Oral History of C. Scott Kulicke

Interviewed by:
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Recorded: September 22, 2004

CHM Reference number: X6196.2011

Craig Addison: The first thing I wanted to ask is not so much about you, but about the founders of Kulicke & Soffa. Can you talk about the personalities of your father and Al Soffa, their management styles and so forth?

Scott Kulicke: My Dad and Al [Soffa] were a very odd couple. They had met in the late '40s working together at Proctor Silex company. They both by chance ended up in the experimental, developmental part of their steam iron business making new models of steam irons. Al is a degreed electrical engineer. My father has no formal training in engineering. He picked up what he picked up mostly in the Army. I still don't know where he learned it all. They had worked together at Proctor Silex, and decided to go off in the classic two guys in a garage, literally, building special machinery for people. The original partnership agreement, hand written, single sheet, 8 and half by 11-inch paper, is evidence of another era. And the company started making special machinery for anybody who walked in the door. Initial equipment included machines for putting string handles on paper bags. I don't know if they're still in existence, but there's a company called the Metal Edge Box Company, making metal edge boxes, all kinds of odds and ends. And along the way…Bell Labs was in the process of building the first commercial transistor and they needed all kinds of special fixtures. Allentown [Bell Labs' headquarters] was just up the road. They would come down and say, "Fred, can you make me a thing to do this, or make me a thing to do that." They'd build it for them and then they went on to the next project. But then Bell Labs started to license transistor technology to companies that also built transistors. On the way back from Allentown they'd stop in Philadelphia [K&S headquarters] and say, "We saw you had this, and this, and this in Allentown, we'd like one too."

So the company backed into what became the first commercially available semiconductor production gear. And the company had an incredibly broad product line at one point in time. It had clean room gear, wet gear, acid dip stuff, it was all very crude. Photolithographic equipment…and assembly equipment. We built the first lightweight diffusion furnaces. Up until then diffusion furnaces were built with fire brick. That was back when they were half inch diameter wafers.

You'd asked about styles and personalities. Very much night and day. Al [Soffa] was classically trained, could sit down and do all the calculations. My father, very intuitive, sits down with a sketch pad and figures out how the parts are supposed to look. And while they changed their roles back and forth over the years, generally Al took care of the heavy duty technical stuff [and] my father took care of the conceptual stuff and the commercial side of the business -- which is how my father backed into helping found SEMI. It was really a commercial issue.

Addison: What about your involvement in the company. Were you there after school as a kid?

SK: One of my earliest memories… is falling down the steps in the garage, because it was upstairs over literally a tire shop, a garage. And I fell down the steps and cut myself badly. I was five or six years old. It was a place to go, hang around and do odd jobs. I started working formally in summers in high school, and with a couple of exceptions have been there very since.

Addison: What did you do during those summers?

Kulicke: I always worked as an adjunct to R&D work. They always needed a “gopher” -- go run this test on this machine -- what today you would call a test technician. But that’s how I started. When I went to college I was an engineering student. I dropped out of college, worked as a machine designer, spent a lot of time on the drawing board. Went back to college, finished up and about the time I got out of college the company had just started up sales and service in Asia and there were some financial irregularities in the Hong Kong office. The company needed somebody they could trust so I got sent to Hong Kong when I was 22. And it was different. Throughout my career, at each step of my career, I got put into a job long before I was ready for it and only in hindsight did I figure out how inexperienced and incompetent I was.

But there I was, a sales manager in Asia at 22. And it was a period when people were just starting to send IC assembly to Asia and the first factories were starting up there. It was a real transition period. I learned a lot of important lessons; essentially the lesson of customer satisfaction. And there’s this funny thing about this business -- it’s so technologically oriented, it’s so much microns and milliseconds. But when a customer makes a purchase decision, the customer is betting his job or his next promotion or his bonus or whatever, and you’ve got to protect that customer who decided to buy from you. And that issue of trust; does that customer trust you, did you let him down the last time or not? Not were you perfect, but did you protect him? [That] is such a key part of this industry on an ongoing basis and you’d think it would be much more cut and dry, much more technological in nature. Still, relationships matter. [And that’s] not “Do they like you?”, “Did you take them out for a drink or golf?” But do they trust you? Do they trust that your organization is going to make them look good in front of the boss or not. And that’s really, more than anything, [what] I learned in Asia.

Addison: Can you talk more about the move of assembly and test to Asia at that time.

Kulicke: It was pure labor. IC assembly at the time was incredibly labor intensive. The equipment was all manual equipment. More often than not it wasn’t equipment at all, it was just tweezers. Factories with banks and banks of workbenches and operators, 99 percent of which were female looking through microscopes with tweezers. And you would go to places and see over the course of a six month project a piece of jungle turned into a factory and people who came in -- it sounds patronizing and melodramatic -- but people who had never worn shoes on a regular basis, coming in and all of a sudden building integrated circuits. The most advanced manufacturing in the world, then and today. It was such a dramatic transition in places that were really quite undeveloped. Today they are very metropolitan in part because of this industry. It was the early days of that, an interesting time, a lot less polished. Everybody was younger and had a little bit of a cowboy in them.

Addison: You said it was mostly manual work. Did you have a hard time selling the equipment to these companies, or did they embrace you and say, “Wow this is what we want”?

Kulicke: The machines were manual machines at the time so it was a question of whose $1,500 manual machine did they buy. Today you couldn’t buy the [operator’s] manual for that amount of money …its crazy how cheap things were back then. Everybody had all the same issues you had today. Can you deliver it on time, does it work. Customers needs evolve. Can you support them through evolving needs? Customers are cyclical, they want them now, they don’t want them, they want them again. All the same things we experience today but at a kind of micro level.

Addison: Of all the countries in Asia you were dealing with, was there any area that stood out in terms of being dynamic?

Kulicke: In the early days there were a bunch of factories in Hong Kong, there were a few factories in Taiwan, but a lot of the early action was Singapore and Malaysia. National, AMD, Intel [and] a bunch of other companies that are no longer around by that name…all had factories in Penang within a baseball's throw of each other. In Singapore you had a cluster of factories. In Korea you had a few. Initially it started in Southeast Asia and moved north, although there was always some activity in Taiwan, some in the Philippines, some in Korea. Now, it seems like Taiwan is the center of gravity for the industry, but that's another story.

Addison: Of your competitors, were there a lot in Hong Kong or Singapore that you ran into?

Kulicke: Initial competitors were Japanese. We [K&S] spawned a few local spin offs in Asia. But for the longest time in the back end most of the competition was out of Japan and occasionally a European company. No American companies.

Addison: The company's first automatic wire bonder was the 1412, [and] you had a lot to do with that. Can you talk about how you became involved with that product?

Kulicke: The industry went into one of its periodic swings. We did a lot of retrenching. I had never planned to be in Asia on an ongoing basis. I had backfilled in Asia, so I went back [to the U.S.] and I became a project manager for our first automatic wire bonder. My father did the mechanisms, Al Soffa did the controls. It was the first heavy electronics machine we'd ever built. It was really a wrenching transition for the company. My father's expertise in particular is mechanisms, and here we had the first microprocessors and the ability with some lines of code to replace intricate, polished tool-made mechanisms. It really was a seminal change, and like any change it has its down side, and the downside was it made a lot of people obsolete. But it was inevitable and we went down the path and it was a success. Lots of people had automatic wire bonders. There were eight automatic wire bonders we competed [against] with that machine. And I don't think in hindsight we had the best machine. But we lived with our customers better than anybody else. And it goes back to what I said earlier, you have to protect your customers, you have to get out there and be with them and make sure they look good. And it also played to the company's technological bent because we built the 1412 and then we figured out all the mistakes we'd made so then we built the 1415. Then we figured out all the mistakes we'd made there and we built the 1419, the 1482 and another one and another one.

One of the great things about this industry is that things never stay the same and there's always an opportunity to go back to do it again better…if you don't go back and do it again better your competitors will run right up your back. So if you are built that way to begin with, this is a great place to be. So we've been building automatic wire bonders ever since and that was 30 years ago.

Addison: So the catalyst for that product was really the availability of the microprocessor?

Kulicke: The availability of the microprocessor changed everything for machine builders, just as it was for a thousand other product niches. A bunch of spotty 21 year olds at a computer terminal can all of a

sudden replace months and months of work of toolmakers; cheaper, better and more flexible. It's an astounding tool.

Addison: Was there a clear leader in coming out with an automatic wire bonder?

Lots of people had it. I'm over simplifying. Up until that time we had the best manual wire bonder as well. So the issue was capturing the process knowledge and porting it into this automatic machine. And it is as true today as it was then; people buy hardware but as often as not they're differentiating on the basis of embedded process knowledge that we essentially give away. It's worse in wafer fab gear which are essentially big empty boxes and a ton of embedded process knowledge in that empty box. And then the process knowledge ties back to understanding your customer and living with him or her, as the case may be.

Addison: So you came back from Hong Kong and you were the project manager for the 1412. Did you feel out of your depth?

Kulicke: I wasn't smart enough to feel out of my depth, honestly, the arrogance of youth. It's astounding. I should have felt out of my depth. But it went into production so I became the product manager. It became the company's principal revenue generator so I became the general manager. Late in 1979 my father and I went through a period of a lot of friction over style differences, prospective differences, strategic differences, and he decided that I was the future of the company and he wasn't. He resigned. I've run the company since.

Addison: I want to explore something more here, from the K&S history book. The [company] organizational handbook said the objective was to "design and develop machines for whatever sectors of the industry we can." You talked about having the different kinds of products. When did that change, when did they say, "Hey, we can't do everything, let's focus?"

Kulicke: We didn't decide, the market decided for us. The company was too small, too dominated by my father and Al Soffa and they simply couldn't manage the breadth of products. So they'd be focusing on this product line and this other one would be attacked by a competitor. And then they'd run over there and try and rescue that one and this one would die. And over time product lines just died because we just couldn't do it. The company didn't have the management culture, didn't have the scale to walk and chew gum. It was not by plan, but simply the last one left was wire bonding (laughs). I wish the last one left had been lithography or something worth a lot more money than wire bonders. It was like [how we got] into the business. The company didn't have a strategy. It was reactive and tactical.

Addison: That was my next question, why did you end up with wire bonders, but you've answered that.

Kulicke: It was the last one left.

Addison: It seems amazing that one company could have had so many different products. Was that standard back then?

Kulicke: No. Remember the level of technology was infinitely lower and as often as not your competition was an in-house tool shop. Fairchild, Motorola, TI and most of the Japanese companies made a lot of their own fixtures and tools. It wasn't anywhere near the level of refinement that it is today, or the amount of money. For several years we dominated the lithography business with the Model 686 and it sold for the ungodly sum of $10,000 a piece. What does $10, 000 buy you today in this business. Not a whole lot. And I use that to illustrate the kind of general level of expertise that the industry was operating at. To put it in a different context, the 686 was in the period when the industry went from the transition from 2-inch to 3-inch wafers. It was a long time ago.

Addison: Was that a scanner or a stepper?

Kulicke: It was a contact printer. You took a mask. You took a wafer -- and it was a full wafer mask -- and you jammed them together and flashed off a light bulb.

Addison: As these other products faded away, did the people involved with them leave K&S and start other companies?

Kulicke: A few did, but given the East Coast nature of the company, it wasn't easy for them. Being on the East Coast has always been a mixed blessing for the company. It makes us a little bit remote from our customer base, especially now that it's an Asian customer base. But at the same time there's a stability in the workforce and there was a machine building infrastructure available to us on the East Coast -- machine shops, foundries, specialty services that even to this day is not available in the Bay area [in San Francisco] for instance. Again, it reflects the lack of strategy behind the companies founding and how we got here.

Addison: I wanted to talk about competition from Japan, specifically in wire bonders. Did that develop independently, or was there any technology transfer?

Kulicke: Independent. The first manual wire bonders were pretty crude affairs. And Japanese companies in particular either had in-house shops that built their own production tool or they had allied companies that serviced them, as they do today. We've always had two particular competitors in the bonder business: Shinkawa and Kaijo. Shinkawa for many years was the world's leader in wire bonders, as measured in volume at least. And it wasn't until the early '90s that we displaced them.

Addison: In the '80s for example, were the Japanese were mainly selling inside Japan, or had they tried selling into the U.S and Southeast Asia?

Kulicke: Their core business was always inside Japan. Still is. They started to view Asia as an incremental market in the '80s, even in the late '70s. I remember our first competitive evaluation with the 1412, which we lost to Shinkawa, was at Rockwell in Mexicali.

Addison: Why do you think you lost it?

Kulicke: We had a process problem we couldn't control. Our first [customer] was Motorola which we developed the machine for. And we got their business. Second was Rockwell. I still remember it, it still bothers me.

Addison: What lessons did you learn there?

Kulicke: Got to work harder, go back and bear down on the process issues. Still are. It never changes in that regard.

Addison: So this was in the early '80s.

Kulicke: No, that would have been 1977 probably.

Addison: The period when Japan was king in quality and the U.S. was falling off a cliff, how did that impact you?

Kulicke: We were always able to hold our own against Shinkawa in head to head business. The problem was that Shinkawa's core customer base was growing faster than our core customer base because the Japanese companies were taking share from the American companies. And that wasn't just a K&S problem. That was a crisis for the entire American electronics infrastructure, from the system houses down to the equipment companies.

Addison: Why do you think there were no major U.S. competitors [in bonders]?

Kulicke: When we introduced the 1412, there were three or four [American competitors]. A couple of Japanese, couple European, probably three or four other American companies. They didn't have the scale, didn't have the dedication. And they didn't have the process knowledge. Luck of the draw, I don't know. They quickly faded and we ended up going hard against Shinkawa for a decade and a half, until Shinkawa started to lose their edge. And now it's K&S and an Asian based competitor, ASM Pacific.

Addison: Another story in the K&S 50th anniversary book talks about the remaking of the company, and how you got "kicked in the behind". Can you talk about how that happened and how you corrected it?

Kulicke: Which time? (laughs) The industry went through a downturn in '84 that was a particularly severe downturn, especially in the back end, not so much in the front end. There was a capacity bubble that persisted for an abnormally long time, and that plus the whole Japan vs. America thing had us going through a very difficult second half of the '80s, and it was really only in the early '90s that we got ourselves together. It triggered extensive restructuring inside the company, rethinking how we ran the business. Really, we made the business in the early '90s. And [it was] just about the same time that the entire American electronics food chain, but especially the semiconductor industry, also got their act together. [It] made the '90s -- despite the cycles -- a really a wonderful time.

Addison: That's the next topic, the cycles. Can you tell me some war stories or some of your recollections?

Kulicke: The wire bonder business in particular seems to be the most cyclical of the various capital equipment niches and to consistently be the leading indicator. Lots of Wall Street absolutely pays attention because when our business goes down it's inevitable that everyone is going to follow us down. We typically see from peak to trough a four-to-one, five-to-one reduction in wire bonder sales without any loss of market share. I've seen some curves that sell side analysts have done, and we lead everybody else by about two quarters both up and down. There's one analyst who's dubbed us the "canary in the coalmine" and I hate the expression but it's unfortunately accurate. So we see the violent cycles where we'll be running along and we'll build a thousand bonders one quarter, and demand will be for 200 the next quarter. You didn't do anything wrong, it's just that customers don't need any right now. I alluded to that horrible period in the late '80s. We went through several quarters where we built none. And it's tough to hold an organization together under those circumstances. We put a lot of work into building collateral businesses that are run rate related instead of capital cycle related to help hold the infrastructure together. I don't believe a pure play wire bond company could survive without those collateral revenue sources. But what do we know about cycles? Every one is different, every one surprises the hell out of you when it comes even though you should have seen it coming, and you've been through seven of them and you're still surprised. It's a failure to learn. You have to keep telling yourself we will come out of it, and with a few exceptions, the next peak is always better than the last and that's the only reason you keep going.

Addison: Most people say the 2001-2003 downturn was the worst. Would you agree?

Kulicke: Well, it was pretty ugly, but actually, no. At least in the back end the '84-85 downturn was worse. But there's me and three other people who remember it. I could be making that up for all anybody knows (laughs). Some of it is that the industry is bigger [so] the stakes are a lot higher. And we're all a little bit older and [more tired].

Addison: How far back do these downturns go; were your father and Al Soffa bemoaning cycles way, way back?

Kulicke: Yes, [they go back to the] '60s. The industry seems to be congenitally unable to balance supply and demand. Occasionally cycles are externally triggered. But for the most part cycles in the semiconductor industry seem to be internally generated, we do it to ourselves, and it's our inability to balance supply and demand. Supply comes on in relatively large granules, demand tends to grow more evenly. Changes in semiconductor feature sizes tend to stimulate 1) excess capital investment because everybody has to have a new fab, and 2) the new products that come with those new fabs generate spikes in demand. We all sit down and linearly extrapolate off the spike, put in too much capacity. We get past that good time. We have to live with the bubble, we clear it out in the downturn and we start over again. That's the classic semiconductor cycle, it hasn't changed and I doubt it will change in my career.

Addison: Maybe you have answered this question, but is there any particularly difficult challenge that you overcame?

SK: There have been so many challenges. I have a perspective deficit. This is the only industry I've ever worked in. So it seems natural to me. But I talk to people, CEOs, senior managers in other industries, and we talk about the rate of change in this business, the lack of constancy in anything. And they look at me like I'm insane. But it is true about this business; things are always changing and while that's hard, it also

means there's another opportunity coming and for people who are built for it. I think that's what makes this such a fun business.

Addison: What are you most proud of?

Kulicke: I think surviving. When I think of all the companies we have competed with over the years, and how few of them are still intact. There's not very many companies who have been able to sustain a leadership position in their niche for more than a couple of product cycles -- a few, there's the Applieds, the KLA-Tencors and there'll be more with the passage of time simply because the barriers to entry are so much higher. But if you go back to the names that led their niches in the '70s and the '80s, and how few of them are still around, I'm proud of survival.

Addison: That raises an interesting point. You have the conglomerates back in the '70s, like GCA, and I guess K&S could have been viewed as a conglomerate because you had so many products. You survived and they didn't. What is your take on why GCA, Eaton, Perkin Elmer and so forth didn't make it [in the IC equipment business]?

Kulicke: I'd like to take credit for it, but I don't think that would be fair. Partly good luck, partly the issue I spoke to earlier on focusing on customers. It's a funny thing about customers. You ultimately survive by making them happy, and you have to understand their business to make them happy, but you can't let them run your business for you. There was a thing in the '90s [about listen to your customers]. But the idea of going out and having your customers tell you what you ought to do with your business…that doesn't work. [You need to] understand customers but look through what they say to find out what they really need. All the wisdom of the world is contained in rock 'n' roll lyrics. This is the Rolling Stones: you can't always get what you want, but [if] you try real hard you get what you need. You've got to figure out what your customers need, not what they say they want. And we somehow did a little bit better job than the other guys of doing that, in figuring out what they really needed. I don't know why, really, except that we worked real hard at it, and we had some luck.

Addison: We'll move onto SEMI next. I'm not sure how much you have absorbed from you father about the start up of SEMI. Is there anything you can convey about that from what he's told you?

Kulicke: I know a little bit about it. Before SEMI…the IEEE used to have an equipment show, what seemed at the time a gigantic show although today it wouldn't fill half of Moscone [in San Francisco]. A soup to nuts of electrical stuff. It was in New York one year, and my father came back livid because he had this little booth over in the corner and nobody ever came to find him. And for purely commercial reasons he said, this is crazy. We have to create our own showcase. He got together with some of his cronies in the industry, competitors, allied companies, and started SEMI out of pure self interest (laughs)…enlightened self interest. My father, [joined with] Bill Hugle, [and] a guy by the name of John Dannelly [from] Thermco. Phil Gregory, who was the capital equipment purchasing manger from Raytheon at the time [also became involved]. I mean, it worked for customers too. It was a lot easier to have everybody in the one place for customers than it was to hunt and pick through the IEEE show. My father's always had a short attention span, though. Once it was up and started he was happy to have somebody else do the heavy lifting of keeping it going, broadening into standards. I mentioned the transition to 3-inch wafers. That was really the thing that started out the SEMI standards effort because

not everybody's 3-inch wafers were the same. We had the first wafer cassettes at the time and some 3-inch wafers wouldn't fit in the 3-inch cassettes and others would fall out the bottom, but they were all 3-inch. It was the birth of the standards movement at SEMI.

My father is remarkably unsentimental about SEMI, interestingly enough. It was tactical response to a commercial problem. It works, he's pleased with it (laughs). I joked once…my year as SEMI chairman [1986] I had to be master of ceremonies at the SEMI dinner. It happened to be just as the industry was going into a downturn. My remarks bemoaned the fact that we were all going into a downturn, we were all losing some money. [I joked that] if my father had been smart, he would have gotten rid of K&S and kept SEMI -- that's where the money was. There's some truth to that.

Addison: How did you, possibly through your father, become involved with SEMI?

Kulicke: Not through my father at all. My father went off and retired. SEMI has always looked for balance in its board of directors. They needed somebody from the East Coast; they needed somebody in the back end. So I was recruited to the SEMI board, and I have the fondest memories of that time. It was an absolutely seminal period and I got to serve on a board with some great individuals. Ken Levy [of KLA-Tencor] was on the board during my period, Jim Morgan [Applied Materials] was on the board, Larry Hansen [from] Varian, and it was the period when we were wrestling with the question of what to do about the Japanese. SEMI up to that time was an American organization and we were all feeling a tremendous amount of pressure from the Japanese and [the question was] how to respond to it. Do we say, "Let's go ahead and take a closed fortress, defensive attitude." Or do we say "No, let's take the bigger view that SEMI's role is to expand the size of the pie" -- that whole metaphor of making the pie bigger, how big is your piece then? And I'm proud to say that we took the high road. After about two years of very contentious debate, we unanimously decided to take the high road, take the international approach. Let's embrace everybody, recognizing that there'll be differences, there'll be factions, and there'll be points of view, but that's not SEMI' issue. So I was really proud of that. We invited all the Japanese in. We truly internationalized the organization in a way that is sustained to this day. I was astoundingly lucky to be where I was at the time.

Addison: Is there anything specific you remember about your term as SEMI chairman?

Kulicke: The issue there was when our customers from the SIA decided to ramp up SEMATECH. The issue for the SIA was not that they particularly loved [SEMI], but rather the SIA had 13 people who had signed up for SEMATECH, and that meant they only had 13 congressmen in their pocket. And SEMI had 800 American members, which means we had a lot more congressional districts. George Scalise [SIA president] wanted SEMI to use its broader congressional footprint, even though it's a much thinner footprint, to help them in Washington. And I was the chairman [of SEMI] so I got the call. Basically…the SIA would make their pitch and then they'd say, "All 800 of SEMI members want it, don't they Scott." And I'm doing the trained dog routine, yeah, yeah, anything you say George. That's a little bit [of an] over simplification, and a little bit of a crude way to put it, but that was the gist of it. Again, I was extraordinarily lucky that it happened to be me; that I got to work with a lot of legendary figures in the industry, Charlie Sporck, Andy Grove, Craig Barrett, Bob Noyce. I was Bob Noyce's boss [because] I was on the board of directors of SEMATECH (laughs). My wife has a picture [on her desk] of Bob Noyce and I testifying in front of Congress. It was so much fun in hindsight [and] I believe we did a lot of good at SEMATECH.

"We" being Sam Harrell and I. Sam, also from the SEMI board, created what was originally known as SEMI-SEMATECH which was a U.S. organization of SEMI members working with SEMATECH. The whole issue there was to drive the message that only cooperation up and down the supply chain would collectively solve the industry's problem. I think we did a lot of good work; both our customers and SEMI members benefited from that. It changed the culture of the industry in a way. I think [that] with success there has been a certain amount of backsliding but it was fun times and productive times.

Addison: How did that [approach] sit with SEMI? I mean, SEMI had gone international and SEMATECH was really a U.S. defensive organization.

Kulicke: We originally formed SEMI-SEMATECH under the auspices of SEMI because we were getting leaned on by the SIA. And the [SEMI] board thought about it for a while and said, hmmm, you guys need to create some distance relative to us. It made sense, and we did. We created [SEMI-SEMATECH] as a parallel organization. The precedent was there. Japanese companies were members of SEMI but also belonged to SEAJ [Semiconductor Equipment Association of Japan]. So you can be in more than one trade association. So you had SEMI for the big picture, make the pie bigger, [and] you had SEMI-SEMATECH for more parochial issues. It was confusing because we picked an awful name in SEMI-SEMATECH. Everybody hated the name but we could never figure out a better one. But it was good at the time. I'm thankful that through SEMI I got the opportunity to do it. In general, when I look back I've been so lucky with the people I have gotten to work with. A lot through SEMI, some through SEMI-SEMATECH, and some just because they were customers. I'm a much better person for it.

Addison: Who invited you on the board of SEMI?

Kulicke: I remember going to lunch with Jim Morgan, Larry Hansen and I think Phil Gregory. I think [Phil] was executive director at the time. I may have my chronology wrong, but sometime after that, Phil had some health problems, and we recruited Bill Reed, who had been on the board. And what a charming guy. Kind, gracious, fair.

Addison: In your perception, how did SEMI change after Bill Reed joined?

Kulicke: It was a period of rapid growth and professionalization that came with the growth. In the Phil Gregory days the professional staff was really tiny. The shows were growing by leaps and bounds. There was a fair amount of money available and a lot of call for services. And a lot of debate about what services, how to get there, what was true value…in figuring out what really added unique value. But whatever we did, Bill oversaw it in a way that was quite professional. Whatever the board decided that SEMI was going to do, we wanted it done well. We could count on Bill to make that happen.

Addison: Let's just talk a little bit about the SEMICON shows themselves. As an exhibitor, how have they changed over the decades?

Kulicke: I don't know if the Hall of Flowers still exists at the San Mateo Fairgrounds, but if it does you ought to go look at it, because in the early years we didn't even fill the Hall of Flowers. [Now] SEMI shows are monstrous, SEMICON West in particular. I guess they have the argument at every board meeting now as they did then; how many shows and where, are we having shows because they're good for the

members or they're good for SEMI? The shows have been remarkably successful. They have the problem of perhaps too much success and there's this sought of, built into the genetic code of SEMI, an inherent set of conflicts between the handful of big members and everybody else. How many SEMI members are there now?

Addison: It peaked at 2,500 [in 2000], and now it's back to about 2,200.

Kulicke: OK, 2200. [The question is] who does the show serve and what is the function of the show. And it's complicated by the fact that in the good old days you could actually put a piece of equipment in the show and run it and have customers come in and have some meaningful interaction with it. That doesn't work anymore. You can't put a stepper in a show, or vacuum gear, or even a leading edge wire bonder. So you get this funny thing where customers seem to say that they go to the shows to maintain relationships and dialogs with their major equipment vendors but most of the booths are taken up by everybody else. So in essence there is a transfer of goodwill from Applied and KLA-Tencor and Novellus and hopefully K&S to everybody else. There's this funny dynamic about the shows that is still being thought out and I certainly hope the SEMI board continues to grapple with this question; what's the show, who's it really for, and who pays for it? I can tell you for K&S, SEMICON West in particular is no longer an equipment show; it is a company positioning exercise. For the back end, because so much of the back end has moved to Asia, the real working shows in the traditional sense of "I'm going to meet middle level customers and talk about real products", that's SEMICON Taiwan, SEMICON China, SEMICON Singapore. At SEMICON West I spend all my time talking to analysts. It's different.

Addison: Let's go back to SEMATECH and some of the legends. Charlie Sporck, as I understand it, was one of the prime movers of SEMATECH. And he was a big guy in the offshoring of assembly and test. What kind of interaction did you have with him during the SEMATECH phase, and your perceptions?

Kulicke: Charlie was a real nuts and bolts, down to earth guy. Very focused, very hard working. Traditional stories about Charlie Spork [were that] he drove a beat up pick up truck to work everyday. That was Charlie.

Addison: He was really fearful of Japanese competition.

Kulicke: The entire U.S. semiconductor industry was getting a lynching. They were all legitimately fearful. The Japanese had figured out a way to roll out technology more crisply, build product cheaper and at higher quality and higher performance levels than the Americans and they were gaining market share and they peaked at just over 50 percent market share. When all was said and done, the part of SEMATECH that really worked…was in the roadmap, and in the ability of using the roadmap and the SEMATECH infrastructure to focus the equipment companies on a few stated objectives so we did a better job of bringing it out on time and to spec. And that allowed the semiconductor guys to regain product parity in a rapidly evolving, technologically evolving environment. And all the rest of that stuff -- the half a billion fab they built [in Austin] -- was really just a big icebreaker to get people to loosen up and talk to each other [laughs]. That's always been my view, I am sure there are other people who disagree with that. But that's where the real leverage was in the whole exercise. I'm not sure that everybody saw it that way. There were some contentious SEMATECH board meetings. The tradition was that the SEMATECH board was the SEMATECH members plus one person from the equipment business, whoever was the SEMI-

SEMATECh chairman at the time, so I got to be on the founding SEMATECH board. I'm so lucky in that regard. And there were some very contentious meetings about whether to embrace the equipment industry or not, whether to work with us or treat us as part of the problem, part of the solution. But ultimately Sporck and Noyce and Sanders and Barrett and a handful of others embraced our argument and we're all the better for it.

Addison: Were you there when Bob Noyce announced he would step up and run SEMATECH?

Kulicke: He announced that at Intel first. What happened behind the scenes, did a Charlie Sporck twist his arm, I don't know. One day we had this problem of how are we going to run this thing, and the next day we had Bob Noyce, which is like God. And you hear people talk about Noyce and they describe a living saint, and it's true. And I'm as cynical as the next guy, but this is somebody who was really smart, really thoughtful, listened, tried to be fair while maintaining focus on an objective, and incredible leadership ability.

SEMATECH had people who were sent in from all the different member companies, so all different kinds of corporate personalities all thrown together, and in a start up so there was no presiding culture. And you had the east coasters... "I've got to have an office, it's got to have this much furniture, this kind of rug on the floor and blah blah blah." And you've got the west coast guys who are a little more rough and tumble and [they're] all arguing about it. And Noyce walks in and says "OK, this is going to be my cubicle, who wants an office?" And this is God taking a cubicle. In fairness it was a pretty grand cubicle. He had that kind of impact. If he said we're going that way, nobody was going to argue with him. But he also didn't say we're going that way until he actually talked to people and listened to people, including people like me. At Intel [for years] nobody had an office. Intel had no org charts and there were no org charts at SEMATECH for a long time. He brought a lot of the Intel culture with him. And the Intel culture gets more things right than wrong.

Addison: You said you were in Congressional hearings with Noyce. It doesn't sound like he'd be the one there saying the Japanese are taking over. How did he approach the argument?

Kulicke: He said we have a problem. We have a problem that has consequences at the national level. It has economic consequences, it has defense consequences. The industry has a plan to sort itself out, we need some help. This is not a handout. We are going to match you dollar for dollar. It has a five year sunset. We won't come back and ask for money in year six. This is what we need. We think it's reasonable and -- not these exact words – it's got an ROI for the country. I think you ought to do it.

It was not an easy story to tell. To this day this is not an industry that has the kind of presence in Washington it has. The technology industry has always, 1) not had its heart in the political process, and 2) not done well by the political process. I was involved in starting up the Washington office [of SEMI]…that was all on my watch. I think they all did a really good job under adverse circumstances, but you know, for the average Congressman… are you talking about potato chips or microchips? It took a long time for SEMATECH to get its story finally home and it was an interesting exercise in that SEMATECH was really driven by a handful of CEOs and it's interesting to watch CEOs together because they don't know how to deal with each other. As CEOs, we're all used to being the boss, we're all used to having minions…and you throw six CEOs in a room together and ask them to do something, they don't know how to do it

(laughs). It's really hilarious to watch. And if you've ever watched the SEMI board you've probably seen similar kinds of things. But we worked through it and we got it done. We did good in hindsight.

END OF INTERVIEW