SIGMA DIAMANT

Technical Manual

SIGMA Dry

SIGMA LAB

SIGMA Tech

2020 EDITION

SIGMADIAMANT was born more than 15 years ago with the idea to become a reference in the production and distribution of all kind of tools for cutting, squaring, polishing and chamfering of ceramics, natural and quartz agglomerate.

The succeed of our company is based on the continuous research of the best raw materials and services to be offering to our clients, providing the best performance and quality and with the best costs.

We develop our products in close collaboration with the main glaze manufacturers in order to obtain the best and updating range of products and materials, and with the latest trends.

Actually, SIGMADIAMANT have the most part of top prestigious national and international firms in our portfolio. We are present in more than 50 countries with an experienced network of agents and distributors in exclusive, which, together with our own subsidiary companies in BRAZIL and POLAND, and our large technical support team, allows us to provide a fast, excellent and personalized services to our customers all around the world.

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1. SURFACES FINISHING PROCESSES

1.1. FULL LAPPATO POLISHING.

We call full lappato polishing to the process in which all the surface of the product is subjected to abrasion, by using a sequence of different grain abrasives.

Depending on the nature of the product to be polished, we can distinguish the following types:

1.1.1. TECHNICAL POLISHING.

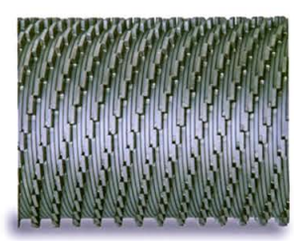
We will identify this type of polishing because they are made over the ceramic body.

This type of polishing is increasingly in disuse, because most part of the customers are changing to polishing full lapatto on glazes or micro grits, in order to obtain some technical improvements in the piece and be able to produce the full range of designs.

The first step in the polishing process is the calibration of the surface, and it is a crucial step, because as better preparation and planarity, can be got, better results and costs in the polishing process.
Typology of preparation and surface calibration tools.

Rollers :

- Discs pack rollers or Pacco dischi



-Spires (5,8 or 12 spires)

SATELLITES:

RADIALS :

METALL FICKERTS:

Subsequently, will be proceeding with the polishing process, for these materials should be made with magnesite abrasives, which could be identified and classified by:

- FICKERTS (they are called because of the anchoring they have to the machine).
  Mainly there are 2 types of fickert 140mm and 170mm

In the recent times, in some cases, the magnesite abrasives are fully or partly replaced by resin diamond abrasives (pictures here below).

1.1.2. DRY GRIT POLISHING

Nowadays, when are polishing full lappato products with a dry grit application, we can find mainly two products:

a) High grammage grit (is the one that commonly we called 2 kg/m2)

b) Low grammage grit, usually should be applied around 1 kg/m2.

For those products, during the polishing process will start with a small calibration with (metal fickerts).

Just after the metallics, in the case a), we can use magnesite abrasives or diamond resin abrasives; and in the case b), the abrasive used going to be always the resin diamond composition.

For those types of materials, we will need a prefect planarity and at least very regular, we can consider a proper and optimal planarity convexity ± 0,3 mm de and a concavity of ± 0,2 mm. Even, can be remarked that flatness and regularity are so important, cause otherwise, we cannot be fitting the pressures on the heads during polishing process.

This kind of products can be polished in a matt or glossy finish.

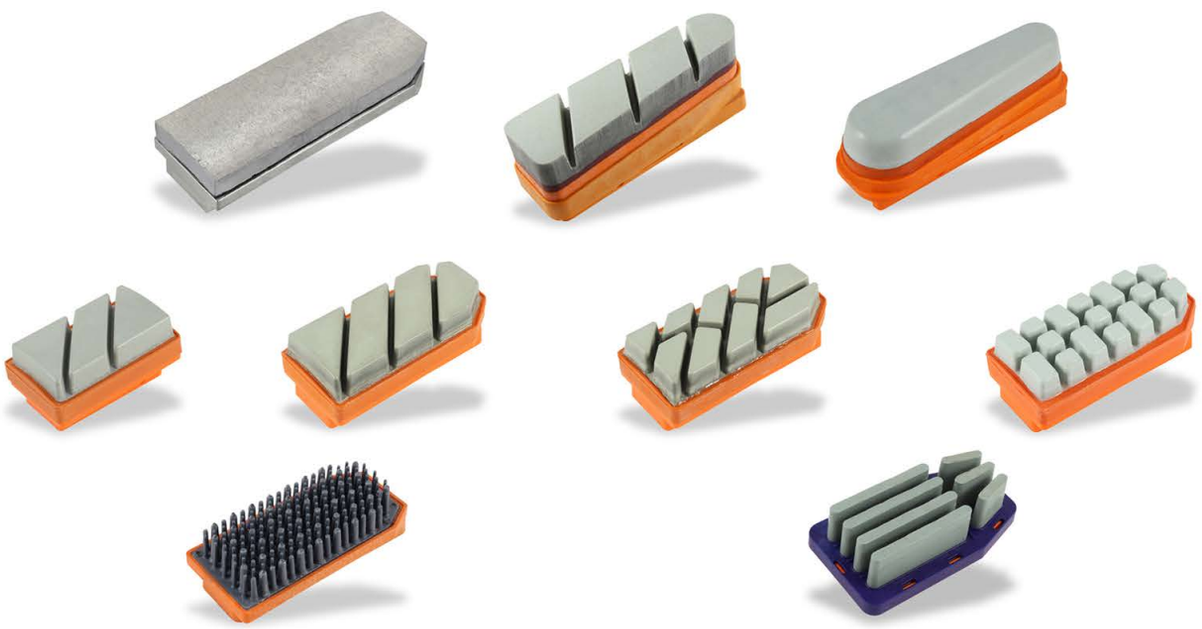
In the case of gloss finishing, the abrasives used are going to be the followings:







In the case of matt finishing, will be used the next:



The most common problems on these polishing processes:

Stripes

● You should take a look at the quality of the water or maybe if there is any broken abrasive or some piece that has some small breakage or peeling (both upper and lower) leaving residues in the machine, or there is any mechanical problem.

Shadows on the edge

● Usually can be solved by adjusting the lateral stop of the polishing machine, although one of the most common solutions is to reduce the size of the abrasive, to be fitting better at the edges.
If it is generated by bad planarity or deformity of the piece, we must adjust the pressures and be able to adapt the result as best as possible, but could be very difficult.

Tv Effect

● Many times we have problems with this effect and is coming from press. But with the new press molds and discontinuous back molds the results are improved.

Lack of brightness in the center of the piece

● It usually comes from lack of polishing time in the center of the piece or very fast lateral speed. We will solve it by reducing the lateral stoppage of the machine.

1.1.3. WET GRIT AND GLAZES FULL LAPPATO.

In the case of full lappato over glazes and micro grit, the range of products are opening to:

a) Microgrit mixed with vehicles applied by airless
b) Microgrit mixed with vehicles applied by vela or bell.
c) Matt Glaze applied by vela or bell.
d) Glossy Glaze applied by vela or bell.

For these kind of production types, calibration will not be performed, we use just resin diamond abrasives.

As we suggested on the dry grit polishing, we will need a perfect planarity or at least regular, because otherwise, we will not be able to fit into surface.

Generally, for those products, we use 2 types of FICKERT: 100 mm y 140 mm

Concerning finishing, we can get it on matt or glossy finishing.

In the case of gloss finishing, the abrasives used are going to be the followings:

And in case of matt finishing:

1.2. LAPPATO.

We call it lappato to the process which just be working over the top of the product, generally with some irregularities to be polish the top (can be relieve from the press/mols or with some printing powder or grit application)

We can find mainly 2 types of lapatto:

- Printing powder surface: We use just resin diamond abrasives
- Micro grit surface: In there before abrasives we will sometimes use brushes (diamond or silicon carbide), reducing the initial roughness of the pieces to minimize the consumption of the abrasives, mainly in the first positions.

Generally, the finishing of the tile will be gloss, but also exist the possibility to be getting the matt finishing for this lappato.

We can see here below the main consumables used on the lappato:









1.3. BRUSHING.

It is a mechanical process that by brushes changes the surface appearance of the product, obtaining a softening of the texture or roughness of the piece.

Nowadays is not so frequent but is gaining many customers and is reaching its spaces into many productions, because is a quick, cheap and much easier process than the rest of polishing.

We can divide in two types: dry brushing and wet brushing

1.3.1. WET BRUSHING.

We identify this kind of brushing because come produced in the polishing machine. In this case cannot be reached a matt effect but appears a small surfaces modification. Some costumers called super soft lappato, but we consider is not a lappato cause the Production speed are completely different.
We used the following tools for this work:

1.3.2. DRY BRUSHING.

This process is what is done by using a brushing machine. There are several types of machines, but we can classify them by those that use circular brushes or those that use cylindrical brushes.

This type of brushing is usually used to get one of the following goals:

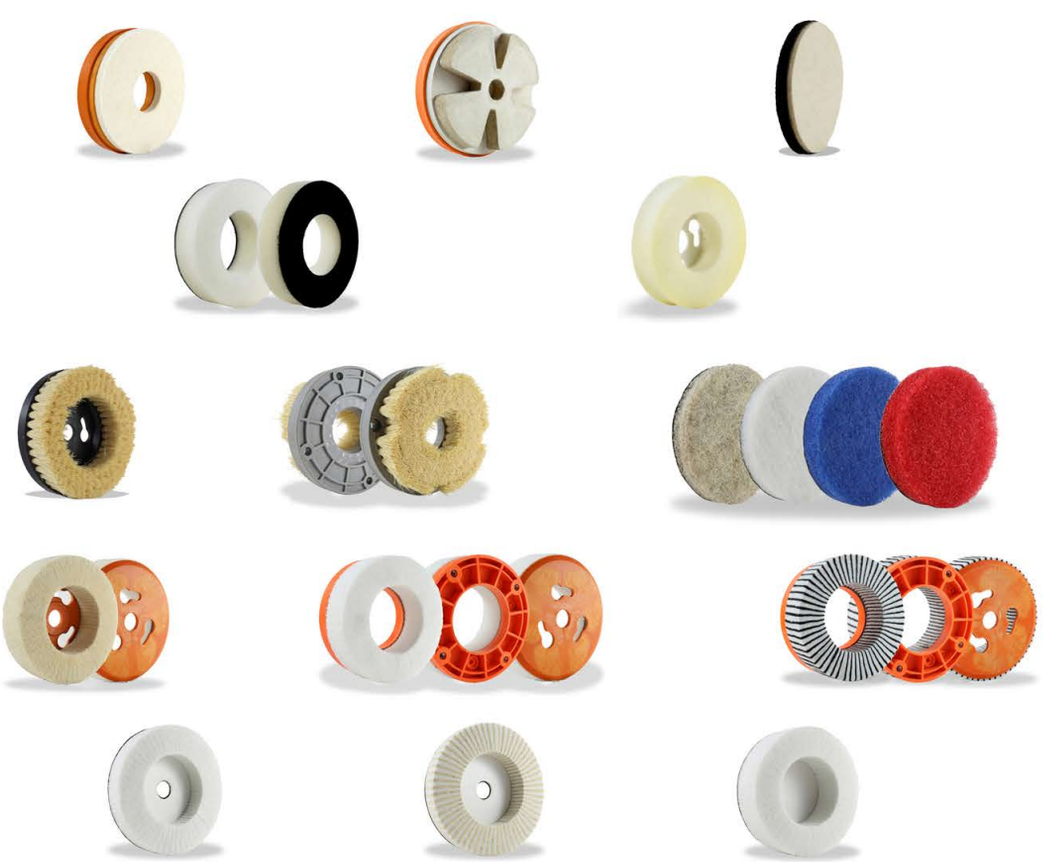
1.3.2.1 TEXTURE MODIFICATION

- Obtain a more silky or soft texture coming for a rough surface.

1.3.2.2. SURFACES TREATMENT

This is the process after polishing where is applied a sealing product and is homogenised by usage of the brushes.

Exits different kinds of brushes used depends of each finishing. Here below all the tools available:



2. SQUARING.

Squaring is a mechanical process that aims to provide the pieces with a perfect lateral finish and perfect right angles to offer aesthetic improvements in the placement of the ceramic. Of course, another of the biggest reasons is to be able to standardize the caliber of the client's pieces, obtaining a uniformity and accuracy appreciated by the final consumer.

We must make sure that the machine must be always well adjusted and without any mechanical failure or measure adjustment, to avoid problems.
If the machine is well adjusted, the productivity is almost 100%

We will have two distinct types of production:

- Wet squaring
- Dry squaring

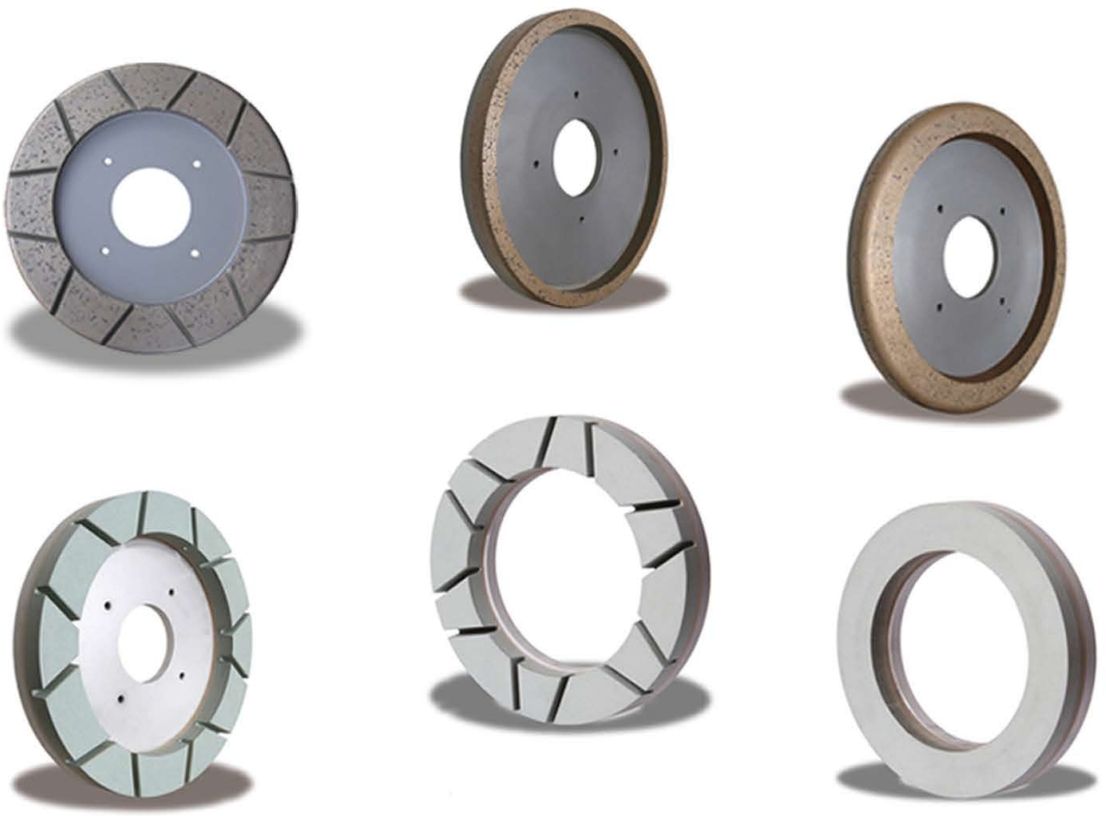
2.1. WET SQUARING.

Until last years was the most standardized in the ceramic field, and of course the most suitable if they are also polishing the tile, because the piece will come wet from the previous process.
Being the most common process, it is much more controlled, and the clients usually have everything quite clear.

The main defects that can happen to us will be:

- Edge breakage: Generally, it is due to a bad adjustment of the machine or some mechanical regulation problem. It can also appear to lack of water
- Curved edge: Bad regulation in the back part of the machine, comes by difference of cut or pressure between opposing engines
- Irregular edge and lines: Mainly due to lack of water or a wheel that is working in excess or defect.

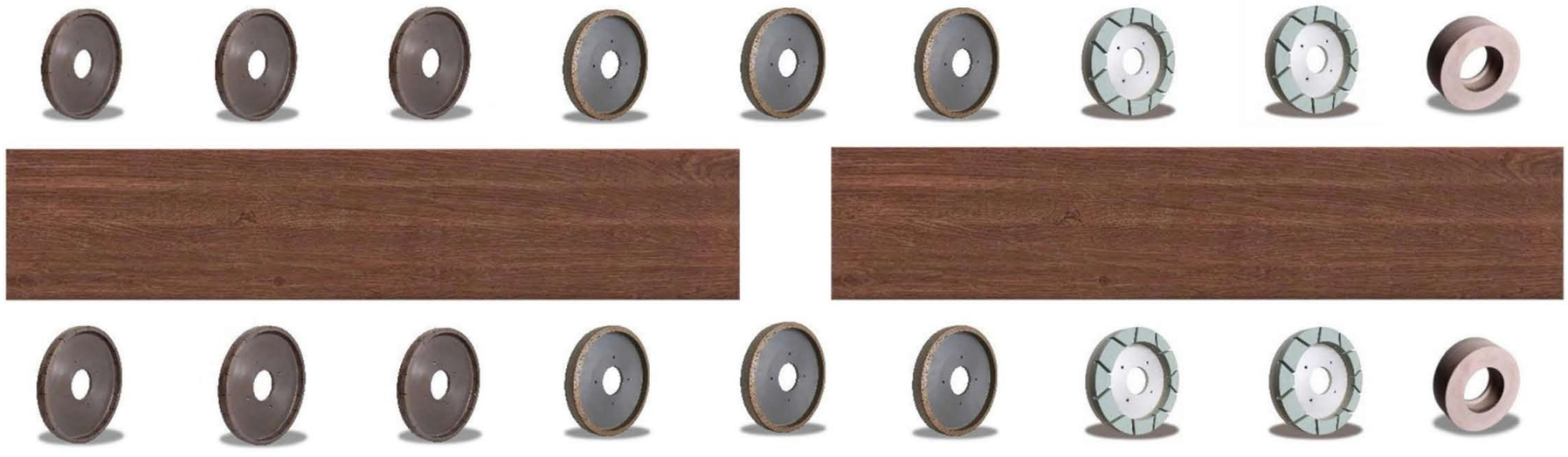
A sample of tools used for the wet squaring are following:



On the last position of squaring, usually comes the beveling. On this process can be used rigid or flexible tools:

NOTE: Concerning the previous related comments, in the next page is a standard example of sequence for a wet squaring machine.

POS 1	POS 2	POS 3	POS 4	POS 5	POS 6	POS 7	POS 8	BEZEL
METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	RESIN	RESIN	RESIN
300 X 12 X 20	300 X 12 X 20	300 X 12 X 20	300 X 12 X 20	300 X 12 X 20	300 X 12 X 20	300 X 40 X 20	300 X 40 X 20	130 X 30 X 25
MAXLB	MAXLB	MAXLB	ATRIA SIMPLE	ATRIA SIMPLE	ATRIA SIMPLE	GROSS	FINE	GRAIN 400



MAXLB	MAXLB	MAXLB	ATRIA SIMPLE	ATRIA SIMPLE	ATRIA SIMPLE	GROSS	FINE	GRAIN 400
300 X 12 X 20	300 X 12 X 20	300 X 12 X 20	300 X 12 X 20	300 X 12 X 20	300 X 12 X 20	300 X 40 X 20	300 X 40 X 20	130 X30 X 25
METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	RESIN	RESIN	RESIN
POS 1	POS 2	POS 3	POS 4	POS 5	POS 6	POS 7	POS 8	BEZEL

2.2. DRY SQUARING.

It is the new trend in our field, optimizes costs and time for the squaring of wall and floor tiles, since we avoid the drying before boxing and the cost of treatment of the water in the sewage treatment plants.

In the beginning, it was developed for cold areas, because being very difficult and expensive the storage of pieces with a certain water absorption in their warehouses, so had to be controlled and of course dry these pieces.

These represent an invest of time, gas, and money; then with the dry squaring can be reduced these costs. That's why most part of the new installed machines in all around the world are coming.

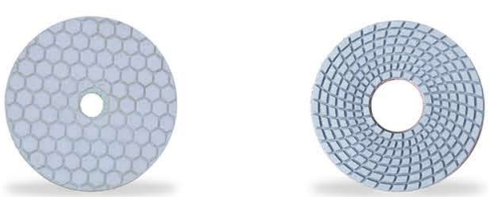
The tools used for dry squaring are the followings:

As in case of wet squaring, the beveling comes in the last position if squaring. In this case also exists 2 kinds of tools:

-RIGID:

Resin - Give us a chance to get a continuous and big chamfer

REDYFLEX – Basing in all our experiences is the most convenient, because we can reach an uniform chamfer and be copying the deformations and planarity on the edge of the tile.



NOTE: Concerning the previous related comments, in the next page is a standard example of sequence for a dry squaring machine.

POS 1	POS 2	POS 3	POS 4	POS 5	POS 6	POS 7	POS 8	POS 9	POS 10	POS 11	POS 12	BEZEL
METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	RESIN	RESIN	RESIN	MICRO
CAIROGG	CAIROGG	CAIROGG	CAIROG	CAIROG	CAIROG	CAIROM	CAIROM	CAIROF	POS.0	POS.0	POS.1	GR.200
300 x 15 x 15	300 x 15 x 15	300 x 15 x 15	300 x 15 x 15	300 x 15 x 15	300 X 15 X 15	300 X 15 X 15	300 X 15 X 15	300 X 15 X 15	300 X 40 X 15	300 X 40 X 15	300 X 40 X 15	Ø 130

300 x 15 x 15	300 x 15 x 15	300 x 15 x 15	300 x 15 x 15	300 x 15 x 15	300 X 15 X 15	300 X 15 X 15	300 X 15 X 15	300 X 15 X 15	300 X 40 X 15	300 X 40 X 15	300 X 40 X 15	Ø 130
CAIROGG	CAIROGG	CAIROGG	CAIROG	CAIROG	CAIROG	CAIROM	CAIROM	CAIROF	POS.0	POS.0	POS.1	GR.200
METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	METALLIC	RESIN	RESIN	RESIN	RESIN
POS 1	POS 2	POS 3	POS 4	POS 5	POS 6	POS 7	POS 8	POS 9	POS 10	POS 11	POS 12	BEZEL

3. CUTTING.

We define it like the process of diving the original piece in two or more pieces with the usage of a tool.

Nowadays, the ceramic tiles cutting uses different processes, but the most common is the cutting with diamond cutting disc.

Moreover, with the arrival of squaring machines, is also growing the incision and breaking (cut crash) with idle Wheel or cutting disc.

3.1. CUTTING BY DIAMOND CUTTING DISC.

We call the "cutting ceramics by diamond cutting discs" to the process using diamond cutting discs / Blades to be dividing in two or more pieces the original piece for a different possibility using one or more discs using a cutting machine.

Generally, ceramics are subjected to cutting processes in order to resize the previously obtained format in production or to manufacture decorative by-products, such as skirting boards, bullnose, listels, steps, mosaics, etc. Although in some cases it is also used to use pieces with very localized defects, cutting the defective parts.

- ***WALL TILE CUTTING***

In the Wall tiles cutting we use the continuous rim discs, in order to get the better quality possible, also can be an alternative, make some laser cuttings on the rim to be increasing the refrigeration and making easy the evacuation of material removed.

Following scheme explain the different grains for this type of product.

GRAIN	CUT QUALITY	CUT CAPACITY
54	*******	*
64	******	**
76	*****	***
91	****	****
107	***	*****
126	**	******
151	*	*******

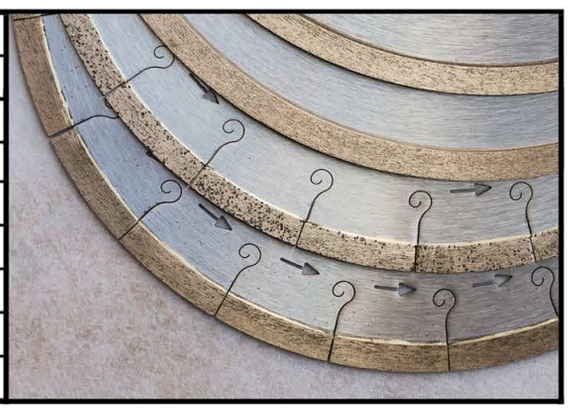
The most balanced disc is usually the grain 91 because it has an excellent cutting quality and the cutting capacity is good enough.

- ***CUTTING DISCS FLOOR TILES.***

For the floor tiles, the most common usage is the segmented discs, because we need the high refreshing and cutting capacity.

Here explained all the different grains and typology of discs:

GRAIN	CUT QUALITY	CUT CAPACITY
107	*******	*
126	******	**
151	*****	***
181	****	****
213	***	*****
252	**	******
301	*	*******



For the porcelain tile, the diamond grain is essential, but also the binder is very important subject : the grain / binder combination must be adequate and balanced to obtain a good cut quality, avoid breakage and have an adequate duration.

For example, a grain 151 disc usually has less cutting capacity than a 213; however, if the gr.213 disc binder is not suitable for the case, it will cause the gr.151 disc to have more cutting capacity.

In order to reach an optimal balance, we have 5 compositions of binders, but the most common are usually 3 of them

KIND OF BINDER

EXTRACUTTING CUTTING STD HARD EXTRAHARD

\- HARDNESS +

With those variations we obtain the most convenient discs to be optimizing the process:

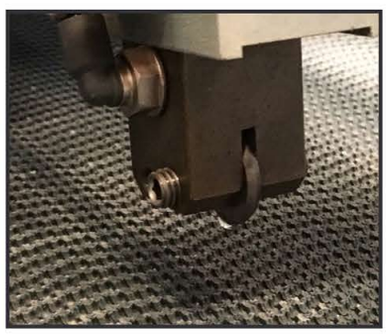
One example could be with red body gress, where fitted 5 discs per axe (in 2 axes) with an approximate lineal speed of 3 m/min, Will be suitable fit a discs grain 151 with a hard binder, cause the red body clay is abrasive and then will keep the diamond refreshed and ready, optimizing the costs and lifetime.

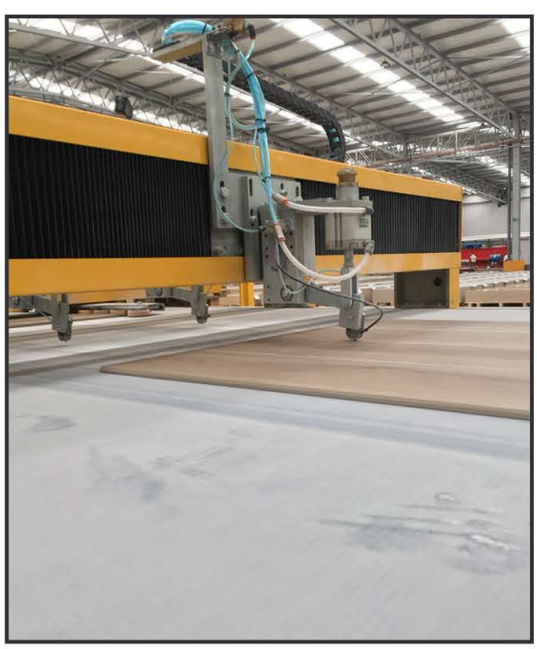
But in the same case on porcelain gress tiles, we should be increasing the grain and using a softer binder in order to avoid problems with breakages.

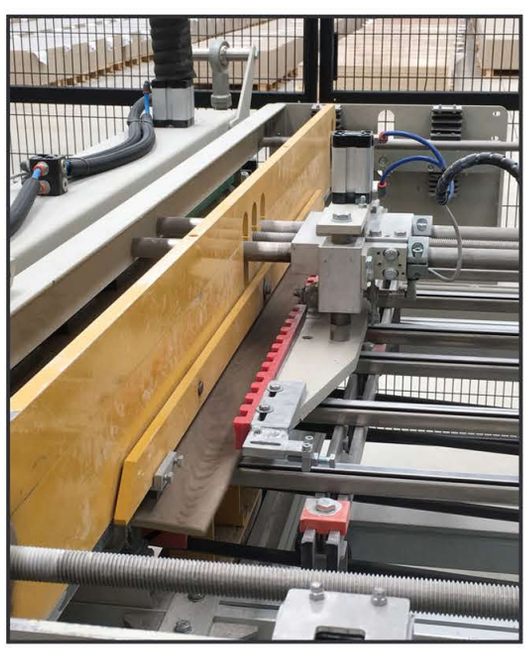
3.2. INCISION AND BREAKING CUT.

This type is the ones used before the squaring process. Mainly is used to obtain thinner tiles to be squared and dividing for the original tile.

The process is an incision over the piece with an idle Wheel or with a cutting disc, and immediately after there are some machine pressing the tile to be breaking the tile.







4. BULLNOSE AND MITERING.

Closely related to the process of cutting is the mechanization of these for the achievement of special products or decorative, such as bullnose, skirting boards, steps , countertops, corners, drains, handrails, etc.

Those materials, in most of the cases, are formed from original tiles which are cut and mechanized at will, depending on the product to be made. Among all the mechanization processes, the most common would be the production of bullnose, skirting boards and the manufacture of steps.

For this process, is used an automatic machine with several machining motors, placed perpendicular to the belt. The tools that are used in this type of machines are:

Finally, find detailed some standard sequence for these products:

MOTOR 1	MOTOR 2	MOTOR 3	MOTOR 4	MOTOR 5	MOTOR 6	MOTOR 7	MOTOR 8	BISELADOR
MS160DT	MS160DT	RW12G50SEG	RW12M50SEG	RW12F50SEG	MS152	LAMELAR	LAMELAR	MS12
								

4.1 ASSEMBLING AND ELABORATION OF PRODUCTS

Another of the ranges found in our product portfolio, would be the adhesives used for the assembly and manufacturing of all types of products mentioned on the previous page.

We have epoxy adhesives and also polyester adhesives:

I order to conclude the process perfectly, we have a series of accessories for manual machines.

Notas

Notas

Notas

SIGMA DIAMANT

- Spain
- Brazil
- Russia
- USA
- México
- Polska
- Portugal
- Turkey

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