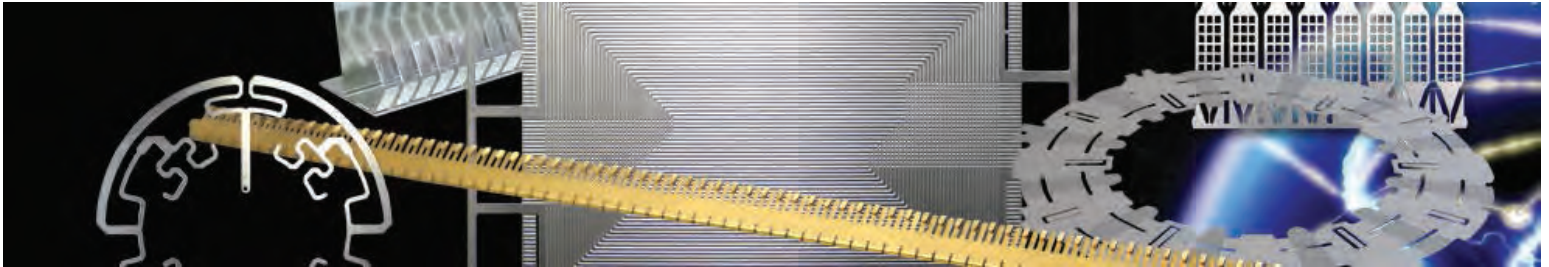




## PHOTOFABRICATION ENGINEERING, INC.

*PRECISION PRODUCTS DIVISION*



### The Past - And Future - of Photochemical Etching

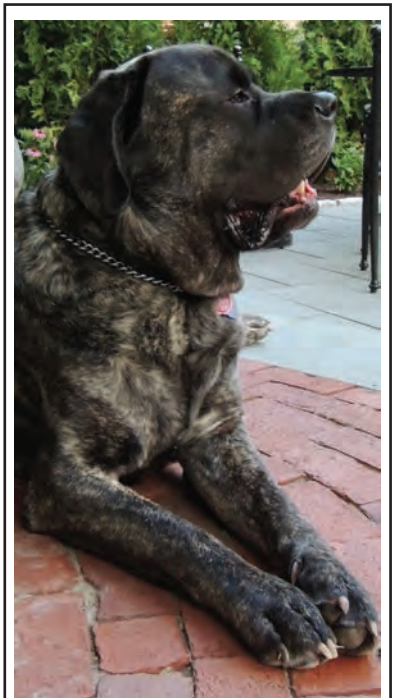
Keynote Address at the 1990 PCMI Winter meeting, Anaheim, CA, presented by William M. Lehrer, President, Photofabrication Engineering, Inc.

At the onset of the 1960s, President Kennedy made a solemn binding promise to the American people to have a man on the moon by the end of the decade.

Something is magic about a decade—a beginning and an end: perfectly measurable and monitored. A ten-year vow is best made at the onset of a decade and in our number system, that is exactly what it is, i.e., 1990. Certainly we did succeed in our goal as a nation—we put a man on the moon, for better or for worse, consequences be damned – but we did it. We challenged ourselves to do the impossible: put our resources where our mouths are and we did it. We not only put up we put up our minds, we put up our human desires, we put up our dreams, we put up our enthusiasm, and we bet our pride. The result was an unbeatable desire to accomplish a goal. Once the goal was defined, all else started falling into place and the resources mustered up and we were on our way. Ten years later, the impossible goal – a man on the moon.

Now here we have the photochemical machining industry—all gathered together at our semi-annual PCMI meeting at the beginning of a new decade. It strikes me most fitting that on our small scale, only a microcosm of our industrial international population, we can and should take the lesson of the '60s and set what may be an impossible goal, and put our hearts, minds and financial resources to its fulfillment. Is there such a goal? Do we have to come up with a committee to describe a bunch of possibilities, or can I be so bold as to throw one out to you right now – just for fun, but maybe more.

By the end of this decade I dream of seeing all the pierce and blank dies in the country sitting idly in warehouses gathering rust and absolutely obsolete. You know why, because in my dream I see, all over the nation, etching machines making flat parts by the zillions—popping out of the end of huge, long etchers like out of slot machines at Vegas—jackpots all the time. Real long runs of pretempered metals that are set up through regenerative etchers for constant speed, days on end - so certain are we of our rate that the parts are stripped in situ and dropped into buckets at the end or



*Our mascot, Charlie, is just waiting for some meaty questions about PEI, its products and its processes. He gets very annoyed when he's bored., so please send him some questions.- 200 pounds of English Mastiff, when annoyed, is not a pretty picture. Charlie will bark out his answers in this corner of the PEI newsletter -- you can also send him a fax at 508-478-2025 (Attention: Charlie) or e-mail him at [pei@photofabrication.com](mailto:pei@photofabrication.com).*

automatically dried and packaged. I'm not going to worry about forming or shaping - we'll keep a few punchpresses around to handle that function. But when it comes to blanking and piercing, photochemical machining is the way to go! That is my impossible goal.

Do you realize how many multi millions of dollars are spent annually for blanking and piercing and tooling? Staggering amounts! Do you realize how we photochemical etchers have approached this market? If humility were oil, we could buy and sell OPEC and corner the gold market to boot. Our temerity is amazing. Hat in hand, yes, hat in hand, through the years, we have been preaching the litany, "We can make your parts burr free," "We can make your last part like your first part because our phototool doesn't wear out," "We will make your prototypes so that you can hard tool it when your design is fixed." "You'll really like the first 1000 pieces from your prototypes; you'll get started and won't be held up waiting for your hard tooling." That's obsequious talk—it makes me sick!! All these are certainly true, but what we have never had the courage to say is, "We can make your parts cheaper and faster and better than any other way that you can make them, including piercing and blanking."

We are declaring war against the blanking and piercing industry and we're going to win it by the end of the decade 1999. There should be no more patronizing—the giant stamper is not going to put your head in his giant punch press and squash you. He's a patsy with an old technology, and we're going after him.

I wonder where the semiconductor industry would be today if the developers of the transistor saw it only as a low-powered amplifier, only suited for handheld portable radios. The vacuum tube industry was really entrenched when the transistor came along. After three decades we are hard pressed to find a vacuum tube triode or pentode in a communication device, let alone find many youngsters who know what it is. So it will be with piercing and blanking!

Okay – brave word, big dreams—a goal. Will you take 50% of the dream? How about 25%, or all of it? What's the difference, what we as an industry must do is accept any proportion of the goal to reach the goal. We want regenerative systems developed or alternate etching systems that can be regenerated—perhaps one for each metal system. We are not going to be a small segment of the etching industry, so we want resists that are not designed for copper in deference to the printed circuit industry. We want resists that are chemically constituted to be compatible with carbon steel, with stainless steel, and with cobalt bearing alloys, and we want them to be as easy to use as solid film photoresists generally are.

Where are the thinner solid films for better resolution or the less than 1 mil mylar coverings? Where are really dependable proprietary preparation baths that guarantee adhesion? Where is the printer that integrates the light after it goes through the tool, not before?

We must have etchers that are so compatible with the regenerative etching chemistry that nozzles don't clog with sludge, or cling with particles of over-hanging resist that are never quite filtered out. How about an automatic etch rate monitor that adjusts your throughput rate? How about an etcher that operates at 180°F, say, rather than 130°F, and the resist to go with it? Remember that etch rate is exponential with temperature. Double my rate and I'll make the stamping industry wiggle and squirm. Old tool makers will just fade away unless they become artwork and phototool generators.

Now, ladies and gentlemen, I'd like to spend the balance of my podium time going through a great litany of more hairy ideas that may, in the minds of many of you, make me a candidate for a funny farm; or you may very well have come to that conclusion already. I sincerely hope not. But, if you have relegated me to the funny farm, we, as an industry, are going nowhere! Why do we all mimic each other and put restrictions on our process? We say "thickness to hole or slot ratio 1:1." We say "tolerance is equal to 10% of thickness," and even that is a premium. We have been saying that for years! Isn't it about time that we did something better – not with tricky procedures, but as an everyday, common occurrence? What does it require to improve these things? Artwork, acids, etchers, resists – whatever we must do—let's do it!!

Somebody in this audience is going to make an industrial improvement--so sell it to us. We don't win wars without cost. We are at war with flat stampings and we have to attack from all directions on all fronts. Our product will not only have to be better, but less expensive. Less cost is a volume, fine toleranced dimension in large sheets, etched uniformly from side, day in and day out. Not just thin parts that are chemically machined because stamping damages them, but thicker parts that are stamped just fine. Now. In the year 1990. But by the end of the 90s, photochemical machining will do them better and at lower cost. So let us engage the enemy and start now.

We have our command headquarters for our war. We are coming together and we will continue to come together periodically to discuss our strategies and tactics and issue information and bulletins as to how our war is progressing, battle by battle. We need more than periodic meetings. We need all our troops trained at all times. We need active roles in committee work--with participation not just by a few, but by all of the members. We also need more members. This isn't a guerrilla war—it's an all-out war. We need representation from suppliers to producers to users. We need a whole-hearted sharing of our technology

through committee action. We must have constant missionary work out there to teach and explain our process. Our committees are assigned to each battle sector and will constantly be devising new strategems and tasks to bring about victory.

I'm not recruiting suppliers only for this war. The producers of etched products bear the greatest responsibility and are in the center of the line at all times. In the producer category, we have the captive and the independent producer. As in other industries, the captive, generally staffed with support troops and multi-disciplined allies, can contribute immeasurably. Committee action by the engineering personnel of captive producers is indispensable to our success. The captive producer will most likely be the greatest contributor in our technological war. The non-captive producers are not going to be exempted from service. I see a hesitancy or inability that is not peculiar to our industry to invest or capitalize sufficiently in the direction of technology improvement. I certainly am the first one to recognize the difficulties of squaring one's shoulders and girding one's loins for the investment of economic resources. It must be done. Financial planning of all companies requires capital plans, equipment upgrading and, not to be ignored, an investment in development. Believe it or not, as a bare minimum, the least investment can manifest itself in simply the expense in contributing and attending and working with PCMI groups and meetings. Joining in round-robins, sending your key people to seminars so that your processes and procedures can be upgraded, and--the greatest expense of all in the minds of some--sharing your "secrets."

We are solving many of these problems in our individual unique ways – that's wonderful. But that kind of thinking will relegate us forever to the status of a craft, not an industry. Let's join forces now and work for a super PCMI booth at future design shows representing our industry - many times more cost-effective than fragmenting into separate company booths.

I would like to see PCMI's publicity and promotion committee be assigned that task and the PCMI budget the function. It should be amply supported with the monies that the individual companies will be saving by not going it alone. We must accept once and for all that what is good for the industry is good for all of us – suppliers, independents, captives and users. So when will we win the war? It will be great for all of us and if our goal is won, we will have many more of us around, but don't be greedy – welcome them. There is plenty for all.

Thank you for listening.



## PRESIDENT'S CORNER

After re-reading the Keynote speech my father originally wrote in 1990, I thought it would be a good thing to share it with our newsletter readership.

My father had a dream that the PCM Industry would become the staple process for producing metal parts. In many instances that has become a reality. We are doing things today that, as a younger person working over degreasers to clean metal panels, I never dreamt were possible. All of our processes have become solvent-free. We produce parts for so many industries it's hard to list them all.

But my father's dreams are becoming a reality because we want to be the best. We want to produce the best possible product to all customers' specifications and to do it on time, repeatedly. This is how you build faith in our industry, and this is how PEI's customers have built faith in us. We strive to be the best and we are the best! Dad, your dreams are becoming reality and we will continue to improve on all fronts within our industry. Always!



**So that our employees and customers can spend time with their families over the holidays, PEI will be closing on December 24 and will re-open again on January 5. Happy Holidays!**



## PEI UPCOMING EVENTS AND NEWS

### 2015 TRADE SHOW SCHEDULE

Visit PEI's booth at these trade shows to learn how we can help you grow your business and improve your productivity with our innovative manufacturing methods:

February 10-12 - **MD&M (Medical Design and Manufacturing)**  
West, Anaheim, CA, Booth 466

May 6-7 - **BIOMEDevice Boston**,  
Boston, MA, Booth 856

### PEI RECEIVES QUALITY AWARD

Chip Lehrer, President of PEI, is proud to announce that PEI recently an award from Senior Aerospace, recognizing PEI for "Exceptional Performance and Commitment to Customer Satisfaction" in 2013. "Quality has always been our top priority," says Lehrer. "This award recognizes the commitment of all of our employees, from the production floor on up, to meet the highest quality standards for our products." PEI has been given this award for perfect on-time deliveries and quality performance – 100% in all categories. PEI proudly accepted this award.



Left to right: Robert Rossi, Executive Vice President, PEI; Chip Lehrer, President, PEI; John Danko, Senior Buyer, Senior Aerospace, LLC; Mike Mastrullo, Process Inspection, PEI.

### PHOTOETCHED LEAD FRAMES

Where do semiconductor and integrated circuit manufacturers come for lead frames that meet all of their electrical, thermal conductivity, and strength requirements? Why, PEI, of course.

PEI has spent more than 40 years refining and expanding its manufacturing capabilities for custom-designed, photochemically-etched surface-mount and insert-mount lead frames for integrated circuit manufacturing. Our lead frames are used in a wide variety of applications including semiconductors, glass-to-metal seals, relays, and in medical applications such as hearing aids. Using base materials including kovar, nickel-iron alloys, copper alloys, and pure nickel, PEI can plate lead frames in their entirety or selectively. Lead-free plating materials include silver, nickel, gold, or tin, depending on the customer's specific electrical and thermal conductivity requirements. Since the lead frame is the main conduit by which heat flows from the chip to the printed circuit board, PEI selects the plating material that will maximize the device's operating life for any given application or environment.

PEI manufactures high-density lead frames with acute profiles and ultra-fine pitches, allowing for high pin counts. Single- or double-sided lead frames are etched without incurring the stresses associated with typical machining methods. More importantly, PEI's process can create lead frames that are too complicated for stamping. Call us today for a quote!

**ALL OF PEI'S PRODUCTS ARE  
PROUDLY MADE IN THE USA!**

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