Bill MILLER

An Interview *with Eric Nee*

Quantum Corp.'s CEO William J. (Bill) Miller is an oddity in the disk-drive business. In contrast to such flamboyant personalities as Seagate Technology's Alan Shugart and Conner Peripherals' Finis Conner, Miller is thoughtful, modest and even-tempered. The typical Midwesterner. ■ Born and raised in a small town in Minnesota, Miller graduated from the University of Minnesota with degrees in economics and law. He spent most of his career in the Twin Cities, including the last 11 years at Control Data Corp. There, he headed that company's disk-drive business, Imprimis. In the spring of last year Miller left Control Data and moved to California to take over Quantum. ■ If Miller is different than the typical disk-drive executive, so is the company he heads. Quantum is the only major disk-drive company that subcontracts the manufacturing of its drives to another firm. It also has the strongest OEM customer list in the industry. This strategy has helped the company become the third largest disk-drive firm behind Seagate and Conner with estimated revenues of about $2 billion for the current fiscal year. ■ This interview was conducted at Miller's unpretentious, windowless office at Quantum's headquarters in Milpitas, Calif. Miller talks about the current bloodbath afflicting the disk-drive industry, Quantum's business model, the future of manufacturing in the United States, new storage technologies such as flash memory and the efforts of disk-drive companies to diversify into other markets.

UPSIDE: The disk-drive industry is now in one of its down cycles. Some say it may be the worst in history.

MILLER: This is the third or fourth of the down cycles that I've been through. Whether this one's worse or not, I don't know. When you're going through them they always seem like the worst ever. It's driven several of the companies into unprofitability and unsustainable levels of operation. So it's a pretty significant hit.

Is it different from the other down cycles? I'm not sure that it is different in a qualitative or analytical sense. These pricing spirals primarily get driven by excess inventory. We all try to maintain plenty of capacity to meet demand because the cost of basic capacity—plant and equipment—is relatively low when measured against the opportunity cost of not having the capacity when the demand goes up rapidly, as it did 18 months or two years ago. We don't build excess drives on

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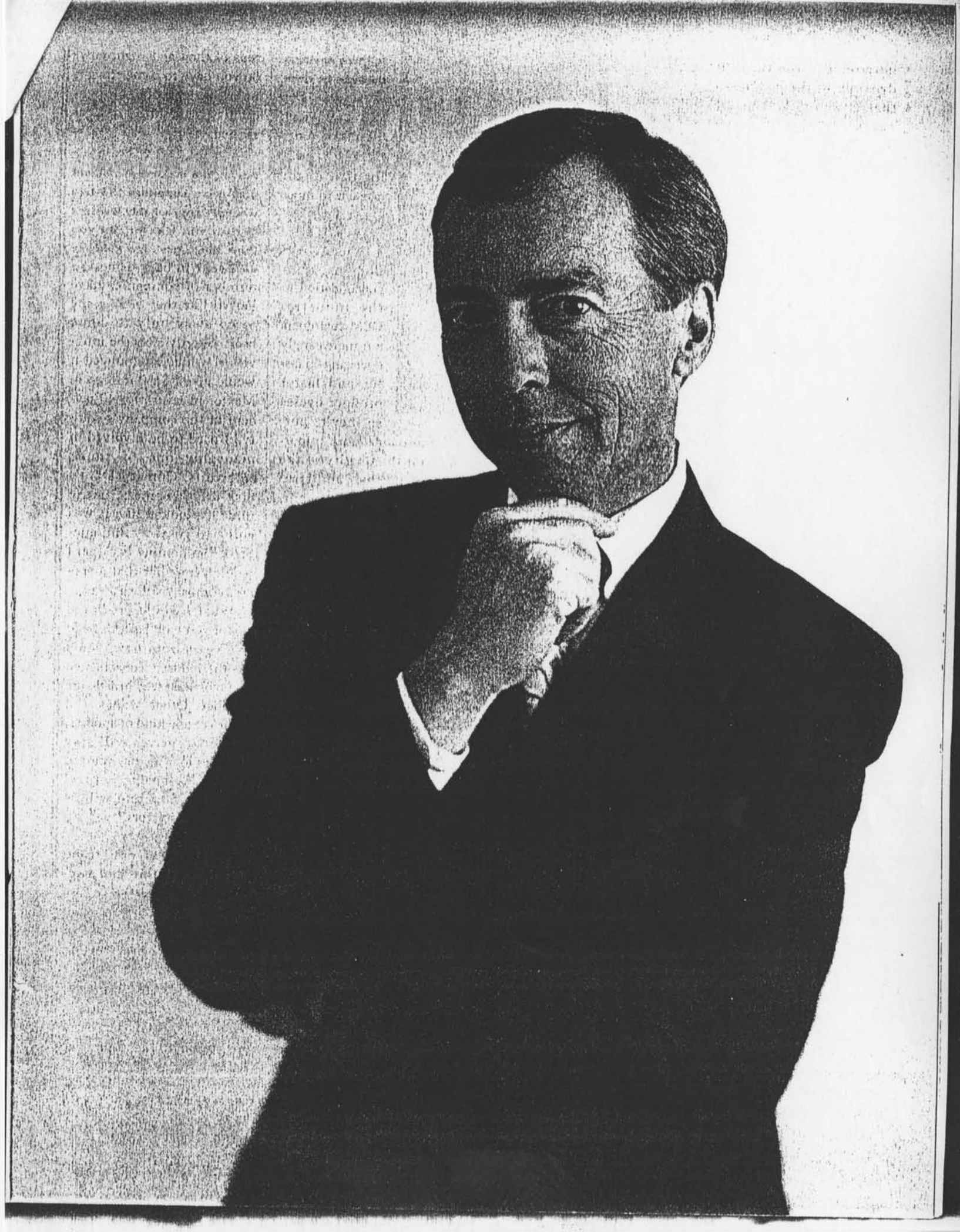

purpose. Because the other dynamic in the business is that inventory is relatively expensive because most of our costs are in purchased components.

When you do overestimate demand, there's a strong incentive to liquidate that inventory because of the third rule of our business: inventory is a depreciating asset because historically our prices have declined over time. In principal, the product will never be worth more than it is today. So people start reducing prices to move the inventory.

What was the reason for the buildup of inventory? Back in 1992 PC companies sharply reduced prices, which drove very high growth rates in the PC industry. That in turn sent the disk-drive makers up to very high run rates to support that growth. In the fourth quarter greater than 10 million units were sold. In 1993 that growth started slowing. We probably all overshot that slowdown in the PC business, creating inventory which you can see on the balance sheets. What's making the price pressure particularly aggressive this time is this combination of the very steep ramp accompanied by a slowdown in total world demand for the PC business.

Wasn't there also a problem because users wanted higher-capacity drives? Yes. It wasn't particularly a problem at Quantum, but in the industry there was a pretty sudden shift up the capacity ladder to 120- and 170-Mbyte drives for the high-volume portions of the PC business. That left a large overhang of 40- and 80-Mbyte drives, which people got desperate to liquidate.

Is the pricing pressure PC vendors are under also contributing to the problem? Sure. They are all under a lot of price pressure and they are all reducing their margin structures. But they are always pretty aggressive about putting pressure on their suppliers to be cost-effective.

The stock market isn't placing a lot of value on disk-drive companies. Does that concern you, and is there anything you can do to change that? Probably the most important reason that occurs is the investment horizon for most people is relatively short, and the disk-drive business is, as we said before, volatile at times.

You have these periods where margins come under a lot of pressure and results show it. That tends to push people out of the stocks. But when you look at the business over a longer cycle, it does very well. Quantum has earned over any reasonable period of time in excess of 20 percent on equity, often in excess of 30 percent, within the upper quartile of the Fortune 500.

Is there anything that can be done to smooth out the cycles? There are some things happening that might cause it to moderate in the future. There has been, over the years, steady consolidation in the industry. OEM customers are increasingly operating on faster and faster product cycles so they're putting more and more importance on the quality of the vendors, on their ability to maintain very consistent, very high-volume production. Those things are leading to closer ties between our customers and the suppliers, which hopefully will lead to better insight into what the product needs to be and what the production volumes need to be. If that does happen, then you could expect to see disk-drive supplies stay a little bit closer to the demand curve and have fewer of these big inventory bulges that tend to drive the price wars.

So you think there will be a consolidation among the disk-drive companies? It's already happened. There are fewer disk-drive companies around than there used to be. It used to be that you could get a few people together to design a disk drive and start taking on a little business and gradually learn how to produce it and grow up the volume curve. You can't do that anymore. As the brand-name PC companies have consolidated their business, they are driving huge volumes. When they qualify a disk drive they want tens of thousands right now. So you have to come straight up into high-volume, high-quality production almost immediately.

Among the major independent disk-drive suppliers the two weakest are probably Western Digital and Maxtor. Do you think those guys are going to go away? In our business, a number of companies have looked like they were going to go away only to come back. [Shortly after the interview Hyundai announced it would invest $150 million in Maxtor in return for 40 percent of the company's equity.] I used to be involved in managing one of them. Imprimis, Control Data's disk-drive business, in the mid-'80s looked like it was going to go away and succeeded in coming back, so I wouldn't predict that a specific company will go away.

What I would predict is that if you look back three to five years from now, you'd see the industry consolidated in favor of fewer broad-line suppliers. Others will exist in niches of one kind or another, and the captives will stay active as long as they want to stay in the business. I feel good that Quantum will be one of the survivors.

Some say you can trace Conner's decline and Seagate's resurrection to the moment when Tom Mitchell left Seagate and moved to Conner to become president and COO. [Laughs] I wouldn't even want to get into that. That's interesting for people to speculate about, but there are probably other factors at work.

You recently invested in a flash memory company. Why? We've taken a small equity

position in a company called SST that's developed a flash memory technology that is unique and going to be attractive. The market for flash memory is going to materialize over the next few years and Quantum has something to bring to that marketplace. We wouldn't expect that to have a material impact on our results in the short term.

Other disk-drive companies have recently diversified as well. Conner bought a tape company and Seagate invested in a flash memory company. Are you guys trying to smooth out the cyclical ups and downs in the disk-drive industry by diversifying into other businesses? The whole diversification thing is something that we maybe take a slightly different view of. We don't think diversification is worth doing for its own sake. You can't persuade a customer to buy the second-best disk drive just because you also sell that customer something else. Strategically, we think of ourselves as a mass-storage company. Any other mass-storage technology is fair game for us, again, if we can develop a competitive advantage.

Then why is it that up until today you haven't done anything outside of hard disk drives? Well, for one thing, we've had to sustain huge growth. This company has grown from about $200 million of revenue in 1989 to a run rate of about $2 billion today. That's a huge growth curve, and we've tried to stay very focused on absorbing the tasks necessary to do that. The second reason is that the big opportunity in mass storage has been in hard disk drives over the past 10 years, and we expect it will continue to be the biggest opportunity over the next 10.

So what is it that you saw in SST and flash memory that made you think you ought to invest there? They have a technology that is unique. The outcome of that technology will allow it to be less expensive because it uses fewer steps in the process, faster in writing because it will erase in smaller blocks than conventional flash technology, more durable—it will do well over a million read-write cycles, which some of the other technology approaches have difficulty with, and run at significantly lower power—it will run at 3-volt operation while the other technologies are still requiring 12 volts.

Then Quantum's got a set of skills that can be particularly helpful. We design our own ASICs here so we have in-house the control technologies that flash needs to interface effectively with the computer. We have done a lot of work with compatibility with a variety of PC systems and one of the issues that PCMCIA devices like flash have is how to get compatible with the whole range of different systems. We have customer relationships, distribution and support capabilities that a startup would have difficulty duplicating, and perhaps some insight into the market requirement of the computing side. So the combination of the SST technology and the skills that we bring can generate a competitive advantage for us in the marketplace.

Then why didn't you just buy the whole company? Well, I'm not sure that our friends at SST would have wanted to sell us the whole company. Pulling everything under our corporate net isn't necessarily the right way to approach the marketplace. Our manufacturing strategy in the basic disk-drive business is entirely different than the rest of the market. The bulk of our manufacturing is done by a partner of ours called MKE [Matsushita-Kotobuki Electronics Industries Ltd.], using the complementary skills that we had to build the business. We're working with that kind of approach with SST.

In flash you are going up against one of the strongest companies in the industry—Intel. Intel's obviously a formidable competitor, but we're used to competing in a pretty hot environment. We've got a better technology approach than Intel's, and in the marketplace that we're going to be addressing—for computing and computing-like applications of a memory device—we know some things about that market that will help us compete on an even footing with Intel.

Is flash memory on these cards more akin to the disk-drive business or to the semiconductor-memory business? It's going to have some similarities to the disk-drive business in that it's a memory device that needs to interface to a broad range of computers. The whole idea of the PCMCIA standard is to get this kind of interchangeability across a range of computers, as opposed to a semiconductor component that's embedded in the architecture of the product. It's going to look like semiconductors on the production side, and maybe look more like disk drives on the marketing and configuration side of the business.

What role do you see these cards playing in the future? Are they always going to be in hand-held devices or do you see them replacing hard drives in portable computers? I don't really see them as a replacement for hard drives in any application in the foreseeable future because of the cost difference. Flash memory will cost some multiple of disk-drive cost for a megabyte of memory. Today, it's anywhere between 10 and 20 times the cost per megabyte of a disk drive.

What is the foreseeable future in the storage business? [Laughs] Depends on the degree of precision you want. What I was thinking was more in the five-year horizon. For that period, and maybe much longer, it's fair to assume that flash will continue to be a multiple of disk drives in terms of cost per megabyte of storage. That tells you that you won't use flash in any application for which disk drives are a perfectly adequate solution.

So then it appears that the desktop is out. That's probably true. When you're going to use flash is when it has attributes that a disk drive doesn't have and that you need. Most of those attributes are fairly apparent. It has very high shock and vibration resistance because it's semiconductor memory. It will go easily to a thousand G's of shock resistance and most disk drives—even the small 1.8-inch disk drives—won't operate much above a hundred G's. It has very low power—it'll run on about a tenth the power of a disk drive, so if you want something to run on AA batteries for 15 hours, you are going to be willing to pay extra.

It sounds as if flash would be a better candidate for PDAs than disk drives. You will see both, actually, and it will depend on two or three things. One is how much shock resistance they really need in the particular device. Another is how low the power has to be. Maybe most importantly is the capacity that's required. Some people don't see them needing more than 10 Mbytes of storage. A disk drive is not an efficient device to deliver that little storage any more, so they'll use flash memory cards and solid-state disks. But I don't think that what they require has been very well sorted out because I don't think that the functionality of those devices is very clear.

I've been amazed how the standard drive that you get with a PC has ballooned so quickly in the last couple years. Is that going to continue? Yes. Today it's up at 120 or 170 Mbytes depending on your system. I think over the next year or two it will migrate up another step.

To what? 250 Mbytes, maybe. Software keeps getting bigger. If you compare Lotus 1-2-3 on Windows to the original Lotus, it's seven times as big. The number of applications that people put on their disks is dramatically larger than it used to be. If you believe that multimedia is really going to become a factor in computing, and I do, you'll get very large requirements because no matter how much you compress, audio and video take up very large amounts of storage.

Will the disk-drive industry be able to keep up with demand for higher-capacity drives at affordable prices? Absolutely.

The biggest economic factors in making a disk drive are things like how many recording heads and disks are in the drive, how much functionality you want and how fast the drive has to be able to move data into the computer—the so-called transfer rate. Historically, we've doubled the aerial densities every 18 months, so every 18 months, we can give you twice as much storage capability for the same number of heads and disks.

For the same price? Close. If your functionality requirements don't increase dramatically, then pricing doesn't go up at nearly the rate we can increase capacity. Historically, disk-drive prices have fallen about 3 to 5 percent a quarter. We'll be able to meet the requirements for much larger capacities on a cost-effective basis.

Why did the industry go from 5.25- to 3.5-inch drives? It was primarily a decision by a variety of the PC vendors to go to small-footprint systems on the desktop. If you remember, when you had a 5.25-inch drive, you had a system that was two-and-a-half feet wide.

So you couldn't fit the 5.25-inch in the smaller footprint? That's right. They decided to go to a smaller footprint to get a better look. The desktop is the volume driver, so the economies of scale make that high-volume form factor the low-cost one in absolute terms. But there is nothing inherent in the technology that makes 3.5-inch lower in cost.

Are we likely to see it go from 3.5- down to 2.5- or 1.8-inch? It's possible, but we are not seeing that movement yet.

Do you think it will happen? Yeah. Eventually, it will happen. At the extreme, the disk-drive technology would make it happen. As we develop higher aerial densities it becomes inefficient to use a 3.5-inch drive because you are not using the whole recording surface. You are paying for a larger disk than you need to. You could do it with one disk and one recording head and a 2.5-inch drive.

You said you use MKE to do your manufacturing. What are the pluses and minuses of that business model as opposed to Seagate, which is vertically integrated? The pluses in this case dramatically outweigh the negatives. First, you have to understand that it is more than just a partnership with MKE to do the manufacturing. Quantum set off in a direction that was dramatically different from the rest of the industry in the middle to late '80s. The rest of the industry moved largely manual processes to Malaysia, Thailand and other low-wage areas to reduce costs.

Quantum and MKE went exactly the opposite way. We applied very heavy manufacturing, engineering and process-engineering skills to develop extremely automated processes. Today, we have by far the most automated production in the industry. The goals were to get the highest quality and the most consistent production capability in high volume, and we've succeeded. We also thought that we could be as cost-effective or more cost-effective by applying engineering skill compared to others who were applying low-cost labor.

Quantum's been competitive in gross margin and return for years, which indicates that we've been cost-effective with that approach.

So is the cost of production in your model more or less than Seagate's? I'll tell you that if you get Al [Shugart, Seagate CEO] to tell me what his costs are. [Laughs]

You guys both know what each other's costs are. In general terms, you do. You know from results over a period of years that we have cost-effective production. Whether it's exactly the same or not—I couldn't give you a precise answer to that and probably wouldn't if I could.

There is some argument in the larger business world about what model is best to use for manufacturing, low automation and low-cost labor, or high automation. I won't be coy at all about that. We're convinced that, at least

ne production of disk ves, applying manufacturng engineering and process-engineering resources to develop efficient, high-quality, high-yield processes and automation is cost-effective. Our revenue per employee is three or four times as high as the industry average, and a couple times higher than the next nearest competitor.

You're at about $400,000 per employee? Over $400,000 when you include the MKE employees. It's over $800,000 if you just look at Quantum employees. In productivity terms, it's been very effective.

Why isn't anyone else doing it then? They are all doing more of it than they used to, and they'll probably keep moving in that direction. We were able to bring Quantum's design skills together with some very highly developed process-engineering and automation skills at MKE. For years MKE has been a manufacturer of high-volume consumer electronic products, and has learned a lot along the way. On the financial side, also sticking with the pluses, we don't carry all of the asset load that some of our other competitors do, because MKE carries most of the manufacturing assets.

Obviously, you have more negotiating cost because you are two entities and you have to keep discussing things to work toward a conclusion. But the fact is, better answers come out of that discussion.

I'm sure a lot of the discussions revolve around price and contracts, and that's not very productive. That's probably true. Obviously, you have to negotiate pricing of products, and that's something you would not have to do if you were a single entity.

How difficult is it to manage that relationship during a period when the industry is in turmoil? When you own the factory, you face the same issues that we discuss with MKE. They've been in this business now for a decade and they know it goes up and down. They know the schedule has to be very flexible and that it has to move quickly.

But with your factory, you can just go tell them, whereas with MKE, you've got to negotiate. No, it's exactly the same. There isn't any negotiation. When we say, "OK, demand has changed, so we need to change our production level," MKE doesn't fight with us about whether we need to change.

You don't think that slows you down at all in reacting to the market? No, I don't. I've run businesses where I've had all my own factories and this one where some of the factory capacity is owned and some of it is at MKE. I'd have to say I really don't see a lot of difference.

In a period in which price competition is rampant, doesn't this kind of relationship make it more difficult for you to make money? Seagate has higher profits than you do today. Seagate is clearly making more money than we are today. A big chunk, if not all of it, comes from their high-end business where the margins are still quite high. We've continued to remain more profitable than the other competitors during this period, at least so far. But it's not a period in which we can

make any significant amount of money. We've told people we are going to lose money this [second] quarter.

The price declines have come down faster than we can reduce costs, and over the last couple of quarters, prices have been declining at large rates—10, 15 percent or more over 90-day periods. Nobody can reduce costs at that rate and that's why you are seeing the disk-drive companies lose money right now. Again, I don't think the MKE relationship really impacts that a lot one way or another.

Many people say the United States needs to get back into manufacturing if it is to compete with Japan and other Asian countries. Do you feel any social responsibility to do that? We do manufacture our high-end products just a few hundred feet from where we're sitting. And we're trying to build that business very aggressively. So we are making some contribution to that effort. We have to continue to build a manufacturing base in this country, but to do that it's going to require some significant changes in the infrastructure.

If anybody thinks you are going to be a competitive force in manufacturing with a third of the investment in plant and equipment, a subsidy of consumption instead of investment, a second-rate education system and a set of policies that don't meet your competition in the world for manufacturing skills and resources, they are kidding themselves. There's no decision by any individual manager that's going to make that successful without a reorientation of our public policies.

Couldn't the MKE plant have been built in the U.S. as easily as in Japan? The reason why the high-volume plant exists today in Japan is that's where the expertise was. We were developing from scratch what has turned out to be the most automated process for making disk drives in the world.

Do you have plans to expand your high-end disk-drive business? Three or four years ago Quantum was basically a one-product company. Almost all the revenue was derived from a disk drive sold for entry-level PCs. Then, a couple years ago, we had a huge success with the 240-Mbyte drive that moved us into the high-performance PC market. About a year ago we set up a high-capacity storage group focused on trying to get us a strong position in high-performance, high-capacity disk drives. We've also got to become a bigger factor in 2.5-inch drives for notebook computers. We're in that market, but we don't have as big a share as we do in desktop PCs.

What's the reason for your lack of success in that market? The simple answer is that we haven't done a good job of having exactly the right product to fit the needs of the big winners in the notebook market at the time that they were gaining volume.

You underestimated the capacity demand? There have been times when we've had too little capacity or too little performance. There have been times when we have had more capacity than people were ready for. We just haven't gotten the timing right. Over the next year or two you'll see us gain some ground in that segment. We've got a very thin 12.5-millimeter device that will have appeal in that market. As people go to subnotebook and very thin devices, that will make headway.

You said earlier that you had strong relations with your OEMs, and that was a competitive advantage. It would seem that if you had had those close relationships, you would have had the right product. We didn't do it very effectively. Conner got out there early and got a very strong position with customers. When Quantum got in the notebook market, the capacities went up faster than we anticipated.

Bad luck? No, it's not luck. We just didn't execute it as well as we should. It was not a complete failure—we're the third-largest producer, but we don't like being third in anything we do.

So the OEM customers were clear about what their needs would be, but you just weren't able to meet them? Our OEM customers would concede that that's a market where all of us, including the customers, had less certainty about what was going to catch with the buying public. In desktops we have a longer history, and maybe more predictability. Both the customers and we got surprised sometimes about what hit with the end users, and we haven't executed it as well as we have in the desktop. We're working to fix that.

You said relationships between disk-drive suppliers and the OEMs would become tighter, but others have said that relationship is becoming more fragile because they're more willing to jump based on price. Historically in the disk-drive business, switching costs were very high because everything was kind of unique and proprietary. As a result, once you had an OEM customer on a disk drive for a particular system, that was it—it wasn't practical for that customer to change because the switching costs were way too high.

We don't have that anymore because interfaces have become much more standard. It's easier to move from one supplier to another. Because of the fast product cycles, though, the strong PC companies come back repeatedly to the same vendors.

Apple's your biggest customer by far [accounting for about 30 percent of revenues]. Are you worried about the problems Apple is having today? No. Everybody in the PC business is struggling with the new environment. About a year-and-a-half ago we concluded that the industry was going to consolidate around the brand-name PC suppliers and we set out to strengthen our position with them. We had a very good start with Apple and a long relationship with HP. Over the course of the year we were able to add Compaq, which has become our second largest customer, Dell and Digital.

Apple has an extraordinarily strong brand name. Business is getting very competitive and they are going through a lot of adjustment. If they execute successfully, they ought to be able to succeed. But we can maintain a leading position in our business regardless of what happens. We have to keep executing, but if we just keep winning that business every day, we'll be fine. ■

Eric Nee is the editor-in-chief at UPSIDE.