. The difference is in the amount of cement and water (slump). This also why 40MPa concrete from the batching plant is not 40 MPa when placed if the contractor adds extra water; it could just as easily be 15MPa. (Note: you can't actually 'pour' 40MPa concrete, it is too stiff, it has to be vibrated usually)

When we talk about hardness (to grind) it really is all about the kind of dust that is produced during the process. Hard concrete tends to produce ultra fine, talcum powder fine dust. This dust is very un-abrasive; it does not wear the matrix of the diamond segment sufficiently. The result is that the diamond grit soon becomes hardly exposed so it grinds even finer, powdery dust; the segment ceases to grind, and the segments may even get hot and glaze over. Simple isn't it? ('Exposed' means; how much diamond grit is poking out

of the segment. You can tell how exposed the grit is by rubbing your finger over the segment).

This is the reason why highly burnished (over-toweled) slabs are difficult to grind fast; the dust is so fine the dust is not aggressive enough. The same thing can happen when you grind a normal hardness slab and the top grinds quite normally, but when you start getting into aggregate, the dust produced from the aggregate may be fine and does not wear the matrix sufficiently; so, it begins to grind slowly.

Of course, the opposite can happen; the dust from the aggregate may be abrasive and grind too well, open up the diamond segment too much and cause fast wear. In addition, the type of sand used will vary the abrasiveness as well as the aggregate. It comes back to experience and regular checking of your diamond tooling. A professional knows to stop if the concrete grinds super easily; it will always cause premature disc wear.

Concrete that is soft or water damaged (through addition of extra water to the mix before discharging from the truck or rain damaged) produces very soft, gritty, sandy, dust; this is too aggressive for most discs and will wear them out very fast. THIS IS NOT A FAULT WITH THE DISC. It is simply a case of using the wrong tooling and/or not inspecting regularly.

CONCLUSION

So now we know that the AGGREGATE, and the SAND, and also the amount of WATER added to the mix, plus also the amount that it was power TROWELED, plus also whether the contractor VIBRATED the wet concrete all contribute to the final equation as to how easily the slab is going to grind.

2. WHAT DISC FOR HARD CONCRETE?

Grinding hard concrete will mean that the dust is soft and un-abrasive (see Para. 1 above), so the metal MATRIX that the segment is made of needs to be 'soft bond' and easily eroded to expose the diamonds. Often a coarser grit can be beneficial because it may produce coarser dust to help erode the matrix.

In addition, reducing the contact area with fewer segments makes a difference. This also has the effect of increasing the weight per square inch on the surface so that the diamond grit will occasionally crack a little bit off the peak to create a fresh sharp peak and start grinding again. Diamond grit will gradually round over if it does not crack off a little bit from time to time. Rounded grit won't grind too well. This is why you will find that adding extra weight or ensuring all the weight of the machine possible is on the head; it helps to keep the diamonds working.

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The Rule of Thumb:

- Use diamond tooling with a SOFT BOND and/or less segments for hard concrete and increase the weight on the diamond tooling. Using coarser grit diamond may increase the dust size and keep the tooling working.
- Equally important; do not use tooling for hard concrete on soft concrete; they will almost certainly wear out incredibly fast.
- If you turn down the vacuum so there is plenty of dust under the machine, this will help the diamonds to be exposed. Careful addition of sand may also help. Don't overdo sand, it could cause premature wear!
- Watch out for the situation where there is a hard-to-grind top layer, and a soft layer below. You can wear out discs fast and you think that because the top is hard, the discs should last. If this occurs, use the soft bond only to, or nearly to the soft layer, then grind the soft layer completely separately with hard bond discs.
- Lastly inspect your tooling. If there is hardly any diamond exposed out of the matrix, and/or the tooling is getting hot, stop and change to a softer bond, or less segments.

3. WHAT DISC FOR SOFT CONCRETE?

Grinding Soft concrete requires 'hard bond' discs that resist the metal matrix being eroded away. The sandy, gritty, abrasive dust will erode many discs abnormally fast, so be certain that you are using the right disc. More than any other time, grinding soft concrete is when contractors fail be aware of the signs of rapid grinding and fast wear to stop work and rectify the problem Do not use the cheapest disc and expect to save money, it becomes an expensive exercise. A super premium disc is usually the best value for money.

In addition, it is also important that the weight on the head of the machine is reduced as much as possible to ensure that the sandy, gritty, abrasive dust that is rolling around under the segments does not erode the matrix any more than we can help. Once again, it can be water damaged concrete the aggregate, sand, Carborundum or metal fibres in the topping, all can be some of the things that require special attention to how you tackle each project.

Important "Rules of Thumb": When Grinding Soft Concrete

- If the disc begins to grind super well, STOP! You are almost certainly are going to wear your diamond tooling too fast. A good operator inspects his tooling regularly for unusually high diamond exposure. This means that when you run your finger over the surface the diamond grit is sticking out a lot. The diamond grit will be falling out of the matrix before you have had a chance to wear them out.
- Use diamond tooling with a HARD BOND and/or more segments.
- Be certain to use the machine weights to reduce the weight of the machine on the tooling.
- In addition, a vacuum that will extract as much dust away as quickly as possible will greatly improve the life of the tooling. If there is a lot of dust rolling between the floor and segments it will cause excessive wear.

