As Linear Technology Turns 30, *Electronic Design* Interviews CTO and Co-Founder Robert Dobkin

November 15, 2011 07:27 AM
Electronic Design
Don Tuite

Linear Technology is celebrating its 30th anniversary, and *Electronic Design*'s Analog and Power editor, Don Tuite, spoke with Linear's Chief Technology Officer and co-founder, Robert Dobkin, about how the company began, the way he manages new product development and trains new engineers, and the future of the company.

Watch Video

Tuite: *I'm talking to Robert Dobkin, Chief Technology Officer and one of the cofounders of Linear Technology, on this, the company's thirtieth anniversary. I have a few questions to ask him about the founding of the company and how things have changed.*

Dobby, the eighties, when the company started, were a remarkable time for innovation and new businesses. You and Bob Swanson left National to come here and create this company. Meanwhile, IBM, introduced the PC as open standard – that opened up all kinds of new business possibilities in what had formerly been a hobbyist culture. Also, Charlie Trimble spun off from HP to create the market for GPS. There were so many things happening. Was there something about the times, or something in the air or the water that was fostering so much innovation?

Dobkin: I know for us, we started Linear because we were frustrated with where we were. We were at odds with management at that time, in that they thought a semiconductor company had to do everything. We thought an analog specialty would make the basis for a very good company – and history has proved us right.

And there *was* venture capital. I think that the other companies – obviously, they didn't all start from frustration, but they certainly started because people had new ideas, innovative ideas, that they thought could make a company, make a business. And the venture capitalists were willing to back them.

Tuite: *Could it have been that the space program was coming to fruition – was spreading new technologies around?*

Dobkin: I think it was the rapid growth of the PC and the rapid growth of the semiconductor industry, at least on the West Coast, that showed how much air was above us that we could grow into and fill with new companies. I don't think so much it was the space program because while that's bigger in a lot of other areas and in military companies, it doesn't show up nearly as much in semiconductors and in computers here.

Tuite: *I was thinking that if it hadn't been for the space program, we'd still be using cores.*

Dobkin: The space program still uses cores because they're rad-hard. But I think the semiconductor industry just looked at a piece of business and said, "Hey, I can do something here." I think that the ability to make cheaper memory was what drove the semiconductor memory business.

Tuite: *Right, until Intel saw the handwriting on the wall and shipped it all out to Japan.*

Dobkin: That was... You know that was a great decision for Intel and a tough decision. I'm sure that they agonized over it – giving up a lot of their business and deciding to concentrate on another area. And it was the right decision.

Tuite: *We can tell that now.*

Dobkin: Yeah, we can tell that now but it was hard, I'm sure, to make that decision at the time.

Tuite: *Okay. What's changed in venture capital? Was it really hot then? Is it going to be hot again, ever?*

Dobkin: My experience with venture capital is limited to our raising of money, which was not hard, because of our reputation. And also seeing some of the other companies that were funded at that time, there were a lot of companies with a Linear story that got funded by venture capital. Some of them are here, like Maxim, and some of them are gone like Telmos.

I think it was probably a little easier, especially for semiconductor companies, to get started back then. Because semiconductor companies

were growing so rapidly, it was easy for the venture capitalist to see how they'd get their money back.

Tuite: *Here at Linear, over the last 30 years, can you pinpoint any new products that were particularly groundbreaking andbranched off from where you started to create whole new product lines?*

Dobkin: Well very early on, we knew that we needed both CMOS and bipolar for the products mix that we wanted. So, I think, within our second year we started doing CMOS. And that brought up a whole new group of products. And right now, over 50% of our products are CMOS, but we still have a huge amount that are made in a bipolar process.

And at each new step of digital processing where they've dropped a line width – where they've dropped the die sizes for digital circuits – has opened up things for Linear. Those new developments in digital, once they've settled in and they're not leading-edge and the prices are reasonable, they open up new fields for Linear circuits.

The smaller line widths will let us go up to very high-frequency A-to-D converters and amplifiers. They're useful in making power MOS devices because of the very tight alignment you can achieve with the newest lithography. So, analog circuitry has improved significantly with the ability to use the equipment primarily developed for digital semiconductor manufacturers.

Tuite: *And that opens the door to second sources?*

Dobkin: Not so much. It opens a door to second sources if you're a foundry, because a foundry would like to have a second source foundry. And a company that does most of their business with a foundry would like to see a second source.

But for standard linear ICs like those made by Linear Technology and some of the other companies, there is no exact second source. If I go back to when we started, there weren't too many processes around. A company would come out with a good linear IC and it would get copied by -- at that time -- Fairchild, National, TI, and Motorola. And most of those were bipolar, so that if you couldn't get it from one guy you could get it from the next. It was almost an exact copy of the layout and it was interchangeable.

Fast-forward up to today, and every company has their own special processes. They've got their own twists on their processes to make them function like they want. And these processes, in-house processes, are *not* copied by other semiconductor companies. So the circuitry that you buy from one company doesn't have a direct second source somewhere else. It may have a functional second source, but that still means re-laying out a PC board, qualifying the circuit, and making sure it works right. But it's not exactly the same.

So I guess we see a lot of purchasing people trying to tell their engineering groups, "You need to have stuff that has a second source," but it's not happening now, okay? You're going to put your company behind if that's your philosophy.

Tuite: *Okay. Let me ask some questions about what it's like inside Linear as you have learned about driving the design process. What's it like here now and how has it changed?*

Dobkin: It's actually changed very little. Our business is to find new functions that we can turn into ICs that customers will find useful. And we do that by talking to customers and having engineers that are familiar with both IC design and systems who will come up with new ideas.

We did that back when we started, and we do that now, because our business is not making the cheapest, highest volume ICs. We want to make high-functionality ICs that provide a solution to a sub-set of the engineering companies. We don't need to be the biggest, and we'll never be the biggest. So we just want to do what we do best, which is make new functions for ICs. These get taken over and used in lots of places, like Intel, or sometimes we go out of the business.

For example, we had some charge pump circuits – voltage doublers, voltage triplers – and they were a standard product. We thought they were a good idea for a standard product. Well, when the backlight for cell phones went to white LEDs, they needed more voltage than they got off the battery. So we started recommending our charge pumps and they started using them in a lot of cell phones.

And then a lot of competition came in and made charge pumps for cell phone LEDs and took the business away from us because we're not the cheapest manufacturer. So we left that business. But our devices are still used in a lot of industrial applications where they want regulation or they want some of the functionality that we built into it, which you generally don't need just for lighting a light bulb.

Tuite: *Okay, but let me pick your brain about managing the development of new products. You've been doing this for that long and longer, and the tendency always is that engineering expands to take advantage of however much time it can consume. So you've got to drive the development and make the product come out on some kind of a schedule without throttling the innovation of the engineers who were doing it. How do you do that?*

Dobkin: When we start, we do have a schedule dictating when the products are supposed to come out, and we try to make it come out on that schedule. Things don't always work right when you're inventing, so sometimes it takes longer, a lot longer. It just means that if it gets past the schedule point, there's a lot more eyes on it and a lot more help in getting it running.

This is one of the problems you see with innovative circuits. If we were to make custom circuits or our customer had a hard date they

needed the circuit on – you can't take any chances. You can't *innovate* because innovation doesn't always work on *your* time schedule and you're driven by the schedule, rather than making the part come out functioning properly and providing an advance.

Tuite: *Has there ever been a case, or cases, where what you were working on gave birth to a whole new kind of a product because somebody said, "Hey, this thing has got this bug; this other thing has got this need; we could do so and so." How often does that happen?*

Dobkin: I don't think it happens so much during the product development, but when you get the product out there. It's new and it's got new applications. You get it out to the customers, then you see all these new applications that it's been designed into, and you get an idea for the next one.

Tuite: *So it's the customers feeding back that...*

Dobkin: Yes. It's the customers feeding back; and our people seeing it in the customers' hands; coming up with new ideas.

Tuite: *Okay. Yeah. I didn't think of that. Yeah, "You guys, you really needed this and..."*

Dobkin: Yeah. Our engineering group goes out and talks to customers all the time. That's where we get some of the best ideas for chips because they can understand the customer system and also what we can do in a chip when we design it.

Tuite: *Okay. The customers we've been talking about, they used to be different than they are now. The center of mass has moved overseas. Are you able to get the same kind of feedback from the new customers as you would get from the customers in days gone by?*

Dobkin: We have a huge field-applications group composed of really good engineers. They give us some of the feedback. We get most feedback from the engineers directly. In some cases, the systems that the ICs are going into are really complex and the customer is not driven by one or two people but maybe a team of 50 or 100. So, our parts will get sprinkled out there and we'll only get feedback from a subset. But that's okay, too.

Tuite: *Talking about the engineers, we can look at the change over 30 years in the kinds of new graduates. Have they changed or are they changing? Do you cast a wider net? Is there a "sorting hat" that picks them out for you?*

Dobkin: The sorting hat is our engineering group. Because we go out and we find students...

A lot of student programs have co-ops where they work for a certain amount of time, and unlike some other companies, when we get these people in, we actually make them work. They don't do studies. They actually work on something. And that makes them really happy because they see a project that they have done and it turns into a product at some time, and they're very proud of it. It's their Masters thesis and they had a good time doing it.

And we're pretty good at training people; the good ones want to come back and work on more projects. So that's good for us too because they already know us, we know them, and they are happy to come back.

When we first started this program, it was very hard to recruit at some of the major schools like MIT and Stanford because we were an unknown. Then the first group of students went back to them, told them what a great time they had in making products and doing things, and we were flooded with people who wanted to come work for us the next year. And other people would tell their stories about how they did a paper study at some company for 6 months.

Tuite: *Yeah. I can see which would be the most popular with most engineering students.*

Dobkin: Yeah. So we get very good people. It's not hard for us to get good people because good people attract good people, and we see some really good people coming out of the schools now. I think that the team of engineers that we have here now is better than I remember the team of engineers at National when I was working there.

Tuite: *Good. What are your hopes for the future? Where are things going to go?*

Dobkin: We have a unique culture here. We have people who like what they're doing and they'd like to continue to do it. We haven't seen people grumbling about going off and starting a new company on their own because, one, they're compensated well, and two, it's a good place to work.

They get to work on things that they have essentially chosen because they've gone out and talked to the customers and come up with those ideas. It's satisfying intellectually, and we try to make it a good place to work, just like we try to satisfy our customers' desires. We're very sensitive about making sure things work when they get in customer's hands.

Back when I was starting, I learned the theory of "a million phone calls." If you make an IC and you sell it to a million people and that IC has a glitch in it, you get a million phone calls, okay? So we try to keep those phone calls to a minimum.

Tuite: *Okay. So, that's where we stand at 30 years and still counting.*

Dobkin: And I think that our unique culture can go for another 30 years.