

STONE & TILE MANUAL



TABLE OF CONTENTS

01 COUNTER TOPS

Stone Types	3
Textures	5
Templating and Layout	5
Sawing	5
Laminating	6
Profiling and Edge Details	6
Polishing	7
Sink Cut-Outs and Coring	8
Rodding	9
Installation	9

02 FLOORING

Tile Types	10
Cutting Tile	12
Floor Grinding and Polishing	12

03 LARGE FORMAT PORCELAIN

Countertops	14
Vertical Panels	14
Pavers	14

COUNTER TOPS

STONE TYPES FOR COUNTER TOPS

Calcium Carbonate Stones - Limestone, Marble, Serpentine, Onyx

These are softer stones that are sensitive to acids and staining. They tend to scratch easily and so are not recommended for kitchen applications. Most often used for vanities, furniture and floors.

Silica Based Stones - Granite, Slate, Mica, Basalt

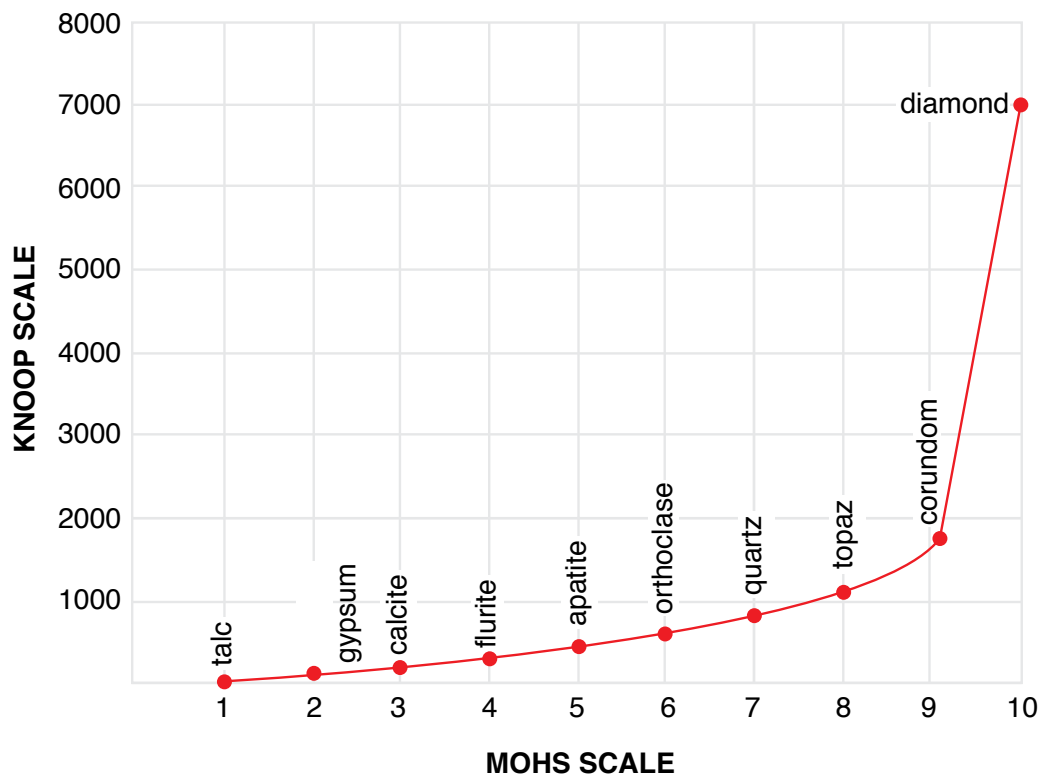
These are much harder stones formed deep in the Earth under tremendous heat and pressure. They are made of crystallized minerals and can take a high polish. Much better suited for kitchens and high usage areas.

Engineered Stones - Silestone, Ceasarstone, Zodiak, Hanstone

These are man made stones made of resin and quartz. They are very durable and hard to stain. They can be fabricated with the same tools as used on granite but their abrasiveness tends to wear them out quicker and they must be wet polished only, as the resin will burn. Some drawbacks are that they are not UV resistant and lack the veining in natural stone. Repairs are a challenge and may void any warranty.

Cementitious Stones - Eco Stone, Ice Stone, Urban Slabs

These are another type of man made stone usually made of cement and recycled glass. Polymer enhanced cement is the binder holding the materials together. They are very colorful and look like terrazzo in slab form. These types of slabs are challenging to fabricate and polish.



COUNTER TOPS

CALCIUM BASED STONES



Marble
White Carrara



Marble
Black with Fossils

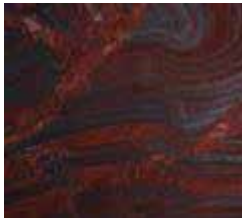


Serpentine
Verde Rainforest



Onyx
Honey Onyx

SILICA BASED STONES



Iron Red



Baltic Brown



Volga Blue

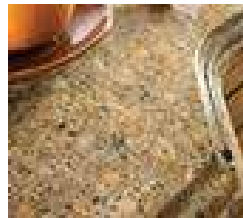


Grey Slate

ENGINEERED STONES



Silestone
Capri Limestone



Ceasarstone
Giallo Quarry



Portofino Verona

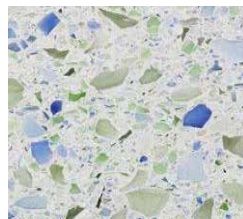


Jubilee Emperadoro

CEMENTITIOUS STONES



Ice Stone



Denim Moss



Tuscan Sunset

COUNTER TOPS

TEXTURES

There are now several top finishes available from the factories for marble and granite.

Full Polish - this is the classic finish that is so polished you can clearly see your reflection when you look down on the surface. It is achieved by using metal bond tools to calibrate and rough grind the surface followed by resin tools going from generally 100 to 1200 grit. The machinery at a factory uses bigger tooling with more pressure and water which allows them to get a higher gloss finish in less steps than the fabricator can with his hand polishing tools.

Honed - this is a more rustic look where the polishing process is halted just before the material becomes shiny. A honed finish can be anywhere from a 200 grit (low hone) finish to an 800 grit (high hone) that has a little gloss. This finish is very popular right now on white marble. Because the pores of the stone are more open than a full polish material it is very important to seal the stone as many times as necessary to make it stain resistant.

Antique/Leather - this type of finish is done with diamond brushes that erode the softer parts of the stone at a faster pace than the hard parts of the stone. Antiquing brushes come in a full range of grit sizes starting as low as 24 grit and going as high as 3000. Most leathered stones only go up to about 320 grit. It gives a three dimensional texture that is very popular right now for fireplaces and vanities.

Caress - This is the newest type of finish where the antiquing process is taken all the way to a full polish using the same brushes used to create a leather finish. It is a unique look as it has the texture of leathered stone but also the gloss of a full polish material.

TEMPLATING AND LAYOUT

Once the customer has picked out the stone the fabricator will send someone out to measure the job and create a physical template. When done properly the template will be laid out on the stone in a way that the cut pieces when put together will look like the whole job was cut out of one piece. The goal of the fabricator is to make the entire job seamless, all veins continuous and all edges consistent with the tops.

SAWING

There are many methods of cutting the slabs. Most preferable is a full size bridge saw that runs 12" to 24" diamond saw blades. A bridge saw leaves the straightest and cleanest cuts and requires less work for the fabricator. A good rail saw is a strong second choice. Rail saws have less horsepower than bridge saws and are slower but still make nice straight cuts. Last option is a hand saw and straight edge, they are economical but require much more labor and time. The sawyer will cut all his counter tops, backsplash and laminating strips in a way so that ideally when the pieces are all put together everything looks like one solid piece with almost undetectable seams.



Full Size Bridge Saw



Rail saw



Makita Hand Saw

COUNTER TOPS

LAMINATING

Granite, marble and engineered slabs come in two thicknesses, 2 and 3 centimeters. To give larger edge appearance the fabricator will laminate another piece of stone to the counter top. There are three primary methods of laminating.

Standard Lamination - is where the fabricator cuts a 1 or 2 inch strip and glues it back to back to double the thickness of the stone. We recommend the back of both pieces be ground with a coarse then fine resin cup wheel to make the edge look like one solid piece.

Miter Laminating - is where two 45 degree cuts are made to form a 90 degree bend. This puts the seam at the top of the counter top. This is the best way to ensure that the laminated piece is exactly the same color and texture as the top piece.

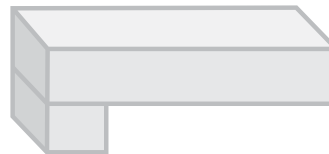
Square Laminating - is where the edge of the piece to be laminated is glued to the counter top instead of the back side. This allows for laminations to be as little as a couple of inches to all the way to the floor.



Standard Lamination



Square Mitered

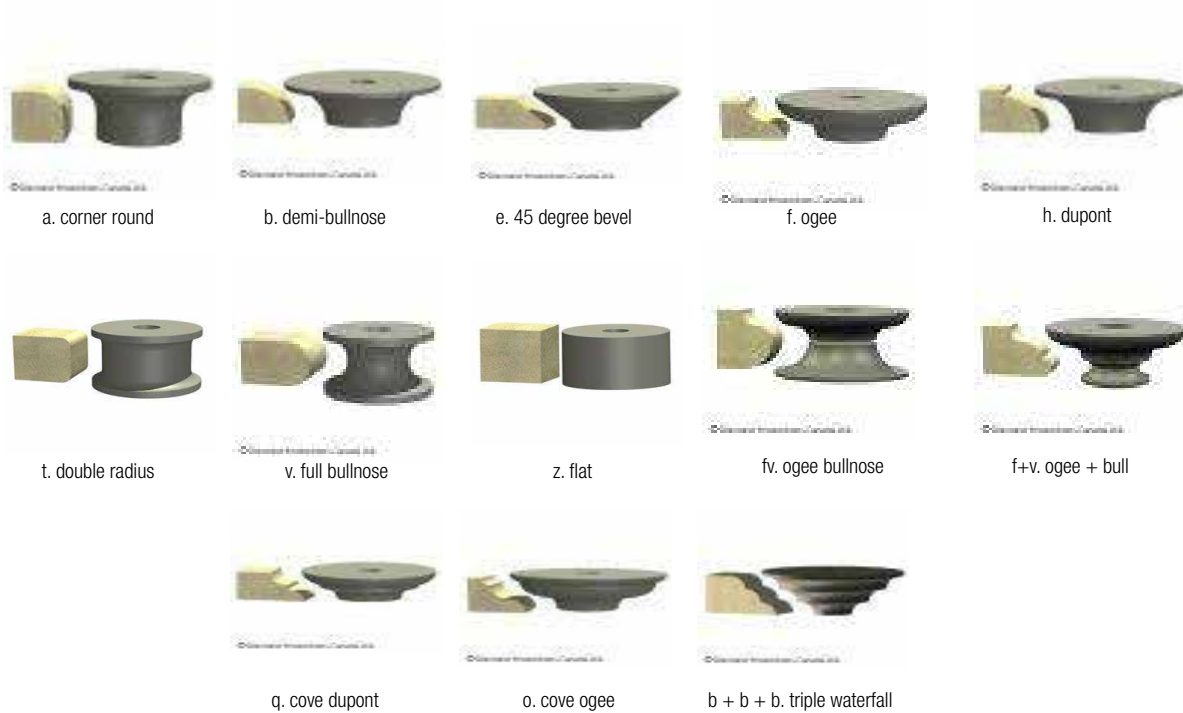


Square Laminated

COUNTER TOPS

PROFILING AND EDGE DETAILS

When the customer picks out the material to be used, they will also pick out what shape they would like for the front edge detail. There are many shapes like ogee, bullnose, cove and dupont; each one has a letter assigned them. The shaping is usually done with diamond router bits. We recommend using diamond cup wheels to pre-shape the stone. This helps to reduce wear on the router bits and allows them to keep their shape longer. Zenesis stone router bits come in coarse and medium which equate to coarse (50 grit) and medium (100 grit). Many fabricators use only the position 1, coarse, and then start polishing with 50 grit polish pads. Using both coarse and medium bits will allow them to start polishing at 200 or 400 grit, eliminating the most invasive pads and ripples in the stone. We highly recommend using both steps when doing edges that are difficult to polish like triple waterfall (b + b + b) or dupont (h) because hand polishing degrades the tight radiuses and sharp points. Stone routers are different from wood routers. They can run from \$750 to \$5000. All stone routers have internal or external water feeds to keep the bits cool.



Big router made by Sector



Small router by Flex

COUNTER TOPS

POLISHING

Once the edge has been shaped it's time to start polishing. Most polishing is done by hand with electric and air polishers (wet) or variable speed grinders (dry) in the 3000 rpm range. All our polish pads need a backing plate that threads onto the polisher. Rigid backer pads are for flat or surface polishing and flexible backer pads work best on radiuses. The original polish pads, like our premium pads, were composed of resin impregnated with diamond and had to be run wet only or the resin would melt or scorch. Several years ago, dry pads were introduced. They are made of ceramic material infused with diamond so they can withstand the high temperatures caused by friction. Wet and dry pads both follow the same sequences of grits: 50, 120, 200, 400, 800, 1500, 3000 and either white or black buff, depending on the color of the stone. An alternate sequence you see is: 80, 150, 300, 500, 1000, 2000, 3000, buff.

There are specialty pads like our metal bond pads which are like a flexible cup wheel. The newest innovation is a 3 step system that needs just 3 pads. They are a bit more expensive but save time. I recommend them for backsplash and bowl polishing, areas that don't get as much scrutiny as the front edge. I explain what each grit is doing in this manner:

50, 100, 200
50 to 200
sands the stone
#1



polisher wet electric

400, 800
400 to 800 hones/preps
#2



pneumatic polisher

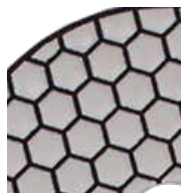
1500, 3000
800 to buff polishes
#3



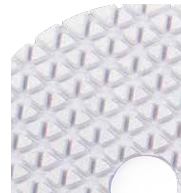
variable speed grinder



premium pads



hexagon dry pads



hybrid 3 step wet pads



metal wet pads



rigid backing pad



flexible backing pad

COUNTER TOPS

SINK CUT OUTS AND CORING

The customer has his choice of either a drop in sink or an under mount sink. Drop in sinks are easy as you only have to cut a hole to accommodate the size of the sink and drop it in. Under mount sinks require that the bowl opening is fully polished like the front edge. The easiest way to cut a bowl opening by far is with the concave blades. The segmented concave blade will give the longest life, the turbo cuts faster than the segmented but does not last as long. All of our concave blades have side protection segments that keep the blade from binding up in the cut. Once the hole is cut out, we recommend the zero tolerance wheels to make the edge perfectly smooth and vertical. The resin filled wheels will give the longest life. The non-resin filled are more aggressive. After cutting out the sink, the faucet holes have to be cored out. The most common size of core bit for faucets is 1 3/8". Our dry core bits from 1" up have vacuum brazed diamonds on the outside of the barrel to prevent the bit from binding up in the hole and brazed diamonds on the inside of the barrel to allow the plug to easily drop out after drilling. 1/4" is popular for horizontal drilling in bath and shower applications like handicap rails and towel holders. 2 1/2" is common for desktop computer wire holes.



concave blades
segmented and turbo



rodding blade



zero tolerance wheel



black core bits



wet thin core bits



non-coring bits

RODDING

Many of these stones while being very hard are also very brittle. Rodding is a process where a channel is cut in the back of the stone and a rod is glued into place. This does not make the stone stronger but it does hold the broken pieces together so the counter top is easier to repair. Most fabricators use steel bars 1/8"x1/4" or fiberglass rectangular rod. Once the rod is dropped into place it is encapsulated with glue and becomes a permanent part of the counter top. The Diamond Vantage rodding blades are 3.3" diameter by 1/8" or 1/4". The reason for the small size is to help prevent cutting all the way through the stone and ruining the top.

INSTALLATION

A good installer is worth his weight in gold. He more often than not has to replicate the work done in the shop on the spot, in the field, with the designer or home owner looking over his shoulder. The main tool will be a variable speed grinder to grind the stone (there is no such thing as a straight wall) with cup wheels, polish an edge using dry pads, or core holes with for the faucet. Sometimes he will have to do the sink cut out in the field using a core bit and turbo blade if it is a rectangular sink like in a kitchen or a concave blade for an oval sink like in a bathroom vanity. Some installers pride themselves on top/surface polishing. Top polishing is done to remove scratches on the surface of the stone and to take out lippage where the pieces of stone come together.

Good installers have seam levelers to make the joint look and feel perfect but sometimes the stone is warped. That unevenness where the pieces are glued together is called lippage. The installer must grind the stone flat then polish it all the way back to the factory finish. This is an art all by itself. We recommend starting with Diamond Vantage Metal Wet pads and finishing with the premium honeycomb pads for both lippage and scratch removal.

FLOORING

TILE TYPES

Ceramic Tile or Glazed Tile - These tiles are made of clay powders compressed and baked into a tile form. They are usually fired in a kiln at 600 to 800 degrees with a patterned and glazed surface to create a shiny, waterproof finish. Of the different types of tiles, they are the easiest to work with. Most standard continuous rim diamond blades will have no problem cutting them. One drawback is that the color is only on the surface so putting an edge detail on them does not work well.

Porcelain Tile - These tiles are much harder than ceramic tile as they also contain feldspar, quartz and other minerals. They are also heat treated at over 2100 degrees. Some are full bodied where the color goes all the way through the tile. For cutting, you really need a porcelain specific blade. Many diamond blade manufacturers have gone to an ultra thin type blade for less resistance. The problem is that after 16" they cannot cut straight. Diamond Vantage has many options and grades. Our flagship Zenesis porcelain blades incorporate a unique slot and rim design combined with exclusive Zenesis technology. This blade will handle small and large format porcelain and even granite tiles.

Clay Tile - These are made of natural clay which is very soft and brittle. Almost any tile blade will work on them. They are used mostly outdoors. Many homeowners will coat them with a lacquer to make them shiny and water proof. These can be profiled and semi polished.

Glass Tile - These tiles are becoming more popular as they are considered "eco-friendly". They are generally made of recycled glass and come in all sizes and colors. You often see them arranged in patterns and glued to a fiberglass backing. Diamond Vantage has blades in many sizes designed specifically for glass.

Stone - You see these tiles in upscale homes and hotels. They are beautiful but require high quality installation. A good polished stone floor will look like one sheet of stone with a grid of lines throughout. Each tile has to be set at exactly the same height and angle. Some stone floors have a natural looking texture created by splitting, antiquing or flaming and are great indoors or out. Diamond Vantage has blades to accommodate each stone. We have electroplated for marble, turbo style for granite and the Vortex turbo for flagstone and slate.

FLOORING

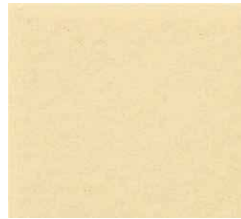
CERAMIC TILES



Fake Stone Look



Laid in Offset Pattern



Unglazed Tiles



Ceramic Tile Counter

PORCELAIN TILES



High Gloss Look



Textured Look



Rustic Look



Formed Tiles

CLAY TILES



Saltillo Tile



Terracotta Tiles

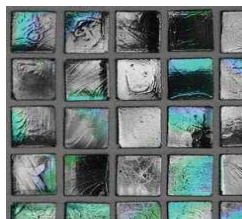


Outdoor Application

GLASS TILES



Mosaic Pattern



Patina Look



Round Shapes



Glass Tile Backsplash

STONE TILES



Granite and Marble



Slate Flamed



Flagstone



Marble Shower

FLOORING

CUTTING TILE

Most cutting is done with diamond saw blades on various types of tile saws. The standard tile saw runs 10" blades and can cut up to 18" diagonally. This poses a problem when dealing with the very popular super size tiles, some as big as 36" square. These tiles require either a traditional saw with an elongated table, a mini bridge saw or as a last resort a hand saw and a straight edge. Most tile blades need water to keep them cool, so almost all tile saws have water feeds and come with ground fault interrupters.



10" 1 1/2hp Tile Saw



Abaco Mini Bridge Saw



7" Tile Saw



Hand Tile Saw

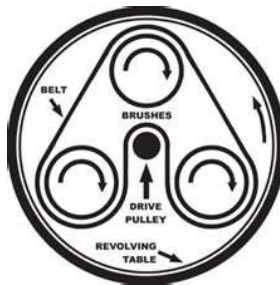
STONE FLOOR GRINDING AND POLISHING

To make a perfect polished stone floor the floor should be set first then ground to eliminate any lippage (toe stubbers) and ensure a consistent reflection tile to tile. A planetary floor machine is the ideal way to tackle this type of job. A planetary machine has a big drive plate coming off the motor that holds three smaller plates that the diamond tools attach to. The three smaller plates spin in the opposite direction as the big plate. This makes these very heavy and powerful machines easy to control. A good floor buffer can be modified to do this job but is not preferred. The flooring contractor will start with metal bond discs.

Metal bonds come in mainly two shapes; round or trapezoid. The job of the metal bonds is to take out the scratches caused by the vacuum brazed discs. A typical sequence for metal bonds is 50 grit, 70 grit, 100 grit then 220 grit. Since metal bonds act differently than resin bond tools, you must go back a grit in your resin pads. For example, if I use metal bonds 50, 70, and 100 grits, I would start resin polishing at 50 grit then continue through the standard sequence up to 1500 or 3000 grit. When completed, the floor will look like one solid slab of stone with grout lines.



Planetary Machine



How Planetary Works



Floor Buffer



F.A.S.T. System



Hybrid Metallic Pads



Resin Polishing Pads

LARGE FORMAT PORCELAIN

I put this material in its own category because it so new. Every week I am seeing new colors, sizes and applications. It comes in thicknesses ranging from ¼” to ¾” and sizes from 24” x 24” to full slabs 8’ x 10’. Some think this is going to be just a passing fad. I can tell you it is not going away and will continue to get better and better. Companies like Cosentino and MSI have invested millions of dollars in plants, marketing, and inventory to make this material. In the future we will see slabs of porcelain that will look identical to natural stone and have none of the maintenance that stone requires. Think about this: there are porcelain tiles that look exactly like wood plank. They have the texture and color of natural wood but never have to be sanded or oiled. Do you think they can’t do the same with these large format tiles to make them look like natural stone?

PORCELAIN SLAB FOR COUNTER TOPS

There are several brands on the market like Dekton, Stile, and Neolith. Each one has variances in the materials used to create the product but they are very similar in the way they have to be processed. They require special tooling and often the fabricator must be trained and certified to be able to work with the distributor. Since each slab is like a giant porcelain tile there is stress in the slab that must be released by cutting an inch or two off two opposing sides before any fabricating can even begin. Cutting the slab requires a special bonded blade that is different from normal bridge saw blades. The most successful blades have segments that are soft bonded with a high concentrate of diamond. The segments are closely butted together to give a smooth and chip free cut. This is critical as over 90% of the edge details are going to be a “mitered” edge. This means that the sawyer must make two perfect 45 degree cuts and laminate the pieces together to make a 90 degree edge that is as close to invisible as possible. The cutting can only be done from the outside of the slab in to the material. Plunge cutting will cause the piece to crack or split and is unrepairable. Coring is also a challenge as regular stone bits will destroy the surrounding area where the hole needs to go. Either a thin wall continuous bit or vacuum brazed bit is recommended. Polishing is very easy as the mitered edge only requires that the sharp corner be brought down to the point where it is no longer sharp and dangerous.

PORCELAIN PANELS FOR WALLS

This is the perfect application for the new large format porcelain. It is thinner and lighter weight, waterproof and antibacterial. There have been many debates on how to properly cut it. Some recommend a score and snap method and others diamond blades on various saws. Many of these are manufactured to look exactly like stone and even made to “bookmatch” multiple pieces. Bookmatching is where the veins of one piece continue onto the next piece. Our Zenesis porcelain blades work great for this application.

OUTDOOR PORCELAIN PAVERS

These tiles are the newest thing in large format. They are heavy ¾” thick super durable pavers that require almost zero maintenance or sealing. They can be set like any other paver and have many colors, designs and textures. Our Thin turbo porcelain blade gave the fastest chip free cuts in testing.