

Enhance Your Refining Returns

Getting the Most Out of Laboratory Scrap

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Waste Not, Want Not

For every ounce of virgin precious metal alloy you bring into your dental laboratory, anywhere from 15% to 25% of it will likely end up as scrap. At 15%, your lab is employing good manufacturing technique and operating reasonably close to peak metal efficiency.

Either way, the hit to your bottom line is significant: For every fine troy ounce your lab puts out in finished product, you are likely buying an average of 1.15 to 1.25 troy ounces upfront. Add to that the cost of having your scrap refined, and two things quickly become clear: In order to minimize material costs and maximize gross margin, you must handle your scrap meticulously and you must have it refined proficiently.

While many lab owners regularly collect their scrap and ship it off to a refiner, they often fail to implement a high-level, professional process designed to take maximum advantage of every aspect of the collection and refining process.

To capture the highest value for your scrap, you need to:

- Understand the scrap your lab produces.
- Optimize your material control system.
- Choose a top-notch refiner.

In this article we'll help you learn how to complete each of these three steps toward securing the best long-term return on your investment in precious metals such as gold, platinum, palladium, and silver.

Scrap: The Good, the Bad and the Ugly

What you don't know *can* hurt you. If your lab technicians are sweeping up scrap as if it's all the same waste material, you are throwing away your chance at earning the best returns before you even get started. Dental labs generate a wide variety of waste materials, and it's vital to understand the different types of scrap your lab produces before you can set up an effective collection system:

<i>Category Description:</i>	<i>Typical Composition Includes:</i>
<i>Metallics</i>	<i>Castings, buttons, sprues, trees, flashings, snips, solder wire, unwanted ingots and returned non-hallmarked coins</i>
<i>Semi-metallics</i>	<i>Clean, de-magnetized grindings and filings</i>

<i>Medium-Grade Combustibles</i>	<i>Polishings and vacuum bags containing bench sweeps</i>
<i>Low-Grade Combustibles and Wet Sweeps</i>	<i>Floor sweeps, low-grade vacuum bags, filters, sludge, non-toxic electro-cleaning residues and even carpeting</i>
<i>Low-Grade Refractory</i>	<i>Crucibles, refractory, alumina oxide and dry investment</i>
<i>Deleterious or Hazardous⁽³⁾</i>	<i>Nickel beryllium, mercury, cyanide, sulfates and chrome</i>
<i>Special Promotions</i>	<i>Ingots returned for credit, coin buy-backs, pure platinum foils</i>

(3) Source: Threshold Limit Values for Chemical Substances and Physical Agents, American Conference of Government Industrial Hygienists, "1997 TLV's and BEI's"

Metallics, a category that includes crowns and bridges, generally return 75% to 95% in metal recovery after initial processing and sampling at the refinery. Most metallic scrap comes from casting operations. Note that buttons and sprues are usually recycled into new casting campaigns, so it's critical they remain clean and well-defined for reuse.

Semi-metallics are bits of metal and abrasive materials remaining after the finishing process. Be sure to remove any magnetic contamination with a magnet before shipping, because magnetized elements can disrupt the refiner's sampling process. Metal recovery after initial processing and sampling is typically less than 90% for this category. It's more difficult to keep an accurate inventory of semi-metallic scrap than it is to keep track of metallics, because oftentimes the collection to any centralized vacuum system would make it impossible to accumulate and weigh these materials separately. Semi-metallic scrap should be recovered weekly from any bench type collection devices, weighed and compared with initial metal issuance for loss prevention control.

Medium-Grade Combustibles consist of residues remaining after polishing, commonly referred to as polishing dust, and vacuum bags containing sweeps with relatively high concentrations of fiber, rouge, rubber and other carbonaceous content. Metal recovery in this category after initial processing and sampling is typically well less than 75%. You must keep these materials well-segregated from higher-value metallic and semi-metallic scrap in order to track the recovery elements over time. As with metallic and semi-metallic scrap, these materials should also be securely stored and routinely extracted, weighed and accounted for, whether the lab uses a centralized vacuum system or just a vacuum cleaner with bags.

Low-Grade Combustibles and Wet Sweeps may not look valuable but can offer a surprising bounty of metal recovery, typically from 5% to 50%. Shop dust, floor and rug sweepings, toweling, papers, air filters, low-grade vacuum bags and carpeting have a high combustible content and usually cannot be tied back to a specific operation or collection device. For very low grade items, when in doubt, send it off for processing at least once in order to gauge its value. Wet sweeps include wet filters, electro-cleaning silt, sink sludge and trap residues, and byproduct waste from spent (galvanic) non-toxic electroplating solutions. Lab operators should dry these items prior to shipping them to the refiner. If drying is impractical, mix the wet materials with plain sawdust (not pressure-treated, which contains arsenic) to absorb excess liquid. These materials should be double-bagged inside a well-sealed container and have no visible evidence of free liquid.

Liquids of a hazardous nature, (Corrosives or Poisons), containing cyanide or even high sulfate concentrations must be shipped only to refineries licensed to process hazardous materials, using a state-supplied hazardous materials manifest and shipped with a Department of Transportation-approved transporter.

Low-Grade Refractory includes a number of items that are not likely to contain material of value but sometimes do, including investment, crucibles, graphite parts and aluminum oxide suspected of containing trace precious metals. Metal recoveries after initial processing and sampling in this category generally fall well below 5%, but are highly unpredictable. Freight charges and treatment charges often absorb most of the resulting metal value in this category, but we recommend you ship and process at least once, or randomly sample these materials from time to time.

Deleterious or Hazardous scrap includes amalgams with mercury, base-metal scrap containing nickel beryllium, and natural teeth. The first two items can be hazardous to your refiner's technicians, if they vaporize during melting or physical abrading. As for any teeth and root structures, these should be sealed in sanitary bags and noted as a bio-hazard to insure adequate hygiene protection for the refiner's receiving personnel. Most U.S. refining operations today will not accept scrap bearing mercury or nickel beryllium; such shipments will be returned at the shipper's expense. Should a refiner technician be harmed by these materials, the shipper will be held liable. Instead, lab operators should locate industrial precious metal refiners who will accept these elements in large lot sizes, or EPA-approved amalgam processors who accept them for recycling and recovery.

Special promotions refer to dental alloy suppliers who offer "buy-back" programs for bullion coins previously taken back as a refining return, and credits for unused alloy, as well as pure platinum foils used in veneer construction. If these programs are available, labs should take advantage of them.

Slow and Steady Wins the Race

Once you understand the scrap your lab produces, the next step is to set up and operate a disciplined, long-term material control system.

You should strive to maintain a "scrap-to-alloy" ratio between 15% and 20%, meaning that for every ounce of gold or other precious metal processed in a given period, about a fifth of it is ending up in the scrap collection stream. Ratios approaching and exceeding 25% indicate the lab is not operating efficiently (i.e. poor casting technique, over-waxing of copings, excessive polishing), and ratios well below 15% may indicate the lab is not collecting scrap efficiently, has an equipment failure or even a pilferage problem.

You will gain the most recovery value from the first three categories, metallics, semi-metallics and medium-grade combustibles, so it's important to carefully collect and segregate these types of scraps and to store them securely to guard against theft and other types of loss. Low-grade combustibles and sweeps, while less valuable by weight, are no

less important and every effort should be made to keep track of their location and security since they often mix with other non-metallics, including rouge, polishing media, floor dust, towels, filters, etc., which are co-mingled with the waste precious metal alloys.

Here are the steps to create a high-level material control system:

- Tightly control metal on the shop floor by weighing work before and after it is issued to casters, metal finishers and other technicians.
- Train metal finishers to clean up their work surfaces and the floor around their work station nightly and turn in all waste. They should vacuum their aprons and clothing and the bottoms of their shoes with a portable vacuum.
- Establish well-defined scrap categories, using the classifications outlined above.
- Routinely collect scrap in these categories and keep the categories separate.
- Weigh and record scrap by category after collecting.
- Store scrap under lock and key to prevent theft.
- Before shipping, label scrap lots with your name, address, phone number and any special instructions.
- Insist that your refiner weigh each category of scrap within the shipment separately. This allows you to compare settlement results over time.
- Keep detailed historical records of your settlements and obtain well-documented reports from your refiner showing the weights received, the after-process weights, the assay and the metal paid, less the refiner's fees.
- If possible, endeavor to refine in regular, not haphazard, intervals that coincide with the scheduling of the lab's physical inventory or stock taking procedure, e.g. end of quarter, semi-annually or at year end. While there is a temptation to hold out for higher markets, the failure to match the lab's refining result(s) to the lab's physical book inventory is a significant accounting omission.
- Use this information to track your "scrap-to-alloy" ratio, and take corrective action when the ratio falls well below 15% or approaches or exceeds 25% and to make the appropriate adjustments to your book inventory.

Choosing the Right Refiner

While your bottom line is very tangible, refining centers operate on a host of intangibles: service, reliability, credit exposure, ethics, accuracy and professionalism. The most important factor is finding a refiner you feel comfortable with, a refiner who is honest, reliable and creditworthy.

Many refiners also manufacture and sell dental casting alloys, such as Jensen, and there are distinct advantages to dealing with them. First, they are more likely to have the technologies and environmental control equipment needed to process your scrap lot in house, as well as the full-time metallurgists, chemists and technicians required to do the job correctly. These firms understand the material you are sending in, because they work with it every day. And they work under a host of quality and audit requirements mandated by the U.S. Food and Drug Administration and other regulatory organizations.

Since alloy companies want you to purchase alloys from them, they have a compelling interest in providing you with the best possible refining yields and the highest level of service. They are also relatively flexible regarding how you take your settlement, provided that you have not repeatedly abused your credit terms.

Refiners should offer you a high level of service and personal attention. Your refiner should:

- Inform you when your lot is received.
- Provide you with shipping and rate information.
- Give you free shipping containers and some additional transit insurance protection.
- Make a technician or refining manager available to answer your questions.
- Provide detailed information on your settlement process.
- Continuously work with you to improve your material control system.

Here are some “red flags” to watch out for:

- **Bad timing.** If your refiner settles your lot overnight or on the spot, chances are that they are not sampling your scrap but estimating the value of your lot (and probably not in your favor). On the other hand, if your refiner takes a month or more to turn your scrap around, they are probably costing you money. A reasonable time period to process and settle your scrap is 10 to 15 days from its arrival, unless you ship an unusually large low-grade lot requiring additional incineration or processing.
- **Lack of payment options.** When you settle, a good refiner should offer you the option of receiving your payment in check, alloy, accounts receivable credit or coin bullion. Avoid accepting cash as a settlement due to reporting regulations associated with the Anti-Money Laundering provisions of the U.S. Patriot Act.
- **Keeping you in the dark.** If your refiner gives you a settlement report that simply lists net paid metals at their applied market rates, this is not enough information for you to judge whether your process losses were acceptable or to compare your results from lot to lot. The report should include a comparison of your original receiving weight to the after-processed or recovered weight and the results for each metal, as well as all refining fees and charges.
- **Giving you no recourse.** Your refiner should let you know upfront what options you will have in case you contest the settlement offer. That could include asking for a re-assay, requesting that the material be re-sampled and then re-assayed, or having your material returned at no charge.

You must also be sure that your refiner is a solid credit risk. They take in valuable materials every day and their customers are taking it on faith they will receive fair value in return, at a future date.

Here are ways to investigate the financial health of a refining company:

- If the refiner is a public company, request their latest annual report for review. If they are private, ask for some references.

- Request their capabilities brochure and ask for a verbal explanation of their rate structure, fees, terms and conditions. Find out whether the company uses published market prices to settle lots, and whether customers have recourse in case of a disputed lot.
- If you plan to routinely ship in excess of \$10,000 per shipment, seek alternative shipping advice for insuring your goods.
- When in doubt, pay to run a Dunn & Bradstreet credit report or contact the secretary of state's office in the refiner's home state to determine whether the company is in good standing or the Better Business Bureau to determine if the refiner has a good customer service record.
- Request the refiner's Environmental Protection Agency number and check on the refiner's standing with its state environmental agency.
- Be wary of overly simplistic websites and exaggerated promises and claims.
- Ask the refiner for pictures of the company's operations, particularly sampling, analytical and environmental capabilities, as well as a description of their premises, in terms of size and number of employees. Some refining companies work out of small premises with limited environmental controls and little or no security provisions yet spin themselves as top echelon refiners. Balance sheets and resources do make a difference.
- Do not be overly preoccupied with the subtle differences in yields and rates between refiners. Labs charge differently, so do refiners. What matters most is what you get back, after fees, and the focus should always be on the net bottom line and the refiner's consistency over time.

The bottom line: You and your refiner should enter into a close, long-term partnership designed to maximize your return on the materials you purchase. Jensen's philosophy is to do whatever it takes to help our client-partners create and operate a high-level metal accountability system.