

**TILE AND STONE**  
*TECHNOLOGIES™*

Product Reference Guide



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# TILE

## Tile types

### Porcelain

These tiles are much harder than ceramic tiles as they also contain feldspar, quartz, and other minerals. Porcelain tiles are sintered by high pressure and heat treated at 2200 to 2500 degrees. By definition, they are less than .5% porous so they do not require sealing and are very durable. The biggest challenge is that they are almost impossible to repair. New technology has allowed this material to be made in many shapes and thicknesses to cover a huge variety of applications. They can be very difficult to cut. We recommend only the highest quality diamond blades made specifically for porcelain. Blades should be dressed regularly with an abrasive material like a dressing stick. This ensures that the diamonds in contact with the porcelain are sharp and cut with little resistance. A dull blade will cut slowly and want to deflect over the length of the cut. This will cause breakage and chipping.

1. Large Format floor tile refers to tiles that have at least one side longer than 15". They can look like wood plank, limestone, slate, and marble without the maintenance requirements for natural materials.

- Best blade for cutting:
  - Continuous rim style.
  - Mesh rim style.
- Best bit for drilling:
  - Thin wall core bit.
  - Brazed rim core bit.



Large format porcelain floor tiles - high gloss look

2. Porcelain panels are sheets of porcelain that are good for doing shower walls. Many are glass coated to give a high polish look like natural stone.

- Best blade for cutting:
  - Continuous rim blade for a tile saw, grinder or hand saw.
  - Porcelain-specific bridge saw blade if using a bridge saw.
- Best bit for drilling:
  - Thin wall bit.
  - Brazed single-layer core bit.



Porcelain panels

3. Porcelain Pavers are thicker tiles for mostly exterior applications. Now available in 2cm, 3cm, and even 5cm for commercial driveways.

- Best blade for cutting:
  - Mesh rim blade.
- Best bit for drilling:
  - Brazed single-layer core bit.



Porcelain pavers

4. Porcelain slabs are becoming very popular for countertops and outdoor BBQ tops. They are very durable, heat resistant, stain resistant, and UV stable.
  - Best blade for cutting:
    - Slotted tile blade or mesh rim for a tile saw, hand saw, or grinder.
    - Porcelain-specific bridge saw blade if using a bridge saw.
  - Best bit for drilling:
    - Thin wall core bit.
    - Brazed single-layer core bit.

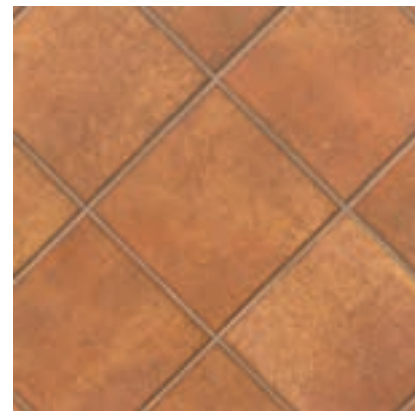


Porcelain slabs

## Ceramic

These tiles are made of clay powders that are compressed and baked into a tile form. Ceramic tiles are usually fired in a kiln at 1800 to 2000 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. Mostly used for inexpensive applications.

- Best blade for cutting:
  - Continuous rim tile blade.
- Best bit for drilling:
  - Continuous turbo rim, thin wall or brazed bits work well.
  - Stone core bits damage or break the tile.



Ceramic Tile

## Clay

These are made of baked natural clay which is very soft and has a rustic look. They are used mostly outdoors. Many homeowners will coat them with a topical sealer to make them shiny and waterproof.

- Best blade for cutting:
  - Continuous rim or mesh rim tile blade.
  - Electroplated cut well but might have a shorter life.
- Best bit for drilling:
  - Turbo rim, thin wall.
  - Brazed single-layer bit.



Terracotta red clay tiles

# TILE

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## *Glass*

Glass tiles are mostly used for backsplash and swimming pools. They come in mosaic sheets that are held together by either mesh back or paper face. Glass tiles are very heat sensitive and must be cut and cored with coolant. They require a diamond blade specifically made for cutting glass. Glass blades have a higher concentration of smaller particulate diamonds to cut chip free.

- Best blade for cutting:
  - Glass-cutting diamond blade. **ONLY** use glass blades unless specified hybrid like the ZENESIS™ Nano.
- Best bit for drilling:
  - Bits designed specifically for glass.
  - Thin wall core bit.



Glass tiles

## *Mosaic*

Mosaic tiles are made of small tiles arranged in patterns or sheets. They can contain all types of materials including metal, stone, glass, and porcelain.

- Best blade for cutting:
  - High quality continuous rim.
  - Glass blade.
- Best bit for drilling:
  - Thin wall core bit.
  - Brazed single layer.



Mosaic backsplash tile

## Stone

Natural Stone tiles are very luxurious and expensive. A good, polished stone floor will look like one sheet of stone with a grid of lines throughout. Some stone floors have natural-looking textures created by splitting, antiquing, bush hammering, or flaming and are great indoors or out. There are two types of stone tiles, calcites or silicates. Calcites are softer stones like limestone, marble, travertine, and onyx. Silicates like granite, slate, and quartzite are much harder and denser than calcites. They are also acid resistant so they do not etch.

- Best blade for cutting calcites/marbles:
  - Continuous rim blades or electroplates blades.
- Best bit for cutting silicates/granites:
  - Continuous rim or turbo blades.
- Best blade for drilling calcites/marbles:
  - Thin wall or brazed single-layer bit.
- Best bit for drilling silicates/granites:
  - Stone core bits.
  - Thin wall core or brazed single-layer bits.



# TILE

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## Types of tile blades for cutting

### *Continuous Rim*

These blades have a solid continuous rim made of diamond and metal bond materials attached to a steel core. While these blades look almost identical there can be a huge difference in quality and concentration of diamond and metal. They can be wet only or good for wet and dry.



### *Slotted or laser cut*

These blades have laser slots cut into the rim to draw in more air and water to run cooler. They can be wet only or good wet and dry.



### *Mesh rim blades aka ultra thin turbo*

These blades have a continuous rim that is like a turbo rim but with much smoother cutting. They cut very fast with minimal chipping. **They are made for straight cutting only!** Mesh rim blades are very thin and cannot withstand much if any side pressure. The cutting speed and ability to cut thicker porcelain make them very popular. They are being used more in natural stone and ultra-compact materials. Most are dry cutting but work well with water.



## *Electroplated*

These blades have diamonds electroplated directly onto the edge of the blade. They are made specifically for limestone and marble but many contractors are using them on porcelain as they give fast and clean cuts. They do not give long life on porcelain.



## *Glass tile blade*

These blades have a much higher concentration of smaller diamonds to cut the glass cleanly. They are always wet cutting only.



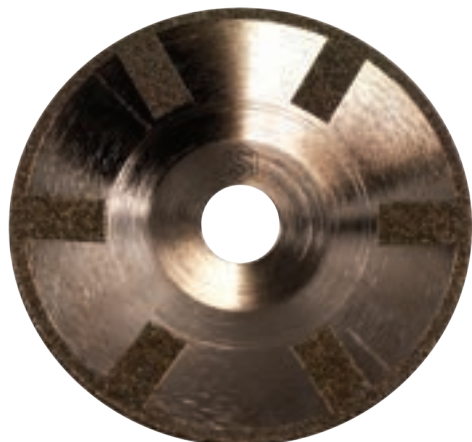
## *Bridge saw blade*

This type of blade is made for big, higher horsepower saws typically used for cutting slabs. The most common sizes of bridgesaw blade for porcelain slabs are 14" and 16". The standard arbor size is 60mm.



## *Contour blades*

These blades are designed specifically for cutting curves and circles. Most commonly used to cut sink openings and around toilet holes. Electroplated contour blades work well on porcelain and natural stone.



## Types of equipment for cutting tile

*Refer to the pictures on the next page*

### **1. Tile saw**

The easiest and most common way to cut tile is with a wet cutting tile saw. These saws have a stationary motor. The material is placed on a moving tray and pushed into the blade. Standard tile saws use 7" to 10" blades while the bigger rail saws use 10" to 14" blades.

### **2. Angle grinder**

Grinders are very versatile and can be used to cut all types of tile straight, angled, or curved. They range in blade capacity from 4" to 9". Because they are handheld, they do not cut as accurately as the other tools.

### **3. Hand saw**

Hand saws are handheld but have a stable base to set on the material. They use blades from 4" to 8". When used with a straight edge they can make fairly accurate and clean cuts. Sometimes they are the best option if the material is too big for a tile saw.

### **4. Portable bridge saw**

These tile saws are job site portable and have a large cutting capacity. They can cut pieces from 36" to 72". They tend to have larger motors that move across the table while the material is stationary. This makes them good for cutting tiles from 1cm to 6cm porcelain or natural stone. Many have a tilting head for doing mitering and angle cuts.

### **5. Full size bridge saw**

Bridge saws are best for cutting full size porcelain panels and slabs. The biggest drawback is that they are permanently stationed and cannot be moved. They have large motors ranging from 10 to 30 horsepower.

### **6. Cutting board - aka scratch board**

Cutting boards use a small carbide wheel on a set of rails to score the top of the tile to create a line to break the tile on. They are quick and easy for standard thickness floor tile. Not recommended for thick large format tiles or slabs. The only drawback is that they can only cut on a straight line and cannot make miter or curved cuts.

## Pictures of tile cutting equipment

1.



2.



3.



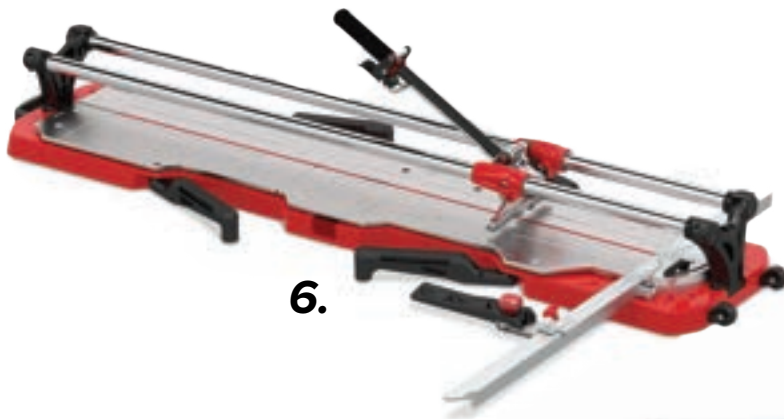
3A.



4.



6.



5.



1. 10" Tile wet saw
2. 4" Angle grinder
3. 5" Hand saw with water feed
- A. Worm drive hand saw
4. Portable rail/bridge saw
5. Full size stationary
6. Manual tile cutter/scratch board

## Edge details for tile

### *Eased edge*

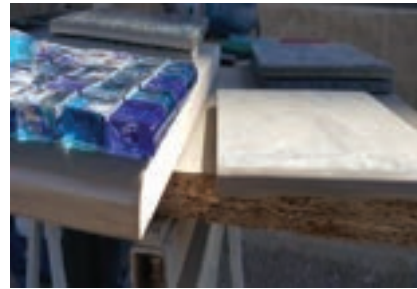
Any cut edge of the tile should be dressed to remove any chips or at least make it not dangerously sharp. Done to a more aggressive degree can make a slight radius or bevel. This can be easily done using a diamond hand pad.



Ease edge

### *Bullnose or demi bullnose*

In the tile world, a half-rounded edge (shape B) is often called a bullnose but in the countertop world, a bullnose is a full 180 degree round (shape V). Either one can be created using a diamond profile wheel or a diamond router bit.



Bullnose or demi bullnose

### *Miter edge*

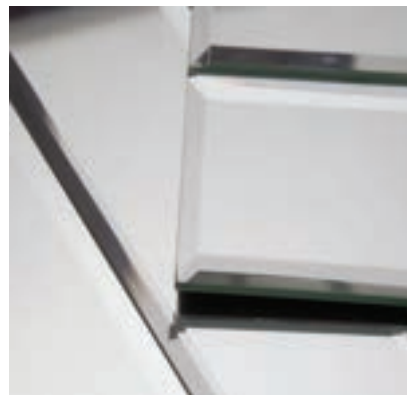
This edge is created when you put two pieces of tile cut at a negative 45 degree angle together to make a matching 90 degree drop edge.



Miter edge

### *Bevel edge*

This edge is created by cutting or shaping the material at a positive angle. Most often this is done on a cut edge to match the factory edge of a tile that has a small bevel on the outside of the tile.



Bevel edge

## Pictures of tools for doing edge details



6" Radius profile wheel sintered



45 Degrees Profile

6" Bevel profile wheel brazed



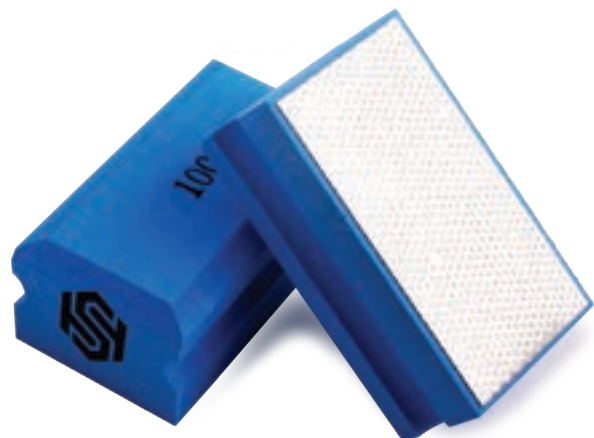
Demi bullnose grinder router bit



Full bullnose grinder router bit



Bevel grinder router bit brazed



Diamond hand pad 100 grit

# TILE

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## Types of cuts in tile

### *Straight cuts*

These are cuts that are parallel or perpendicular to the outer edge of the tile. The material is flat so that the blade is perpendicular to the tile.



Straight cut

### *Diagonal or angle cuts*

These are cuts where the blade is perpendicular to the tile but the tile is at an angle to the outer edge. The most common is a 45 degree cut.



Diagonal cut

### *Miter cuts*

These cuts are straight but the blade is not perpendicular to the material. This is most commonly done at a 45-degree angle. When you put two matching pieces cut at 45 degrees together they can be joined seamlessly to create a clean 90 degree drop edge.



Miter cut

### *Curved cuts*

These cuts are the most challenging. They are best done with a blade made to cut curves.

**Very Important!!** Do not use tile blades designed for straight cutting to cut curves. They will break and cause injury.



Curved cut

## Drilling and coring holes

Many times drilling a hole in the tile is necessary. Examples would be holes for faucets, shower drains, towel holders, and handrails. There are just as many differences in bits for drilling as there are in blades for cutting tile.

### **1. Turbo rim tile bits**

These are the original diamond bits for drilling tile. They work fine on ceramic tile, natural stone, and clay tile. They do not work well on porcelain and are not recommended for glass. Most of the bits in this style can be run with or without water. These bits can be found with a female threaded arbor or straight shank for use with a drill motor.

### **2. Brazed single layer bits (BSL)**

These bits have a single layer of diamond on the cutting edge and the lower part of the core bit. While they may look electroplated, the diamonds are adhered with much stronger metals. BSL bits are the most versatile and can be used for drilling any tile, stone, masonry, and metals. They work equally well dry or wet. Smaller diameter bits may have straight male shank for drill motors while larger sizes will have 5/8"-11 female threads for grinders and stone polishers.

### **3. Electroplated bits**

These bits are older technology but work well on soft stone, ceramic tile, and porcelain. Because they are also single layer diamonds, they look like brazed diamond bits but on porcelain have a very short life.

### **4. Segmented stone core bits**

These bits are made specifically for natural stone. They have segments with space in between them to cut aggressively and stay cooler. Higher quality segmented bits have brazed diamonds on the outside of the barrel to keep the bit from getting locked up in the hole. Brazed diamonds on the inside of the barrel make it easy to remove the core after drilling. They usually have 5/8"-11 female threading to go onto a grinder or stone polisher. An adaptor that goes from 5/8"-11 to a straight shank can be added to the bit for use with cordless or corded drills. These bits are not designed for ceramic or porcelain tiles. They will leave extreme chipping or break the tile.

### **5. Turbo segment stone core bits**

These bits are similar to segmented stone bits but the segments are turbo shaped. They tend to cut a little faster than segmented bits. Like the segmented stone bits, they are only designed for natural stone. Side note: They work well on concrete pavers.

## 6. *Thin wall core bits*

These bits have a thin segment to cut fast and clean. They work well on almost all materials.

## 7. *Non coring bits - aka blind hole bits*

These bits are old technology that at one time was the only way to drill smaller holes with a diamond bit. They are very fragile and can only be run wet. This is a real challenge if the surface you are drilling on is vertical.

## Pictures of core bits

1.



2.



3.



4.



5.



6.



7.



8.



1. Turbo rim bits with stem and pilot bit
2. Brazed threaded and drill shank
3. Electroplated bit with drill shank
4. Segmented stone core bits with BSL in and out of barrel
5. Turbo segmented stone bits with BSL
6. Thin wall core bits with threaded arbor
7. Noncoring bits with threaded arbor
8. Core bit adaptors

# STONE

## Stone types

### *Calcium carbonate stones - Limestone, Marble, Serpentine, Onyx*

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

### *Silica based stones - Granite, Slate, Quartzite, Shist*

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 as they do not react to acidic foods or cleaners.

### *Engineered stones - Silestone, Ceasarstone, Zodiak, Hanstone*

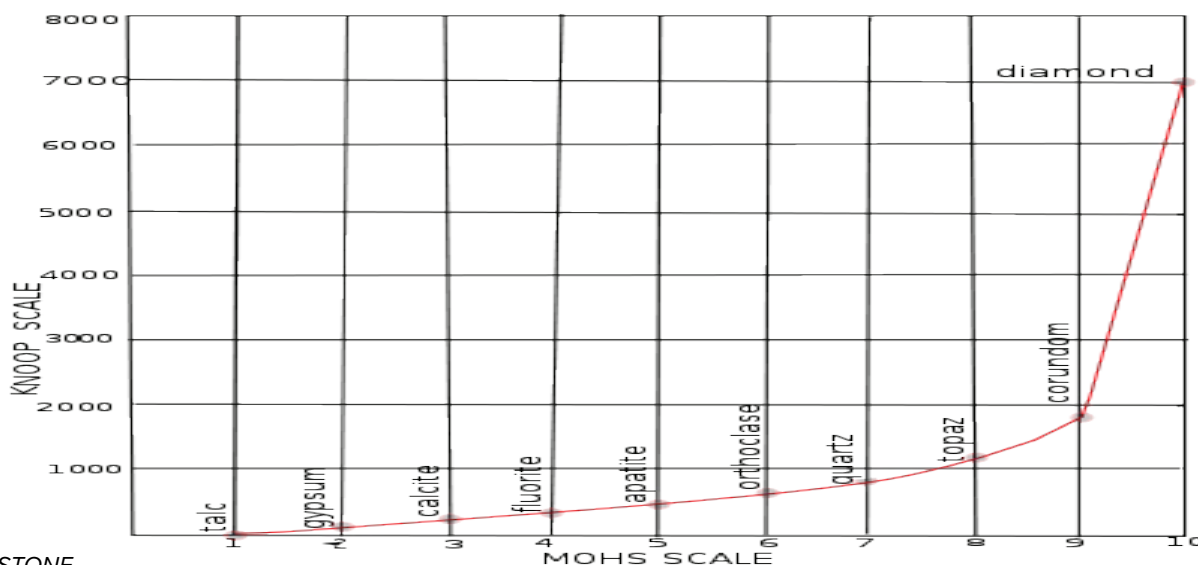
These are man-made stones made of resin and quartz. They are very durable and hard to stain. They can be fabricated with the same tools used on granite but their abrasiveness tends to wear them out quicker. They must be wet polished only, as the resin will burn. Some drawbacks are that they are not UV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

### *Sintered Stone - Dekton, Lapitec, Neolith*

These materials are man-made and very similar to porcelain. Made up mostly of quartz and glass they are very difficult to fabricate. Due to the extreme hardness, many new diamond tools have been created to handle these types of materials.

### *Cementitious stones – Decorative Concrete, Eco Stone, Ice Stone, Urban Slabs*

These are other types of man-made stone usually made of cement and recycled glass. Polymer-enhanced cement is the binder holding the materials together.



## *Calcium based stones*



White carrara marble

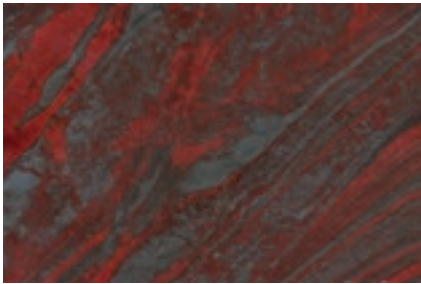


Black marble w/ fossils

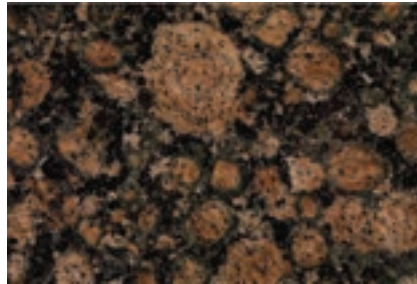


Honey onyx

## *Silica based stones*



Iron red



Baltic brown

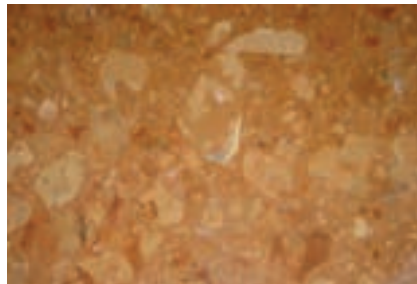


Volga blue

## *Engineered Stone*



Capri Limestone by Silestone



Verona Portofino agglomerated marble

## *Sintered Stone*

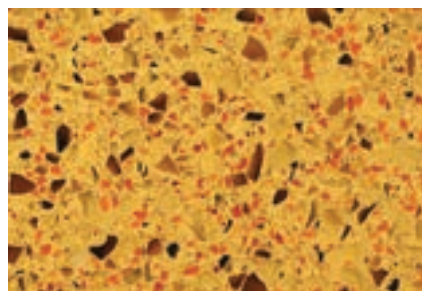


Sintered Stone

## *Concrete or Cementitious Stones*



Denim Moss



Tuscan Sunset

## 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 or digital template. When done properly the template will be laid out on the stone in such 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. New technology makes it possible to take pictures of the slabs and combine them with a digital template so that you can see what the final look of the job will be before a single cut is made.

## Equipment for cutting stone

### *Bridge saw*

The most preferable way to cut slabs is a full-size bridge saw that runs 12” to 24” diamond saw blades. They have big motors with 10-50 horsepower. A bridge saw leaves the straightest and cleanest cuts and requires less work for the fabricator. Most will make straight and miter cuts. New CNC (computer navigated control) saws can be programmed to do many functions besides cutting like routing out sink openings and drilling faucet holes.

### *Rail saws*

Rail saws are great entry-level saws that are accurate and portable. They range in blade capacity size from 5” to 14”. Some of the drawbacks are that they have lower horsepower than a full size bridge saw and few will do miter cuts.

### *Hand saws*

These smaller saws when used with a straight edge guide can do a nice job cutting stone. Most hand saws have a base plate for the saw to ride on. They do take more time to complete the job and miter cutting can be tricky. Some of the better ones have water-feed attachments.

### *Angle grinders*

Angle grinders are good for making short cuts but not good for cutting slabs down to countertops. They are versatile as they can be used for cutting, grinding, shaping, coring, and polishing if they have variable speed ability.

## Pictures of tile cutting equipment



1. Bridge Saw Blade
2. 4" Angle grinder
3. 5" Hand saw with water feed
4. 7" Worm drive hand saw
5. 5" Variable speed grinder

# STONE

## Types of blades for cutting stones

### *Small diameter blades*

These blades are used on hand-held tools like grinders and hand saws. They generally range from 4” to 8”. For granites and engineered stones turbo rim blades are the most popular. They are fast cutting and leave a cleaner edge than segmented blades. For marbles and limestones, continuous rim blades and electroplated blades work very well. Most small-diameter blades are designed for dry cutting but work very well with water to eliminate dust.

### *Large diameter blades*

These blades are designed to be used on full size bridge saws. Most common sizes are 14” to 24” and have special laminated cores to reduce noise. They are usually designed for specific materials like granite, marble, sintered stone, and quartzite. Very few blades will cut all materials well. Blades that are used for miter cutting require a very strong core to handle the side pressure created when cutting with the blade at an angle to the surface of the stone. Some blades come with a reinforced core to help keep the blade cutting straight at an angle. Other blades have a solid steel core that is very strong but very loud. Almost all large-diameter blades for stone are wet cutting only. The segments are welded on and put under extreme heat the weld will fail and can cause segment loss and possible injury.



All purpose  
bridge saw blade



Marble blade



Quartzite blade



Porcelain and  
sintered stone blade

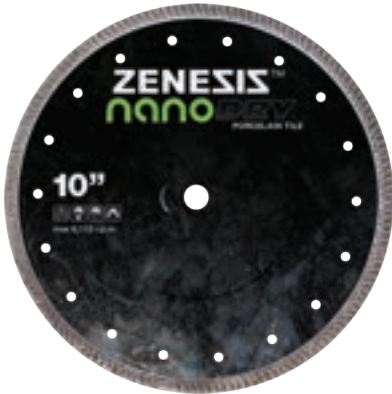
## Pictures of stone blades



Stone turbo rim blade



Quartzite blade with side protection



Mesh rim blade



Continuous rim blade with slots



Electroplate marble blade

# STONE

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## Laminating

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

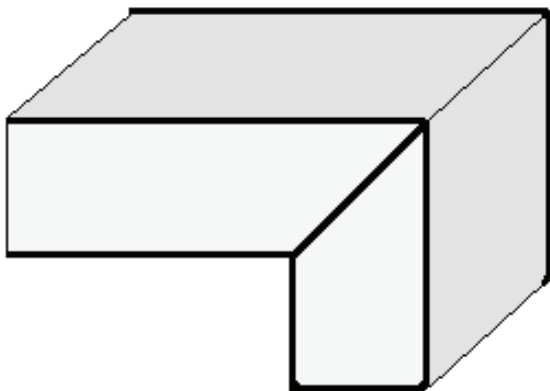
### *Stack*

This type of 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 lamination line almost invisible.

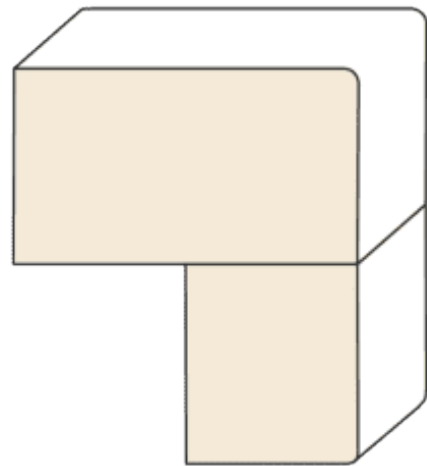
### *Miter*

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 countertop. This is the best way to ensure that the laminated piece is the same color and texture as the top piece. With any material that only has the design on the surface a miter lamination is the only professional way to make the edge detail.

## Pictures of laminated edges



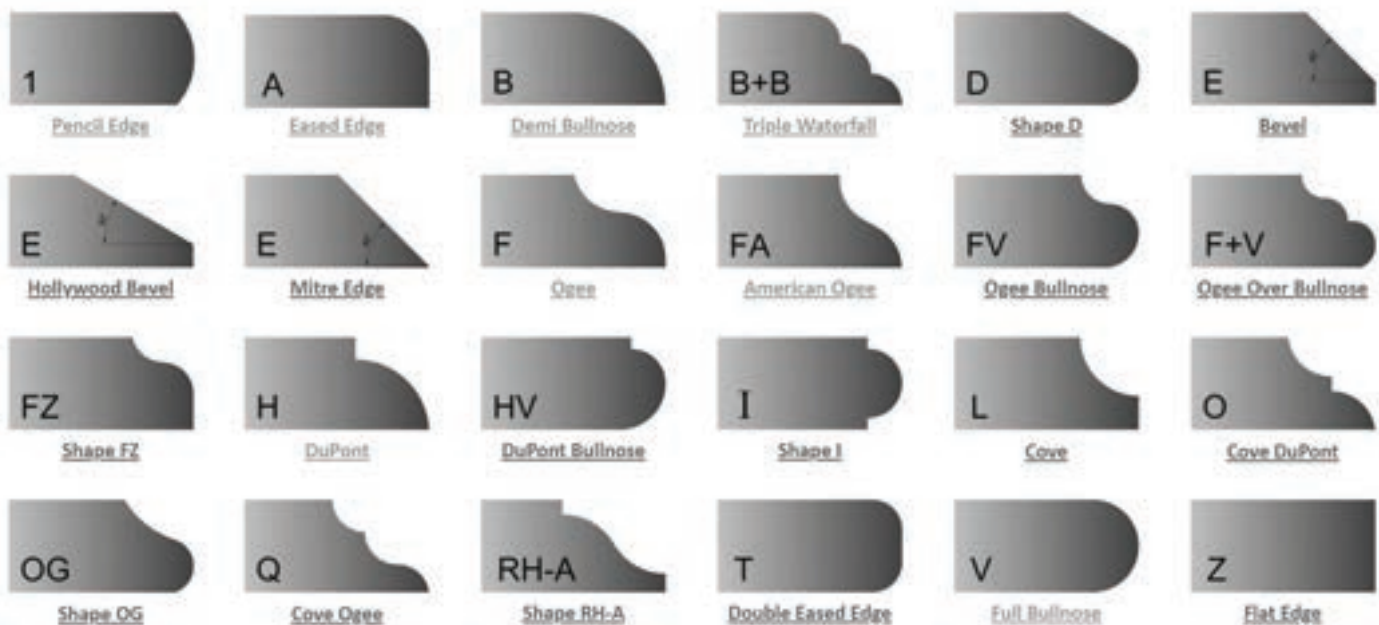
Miter



Stack

## 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 edge detail. There are many shapes like ogee, bullnose, cove, and dupont; each one has a letter assigned to 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. Many stone router bits come in position 1 and position 2 which equate to coarse (50 grit) and medium (100 grit). Many fabricators use only 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 grit, eliminating the most invasive pads that cause ripples in the finished edge. We highly recommend using both steps when doing edges that are difficult to polish like a 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.



## Stone routing machines



## Hand 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 Velcro backed polishing pads need a backing plate with male velcro that threads onto the polisher. Rigid backer pads are for flat or surface polishing and flexible backer pads work best on edged that have a curved surface. The original polish pads, like our premium pads, are composed of a resin impregnated with diamond and must be run wet or the resin will melt or scorch. Dry polishing pads are made of ceramic material infused with a 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 buf, depending on the color of the stone. An alternate sequence you see is 80, 150, 300, 500, 1000, 2000, 3000, buf.

There are specialty pads like our metal bond pads which are like a flexible cup wheel. The newest innovation is a 3-step pad system that needs just 3 pads. They are a bit more expensive but save time. Different grit application is explained below:

50 grit	100 grit	200 grit	400 grit	800 grit	1500 grit	3000 grit
	50 to 200 sands the stone		200 to 800 hones/preps		800 to 3000 polishes	
	#1 3 step pad		#2 3 step pad		#3 3 step pad	



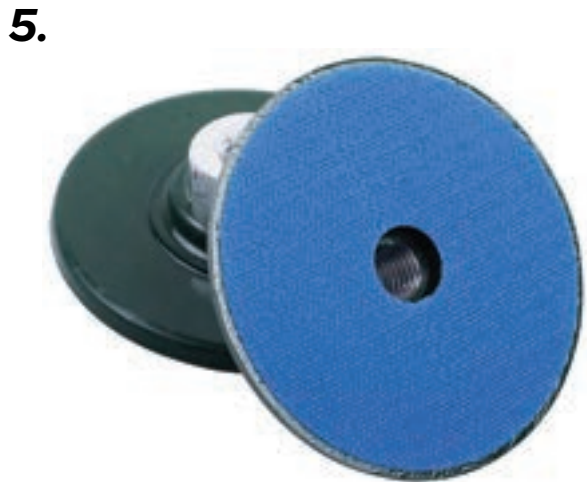
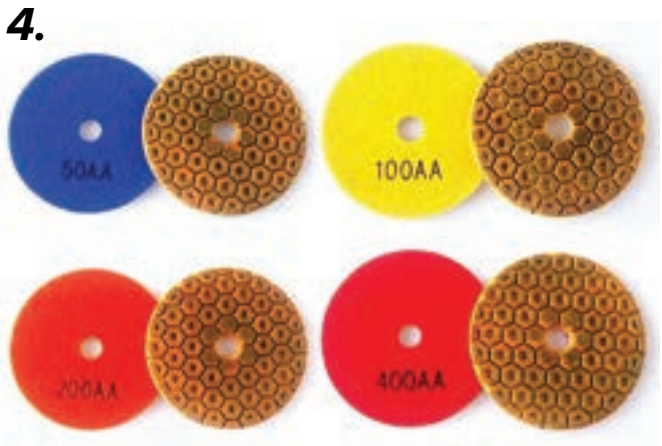
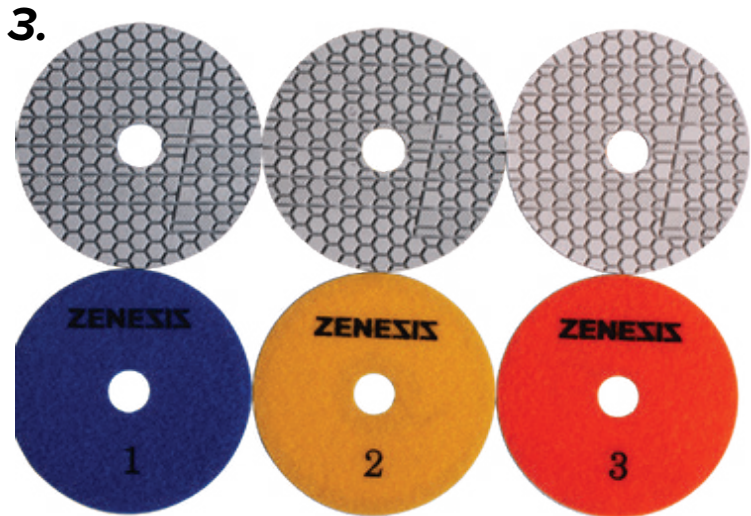
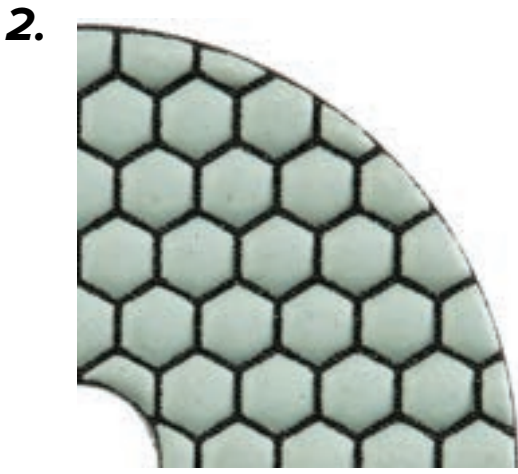
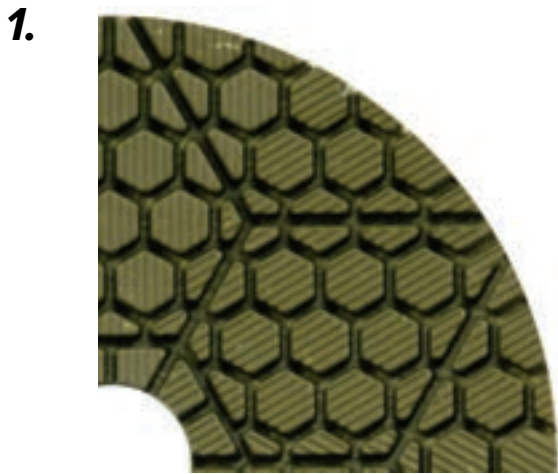
Electric wet polisher



pneumatic polisher



variable speed grinder



1. Premium wet pads
2. Hexagon dry pads
3. Hybrid 3 step wet pads
4. Metal wet pads
5. Flexible backing pad
6. Rigid backing pad

# STONE

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## Textures

### *Full Polish*

Full polish is created by going through a complete sequence of polishing tools. This is the classic finish that is so polished you can see your reflection when you look down on the surface. It is achieved by using metal bond tools to calibrate and smooth grind the surface followed by polishing tools going from generally 100 grit to over 1200 grit.

### *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 little if any 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 abrasive brushes that erode the softer parts of the stone at a faster pace than the hard parts of the stone giving the material a 3-dimensional surface. 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. To match the surface of the countertop the edges must be textured with the brushes on a grinder or polisher. There are several types and shapes of antiquing brushes. Fickert and Frankfurt brushes are generally used for the surface of the stone. 4" round brushes are used for doing edges. The bristles of the brushes can be made of nylon, plastic, rubber, or silicon

## Pictures of antiquing brushes

Fickert shape with diamond bristle



Frankfurt shape with silicon carbide bristle



Round w/nylon and diamond bristle



Round with rubber bristle



Round with plastic bristle

## Sink cut outs

There are two types of sink installations, either a drop-in sink or an undermount sink. Drop-in sinks are easy as you only have to cut a hole to accommodate the size of the sink and silicone it in. The sink sits on top of the granite.

Under-mount sinks require that the sink opening is fully polished like the front edge. The sink is then mounted under the countertop. The easiest way to cut a vanity oval sink opening manually is by far 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. Electroplated contour blades are for fragile materials like marble and porcelain. All 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 opening smooth and vertical. The resin-filled wheels will give the longest life. The non-resin filled are more aggressive. Brazed drum wheels are good as they never lose their shape.



Segmented contour blade



Turbo contour blade



Electroplated contour blade



Resin filled zero tolerance wheel



Brazed drum wheel



Electroplated contour blade - side view

## Coring/Drilling

Core bits are used to put holes into the countertop. The most common size of core bit for faucets is 1 3/8". Smaller bits are needed for reverse osmosis systems. 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. There are many types of core bits for the many different materials. Stone core bits are best for natural stone, thin walls, and brazed bits are best for porcelain and delicate materials.



Core bit with brazing



Small non-core bit



Thin wall core bits



Brazed core bit

## Rodding

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 countertop is easier to repair if it breaks. Most fabricators use steel bars 1/8" x 1/4" or fiberglass rectangular rods. Glue is poured into the channel made by the rodding blade before the rods are inserted and becomes a permanent part of the countertop. The ideal size of a rodding blade is 3.3" in diameter by 1/8" or 1/4". The reason for the small size is to help prevent cutting through the stone and ruining the top.



1/8" Thick  
rodding blade



1/4" Thick  
rodding blade



1/8" x 1/4"  
Fiberglass rod



Epoxy being poured into the back of the slab  
before inserting rods

## Installation

A good installer is worth their weight in gold. They more often than not have to modify the work done in the shop out in the field, with the designer or homeowner looking over their 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, and polish an edge using dry pads, or core holes for the faucet. Sometimes they 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.

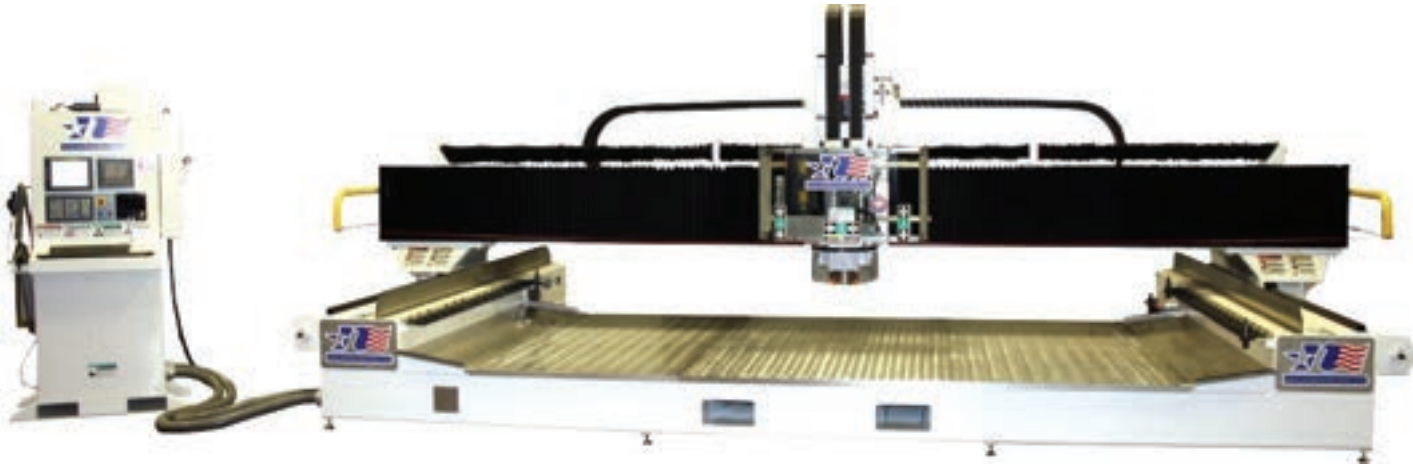
Some installers pride themselves on top/surface polishing. Top polishing is done to remove scratches on the surface of the stone and to take out lippage where the pieces of stone come together. Good installers have seam levelers to make the joint look and feel perfect but sometimes the stone is warped. That unevenness where the pieces are glued together is called lippage. The installer must grind the stone flat and then polish it back to the factory finish. This is an art all by itself.

## Automated machines for stone

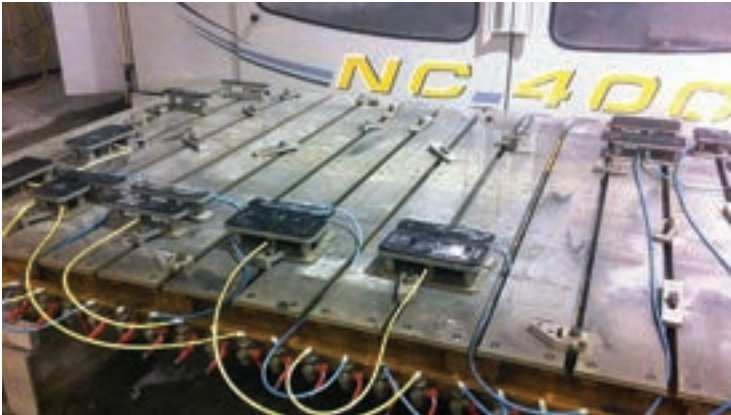
### *CNC Machines*

CNC, computer numerical control, machines are now a large part of stone fabrication. These giant stone routers can hold dozens of tools mounted on “cones” to cut, grind, shape, polish and core a slab without any human touching the stone other than to load the slab and unload the finished pieces. The stone slabs are loaded onto the bed of the CNC and held in place by vacuum pods. The pods are arranged to hold the pieces in place during the fabricating process. Many shops will do the entire process by machine while some will do all but the final polishing which they will do by hand.

## Pictures of CNC machine and accessories



Northwoods CNC stone router



CNC vacuum pods

CNC tool holder/cone



## Tooling for CNC machines

### *Finger bits*

Diamond milling bits also called finger bits do the majority of the cutting instead of a diamond blade. They are made in different lengths and widths. The most common is 1 5/8" and 2" long. Like diamond blades, there are different bonds for different materials.

### *Core bits*

CNC core bits are just like other core bits for stone with the exception that instead of a 5/8"-11 female thread they have a 1/2 gas male thread. Most CNC core bits use thinner segments to help prevent blowing out the bottom of the stone.

### *Z Wheels*

Z wheels are drum wheels made to grind the edge of the stone to a perfect vertical. They can be segmented, continuous, brazed, and electroplated.

### *Incremental bits*

These smaller CNC bits look like a mini version of a drum wheel. They are used in the same application of a finger bit but instead of milling the stone in one pass, incremental make several passes at high speed.

### *Milling wheels*

Milling wheels are often called stubbing wheels and calibrating wheels. They are for milling down the stone to either calibrate it or create a recess in the stone.

### *Profile tools*

CNC profiling tools come in all the shapes as other stone router bits but with many more positions per edge detail. To get to full polish the machine will use up to 7 tools. Most common is to use position 0 to rough shape the stone, positions 1, 2, and 3 metal bond to grind coarse, medium, and fine, and finish with positions 4, 5, and 6 in resin or ceramic bonds to go to final polish.

## Pictures of CNC tools



Finger bits with 1/2 gas arbor



Thin wall core bit with 1/2 gas arbor



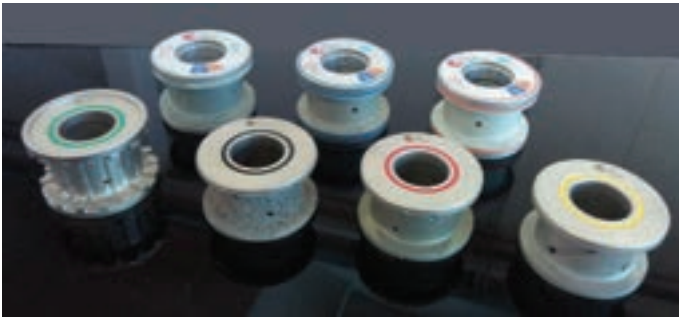
Wheel with 50mm arbor



Incremental bit with left and right thread



Milling/Stubbing/Calibrating wheel



Full set of CNC tools for 40mm "T" profile positions 0 to 6 with 50 mm arbor



Multiple sets of tools mounted on cones in sequence to be used

## Automated polishing machines

### *C Frame machines*

These machines can be programmed to do many different edge details using a single head that moves back and forth while rotating 180 degrees up and down. The only drawback is that the tools must be taken off and put on manually. The most common machine is the Park Pro-Edge.

There are two types of bonds for these machines. Harder bond metals and resins work best for doing edges that have a radius. Softer bonded metal and resin tools are designed for flat or bevel polishing. The most common size of the tool is 4" in diameter. They will have either a snail lock or Velcro backing to attach to the machine.

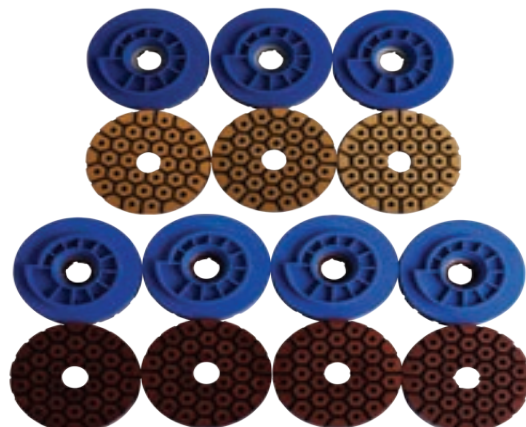
## Pictures of C frame polishing machine and tools



Park Pro-Edge III with an assortment of tools



4" snail lock tools for radius polishing 2 metal and 4 polishing



4" snail lock tools for flat polishing  
4 copper bond and 3 resin bond

## *In Line Machines*

Fully automated line machines can take a countertop from raw edge to perfect polish. With this type of machine, the stone is loaded onto a conveyor belt and taken across a series of heads. There are two types of line machines, one type can do radius and flat polishing the other does only flat.

Machines that can do both flat and radius polishing will have more motors and spindles to accommodate more tools than flat polish-only machines. They will have a calibrating wheel to ensure that the front edge is perfectly square and straight. Then there are beveling wheels to cut the top, bottom, or both on a 45 degree bevel. After the beveling tools, the stone will go through a series of metal bond tools for shaping and resin bond tools for polishing. The squaring and beveling heads are stationary while the shaping and polishing heads can rotate 180 degrees.

Some machines do only flat polishing. These machines have a sequence of spindles that do not rotate but some can oscillate. They will have a squaring head then metal bond and resin bond polishing heads. These machines are great for doing backsplashes very quickly.

## Pictures of line machines



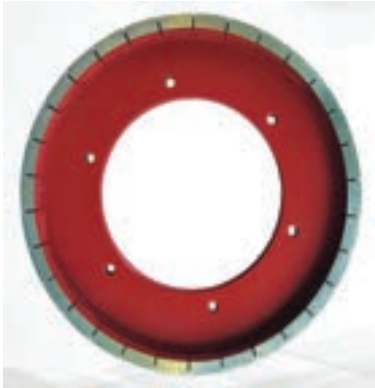
Marmo Meccanica machine for radius and flat polishing



Park Fastback for flat polish only

# STONE

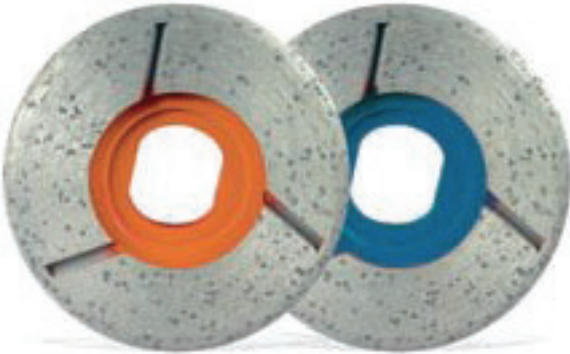
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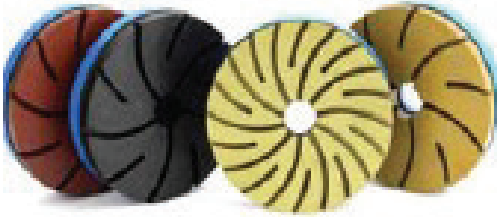
Squaring wheel



Beveling wheels



Metal bond shaping wheel



Resin wheels for radius polishing



Resin wheels for flat polishing

## 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 from 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 one uses metal bonds 50, 70, and 100 grits, they should start resin polishing at 50 grit and 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.

## Pictures of floor machines and tools



Planetary machine



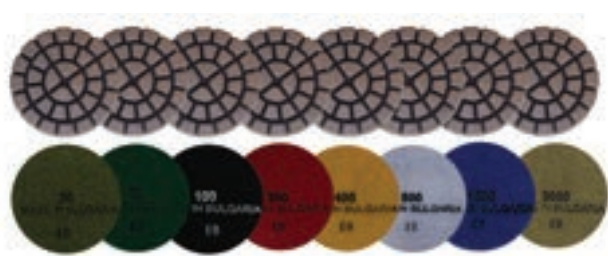
How planetary works



Floor buffer



Hybrid metallic pads



Super thick 3" pads



F.A.S.T. System



**TILE AND STONE**  
*TECHNOLOGIES™*