

Electrochemical Metal Removal— Aligning the Field and the Forum

Phillip Miller & David Ku

In our first column in the April issue, President Doug Lay, CEF-2, said this about the Emerging Technologies (ET) Committee:

“The Emerging Technologies Committee will be a great way for AESF to reach out to and be intimately involved with the most promising new technologies on the horizon. For example, already three subcommittees have been formed in the areas of electrochemical metal removal, nano-materials and MEMS. The Emerging Technologies Committee will be a way for AESF to increase membership in a way that invites individual industries that may have been left out in the past.”

What, new members with new ideas?

Sounds innovative to me. As a matter of fact, it sounds like a golden opportunity to learn something new. Perhaps this new knowledge could stimulate your thinking toward implementation of new innovative technology. Or, perhaps these new members will want to buy something from you. Either way, new thinking stimulates creativity. Creativity stimulates innovation. Innovation is the genesis of improvement. And cash flow is “King!”

Last month, we introduced our readers to the AESF Emerging Technology (ET) Committee. Thanks for all your great feedback! As promised, in subsequent articles, we will introduce you further to the happenings of this important venture.

In the next few months, our committee will sponsor a series of columns devoted to the Emerging Technologies (ET) Committee. We will interview each of our three subcommittee chairs and also include an interview with the current chair of the Research Board to see how some of the R&D funds are being directed toward emerging technologies.

This month’s article focuses exclusively on the ET Committee’s Subcommittee on

Electrochemical Metal Removal. We especially thank David Ku (DK) for his help and expertise on this subject.

AESF Questions for David Ku

AESF: Why is it necessary to have this subcommittee as part of AESF’s ET Committee?

DK: In the past 10 plus years that I have been involved in the industry, one trend has been constant. That is, electrochemical processes in the metal removal field have generally been kept secret or—at least—have not been widely discussed. This differs from typical plating operations, which have been much more openly talked about and reviewed.

Many companies are involved in electrochemical polishing, machining, and deburring. But, unfortunately, no single source exists for these professionals to belong to and/or network with. Companies in these sub-fields have generally kept their knowledge “close to the vest” and have progressed along their own development lines. There has been a status quo of not sharing ideas.

But now, we have a chance to make something happen for these professionals and companies. We have a chance to create a forum just for them. I’m excited to see discussion about metal removal become more pervasive.

AESF: Why have these technologies in the metal removal area been kept secret?

DK: I’m not sure I have the complete answer to that question. Some companies may have large equipment and other capital investment in their particular approach or idea. Keeping silent is a form of protection and also is a way to maintain a competitive edge.

However, we all know the old adage that the whole is greater than the sum of

its parts. Technology is moving faster than ever before. This is the time for a new attitude of cooperation. And, our subcommittee can be a place where more openness can begin, take root and expand.

Also, potential customers in the surface finishing field are not only vast but their requirements are getting more specific than ever. Often, surface finishing customers specify an end result but not a path to get there. If enough people in the surface finishing field continue asking for stricter finish specifications, I believe it will drive companies and engineers to be more open.

AESF: What about proprietary processes? Won’t that keep people from breaking the silence?

DK: There is always some risk to sharing information and ideas. However, there are also ways to protect ideas, and many companies have begun to capitalize on these.

Plus, a company struggling to find an answer to a specific problem may discover the solution through a committee like this. In a way, surface finishing has the potential to become a lost art. There are many older professionals who will be retiring soon. To avoid a regression, we must start talking more openly.

AESF: How will the subcommittee on Metal Removal operate?

DK: Even though we are a subcommittee of the ET Committee, the Metal Removal Subcommittee will operate fairly autonomously. Not all our members will be members of the ET Committee, though I’m sure some will.

It is possible that we will eventually become a separate committee but, for now, we will continue to align ourselves with AESF’s ET Committee.

The Metal Removal Subcommittee is tasked with finding as many developmental processes as we can and passing them

along to other members of the industry at large. We will meet twice a year—at SURFIN® and again during AESF Week. In between these meetings we will have ongoing dialogues and agendas. I would also like to point out that those interested parties who do not have as much time to devote to this subcommittee will still be able to keep track of what happens within the subcommittee.

Our primary goal will be to utilize SURFIN® and AESF Week as educational venues. We want to discuss how industries are evaluating surface finishing processes and which ones seem to be on the cutting edge. Since we are a fairly new entity, our mission at the upcoming SURFIN® at the end of June will continue to cover the basics of electrochemical metal removal processes.

AESF: How has Electrochemical Metal Removal evolved in recent years?

DK: I already mentioned that those in need of these processes have become more specific than ever about the end results. I expect that trend to continue.

For example, there is a huge need for creating smooth finishes. In the past, just being able to produce a surface measured only by surface roughness (Ra) was adequate. In many instances, this is no longer the case. The quantified finish expectation is now much higher than that.

Not only have metal smoothness specs become more challenging but corrosion resistance has emerged as an important surface characteristic as well. While there will probably always be a need for simple cosmetic surfaces, these additional requirements have driven the industry to more complicated processes in order to meet specific market demands.

Two industries that currently require more sophistication are the Aerospace and Semiconductor industries. In the semiconductor industry, not only must surfaces meet cosmetic designs but they must also be “clean” of all particles, especially as chips get faster, smaller and more complex.

AESF: What other trends do you see affecting how this industry moves forward?

DK: The trend towards lean manufacturing and just-in-time production that have been evolving are here to stay. Electrochemical processes have traditionally been done through batch and queue techniques. This standard is becoming a thing of the past.

Processes must now be in sync with industry trends that do not allow for stock-

piling and where progressive streamlining is the ultimate goal. This, of course, affects how processes are implemented along manufacturing lines, and it also affects any inspection processes currently in place.

Additionally, more sophisticated products are now moving toward commodity production. Everyone wants it faster, cheaper and better! This trend is also affecting E-C processes of all kinds and that includes E-C Metal Removal. Those companies used to charging a premium for a complex process may need to find way to meet the demands of commodity production. Just like any market, E-C solutions will continue to be driven by cost.

AESF: Are there any specific processes you consider promising right now?

DK: Anything related to nano-technology and MEMS are sure to be hot topics as we move forward. I mentioned the semiconductor industry and this is one that is very cyclical—either very fast or very slow. We are looking at cleaning processes that are not solvent-based, as well as processes that can remove residual electrolytes and clean a surface once it's been finished. However, I want to point out that, since the charge of the Electrochemical Metal Removal Subcommittee is to find technologies and promising processes that might be going unnoticed, I expect we will be delving into other emerging technologies shortly.

The next step (in addition to our meeting in June) is for us to encourage universities and institutions to submit proposals for R&D to the AESF Research Board for funding. We believe this is one key avenue to discovering promising technologies related to metal removal though, of course, it's not the only avenue.

AESF: What if a technology is still in the infancy stage? Can a company still get involved in the subcommittee?

DK: Yes, they should still get involved. There are great advantages to a public forum like this and we all know how valuable networking can be. Those who get in touch with us will find we can offer them leads and connections to further their individual missions and goals.

AESF: Finally, what do you think will be the future of E-C Metal Removal?

DK: It's not as explosive as it may sometimes sound. It will grow as individual industries that rely on E-C Metal Removal grow. Some processes won't get replaced because they do not need to be. In general,

the growth will be steady and gradual. E-C Metal Removal will be driven only by customers and, as such, demand may fluctuate. I consider E-C Metal Removal to be—now and in the future—a niche market.

About David Ku



David Ku is a project engineer and chemist with Swagelok where he has been employed for the past 14 years. His areas of expertise include surface finishing techniques and related fields such as cleaning and passivation processes.

About Philip Miller



Phillip Miller is the marketing director at Faraday Technology, Inc., 315 Huls Drive, Clayton, OH 45315. He coordinates the technical marketing and business development activities in support of Faraday's technology platform. Prior to joining the company, he worked as an independent business consultant and a senior business analyst for a Manufacturing Small Business Development Center sponsored by the U.S. Small Business Administration. In that capacity, Miller provided business services and assistance to a variety of small technology and manufacturing firms, including market research, technical writing and communication, and business analysis. In addition, he provided business plan screening and analysis for the National Center for Industrial Competitiveness, a federally financed venture capital group. Miller was honored as a Business Counselor of the Year by the Dayton Area Chamber of Commerce and the Ohio Department of Development. He currently teaches college-level small business management and planning classes. At Faraday, Miller is responsible for new business development, technical marketing, and program management. He currently serves as co-chair of the AESF Emerging Technologies Committee.