Platinum Mass-Finishing

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There are a number of schools of thought on mass-finishing platinum. Over the past decade, platinum as a commodity has re-emerged in popularity making the mass-finishing of it an important issue among jewelers and their suppliers. This article is an introduction to one of these methods utilizing specific types of mass-finishing equipment, compounds, and media. The premise of this information is based on the results of researching and processing platinum rings and settings with various types of alloys in our laboratories. These alloys include tungsten, cobalt, copper, iridium, and ruthenium. Although these are the only platinum alloys we have tested to date, there is no reason why the process(es) would not work in the same manner, or at least very close to it, with other platinum alloys.

I hope this information will assist you with some guidelines to make your platinum processing easier and more profitable.

WHY IS PLATINUM SO DIFFICULT TO MASS FINISH?

Platinum is a heavy metal and can be difficult for many manual as well as mechanical polishing operations to process because few understand the characteristics or properties of the metal. Many try to use the same process with platinum as they would with gold or silver and then wonder why the results were not as impressive. You need to actually have a different mind-set when running platinum parts compared with other metals, and understand what is transpiring on the surface of your parts in order to have any success.

In short, platinum is a rather soft metal in its pure form and needs to be alloyed with another metal. Even alloyed, the platinum smears and pushes when being worked with. Most of the time it work-hardens and can be less forgiving than other precious metals.

Certain influences can effect the results of the smoothing and polishing of platinum. Some of these would include the alloy used in the metal, the purity of the platinum, the process being used to smooth and polish it, as well as if the proper equipment and media are being used for a specific application. It is also extremely important to not let the platinum surface get contaminated. We recommend that you keep a clean work area and always run your platinum parts in its own separate media to avoid this problem. If contaminated, it would need to be reclaimed through refining, which is costly.

WHAT ARE SOME OF THE ALLOYS USED WITH PLATINUM AND WHICH ONES WORK BEST?

From a mass-finishing point of view, we have found the following platinum alloys work best in mechanical mass-finishing equipment:

- Tungsten
- Cobalt
- Copper

Other types of platinum alloys studied with less favorable results:

- Iridium
- Ruthenium

Results with the above alloys proved to be less positive after the final polish. Platinum with iridium alloy gave a light grayish tone after mass-finishing. Parts, which were hand, prepared (lightly sanded) came out far better than parts with no preparation.

IT'S IN THE PREPARATION!

The quality of the mass-finish depends greatly upon the steps preceding it. Mass-finishing is, or close to, the final-step in many cases and is not a cure-for-all process. If the alloy, the quality of metal, the casting and preparation (removing the sprue and a light sanding if need be) are not properly performed, chances are that a high luster or quality finish will also not be achieved.

More times than not some initial hand preparation (depending on the condition of the platinum part) can lead to very favorable high-luster results! This is especially true if the surface is porous. Manual labor can be largely reduced by using mechanical mass finishing equipment; however, it may not be completely eliminated and there should be some sort of a synergy between hand labor and me-

PT MASS-FINISH RATING

TYPE	HARDNESS	POOR	AVERAGE	GOOD
PT 950/ CO	135 HV			X
PT 950/ CU	120 HV			X
PT 950/ W	135 HV			X
PT 950/ RU	130 HV			X
PT 950/ IR	80 HV	X		

* Note: hardness in table are for the annealed state

chanical equipment.

MACHINES, MEDIA AND COMPOUNDS RECOMMENDED FOR MASS-FINISHING PLATINUM:

New processes, machinery, media and compounds are evolving faster now than ever for the mass finishing of platinum. Depending on the parts to be processed, there are a couple of machines, media and compounds that we have found to work best. For cast platinum parts such as rings we recommend a high-energy machine in order to do the first cut down step and remove the outer skin and as much porosity (if present) as possible.

MACHINES:

The two most popular for this would be the high energy **Centrifugal Barrel Finisher, or CBF**, and the disk finishing machine.

The CBF Machine can produce highest speeds and energy requisite for the removal of surface metal, burrs and parting lines. This is achieved by the barrels turning in one direction while the turret holding the barrels turns in the opposite direction creating the high energy and speeds (*see figure 1*). It is also important that a hex-shaped barrel be used to give additional action during the process. Results from round barrels are not as favorable.

The machines can be run for both wet as well as dry processing to include wet cutting, dry smoothing and dry polishing.

Fixtures to hold parts in place to keep from colliding can also be installed inside of the barrel (dry processing only).

Disc-finishing machines, (also regarded as high-energy machines) are now becoming another popular means of mass-finishing platinum. The action of the disc-finisher is not as rigorous as with the CBF machine, but it does a good job on platinum and has the advantage of having an open bowl to view parts. It is ergonomically superior to CBF machines, thus, making the switchover and separation of parts far less cumbersome. Many people prefer this convenience over time. The toroidal action taking place in the machine bowl produces a quality surface finish for both cutting and smoothing. Results from polishing platinum in these machines have not been as favorable as with the CBF or the **drag-finishing machines**.

The **drag-finishing machine** is ideal for parts needing fixturing to avoid collision and scratching.

Its' principle is simple. The fixtured parts lower into a processing bowl with dry (smoothing or polishing) media and then rotate for a desired time. Once the process is complete the fixtures rise out of the media and can be removed. One of the important points about the drag-finisher is its ability to finish the inside of the parts as well as the outside. It should be noted; however, that the inside of the parts cannot be processed to the same extent or quality as the outside but in most cases the inside does achieve a finish about 75% as good as the outside.

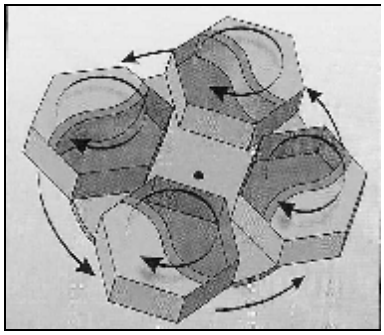

Figure 1: Movement of CBF machine barrels and turret

CBF machine

We also recommend that you use a drag-finisher with the planetary type centrifugal motion. By this it is meant that, like with the CBF machine, the fixtures rotate in one direction while the turret moves in the opposite thus creating an optimal processing movement of the parts through the media. A bi-directional motion is also favorable. This is a setting on the drag-finisher which when activated will turn at first in a clockwise motion for a set amount of time, and then stop and go in the opposite direction for, also, a set time. I would recommend ½ hour in each direction.

Drag-finisher

Disk-finishing machine

Vibratory bowls can also be used with good success for burn-ishing platinum parts. The size and shape of the steel media should be considered when using this method depending on the shape, size, and how intricate the design of the parts is. With a vibratory bowl it is important to find the right toroidal action so the 3-dimensional movement of the media can achieve its maximum function. Basically, the steel media will press or flatten the surface thus tightening the metal. Depending on the parts, I have found vibratory bowls a very good secondary process (tightening and giving shine to the surface) before putting the parts into a drag-finisher to give the part a high luster. In some cases, the process has even given parts a final polish.

MEDIA AND COMPOUNDS:

In the cut down process, or first step, it is important to find a media which is aggressive enough to remove the surface layer in a relative timely fashion. Always make sure the media size does not present any lodging problems and can reach all of the necessary areas of the part. The compound used with this media should assist in cutting and/or cleaning the parts.

For dry media, it is also important

to find a size (i.e. of walnut shell) which will be suitable to perform its primary function but not lodge in the parts. A good rule to remember is that the larger the media the more aggressive it is. There are a variety of cutting or polishing pastes, powders and liquids available for dry media, which are used to enhance the media performance and to keep the life span of the media longer. Combinations or media sizes, when processing either wet or dry, is also a consideration. An example of this would be using larger plastic cones along with smaller pyramid shaped plastic or ceramic media which can reach areas the cones which can reach areas the cones cannot reach but also allowing the cones to work the larger, flat or rounded surface areas.

PROCESSING (CAST VS. TURNED):

The process used for cast parts compared to turned parts is relatively the same except for the time needed to process cast parts is longer. In some cases, turned parts were processed using strictly a dry cut and dry polish in the CBF and drag-finishing machines. This was accomplished where the milling machine was able to cut the platinum so fine it was difficult to detect the turn lines.

MAGNETIC FINISHING:

There is some misunderstanding in the industry as to what magnetic finishing can accomplish. This equipment is not capable of producing a high-end polish. Its purpose is to have the fine pins reach areas where standard media cannot reach such as the inside of ring prongs. It is also ideal for removing casting vestige found inside of concave or pronged areas. Again, the finish in these areas will never be a mirror bright polish, but it will have some luster and the area will be clean.

IN CONCLUSION:

With the growth of platinum in recent years along with rising costs of manually manufacturing quality products in a timely fashion, we are at an important juncture where the mechanical means of finishing products should be considered. Machinery can assist or, in some applications, completely finish platinum jewelry saving time and money. Basically, it is hard to find, train, and keep good hand polishers today, and the growing costs to keep such help is also escalating. The benefits of machines, although needing some maintenance, is that they do not require a salary (except the initial purchase), they do not have good and bad days, nor do they quit, take vacation, steal or call in sick. They do not require a costly benefit package, and machines can be a tax write-off over the years. They can even work at night or overtime and will not require time-and-a-half pay. It is even proven that less metal is lost utilizing these machines compared to hand workers.

The processes for finishing platinum are now available, and it is important to ponder if your product can benefit by one of these mechanical means of mass finishing in order for you to be more competitive and profitable.