MEDIA FRENZY

With so many options, choosing the right finishing media for your operation can have you spinning.

Wouldn't it be great if choosing polishing media were like picking out sweets in a candy shop? You could let your eyes wander over the rainbow of colors and shapes, filling your bag with handfuls of those that tickle your fancy. In the end, you'd have a bag full of the prettiest colors and the most attractive shapes – and a bunch of ugly problems for your finishing operation.

Considering the wide assortment of mass finishing media on the market today, it can be difficult to figure out where to start. Media comes in a variety of types, including plastic, ceramic, carbon steel, stainless steel, porcelain, synthetic and organic. Each mass finishing operation is designed to impart one to three actions: material removal, burnishing, or polishing. The challenge is matching the media to the desired action. And with such variety, making the perfect match can be a bittersweet game of trial and error

The following are some general guidelines to help you sort through your options when choosing the best media for your operation.

CUT DOWN MEDIA

Material removal operations, which are commonly referred to as "cut-down" operations, are used for deburring or surface removal, or both. The cutting action occurs when the media moves against the surfaces of the work pieces. As they grind against each other, material is removed from the work pieces, changing or refining their surfaces. The most common types of media used during the cut-down phase are ceramic and plastic. (Organic media, which has to be combined with an additive, is occasionally used on delicate pieces that can't stand up to the rigors of plastics and ceramics.)

Ceramic and Plastic Media. Both of these media are made in pre-formed shapes by mixing an abrasive material with a binder. The types of abrasives used vary by material size, depending on the desired finish and the material of the work piece. Generally, ceramic media is used on ferrous metals and plastic media is used on non-ferrous metals. ***What shape is it generally available in and how do you choose which shape to use?*** When discussing ceramic or plastic media, it is important to realize that what is being identified is the binder material, not the abrasive. The abrasive portion of the media is made up of small particles of silicon carbide, aluminum oxide, garnet, sand, zircon, or other materials. Cut-down media is available in different grades (compositions), the most common of which are coarse, medium, and fine. The grade refers to the resulting surface finish. Coarse media is the most aggressive and produces the roughest surface of the three. Medium grade is moderately aggressive and leaves a smoother surface than coarse. Fine grade produces the smoothest finish of the three. Generally, as the media becomes less abrasive, the cycle time increases. Take plastic media, for example. A typical sequence would be to tumble using coarse media for 15 to 20 minutes, medium grade for 30 to 60 minutes, and fine grade for 60 to 180 minutes. Given this scenario, the total cut-down time could range from one hour and 45 minutes to four hours and 20 minutes. In addition to the coarseness of the abrasive, weight affects tumbling results. The more media used, the more weight available to aid in cut-down. The fasted results can be achieved by using as much media as the machine can handle.

When calculating how much media your machine can accommodate, be sure to include the material weight in the equation to ovoid overloading the machine. (One exception is when barrel tumbling**; because space is required to impart the desired action, the machine cannot be filled to capacity.)**

During the cut-down process, the media not only tumbles against the pieces, but also against itself. This is beneficial because it wears away the binder supporting the abrasive, exposing new abrasive particles and cutting edges. The down side is that the media is consuming itself at the same time. Therefore, it's a good idea to add fresh media to the mix periodically, and to separate out media that has

become so small that it becomes lodged in the parts being finished.

BURNISHING MEDIA

Unlike cut-down media, burnishing media is not intended to remove material, but rather to smooth and brighten the surface through a rubbing action. However, it is occasionally used to debur parts; It flexes the metal bur back and forth until it fatigues and breaks off.

The most common types of burnishing media are carbon steel shot, stainless steel shot, and porcelain. They come in a wide variety of shapes and sizes, including balls, pins, ball cones, and diagonals.

Carbon Steel. Suitable for burnishing all metals except platinum, carbon steel is generally used for mountings and findings. If price were the only consideration when choosing between carbon steel shot and stainless steel shot, carbon steel would win hands-down. However, you should take some other factors into consideration as well.

One major drawback to carbon steel shot is that it rusts if not used and stored properly. The rust that forms on the surface – and it is not always apparent – rubs off of the carbon steel shot during the tumbling process and may contaminate some non-ferrous materials, such as gold, silver and copper-based metals.

When carbon shot rusts, it suffers surface breakdown – another drawback. The outer surface of the shot begins to pit, causing the surface to become irregular and rough. This begins on a nearly microscopic scales and progresses, affecting the surface quality achieved during the burnishing cycle: As a result, the rougher the shot the rougher the surface finish will be.

Carbon Steel generally performs the best under constant operation. It is ideal for round-the-clock finishing operations where finished parts are removed as new parts are introduced. Also, due to its propensity for rusting, carbon steel shot must be maintained properly, and stored in a shot conditioner.

Stainless Steel. Like carbon Steel, stainless steel shot is costly, at about two to three times more than carbon steel shot of equivalent size and shape. However, in looking at the price of shot alone, the overall cost of operation is not taken into account. When choosing between the two, you should also take into consideration maintenance, storage, and longevity.

Porcelain Media. The lightest of the burnishing media, porcelain media is often used on lighter and more fragile parts, such as delicate findings. It tends to produce less impingement than steel show, which helps to achieve a smoother surface. It is also the best choice for platinum: Unlike carbon steel and stainless steel shot, porcelain does not contaminate non-ferrous materials while in use.

ORGANIC MEDIA

There are four main types of organic media used in the jewelry industry: wood shapes, wood compound, corncob and walnut shell. Unlike cut-down and burnishing media, organic media is intended to as a dry media, and is often referred to as such. It is suitable for use with all metals.

Organic media is always used in conjunction with an abrasive additive. Without it, the organic media would have no effect on the items being tumbled. Since an abrasive is added, organic media can be used as either a cut-down media or a polishing media. Because it is lightweight, organic media is incapable of burnishing.

There are no clearly defined limits for any of the dry media. Most restrictions are specific to the finishing machine they are used in. However, when choosing between wood media, certain shapes work better for certain pieces. Commonly used wood shapes include cubes, diamonds, and pegs. Cubes are used for general-purpose applications. Due to their shape and size, they are less likely to become lodged in the parts being tumbled. Diamonds, which are larger than cubes, have more weight and seem to work fater than cubes. They are ggod for large surface areas. Pegs, the lightest of the three, are used where penetration is required to reach into tight corners and holes. Since they are the lightest of the three, they take the longest time to achieve the same results.

ADDITIVES

With the exception of dry media, which may use a paste additive, all mass finishing needs to be combined with liquid chemical compunds to work in a mass finishing machine. The additives used vary, depending on the application and the materials. Most additives keep the media clean, work as a coolant, and flush away buildup that can accumulate in the process. They can be formulated to be either acidic or alkaline, depending on the specific need. (Some are available with rust inhibitors for use with carbon steel shot.) Water is considered the neutral point between acidic and alkaline, measuring 6.7 on the pH scale. Higher numbers are alkaline, and lower numbers are acidic.

In choosing which compound is right for your operation, it is necessary to know how the material you wish to finish reacts to acidic and alkaline compounds. Copper-based metals, for example, tend to discolor in alkaline compounds. If you are unsure of which to use, you can test the part to be tumbled with a little ammonia. If it discolors quickly, do not use an alkaline based compound.

Once you've chosen a compound, it's important to use it properly. Most solutions are supplied as concentrate and must be diluted with water. Always check the manufacturer's label for the proper ratios. Too much solution can cause excesive foaming, which can slow down the action and create a considerable mess. Too little solution can parts and media to develop residue, also inhibiting the action

In addition to supplying cleaning action, solutions provide lubricity to the mix. When parts tumble, they need to be able to slide over one another without galling. Since media works through micro abrasion, any aaction that exaggerated the degree of abrasion is counter-productive to the process.

In addition, without proper lubrication, parts can stick together throughout the tumbling process, bloacking some surfaces from being finished by the tumbling media. This is most common with thin, flat shapes that have large surface areas relative to their wight. In instances such as these, the additive has to reduce the surface tension of the liquid sufficiently to keep the parts from sticking together.

As with all chemical compounds, you should read the labels for proper use and disposal instructions. It's also important to check local and state codes, which may regulate against the use or disposal of certain compounds.

DRY MEDIA ADDITIVES

Dry media additives come in various forms, including liquids, pastes, and powders, and contain abrasives that are required for the media to function. These additives work by impregnating and adhering to the dry media. They are not rinsed off or flushed from the mix, but are periodically reapplied on an as-needed basis as indicated by the results.

Dry media additives can be classified into two general categories: abrasive and polishing. The abrasive additives are similar to those found in plastic and ceramic media. The polishing additives may contain finer grades of these same abrasives, various metal oxides, or diamond. To refine surface finish using dry media, parts are removed form one media container a coarser abrasive and palced into another containing a finer abrasive. This prevents contaminating the media containing the finer abrasive.

When using dry media, fewer parts are tumbled in relation to the amount of media used. (there is no set ratio; this is most often determined by trial and error.) This minimizes surface-to-surface contact between the parts, which can negatively affect the quality of the surface.

Although the best possible finish is no trip to the candy store, it can less of a gamble if you know which media to choose for your operation.