

Maximizing Refining Returns for Platinum Alloys (Knowing Your Inventory)

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Platinum jewelry manufacturing presents some very different concerns when discussing the collection of materials for refining purposes. The assumption that methods used for gold and silver collection and recovery can be used for platinum can lead to real problems and problems of perception.

Areas of concern are definition of materials to be collected, cross contamination, mixing of alloys when “refreshing” casting grain, the number of times refreshing can be safely accomplished, removal of magnetic material, assaying methods, processing times, return of dollars vs. ounces, increased refining costs, settlement times, and expected levels of return.

Collection of Materials

In any collection effort materials must first be defined to allow for proper refining operations. There are two basic types of materials in the jewelry industry when discussing refining. These are Meltable and Burnable. All jewelry-related materials fall into the following categories.

Meltable items are those that are

predominantly metal, such as trees, sprues, filings, substandard inventory (scrap), bench sweeps and any fabricated product such as sheet metal skeletons, wire tubing, etc. All of these are items that should be melted, sampled and assayed.

Burnable items are also defined as sweeps materials. Polishing dust, floor sweeps, ultrasonic sludge, tumbling solution, slag, crucibles, sink trap sludge, filters and carpeting. Floor sweeps includes buff pads, brushes, sandpaper, emery cloth, paper towels, clothing, boots, gloves and trash. These items should be incinerated, ball milled/crushed, screened, sampled and assayed. During the screening process, if oversized material is present, these materials should be returned to the customer or melted, sampled and assayed.

Cross Contamination

It has repeatedly been said, “do not use the same polishing and buffing pads for both gold and platinum.” Gold will become imbedded into the platinum resulting in a product that requires more finishing. Platinum particles embedded into gold product requires extensive finishing work. Manufacturers must label the buffs to be used specifically and individually for gold and platinum. Also, use of polishing rouges should be identified as well for platinum and gold use only. As stated previously, the Platinum manufacturing process issues the variety and availability of differing rouges is growing and each with a specific use in polishing from coarse to fine.

Another area where cross contamination can occur and cause large problems is the mixing of bench filings or metal scrap. Many

manufacturers have a standard alloy that dominates their production. Often due to availability, experimentation, cost or processing problems a new alloy is introduced to the production cycle. Imagine a standard alloy of 95/5 IrPt alloy and an addition of 90/10 IrPt along with 95/2.5/2.5 Pt Cobalt Cu. Each of these alloys in the production cycle requires casting and bench work. Each has differing melting temperatures. If one were to mix the filings, sprues and trees for reuse then a new animal will be created with unknown properties. Any product manufactured would not be able to be identified as Platinum due to the introduction of the 90/10 material.

For those operations where bench filings are kept separate, they should also be kept separate from trees and sprues. Bench filings separated by alloy type will contain contaminants that should not be introduced into the reuse materials. However, if kept separate, bench filings can be cleaned with aqua regia and dried. The clean filings can then be melted and used for piecework.

Lastly, cross contamination can also occur from the use of bench tools for both metals. Saw blades and other tools can deposit gold onto platinum and vice versa, not to mention iron from files and cutters, etc. It is suggested that when possible, a completely separate workstation be made available. This would include all tools and needed supporting items. If this is not possible, then complete cleaning is required. One suggestion is to place all hand tools in the ultrasonic cleaner before and after use to clean off any metal particles. At the same time you are now collecting these particles for refining at a later time.

To collect the sludge from the ultrasonic cleaner use a strainer and coffee filters. Place the filters in the strainer and pour the solution through the filters. Wipe the tank with the filters or a paper towel and keep them for refining as sweeps materials.

Refreshing

Refreshing is defined as adding in new alloy to existing scrap, casting trees or sprues and buttons. Typically with the standard gold casting processes this can be an extremely dangerous operation. The build up of impurities in the casting metal will cause porosity and inclusions. Additions of 50% to 75% new gold alloys are required to maintain the purity and karatage. Of course, the complete removal of investment is mandatory for both gold and platinum casting operations. The number of times manufacturing casting can be accomplished before starting with completely new casting material is very dependent upon how clean the casting material is. Many gold manufacturers can go as many as 1-15 casting lots by refreshing before starting with completely new casting grain. The build up of zinc and other impurities will force the eventual use of "new karated gold."

The high levels of metal purity in platinum alloys, specifically platinum ranging from 90-95%, dramatically increases the number of times refreshing can be accomplished.

This eliminates the greatest danger to refreshing as found in karat gold alloys. The number of times that refreshing can be accomplished safely is therefore multiplied dramatically.

Practically speaking, providing that investment is removed, the reuse of sprues, buttons and trees

can be done. In reviewing this aspect of platinum casting with several manufacturers reuse and addition of new alloy can be done as many as 40 to 50 times without problems before having to "scrap" material for refining.

Magnetic Material

In certain alloys of metal, platinum with silver and nickel at the right percentage will produce a magnetic alloy. This is common in dental refining lots and those lots that have low levels of platinum (3-7% Pt) in the metal. Magnetics create problems with assaying for any precious metals content. Unless processed properly, the resulting assay may report too high of a metal content (bad for the refiner) or too low of a metal content (bad for the manufacturer). The addition of copper or copper oxide to the magnetic material during the melting process will homogenize the magnetics and alloy for accurate assay of precious metals. This can require in some cases 200-300% addition of copper to eliminate the magnetics. As a result, refining costs to deal with this specific problem can increase. Additionally, the melting time can double or even triple. The introduction of oxygen to the melting process will accomplish the same result, however, processing times are increased also increased with additional costs as well.

The refining of polishing sweeps and floor sweeps typically have charges associated with the incoming weight of the material. To minimize the refining costs of these materials standard recommendations are to remove items such as paper clips, saw blades, iron filings, staples, etc. by running a magnet throughout the material. This removes magnetics and also

reduces the weight of the lot, lowering the refining costs. With platinum based sweeps this can remove platinum filings as well. Therefore, it is strongly suggested that a very close visual inspection on all sweeps be conducted to remove as many non-value materials as possible and refrain from the use of magnets. One consideration with respect to saw blades would be to immerse in the ultra sonic cleaner to remove any precious metals before discarding.
Platinum alloy containing cobalt will be magnetic! (Cobalt is a magnetic material therefore all of the above doubly applies for this alloy.)

Processing Times

The time for refining platinum materials takes longer than for gold materials. This is due to the increased temperatures required for melting platinum versus gold. Additionally the assaying times are longer due to the different methodologies used. Typical assay times for gold alloys range from two to six hours, whereas gravimetric or Atomic Absorption assay methods can take up to a full day. Accuracy of assay can also cause samples to be reassayed, thereby adding additional time. Should an improper melt occur for platinum material resulting most commonly in an invalid sample, the assay would definitely have an inaccurate and subsequently lower assay content. The standard pin sampling method is not advised, since the glass pin tube will normally melt before the sample can be taken. Grain samples can be utilized, these take timing and skill and the proper technique. Most important however, is having the equipment with enough power to completely melt the metal and allow for complete homogenization of the lot. Most

accurate of the sample methods is the foil sample; this however is predicated upon proper melting of the metal in to an ingot.

Processing times for platinum based sweeps are the same for standard gold sweeps. However, the assay times are more time consuming and therefore more costly.

Mixing or collecting gold and platinum scrap automatically adds more work and effort to the refiner. This will add to the settlement time and also add cost.

Settlement Time

Standard settlement times for gold based refining materials range from straight exchange to 10 days. This varies based upon purity of metal and volume for metallic scrap. Sweeps range from two weeks to four weeks. When platinum group metals are added into the equation, time may be extended out to 14 weeks regardless of material type. There are those companies who are able to settle within four weeks for sweeps materials and in some cases two days for platinum only melt lots. It may be beneficial to investigate. This is due in some part to the problems associated with platinum mining operations, which have had serious affects on the market price of platinum. Coupled with the refiner's ability to price metal for sale on a future market adds to the extended lead times.

Return of Dollars Vs Ounces

One of the most important aspects of the refining process is the type of return available to you. Dollars are easily funneled back into your business. However, the consideration of having metal returned in the form of alloy or pure can have benefits and some limi-

tations. Many refiners do not have access to pure platinum unless they transfer ounces to another refiner or trading operation. Many times the refiners do not manufacture alloys and thus need to transfer dollars or ounces to another source to provide service for customers. Therefore, other than refining charges, consideration should be given to the costs of having metals returned as opposed to dollars. There are always costs related to metal returns, but dealing with sources that provide full service, especially for alloys can minimize some of these costs.

Expected Levels of Return

With gold refining the manufacturer can maintain a system to track metal loss by operation and from there predict over time what the refining returns should be. These systems can be readily applied to platinum manufacturing as well. When discussing polishing sweeps and floor sweeps these areas differ significantly. Where 14kt. gold manufactured polishing sweeps can yield as much as 4%, platinum contents vary greatly. Based upon dust collection systems where gold and platinum are collected together into the same filters, as opposed to completely segregated systems along with differing types of rouges, the percentage of assayed content ranges from 0.5% Pt to 8-9% Pt. The lower percentage is due to mixing of gold dust with platinum dust in the same refining lot. Floor sweeps will typically be much less. One method that gives a level of predictability over time is to track the ratio of net weight shipped versus refining return. This can be applied to metals and sweeps and gives the manufacturer a picture of his processing operations.

Keep in mind that proper assaying is the only accurate method to determine metals content or value.

However, this ratio can be used to paint a fairly high estimate.

$$\frac{\text{Net Weight Shipped}}{\text{Oz./Dollars Returned}} = \text{Ratio of refining return}$$

This ratio can also be used as a general comparison of one refinery against another providing the terms are similar.

Some simple questions to ask regarding refining:

1. Do you get a sample for your own assay?
2. Do you witness your material being processed?
3. Do you get paid for your oversized material?
4. What are the settlement times for your return(s)?

Summary

All materials collected for refining have already been paid for, as some sort of inventory or support needs for the manufacturing process. There is a direct correlation between the knowledge of your process, the capability of your refiner and the costs associated with your refining returns. Manufacturing produces inventory for sale but also generates inventory from the manufacturing cycle. Control and effort should also be directed to these inventory items to maintain and reduce costs as well.

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