

COATED ABRASIVES MAKING PROCESS

The making process for coated abrasives is, at its most basic level, a printing process modified to allow the electrostatic coating of grain. We'll look at the 10 steps of the making process and the results when it's done correctly, as well as some possible effects when it's not.

PRINTING

Printing is an important step in the making process because you have to know what you're making! Backings from all manufacturers will normally have product and company information printed on them to some degree. KLINGSPOR backings for instance will provide you with the following info:

Company Name & Logo – KLINGSPOR and the KLINGSPOR Spur
Material Name, Grit and Grit Grading Scale and backing – I.E. CS412 P80 YX
OC, A/S, W/P (optional)
Batch or Material Control Number - 459
Directional Arrows - - ----->
Point of Origin Statement – Made in Germany, Made in US, Made in Mexico

Very few manufacturers actually print sizes on their belts, sheets, discs etc. Normally the only time it's seen is when private labelling is being done in large quantities for someone. When the jumbos come in we have no way of knowing what different sizes of belts etc will be made out of that jumbo so pre-printing a size is not possible. After the belts etc are cut we'd have to print the size on each individual item and that's not practical. If an entire jumbo were dedicated to one particular size belt etc it would be more feasible to do, but still rather unlikely. So you need to know your sizes!

Material name, grit, grit grading scale and backing provide you with 60% of the information you'd need to be sure you're using the correct abrasive grain, backing and bonding. Using the examples above, CS412 is the actual material name, P denotes that the grain used in this product is graded on the P or FEPA grit grading scale, 80 denotes the grit size and YX denotes the backing is lightweight polyester. Depending on the material and whether the notations would apply, you may also see OC (open coat), A/S (anti-static), W/P (waterproof) or other similar remarks. This or the lack of this provides you with another 25% of the information you'd need to make a complete cross reference.

Batch numbers are assigned when the jumbo roll is produced and are control and tracking numbers. For KLINGSPOR the batch numbers are normally 3 digits (like 459 above). The first two digits denote the week of the year (there are 52 weeks in a year) and the last digit reflects the last digit of the year. So using the info above and present date as a reference, a batch #459 would tell us the material was made the 45th week of 2009. Batch numbers are important for raw material type complaints as a way of tracking where problems have arisen and where testing may need to be done.

Directional arrows are printed on jumbos for all materials that may be made into belts. No lightweight papers A, B or C will have arrows on them, but D, E & F as well as all the cloth backed material will. The arrow is used in the manufacture of lap jointed belts. It informs the belt line which side of the cut to size material will end up being the bottom of the lap and which end will be the top side of the lap so that skiving is done to the appropriate end. After the belt is joined, the arrow informs the customer of the direction in which that belt must be run. **THIS IS ONLY APPLICABLE FOR LAP JOINTED BELTS!** The arrow prints on all jumbos because again, we have no way of knowing what sizes or types of belt will ultimately be made from the jumbo. It's very common for belts with same material and grit but different sizes to use different joint types. For example, the standard pump sleeve material CS309JF will always have a #1 lap. But a 3 x 132 in the CS309JF will usually have a #4 butt joint. Same material, same grit, different size and application. So even though the arrow is on all belts, you only have to pay attention to it if the joint is an overlap. Any belt with tape on the back, regardless of what the front looks like or the fact there are arrows on the backing, is a bi-directional belt! This can buy you some extra life as the butt or tape jointed belts can be run in one direction, then removed and put on to run in the other direction.

Finally on the backing of all materials and or the boxes and labels will be the point of origin for manufacturing of the item.

MAKER COAT

The maker coat is the first layer of adhesive bonding in the maker process. The purpose of the maker coat is to provide a seat for the grain that will be applied in the electrostatic coating process. In other words, it's what adheres the grain to the backing. Most of the bonding agents today are synthetic resins and are phenolic which ensures a sturdy, heat resistant point of connection between the grain and the backing.

ELECTROSTATIC COATING

Electrostatic coating is a process in which negatively and positively charged plates are placed above the backing (which has the maker coat applied) and below a loose grain conveyor (containing pre-graded for size grains). This results in a separate charge being created between the two plates that will pull loose grain up from the conveyor and onto the backing in such a way that the grain is consistently oriented on the backing with a broad base against the backing and a sharp end pointing out.

This is the most common method used to coat backings with abrasives in use today. There is another method of grain coating called gravity coating, which simply pulls the loose grain up onto the backing without orienting it as the electrostatic method does. This method is still sometimes used today for coarser grits but would be most ineffective for any type of finishing grits, and therefore has mostly been replaced by electrostatic coating processes.

This process may be modified to alter how much grain actually is applied to the backing, determining whether a product is closed coat, semi-open or full open coat. This is done by inserting a filtering screen between the maker coat and the loose grain conveyor that will only allow 50 – 70% of the backing to actually be coated in grain.

CURING

After the maker coat has been applied and the electro statically placed grain has been added, the material is run through curing ovens to ensure a good bond between the grain and the backing. You can have the best grains and backing in the world, but if they don't remain connected, your products will not be effective. Curing oven times and temperatures vary depending on the types and sizes of grain/grit used, the backing used and the type of bonding agents used. Once this initial curing is completed you are ready to add the second layer of adhesive bonding called the size coat.

SIZE COAT

The second layer of adhesive bonding, referred to as the size coat has two main purposes. The first is to tie the individual grains on the abrasive face together, so that they act as a unit instead of as individual grains. The other function of the size coat is to act as a heat shield for the grain. As we've previously discussed, most of the bonding agents in coated abrasives are phenolic resins, which after curing, are heat resistant. Too much size coat or too little size coat can therefore cause performance and finishing issues. Too much size coat and your grain won't be able to cut, instead creating a shiny effect on the abrasive's surface often resulting in burning of both the abrasive and the work piece. This is called glazing. Too little and the grains won't act as a unit and will shed individually under pressure. Glazing and shedding are primary indicators that something may have gone wrong during the application of the size coat.

Size coat is also where several optional steps may occur. These would include but not be limited to the addition of dyes, stearates and lubricants. Size coat is a critical part of the making process that can have far reaching affects on both the life and finishing properties of coated abrasives.

CURING

After the size coat is applied another curing step needs to be implemented to ensure the bonding agents set up.

JUMBO

After the 2nd curing, the material is wound onto jumbo rolls. These rolls vary in width depending on the material backing and it's most common use, but may be as narrow as 37" or as wide as 65" with lengths ranging from 50M to 2000M.

FLEXING

Flexing is a process by which a base cloth material, in our case either the J or X weight cottons, may be made more pliable. When a material is flexed, such as the J-Flex or X-Flex, the base material (J OR X) is run over a series of stainless steel rollers set up at a 45° or 90° angle to crack the bonding. By cracking the bonding, you enhance a material's flexibility. However, by cracking the bonding you also provide a doorway for heat to get to the grain and for that reason, flexed products will exhibit lower life than non-flexed materials. Flexing is necessary for the sanding of contoured parts, and should only be used when a degree of conformability to a profile or contour is required. Otherwise, you sacrifice life and get nothing in return.

STORAGE

After all processes to the material are accomplished it is put into storage until required to fill orders.

CONVERSION

Conversion is the manufacturing of belts, sheets, discs, flapwheels etc. from jumbo roll material.