

## Technology Boosts Microelectronics Manufacturing

It was easy for almost anyone to turn a profit in the machining business prior to 2000. That's the belief of Mohamed Shahin, president of Sandy Bay Machine (Rockport, MA). Today, the executive says it's much more difficult. That's why his company has begun investing heavily in advanced technology so that whenever the market turns, the company will be better positioned to compete with the shops still standing.

Sandy Bay is a world-class manufacturer of microelectronic components, typically for antenna, microwave, and aerospace applications. It has more than 30 CNC machines manufacturing precision workpieces for a diverse base of companies like Boeing, Lockheed Martin, Motorola, and Raytheon.

Sandy Bay's manufactured components are mostly complex, electrical-

based components, requiring sophisticated, reliable manufacturing techniques. The slightest inaccuracies result in scrapped products, and small lot sizes and quick turnaround runs are often required.

**“We don't drill often, and boring allows for increased surface straightness.”**

In 2003, Sandy Bay purchased a standalone a51 HMC from Makino (Mason, OH). “Our Makino a51s did exactly what Makino had promised,” explains Shahin. “The a51 reduced the cycle time of the part we tested from 25 to 15 min. The surface finish visually improved as well. In another instance, it took us 2 1/2 hr to run four parts on our old machine. On the a51, we reduced the cycle time to 40 min.”

Several other legacy machines were not performing to Shahin's strict stan-

dards, so he made the switch to the a51. “The Makino machines were the only HMCs that could hold the 0.0002" [0.005 mm] tolerances we needed in our complex parts,” says Greg Osmond, Sandy Bay's production manager. “We looked at other machines, but the Makinos were the only ones that could cut complex parts accurately.”

Among the products manufactured at Sandy Bay Machine is a satellite antenna that holds circuits to divide microwave signals. The part's 0.00035" (0.009 mm) tolerances require a 3/32" (2.4-mm) tool with a 16" (406-mm) extension, boring two holes in precise locations over 9" (228 mm). The part's surface flatness has to be matched within 0.001" (0.03 mm).

“We don't drill often, and boring allows for increased surface straightness. As a result, the roundness and concentricity are perfect,” says Osmond.

Filter housings are another part Sandy Bay regularly manufactures. The part measures 15" (381-mm) wide by 13" (330-mm) long by 1.75" (44-mm) thick, and requires a substantial amount of hog-out work before it reaches the finished size.

Surface finishes must also be considered. Osmond explains: “Most parts are coated with silver, gold, or another material in the end to aid in conductivity and sensitivity for the final application, so this must be taken into account when programming. Some parts require a 0.02" (0.51-mm) radius on the corner, which means lots of cutting with a small end mill. Makino's Super Geometric Intelligence helps eliminate corner chatter, a problem we've had in the past. With the Makinos, we can reduce cycle times because the tool doesn't slow as it enters corners nearly



**Sandy Bay's MMC2 contains two worksetting stations with 24 pallets feeding three Makino a51 HMCs, providing the flexibility to run many jobs at once without major operator intervention.**

as much as with other machines. And we don't have tool-chatter problems anymore," Osmond asserts.

Sandy Bay has made a flexible manufacturing system, the Makino Machining Complex (MMC2), the center of its manufacturing operation. The MMC2 features a pallet-handling system, two worksetting stations with 24 pallets feeding three Makino a51 HMCs.

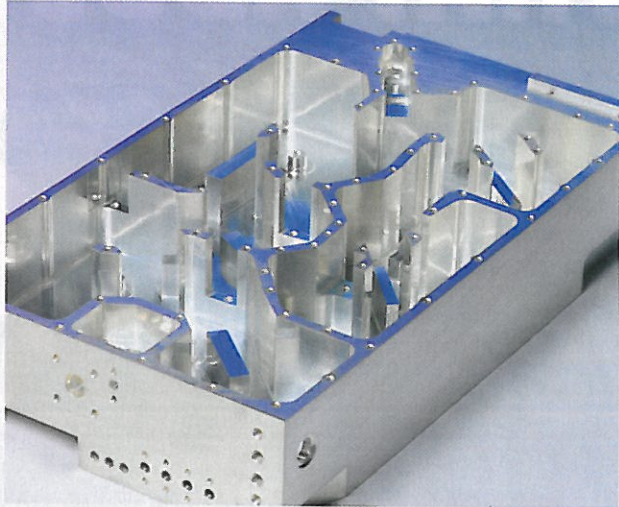
"The Makino Machining Complex gives us the flexibility to run many jobs at once without major operator intervention," says Osmond. "We can program and set up several jobs and call them up whenever we need them, without having to reprogram and re-setup the machine. This results in more uptime and less setup time on common jobs."

According to Osmond, the Makino Machining Complex has cut setup time by 50%. Shahin has also said that he can actually connect to the system via the Internet from a remote location to check on work progress.

To further optimize production, Sandy Bay makes its own tombstones. "The Makinos can machine accurately everywhere in the work zone, even high in the Y [axis]," says Shahin. "Confidence in the equipment's accuracy no matter where we're machining allows us to fixture many

parts per face of each tombstone, often up to 12 or 16 parts per face on a five-sided tombstone. This reduces out-of-cut time and pallet changes, and allows us to produce parts in specific batch sizes completely based on the customer's needs."

The spindle runs 94% of the time on the MMC, which amounts to much more up-time than achieved by the VMCs and standalone machines in the shop. Shahin attributes the remaining 6% of downtime to routine maintenance.



**Extracting accuracies of workpieces required machining centers capable of achieving tolerances as low as 0.0002" (0.005 mm).**

Sandy Bay was worried that part accuracy would suffer without an operator standing in front of each machine, but management quickly found that the MMC produced parts just as accurately as a stand-alone Makino. In fact, the system provides more stability and reliability in the process, reducing the variables for error.

"This technology gives us confidence that we can deliver on the contracts we are bidding on, no matter what the quantity, accuracy, or delivery requirements are, and helps us attract and retain good employees," explains Shahin.

"Skilled workers are hard to find," explains Shahin. "Having a continuously evolving company goes a long way in attracting potential employees. We were able to change from three to two shifts, leaning more on optimized equipment like the MMC to pick up the slack. The third shift was always the hardest to find workers for, and many of those employees were glad to move to the day shift."

The successful implementation of the Makino a51 MMC has encouraged Sandy Bay to continue down the path of automation. While the company currently has a two-level-high pallet stocker MMC system, Shahin plans to purchase a new MMC that will be a three-level-high system.

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Recently, Sandy Bay joined other leading manufacturers under the TSI Group Inc. (North Hampton, NH). Under this new ownership, the company is expecting continued growth, with a goal of doubling their revenue in two years.

“We are showing the success of our MMC to the other companies in the TSI Group every day, and have become an example of how productive a flexible, automated production system can be,” says Shahin. “This investment will allow us to come out of tough times stronger and more competitive, instead of closing up shop like so many others.” ■

For more information on Makino Inc., go to: [www.makino.com](http://www.makino.com) or telephone 513-573-7200.