

# surface performance

## CHICAGO PLATER THRIVES AS PERFORMANCE DEMANDS RISE

**Precision Plating succeeds in the world's most competitive markets, thanks to best-available product technology and expert engineering**

**Precision Plating Company (Chicago, IL)** is a leader in electrolytic and electroless finishes, plating some of manufacturing's most complex assemblies: ABS modules, aircraft, drive-by-wire controls, implantable medical devices.

Founded in 1904, the company is one of America's largest and most respected contract platers. The company is unusual in that, as shops have become more process-specific over the last decade, "PPC" has remained a true "one-stop shop," providing barrel, rack, selective and overall R2R plating, and a materials range that's equally diverse: gold, silver, palladium, copper, tin, nickel and trimetal.

The company is also distinctive in that it hires most of its managers first into the engineering department, where they learn the business from the ground up.

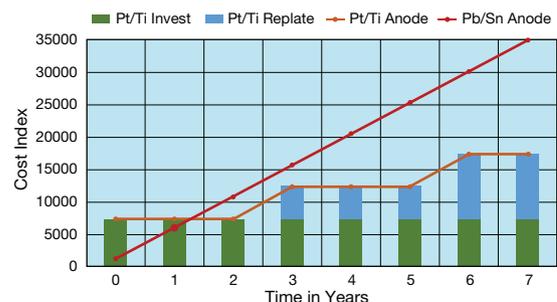
"By hiring and training new engineers onto our team," says Precision Owner and CEO Gary Belmonti, "we organically create future generations of leaders for Precision."

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### It's Time to Dispose of Disposable Anodes

Hard chrome platers can opt for disposable or permanent anodes. With the former, the end product is a hazardous chunk of lead that's difficult to dispose of – highly undesirable from an EHS\* standpoint.

**Umicore platinum plated titanium anodes for hard chrome plating offer an effective, and cost-efficient, alternative.** As the chart shows, the disposable anode, indicated by the red line, is less costly at the beginning of its life, but the cost for the two alternatives converges at the one-year point. After that, the permanent "Platinode" anode has the advantage – and that advantage becomes more significant over time.



\*Environmental, Health & Safety *(continued on page 4)*

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**Precision's focus is high reliability electronic connectors.** "These are products where plating must function at the highest levels of performance in terms of safety and reliability," according to Engineering VP Hanie Miri.

"70% of our work is automotive," he continues.

"These are critical components for air bags, transmission controls and the like. PPC supplies globally," he adds, "and has major customers in Mexico, India, Germany, Singapore, and Malaysia.

"Each of those regions is intensely competitive," he notes, "and what drives our success in those regions is the very high levels of scrutiny our customers have for plated parts. Local suppliers do not have the technical resources to meet exacting demands, and as a result, air freight and lead times – two factors that would otherwise be obstacles, are less of an issue.

"Growth is robust in the higher end of the spectrum," says Miri. "Silver plating is particularly strong, and while the auto industry is not necessarily making more vehicles, the quality requirements of electronic components in cars - and the increasing density of electronic connector systems - both work in our favor.

"Consider the number of connectors and sensors in today's cars," he suggests. "We are also working with electric vehicles, and many of those manufacturers are focusing on future applications such as driverless technology.

"When OEMs or their component suppliers are concerned about whether or not a finish will perform a specific function, or have an issue regarding tolerances or tarnish, that's when we're brought in. Our experience gives us the ability to help customers through their plating roadblocks, while keeping costs down."

## **Antitarnish at Precision**

Precision Plating has a long history with antitarnish chemistries. Richard DePoto, Business Manager for Umicore Products, explains. "UIC achieved its first organic product qualification in partnership with PPC. They were pioneers in the field, and a natural candidate to benefit from these then-new products.

"The auto industry wanted to qualify a product, so they approached PPC, which contacted us. We submitted a POR\* for our 614 product, a stable and highly effective chemistry that was quickly approved. It did a great job for PPC for about 15 years; with new advancements, its successor has become our Sealing 691."



*Precision Plating Company has lines for rack, barrel, and reel-to-reel plating.*

Sealing 691 is an elite antitarnish developed by Umicore and available exclusively throughout North America through Uyemura. An advanced nano-technology solution, Sealing 691 is tailor-made for manufacturers of connectors and other electronic components where there's a need to minimize PM costs and deposit thicknesses, while meeting specs for contact resistance, corrosion and wear, solderability and bondability.



*R2R line installed at Precision Plating Company.*

*\*POR – Process of Record*



*Barrel plating line at PPC. Uyemura's Miralloy trimetal can be efficiently barrel plated.*



*Precision Plating Company has lines for rack, barrel, and reel-to-reel plating.*

“Our experience with the antitarnish Uyemura supplies has been excellent,” says Miri. “It’s a solid performer, extremely consistent. Parts plated with silver or copper inevitably oxidize, and the farther we send them and the longer customers hold onto them, well, there’s a ticking clock for deposit oxidation.

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**“ Sealing 691 is tailor-made where there’s a need to minimize cost and thickness. ”**

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“In Mexico particularly, the heat, humidity and atmospheric sulfur dioxide all work against us. The Uyemura product is the best tarnish inhibitor, and although it was developed for silver, we’ve expanded its use to other finishes, primarily copper. Their people are extremely well-versed in the product and provide extensive technical data regarding what it can and cannot do.

“Increasingly,” Miri adds, “we’re fielding customers’ questions about lubricity, temperature resistance and other factors, and Uyemura is able to answer those questions extemporaneously – and support the answers with hard data. As a result, our customers are reassured.”

Precision Plating has used Uyemura’s antitarnish technology for more than 7 years. Between its early use of 614, and the newest product, Sealing 691, Precision processed an interim product that contained an additive for interlocking – a huge advancement that enhanced the protective properties of the chemistry.

Precision Plating operates 28 reel-to-reel lines, a number that will grow to 34 by early 2017. It also operates 14 rack and barrel plating lines. There are 5 dedicated lines that use antitarnish, as well as modular tanks that are moved in and out of other lines as needed. Plating lines can be set up in just a few hours; equipment was engineered and built in-house and is both modular and standardized for quick change-over.

## **Trimetal at Precision**

One of the newest lines Precision has built is dedicated to trimetal processing. For critical components in microwave connection systems and the broader telecom industry, Precision processes Uyemura’s Miralloy.

Miralloy is industry’s benchmark trimetal chemistry and has earned widespread acceptance for use on HF connectors, contact elements and solder pins. Miralloy deposits up to 15  $\mu\text{m}$  with exceptional uniformity. Deposits are diamagnetic, with abrasion resistance and hardness equal to electroplated nickel. It has excellent solderability, and high hardness value. It is also tarnish-free, RoHS compliance, non-allergenic and RF-friendly.

In addition to uses within telecom, Miralloy is widely regarded as a cost-effective alternative to silver, palladium and nickel for many other technical (and decorative) applications.

**“ Miralloy is the industry’s benchmark trimetal chemistry. ”**

Precision has used Miralloy trimetal for more than a decade; it was, in fact, the first product Uyemura supplied to Precision. “UIC has always been the name here, internally,” says Miri. “Although we have used others, we have a strong preference for UIC and its products.”



Starting end of a Precision Plating R2R line.

Precision Plating has a well-earned reputation for quality, for competitive pricing, and for a stellar environmental record.

“Our facility is located in an upscale residential setting within Chicago,” says Miri, “and it has always been our highest priority to be good environmental stewards. We have a world class environmental treatment system and a compliance officer with 40+ years of experience. One of the things we’re proudest of is the recognition we’ve received from our regulatory agencies.”

*Precision Plating is TS 16949 and ISO 9001 certified.*

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**If permanent anodes are the choice, there are compelling arguments for Umicore’s Platinode products.**

Platinode anodes are manufactured in a molten, water-free plating bath. This is one reason for their exceptional service life – typically 7-10 years.

The unique molten metal structure of the platinum, which is stress-free, means ductility is high, and cracking – a common problem with conventional anodes - is virtually unheard-of.

### Anode Comparison

Parameter	Pt/Ti		Pb/Sn	
Form Stability	Excellent	✓	Poor	✗
Ease of Shaping	Excellent	✓	Poor	✗
Lifetime	Excellent	✓	Moderate	
Weight	<5% of Pb	✓	Very High	✗
Maintenance	Very low	✓	High	✗
Toxicity	-	✓	High, Pb	✗
Sludge / Disposal	-	✓	High	✗
Work-In	-	✓	Required	✗
Scale Formation	-	✓	During downtime	✗
Investment	High	✗	Low	✓
ROI	Excellent	✓	---	---
Energy Cost	Moderate	••	High	✗
Replatinizing / Refining	Possible	✓	-	✗
Fluoride Compatibility	Poor	✗	Moderate	••
Fluoride Compatibility (Nb)	Excellent	✓	Moderate	••
Optimize Chrome Deposit	Excellent	✓	Poor	✗

Platinode anodes are also bendable, and can be shaped to any part configuration.

Platers that process large quantities of one part, or who require extraordinary deposit uniformity, benefit substantially from this capability.





“ Sometimes what a company values most about its product can be different from the reasons customers actually buy it. ”

by **Rich DePoto**

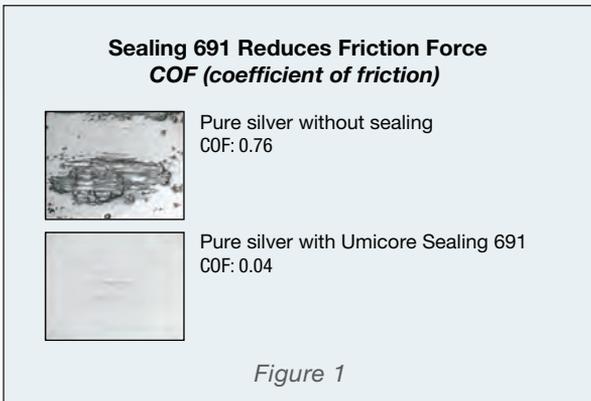
Business Development Manager Umicore Products

Recently, I learned that not one, but several customers in the connector industry were purchasing Sealing 691 not for its antitarnish properties, but for its ability to change the coefficient of friction.

Component insertion has to produce a reliable connection without a lot of insertion force. If the force is too high, one or both mating plugs can become damaged. **So, the ability to change the metal's coefficient of friction is of great interest – but only if whatever's being used to enhance lubricity does not compromise electrical contact.**

That's exactly what these companies are discovering that Sealing 691 provides. It's invisible, it's lubricious and it will not diminish electrical properties. (And, oh, by the way, it also prevents tarnish!)

Some background: Until now, any organic applied to the metal surface diminished its electrical properties, so what our customers discovered is truly new. Figure 1 shows the reduced coefficient of friction that results with the application of Sealing 691. Figure 2 shows how well it maintains the original contact resistance of the connector.



### Electrical Properties

Dip Time vs Contact Resistance at Contact Normal Force 10 cN

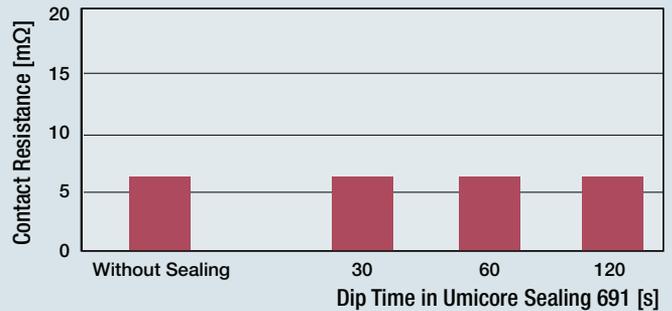


Figure 2

Several companies are working on products – or techniques – that will make it easier for connectors to connect. Mostly, these solutions involve the use of springs and other add-ons. **In contrast to these mechanical fixes, UIC does it cleanly - with chemistry.**

Three factors are impacting what happens next: press fit connector geometry is becoming more complex, with tighter real estate, more IOs and more pins; also, tolerance specs are tightening, and insertion forces are increasing.

From what I've seen, *none* of these bode well for a mechanical solution, and *all* of them bode well for a chemical one. It turns out, the chemical one is a proven organic lubricant that lowers friction - without affecting electrical performance, while also accomplishing its original (antitarnish) mission.

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There's something else that's getting attention, too: **this sealant technology is self-healing**. Abrasion wear tests done by one OEM show that it moves, and insertions beyond the initial one re-distribute the sealant. And while this is not ideal where the service life involves 150,000 insertions, it has been shown to be very well suited for 500 – and in some instances, 1000.

What the new sealant technology *doesn't* offer is high temperature resistance. But that's not in high demand anyway – at least in the short run. As applications move under-hood, the best solution will be a Sealing 691-type solution that does not degrade with heat. (Watch this space.)

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“ **The agility inherent in Uyemura's lean management system gives us flexibility others can only dream about.** ”

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As I've listened to customers around the country, what comes out strongest is how well UIC is suited to do the new things that will be needed. We are absolutely the right size company; we have best technical resources, and we have the powerful asset of agility on our side, too.

We can decide tomorrow to pursue a R&D project - and then just **do** it! No committees, no studies, no endless meetings. The agility inherent in Uyemura's lean management system gives us flexibility others can only dream about – with the energy to match. When the issue is technology development, there is no equal to UIC's technically expert, action-oriented culture.

One more thought: **preliminary work on the friction issue led one OEM to wonder if this sealant could help with vibration**. Their theory is that, its high lubricity factor could improve the reliability of connectors under vibration. So, they're testing.

Will it turn out that vibration stresses are lessened because the initial connection is better? Or will the presence of lube inside the connection dampen vibration once it has started?

For several OEMs we know, that would be huge: vibration stresses are the #2 cause of failure for every electronics application. (There is truly no such thing as “Good Vibrations”.)

So, customers continue to ask great questions – and test for possibilities. The immediate question is: **can the insertion force of 2 mating connectors be reduced once the coefficient of friction is lowered?**

Tests suggest the answer is **yes**.

*I suggest that our valued customer will soon gain financially by implementing a smart chemical solution – and obliterating losses due to board and connector damage.*



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*On the cover: Plated product exiting Precision Plating's R2R vertical conveyor system, the final stage of which is Uyemura antitarnish chemistry.*

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