surface performance

Swarovski Shines Bright with Accent Plating and UIC Chemistry

Swarovski crystal gives sparkle to couture fashion, jewelry, avant-garde glassware, architecture and lighting. Crafted in Austria, it is treasured worldwide by designers and collectors.

In the all-important US market, Swarovski is best known for its jewelry, which combines approachable elegance with impeccable quality. To maintain the brand's upscale image, the company adheres to strict quality parameters, and relies on a single source for its precious metal electroplating.

Accent Plating (Pawtucket, RI) is a 55 year old family owned company providing rack, barrel and basket plating. Founded in 1962 by Robert Mancini, Accent is best known for its high end costume jewelry programs, but also plates decorative precious metals on specialty items, such as belt buckles, jean rivets and cigarette cases. Production is over one million pieces per month.

Accent's specialties include trend-forward charcoal and black finishes, gold, silver, palladium and other precious metals, such as rhodium, and antique gold. Accent also provides nickel-free underplate finishes such as palladium and Miralloy (Cu-Sn-Zn).

For its Swarovski programs, Accent runs 6 Umicore processes supplied and supported by Uyemura. Each has a dedicated line, and runs daily.

Ruthuna 479 is a black ruthenium process that is often specified, according to Plant Manager Gilberto Arteaga, as a hypoallergenic alternative to gun metal-type deposits. "Some gun metals," he explained, "test positive for nickel – so they often can't be used." Ruthenium deposits have high color consistency, can retain their brightness and also provide a jet-black appearance, depending on the under plate deposit.

Umicore's Ruthuna product series deposits either as a dark charcoal, or deep jet black, depending on how it's processed. "Either way," says Arteaga, "it's an easy process to run, and ideal for chains, rhinestone settings, other jewelry components, and writing instruments. Interestingly, customers call Ruthuna by all kinds of names: ruthenium, black nickel, gun metal - even *'hematite!'*

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Rhoduna Alloy is a pure white rhodium-ruthenium, and the process Accent plates in the highest volumes. "Part of the reason," says Arteaga, "is that you can tailor the deposit thickness without altering the color, and you can apply it to anything: castings, brass or copper stampings, nickel, palladium, silver, gold."

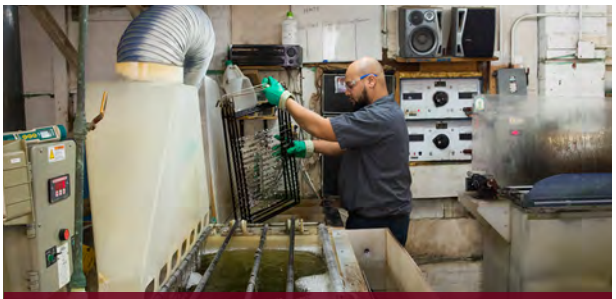
Rhoduna Alloy is a bright white color equivalent to a pure rhodium layer – yet it surpasses rhodium in durability and scratch resistance. The deposit is crack-free up to 1 µm, and its good throwing power means it can be used on complex geometries such as chain and rings. It has a wide current density range for ease of processing.

> **Rhoduna's deposit thickness can be modified without altering the color – and you can apply it to anything.**

Auruna 215 is a 24K hard gold, and Accent's second most popular finish. This "warmer" alternative to traditional 14K is nickel-free, cobalt-free, and has a range of coating color (1N-2N) that is independent of pH value and current density. The main advantage of this product is that it precludes the potential for skin allergies.

Palluna 457 is Accent's universal base layer. This neutral pure palladium is light white, low in porosity, and exceptionally corrosion resistant. Palluna will build crack-free layers of 3 µm and higher. "Years ago," says Arteaga, "we used a cobalt-based chemistry, but for primarily environmental reasons, Swarovski specified a chloride bath. Palluna is an exceptional alternative, and provides increased corrosion resistance."

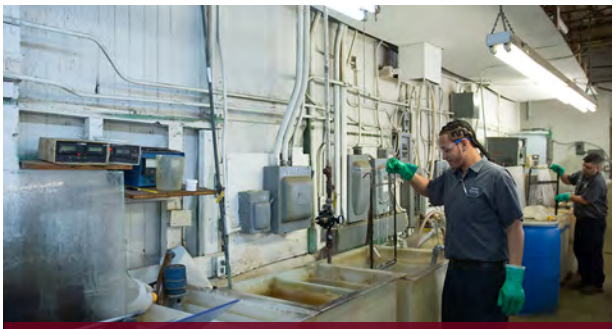
Accent's fixture specialists ensure that contact points in rack plating maintain aesthetics and functionality.



Accent Plating specializes in rack, barrel and basket plating for jewelry manufacturers.

Auruna 500 LC deposits "rose gold" 18 carat gold copper coatings that are very hard and resist both abrasion and tarnishing. It will build to 10 µm and is cadmium-free. The main advantage of the 500 LC is that this bath operates at a low gold concentration of 2.0 grams, yet provides a wide operating window to hold the 18K alloy - critical for tarnish resistant gold-copper deposits.

Auruna 246 is Accent's newest bath addition. Explains Arteaga, "we set it up last November for a new customer whose production volumes were small at the time. They wanted a specific finish for chains– a unique brownish gold – and heard that we ran some unique baths. We didn't have a good match, so we asked (UIC Business Development Manager) Rich DePoto for help and he suggested 246. We plated samples, fine-tuned the temperature and voltage, and the customer loved the result."



Accent Plating is a specification electroplater with multiple lines and a broad range of capabilities.

Uyemura has actively partnered with Accent in providing guidance on operations, contamination management, and reuse / recycling, as well as analytical testing to augment Accent's own testing capabilities.

Accent Plating is one of New England's largest precious metal platers and counts among its other customers the prestigious Hord Crystal, another preeminent supplier of high-end costume jewelry.

How BLACK is YOUR BLACK?

by **Rich DePoto**

Customers frequently ask vendors what the "blackest" finish is. The answer may have just changed.

The classic black coatings used by GMF shops include nickel alloys, chrome-based overplates and chrome conversion coatings.

The chrome-based conversion coatings are called chromates and have a long history. Formulations and performance differ, but they all share the same downsides.

Shops are reluctant to use chrome-based chemistries because of environmental concerns. Also, the nickel alloy overplates and chromate conversion coatings are thin, often fragile, and inherently unable to provide the robust corrosion protection that OEMs require.

Also, many try to avoid plating chrome. Mercury aside, hex chrome is the worst actor among heavy metal contaminants, and adapting to what's required for its application is not an appealing proposition.

New alternatives?

Recent developments in nickel overplates and co-deposited blackening agents have yielded a process that delivers both a dark black surface and very high hardness values. Trade-named BlackNight, it has been adapted to use an electroless nickel rather than an electroplated nickel underlayer and overplate. This allows the plating of complex part geometries and designs, cost effectively and with a uniform nickel thickness.

The technical particulars

The BlackNight process uses a standard EN underplate followed by a thin mid phos electroless Ni-P deposit layer. This thin 5 micron electroless Ni-P overplate is a lead-free ELV, WEE and RoHS compliant layer that serves as both the seed layer and a topography matrix for the blackening deposit.

The last step of the process is immersion of the parts in an alkaline blackening bath for about 15-20 minutes at 50°C. The treatment time is adjusted based on the complexity of the part geometry and the solution dynamics of the plating tank.

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Umicore Specialists Add Tech Savvy to Sur-Fin


Uyemura is pleased to host Umicore GT's Technical Sales Managers Robert Ziebart (left) and Joerg Weber at Sur-Fin, Booth 331.

Mr. Ziebart and Mr. Weber are both well known throughout America's plating community for their expertise with advanced surface technologies, including electrolytic precious and nonprecious metal plating, trimetal plating, and antitarnish and sealant applications.

The final result is an ultra-uniform, high surface area matrix that does not necessarily take on the typical appearance of electroless nickel. Rather, it has a distinctive topography that is the key to creating an extremely dark black surface.

A cross section of the BlackNight deposit shows that the matrix film has some depth versus simply being superficial, and this undoubtedly contributes to the lower reflectivity of the deposit and its unusually dark and highly uniform color.

Notably, the final deposit can be heat treated to improve its durability and wear resistance. There is, predictably, a minor loss in the darkness level of the deposit as a result of the baking process.

However, compared to the conventional processes, even after baking the darkness level improves by 60-70%. L values (SCI) for the standard process are between 30 and 35; this new process ranges from 8-12 L value (SCI). Lower reflectance critical for dark appearance is also achieved with values as low as 1.0 percent. Conventional processes are in the the 8-10% reflectance range.

Following heat treatment, and depending on the time and temperature applied, a Vickers hardness number of 600-800 can be achieved. 250°C for 60 minutes is a typical baking cycle.

Improved L values

Improved L values and low reflectance values appear to be the result of two symbiotic factors: the deposited matrix that has been developed through use of a specific mid phos electroless Ni-P overplate, and a blackening agent electrolyte that uniformly etches and deposits a Ni2O3 enriched surface.

The deposit is atypical of an etched electroless nickel surface in its micro-uniformity and high surface area. This leads to a darker and more uniform black surface with lower reflectivity. The process has a secondary advantage of keeping the underlying higher phos nickel underplates "intact." This produces higher corrosion resistance in the final protective layer.

Film morphology

Chemists describe BlackNight deposits as an entirely new film "shape." What they have developed is a nickel phos surface that has a strong affinity for a secondary blackening agent. The subsequent Ni2O3 growth layer is comprised of a shortened, high density topography. The combination of receptive topography and unique blackening agent are what creates the final result.

Richard DePoto is Uyemura's Business Development Manager, and the company's leading expert on general metal finishing, and Umicore chemistry in particular.

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