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UYEMURA INTERNATIONAL CORPORATION

Copper Via Filling Process Slashes Cycle Times 80%
for Prominent Canadian PCB Manufacturer

UIC EVF-R via fill process also eliminates voids

ITL Circuits is one of North America's leading providers of PCB fabrication services. It is also the oldest and largest privately-held PCB manufacturer in Canada, specializing in high-complexity boards up to 30 layers and more, for military and aerospace, industrial automation, medical devices, and communications. All of its manufacturing is in-house.

The company serves OEMs and CEMs - electronic manufacturing service companies - worldwide. It has significant resources for prototype development, and capacity sufficient for the highest production volumes.

Located near Toronto, in Markham, Ontario, ITL has over 65,000 sq. ft. of factory space, 130 employees, and some of the most advanced pcb fabrication equipment on the continent for HDI boards. **Its most recent acquisition: a copper plating system engineered for Uyemura's EVF-R – the linchpin of ITL's via-in-pad design.**

ITL owners have, from the time the company was founded in 1971, invested aggressively in technologies that allow it to compete globally, and keep pace with the ever-evolving design miniaturization.

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Final Finish Cleaners

What's New... What's ***(Still!)*** Best-in-Class ...What's "Best-Available" for Blind Via Fill

Nickel/Gold

- **Palla-Clean MPC-300** strips palladium from through holes with exceptional efficiency. This is UIC's newest NPTH cleaner technology, and it's particularly useful as an ENIG pretreatment, where residual palladium would allow nickel to deposit in NPTH. A mild acid formula, it's friendly to copper, and compatible with dry film resist for selective plating. It is odor-free, with simple waste treatment requirements.
- **Thru-Cup ACL-007** with 20+ years of user history, this mainstay multi-purpose performer is quick, thorough and won't dissolve copper. It is an excellent surface prep for microetch that rinses well and won't damage soldermask. It is highly recommended for the electroless nickel plating of fine pattern PCBs.

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The Sales Professional's Brass Ring

By: Rob Coleman
UIC Midwest Sales Manager

People like me, who aspired to become sales professionals, go through all kinds of sales training to develop the necessary techniques: selling against the competition, communication strategies, elevator drills, identifying customer needs, handling objections.

Later, training becomes more intense, and nuanced. DISC, Consultative Selling and other tools are used to identify and understand motivations and strengths. But **the ultimate goal of all sales training is to become your customer's trusted advisor:** to achieve a status that connotes credibility and trustworthiness. This is the pinnacle of the sales profession –the quintessential opposite of a vendor doing arm's length transactions.

And that is not something you learn in any training.

Of course, we all start at Level 1. In the beginning, all sales relationships are transactional. You deal with price, product availability, terms; it's straightforward buy-and-sell. "Just mail me a quote."

At Level 2, the sales professional becomes a preferred supplier, someone who has been approved for sourcing. If the relationship moves to the third level, the salesperson evolves from a preferred supplier to more of a partner. He often gets the first call when the customer has a need to fill. There are collaborative aspects, but they are limited: the sales person is contributing added value, and working together with the customer, but he/she has only limited exposure within the customer organization.

If the relationship moves higher to Level 4, it becomes the close alliance I mentioned earlier. The sales professional has greater exposure to related facets of the customer's business, and contributes substantial added value, often both operationally and competitively. Support services are offered – even created - that align with the customer's goals.

This is more a strategic partnership than a sales relationship. Customers at this level actively look for ways to help the sales professional succeed, because they want him as part of their consultative management team. There is an understanding that you'll do, and recommend, what's in the best interest of the customer, no matter what. And customers reciprocate by protecting you.

For a sales professional, this is the ultimate affirmation. It is earned exclusively based on credibility, trust – and perseverance. It is hard-won, and can be easily lost.

Every conversation is an opportunity to discredit yourself, or conversely, to reinforce why a customer wants to work with you. No one achieves this level with every customer, and it's certainly easier to attain with privately-held companies, where outside shareholders and banking rules aren't there to complicate things.

In a prior position, I managed a PCB shop. One of my strategic customers called one day; he was thinking about buying another business. He wanted my opinion and asked me to "go kick the tires" with him to assess the opportunity.

I considered it a great compliment, as I realized I had become one of his trusted advisors. This is the highest stage of a sales relationship, one where the two parties have equal stake in each other's success.

As part of my early sales training, I read a book called *StrengthsFinder*. It identifies a sales person's top 5 strengths. More importantly, it shows how one's dominant talents can be used to develop a strength-based approach to selling.

The tendency of businesses is to identify a sales person's weaknesses and develop a plan to improve them; in effect, asking the salesperson to change his stripes. In my years of sales management, I have found that people rarely change their stripes.

***StrengthsFinder* fosters a team selling approach. "We need attributes: x, y, and z. Who is best at those?"** Let's maximize how we use individuals' strengths, and minimize situations where individual weaknesses are exposed." This is a far more effective sales approach.

Adults don't change in fundamental ways. You can fix the low-hanging fruit, like time management or listening skills, but don't seek to develop Superman. Instead, create super *teams*.

Which is precisely what I found when I joined UIC. The company is incredibly effective at aggressively using

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In 2015, the company determined that copper filling laser-ablated blind vias for their via-in-pad programs was its next important move.

Rick Scherenzel, ITL's Projects Manager, explains, "we had done epoxy-type via fill planarization for years – and had increased our technological capabilities on that side. Increasingly, customers demanded copper fill planarization processing, and that involved, with conventional chemistry, an 8-10 hour cycle. Another issue with conventional copper baths is that, even with adjusted chemistry, you end up with a dead cavity (void) in the center. This is acceptable by IPC standards, but far from desirable."

ITL considered several via fill chemistries, ultimately giving the nod to Uyemura's Thru-Cup EVF-R.

EVF-R is a unique DC (direct current, no pulse) copper plating system for blind via fill. It is a robust, high-copper, low-acid process that is highly compatible with sequential architecture and HDI boards.

EVF-R fills blind vias of diverse diameters and depths: 30 microns to 145 microns, at unprecedented speeds. It produces minimum (less than 15%) "dimple," and low surface thickness.

EVF-R is primarily designed for aspect ratios of 1:1 or less. With current/ time manipulation, it will also plate aspect ratios higher than 1:1, (i.e. vias whose depth exceeds the diameter of the ablated hole).

Uyemura KAT ENIG line at ITL Circuits

EVF-R's organic additives work in the bath at a specific acid-to-copper ratio and rarely require regeneration. The organic components include a brightener (accelerator/grain refiner), a carrier (a wide range suppressor) and a leveler (selective suppressor). Components are readily analyzable with CVS.

For optimum performance, the chemistry is augmented with solution dynamics that preferentially maintain the leveling component at the surface, rather than the bottom of the via. The leveling component suppresses plating on the surface; the brightener and carrier combination accelerate plating at the bottom of the via.

EVF-R process allowed ITL Circuits to reduce cycle times by 80%

The equipment and rectifier to run the EVF-R was designed by George Milad, Uyemura National Accounts Manager for Technology and Chair of IPC's Plating Committee. According to Milad, "the key to the design is adequate anode/cathode spacing and enhanced solution dynamics to ensure that the leveling component is predominantly available at the surface and the knee of the via. The rectifier should have high resolution and very low ripple. It should be properly sized for the intended use."

When the EVF-R bath was established at ITL, cell design, solution dynamics, spargers, rectification and filtration were optimized for best results. The selection of ASF and dwell time was determined based on hole diameter vs. depth.

At ITL, via diameters are .004 to .006"; depths are .0025" to .005" depending on design. The recipes provided by UIC specified the plating current density from a rectifier sized at 150 amp. Dwell time without flash is 2 hours; with a flash, it's 90 minutes or less.

"Once we installed Uyemura EVF-R," Scherenzel continues, "2 important things happened. First, our 8-hour cycle went down fourfold to 2 hours – and down to just 1-1/2 hours for some programs. Also, there were no more center voids. Although allowed by IPC specs, this is not a favorable condition."

"The reason," according to Milad, "is the EVF-R process suppresses the plating in the high current density areas - the surface and the knee of the hole - allowing the plating to proceed from the bottom up."

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"Typically," Scherenzel says, "ITL customers need prototypes quickly. The original prototype then goes thru iterations - often 2-3 design and test cycles. We offer a true 'quick turn' manufacturing solution for panel sizes up to 18" X 24": not the standard lead time of 4 to 5 weeks, but just 3-5 *days*. So their matured product gets to market faster.

"All PCBs are custom, and boards are the last thing that's designed," he adds. "As a result, customers need speed. The ability to consistently do small-quantity, quick-turn work, as well as very large volume programs, is what sets us apart."

Dual UV and CO_2 Cobra laser for micro-via drilling, die cavity ablating and flex circuit profiling

Rigorous process controls and high standards of workmanship further distinguish ITL; the company also has a dynamic Business Performance Excellence System, which drives continuous improvement.

"As we always do," says Scherenzel, "we considered and tested various via fill alternatives. In the end, we all felt most comfortable with Uyemura. The chemistry is first-rate, they have successful installations here in Canada, and we get terrific technical support."

ITL Circuits has run EVF-R since March, 2016.

In addition to EVF-R, ITL Circuits processes 400-500 boards daily using Uyemura's KAT ENIG. KAT is the industry standard for producing uniform mid-phos EN deposits with a thin topcoat of immersion gold, over copper substrates. Highly resistant to corrosion, KAT ENIG is solderable and aluminum wire bondable, and an ideal contacting surface. More importantly, KAT users never have to "dummy plate."

("Brass Ring" continued from page 2)

the strengths of its top scientists. UIC is widely recognized as having the most credible technical experts in the field, both here and internationally. As technical contributors to a sales team, they have no equal. The experiences I've had with them have been impressive in advancing our presence at the customer site.

UIC has what I would call an "extreme" technical focus. Much to its credit, it has balanced its superior technical bench with sales professionals who have the ability to achieve that "Level 4" status I mentioned earlier– individuals whose strength is to establish and sustain exceptional, customer relationships, and provide service and support over the long term.

That's the foundation I look forward to building on as a UIC Sales Manager.

Coleman is a 33-year veteran of the PCB industry, with extensive experience in manufacturing and operations as well as global account management. He is an expert in wet process chemistries and through-hole metallization.

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Copper

- **MSC-PS** acidic soak cleaner removes organic residue and oxides from the substrate and activates the copper for plating. It wets blind vias thoroughly, allowing uniform blind via filling with Thru-Cup EVF-R or EVF-N. It is also well suited for PTH acid copper. Superior detergency, coupled with low surface tension, produces excellent copper adhesion, and void-free coverage. It's an excellent cleaner for ENIG and ENEPIG.

Nickel/Gold/Copper

- **Thru-Cup ACL-067** chloride-free cleaner is used in combination with peroxide etches. ACL-067 also has multi-metal application: it's compatible with nickel, gold and copper.

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