UKAM Industrial Superhard Tools Division of LEL Diamond Tools International, Inc.
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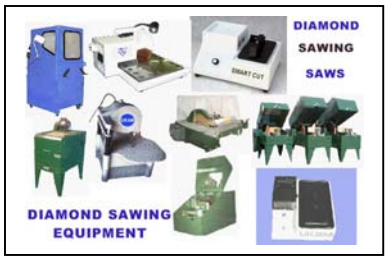
Selecting the Right Diamond Blade for your application



The following are some factors to consider when selecting the right diamond blade for your application.

Material to Be Cut

Materials you are planning to cut will have a large impact in the types of diamond blades you can use. If you are cutting hard alumina or sapphire, it is generally recommended that you use a soft bond, thin kerf diamond blades. However, if you are cutting abrasive materials such as sandstone or flagstone, a hard bond, thicker diamond blades may be a better solution.

a.) **Hardness of Material** – harder materials such as sapphire and alumina will require a softer bond. Softer and more brittle materials require a harder bond.

b.) **How expensive is your material** - if the material you are cutting is precious, valuable, or expensive. The diamond blade cost will play a minor role in your cutting operation. It is suggested that you obtain a **thin kerf diamond blade** to minimize material loss and chipping. It's always a good idea to have some type of an estimate of target cost and quality per cut.

c.) **Material Thickness** – the thicker the material you are planning to cut, the greater amount of coolant and water pressure is required.

Equipment to be used

The equipment you will be using and its physical condition, will dictate the speeds (RPM's) and coolants you can use along with your blades. Hence, somewhat limiting your diamond blade selection. Diamond Blades are usually used on the following equipment

Precision Diamond Blades are generally used on:

a.) Tile Saw
b.) Precision Cut off Saw
c.) Slabbing Saw
d.) Surface Grinder
e.) Dicing Saw
f.) Wafering/Sectioning Saw
g.) Band Saw
h.) Gang Saw
i.) Milling Machine
j.) Other Equipment

Number of Cuts to be made

Your diamond blade requirements will greatly vary with your frequency of use and the number of cuts you need to make. Diamond Blades are generally used for:

Production - Diamond Blades will be used every day or several times a day, cutting several thousand times until the blade is warn out and replaced. Metal Bond (Sintered) diamond blades are usually recommended for this type of heavy duty use. However, if you have a very fine or specific finish requirement and do not polish material after cutting. HYBRID Bond diamond blades may be the best solution for your application.

R & D / Occasional Use – Diamond Blades will be used occasionally for a specific job and than stored for later use. If you are planning to make less than a 100 cuts, we recommend you use an electroplated (nickel bonded) diamond blades. However, if you are planning to use the blade a number of times through the year, sintered (metal bonded) diamond blades.

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Technical Requirements/Specifications

Chipping/Surface Finish Requirements – if you have an application where surface finish and chipping is a critical factor, a sintered **(metal bond) diamond blades** with a very fine diamond grit may be the best solution. **HYBRID Bond diamond blades** is another alternative.

Tolerances – if you are using diamond blades to cut material for a product that requires specific tolerances, you will need a **custom diamond blade** specifically designed for your application.

Material Cost – if the material you are cutting cut precious, valuable, or expensive. The diamond blade cost will play a minor role in your cutting operation. It is suggested that you obtain a **thin kerf diamond blade** to minimize material loss and deformation. It's always a good idea to have some type of an estimate of target cost and quality per cut.

Coolant to be used 

Your capability to use coolant while cutting, will seriously effect your diamond blade selection. Most diamond blades **must be used with coolant**. Shorter cutting life, material and cut deformation will result when using blades dry. Electroplated (nickel bonded) diamond blades and some Resin Bond Blades may be used dry (without water) depending on the application (material being cut). UKAM Industrial Superhard Tools does have the capability to manufactured diamond blades to be used without coolant. However, ***using diamond blades dry is not recommended*** on most applications. When chance prevails, use all diamond blades with coolant.

Diamond Blade Variables

Bond Hardness – harder materials such as sapphire and alumina generally require a softer bond. Whereas softer and more brittle materials require a harder bond.

Grit Size – grit size (mesh size) is generally selected depending on the speed you wish to operate the cut and surface finish of your material.

Blade Thickness – the thinner the kerf of your diamond blade, faster the speed (RPM) your blade may run, less chipping and heat your blade generates. You will also obtain a smoother and higher quality finish. Thin kerf diamond blades provide the following advantages:

- less loss of material
- minimum material deformation
- less heat generation
- faster cutting speed
- less chipping
- better finish quality

The trade off is shorter diamond blade life.

Evaluating Diamond Blade Performance

The performance of a diamond blade can be evaluated under various criteria. The importance of any criteria depends on your requirements.

Cutting Life - The life of a diamond blade is determined by the number of cuts it can make. It is fairly difficult to estimate the life of diamond cut. Diamond blade life is affected by various factors such as the application, bond type, blade manufacturer, and experience of user in properly using the blade. The following considerations play a major role in diamond blade life:

- hardness and abrasiveness of the material being cut
- speed and power of your equipment
- amount of pressure used
- proper use of coolant
- operator experience
- overall age and condition of cutting equipment
- quality, hardness, sharpness, and mesh size of the diamonds
- hardness of the bond compared to the material being cut
- experience and technology of manufacturer in keeping diamonds in the bond

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Finish Quality - The quality of the surface finish is evaluated by the amount of chips generated on the face of the material. A visual check is just about the only way of checking finish quality.

Break in time - A diamond blade requires time to break in, to produce relatively chip free performance. The period of time under witch this occurs, separates one diamond blade from another.

Frequency of Dressing - The less you have to dress your diamond blade, the better off you will be.

Diamond Blade Bond Types

Sintered (Metal Bond) Diamond Blades

As a general rule of thumb, Metal Bond (sintered) diamond blades last longer than other diamond cuts available. Life will vary with manufacturer, and factors shown above. With most conventional sintered (metal bonded) diamond blades, you should be able to obtain 450 to 1200 cuts. Diamond Blades with **SMART CUT™** technology have shown to last **several thousand cuts** on most materials. Metal bonded diamond blades have diamonds sintered and multiple layers of diamonds impregnated inside the metal matrix. They wear evenly, and are known for their consistency. **Sintered (metal bonded) diamond blades** are the latest technology available in Diamond Blades. And represent the best value and performance per cut.

Resin Bond Diamond Blades

Resin Bond Diamond Blades last less than Sintered (Metal Bond) diamond blades, but more than electroplated (nickel bond) diamond blades. Resin Bond diamond blades are used in applications that require a smooth surface finish and minimum amount of chipping. Made from a tough polymer formed to hold the diamond particles in the bond. A resin bond is really tar in a solid form. A resin bond must remain very fragile in order to expose new diamonds. For this reason, strong and high quality diamonds cannot be used in a resin bond. High quality diamonds are harder than a resin bond matrix, and would soon disintegrate the bond that keeps them in place. The diamonds that are used in a resin bond are poor to medium quality. Most of them disintegrate or fall out of the bond, before they have a chance of being used. This brings about the need for frequent blade dressing, causing the cut to loose its roundness or form. A more durable bond is sintered (metal bond).

HYBRID BOND Diamond Blades

Between METAL BOND and RESIN BOND. Designed to replace the conventional resin bond diamond blades. You will find all the advantages of cutting speed and fine finish that you have come to expect in a resin bond, and long life, consistency, aggressiveness, durability, and excellent performance on you look for in a metal bond. Hybrid Bond Diamond Blades are used on finish critical applications, that require a minimum amount of chipping and where no further polishing, lapping, or processing of material is planned. Applications include: Glass/Quartz Tubing, Bk7, Fused Silica, Other ultra brittle materials. Advantages include: Less Chipping, Additional Universality in Application - 1 blade will work in both metal bond and resin bond applications, and Greater Consistency in Performance.
Find out more...

Electroplated (Nickel Bond) Diamond Blades

Electroplated Diamond Blades have a high diamond concentration and give a freer, faster cutting action with minimum heat generation. Diamonds stay on the surface of the cut allowing for fast material removal. Electroplated Diamond Blades last less than metal bond, resin bond, hybrid bond blades and are the least expensive diamond blades available. Perfect for smaller jobs and beginning cutting operations. Just about the only type of diamond blade that may be used dry (without coolant) in a few applications, excellent for cutting very abrasive materials.