

Manufacturing Seen as Key to Silicon Valley's Innovation, Economic Resurgence



A technician at Bestronics carefully observes wave soldering of PCB assemblies
Photo courtesy of Bestronics Inc., San Jose, California

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Contract manufacturers are playing a big role in bringing innovative products to market

The Silicon Valley area of Northern California has long been known as a breeding ground for technological innovation and new product development. Many different types of high-tech OEMs inhabit the Valley, including makers of medical devices, green technology and clean energy products, semiconductor equipment, communications equipment, and electronic instrumentation. But one of the hottest emerging sectors of the Silicon Valley economy these days is real manufacturing—an often overlooked sector comprising the companies that engineer, fabricate, machine, assemble, weld, mold, and stamp out parts and components for the Valley's high-tech product brands.

"Manufacturing is paving the way for economic resurgence in Silicon Valley," said Kim Walesh, director of economic development for the City of San Jose, Office of Economic Development, in a statement. "Contract manufacturers of all sizes are expanding their activity in San Jose and the surrounding area. Their client

companies are tapping the Valley's deep manufacturing expertise to design and produce the very latest innovations here—before they do high-volume production globally."

The region's contract manufacturers and design service firms are a highly valued asset in new product innovation and are emerging as a vital component in Silicon Valley's innovation ecosystem, according to a February 2012 study conducted by BW Research Partnership on behalf of work2future (www.work2future.biz), a local workforce investment board. Executives who were interviewed for the study described contract manufacturers as an important driver of the local economy, playing a unique role in the development and introduction of new products in the clean tech, information technology, and medical device industries.

The work2future study, "Contract Manufacturing in Silicon Valley," used existing labor market and educational data, together with interviews of 16 executives from contract manufacturers, to identify opportunities for continued local growth of the industry. The report pointed to the proximity to customers, the rapid pace of innovation and new product development, and access to talent as the key drivers for the expansive growth of this industry in Silicon Valley.

The report found that Santa Clara County is home to nearly 100 contract manufacturing firms that employ approximately 7,600 workers—about five percent of all manufacturing employment in the County. In addition, there are 40+ small product design services firms, which are closely related to contract manufacturers.

"A new wave of innovation is emerging in Silicon Valley," said Joel Bustos, vice president and general manager of SMTC San Jose, "and we are seeing growing interest from new companies looking to develop and manufacture these high-tech products right here in the Capital of Silicon Valley. This next generation of innovators is utilizing our expertise in early development stages, from design for excellence (DFx) to product prototyping and then production. We become their virtual manufacturing partner and a key element of getting their product to market quickly and effectively."

A Manufacturing Process that's Close to the Designer

Clearly, new product introduction (NPI) is important to Silicon Valley's ability to maintain its leadership in innovation. Nat Mani, president of [Bestronics Inc.](#), says that most companies that are attempting to introduce innovative products are receptive to suggestions on how to redesign their products for better manufacturing. Bestronics, a contract manufacturer based in San Jose, Calif., provides a wide range of manufacturing, NPI, process engineering, testing, supply chain, and program management services. Offering its customers plenty of open dialogue, the company makes its team of engineers and test lab resources available to OEM customers so that they can tap into its knowledge base and expertise.

"If we look at the broader trends in Silicon Valley, we see that a lot of design and development activity is happening for new products right now," Mani said in an interview. "An important thing [for a product developer] is to have the resources of a test, assembly, and manufacturing process that's close to them and can interact with them on a real time basis. We understand, from an engineering perspective, that things are fluid and they're not always cut into stone, so we need to be very flexible around it; we have to adapt our models to fit that. Another thing we've done, as a company, is that if we don't have exactly what the customer is looking for, we bring partners over and we find out what they need—whether it's a test solution, fixtures, or some other special processes. We enable that so that the customer gets what they want. We're tapping into the Silicon Valley ecosystem, but also acting as a project manager. Our customers tend to appreciate this."

Dennis Cima, senior vice president of the [Silicon Valley Leadership Group](#) (SVLG), believes that a primary benefit of designing, engineering, and manufacturing new products in Silicon Valley is the diversity of the companies and technical personnel that are available. "This is not necessarily a one industry, one factory kind of town," he said. "There are high-tech, biotech, financial services, and many other types of firms in Silicon Valley." But as real estate costs go up, housing costs also increase, making it more difficult to recruit and retain people in the Valley. "We need these people with their brain power to keep these innovations happening," he added. "So this puts a strain on the system."

Intuitive Surgical, a Silicon Valley OEM headquartered in Sunnyvale, Calif., designs, engineers, and assembles robotic surgical equipment that's used in hospitals nationwide. As a maker of physical goods that manipulate tissue and perform surgery, Intuitive is frequently seeking smaller, higher-tolerance parts and components that offer higher strength and longer life. The company approaches innovation from various angles while continuously looking for ways to upgrade and streamline its cutting-edge robotic surgical equipment.

"We're definitely a young company in a rapidly changing, technology-focused industry—medical devices," said Mike Prindiville, senior director of manufacturing engineering at Intuitive Surgical. "So innovation is critical to our future success. Our business is about providing patients with the best surgical outcome possible. So how do you do that? With innovation. You want to make sure you match technology with customer needs. It doesn't really do any good to have a technology if it doesn't meet a customer need. Making that pairing wisely is something that takes a certain amount of discipline."

How Innovation Iteration Works For Product Development

Prindiville said that innovation iteration, especially rapid iteration, is key to new product development. It's a company's ability to execute through various iterations, try out different ideas, and then learn from each other's ideas. "We understand that a product development cycle doesn't go through one iteration; you would really define that as luck," he said. "It's really about trial and error. One of the ways we've been able to focus on our ability to iterate is by embracing the use of 3D printers and additive manufacturing. We have four or five of those in-house right now. It gives our engineers a tool so that they can go from CAD to something physical in a short amount of time. Even if it doesn't have all of the mechanical properties, it bridges a gap in our development life cycle. This is a trend I've seen in the last five to ten years, which I expect will continue."

"Another thing about iteration that can't be overestimated is the change control system—your ability to communicate and review documentation in a timely fashion," he added. "So we have fully electronic, automated change-control systems that enable us to process a high volume of change activity efficiently. This is something we're very proud of. Clearly, I think rapid iteration is a key to innovation."

As a contract manufacturer, Bestronics offers its engineering services whenever possible to help OEMs come up with the best possible design for their products. "Our engineers want to help them make sure it's a robust design, and then we help with manufacturing challenges," said Mani. "We're working on a product right now where we partner with an industrial design firm. A customer wants us to do manufacturing for a particular product, and it's in the very early stages. We're helping the industrial partner and the customer optimize a manufacturing solution. So we are basically tapping into the Silicon Valley ecosystem to help them find a solution to this design challenge." The company often helps its OEM customers with new product introduction (NPI) and prototyping, offering many choices for production processes and component selection. "Since we're not a design house, what we do, for example, is help with component selection," said Mani. "If they're coming up with an initial design, we would look at component partners to see what kind of components they should be using. We'd provide feedback to them, and in some cases, if it's a new product or an existing product, we can help them find a cost-reduced version of it. We will see if we can use our

partners to help them find some alternative component selection, to make the new product better for them and to extend the lifecycle of an existing product."

[Bestronics](#) nearly tripled the size of its manufacturing facilities to 71,750 square feet when it moved to a new address at San Jose's International Business Park earlier this year. The additional workspace gives Bestronics the new capabilities—clean room assembly, enhanced anti-static ESD flooring, and larger, specialized test facilities—needed to better serve its high-tech clients with critical parts and components. Mani said that the company's move celebrates the resurgence of local manufacturing in a city that has launched what he called "some of the most inventive manufacturing-dependent companies in the world."

"Bestronics has seen many waves of manufacturing cycles in its 25 years in the Silicon Valley and, with these new facilities, is positioned to capture what promises to be a new groundswell of support for local manufacturing," said Mani in a statement announcing the relocation. "We have already increased our team of highly-trained professionals and plan additional hires this year to support our growth."

Relying on a Diverse Supply Chain

The strength of Intuitive Surgical's business model relies heavily on the company's supply chain, according to Prindiville. While the company oversees manufacturing and performs its own final assembly, it doesn't machine, fabricate, or manufacture any components itself. It has, therefore, compiled an extensive list of highly competent suppliers.

"We really look to find best-in-class suppliers that we can work with," said Prindiville. "The daVinci system, depending on how you count parts, represents approximately 10,000 parts. We have to integrate them and bring them together on a daily basis. There are electronic circuit boards, various mechanisms with gears and cables, and motors and sensors. So it's really critical that we engage the right suppliers. It's important to me to understand tolerances and be able to communicate and guide us through the best practices for how to manufacture and use these components.

"We often have to coach our suppliers to tell us 'no' and keep us in check," he continued. "It's not uncommon for a supplier to get a tolerance that they can't meet, or some other difficult request. They don't want to offend us by saying, 'No, we can't do this.' This can push some risk late into the project lifecycle, where we then determine if it can or can't be done."

Over time, Intuitive Surgical has developed a vertically-integrated supply base, teams that have a proven track record of meeting their commitments in their core competencies. "A supplier can't just come to the table and start making promises," Prindiville says. "We build these relationships over time to develop confidence in our supply chain."

Prindiville also stresses the importance of aligning stake holders across the product life cycle in order to reap the benefits of concurrent engineering. "We make sure we have teams, not just from design, but really from all of the different life cycles of the product—R&D, design, new product introduction, and manufacturing, as well as service and marketing," he said. "It's important to have all those functions kind of come together, and really be co-located. The nice thing about being in Silicon Valley is we can bring all of these different skill sets together in one place and facilitate communication, and make sure that we're working on the right product challenges."

Silicon Valley's knowledge base is about the best in the world, according to Mani, especially for high-tech products. "If you let the manufacturing ecosystem crumble, then over time, it kind of withers away," he said.

"We see more and more attention being paid to that, so we see companies taking advantage of it and making a conscious effort to have this infrastructure here locally to get their products launched."

"I believe San Jose has the largest manufacturing workforce in the United States," said Mani. "It's almost a magnitude of five or six times the next city, which is the Durham, North Carolina area. So, clearly, the innovation infrastructure—even after all the downsizing in the Valley and manufacturing going offshore—is still sizable. I think it's very important that we keep that ecosystem and infrastructure so that the innovative companies can have a place, locally, where they can get their products manufactured. From a Silicon Valley prospective, a lot of the technical knowledge base in the world is here—probably the largest concentration of manufacturing process engineers that work in factories, and engineers that work with their partners to launch products."

"The secret sauce of Silicon Valley is hard to define," said SVLG's Cima. "But I think there are a few things that go on here. One is you have a culture of folks here that aren't afraid to fail and take risks, but they understand that if they need to fail, it's better to fail fast, then come back at it and take more risks. Another thing is we definitely have world class universities and community colleges. There's venture capital here, and you have a good diversity of companies, industries, and individuals, and a high degree of economic productivity."

"People in Silicon Valley have learned how to innovate quickly," he continued. "You have your widget person on one side of town and your widget plus one person on the other side of town, and they can collaborate. You don't necessarily have these things in all cities. In the Bay Area, we have the advantage of traditional shipping ports and other industries in places like Oakland, and your Facebooks and Googles in the South Bay. All of these things tie in closely together."