

# Innovative technique is what the doctor ordered

*Florida firm relies on Traub machines for speed and accuracy*

**M**edical parts manufacturing requires processing of complex, intricate parts to exacting tolerances. Processes involved include micro-machining and multi-axis milling and turning in prototype quantities as well as high volume. At Structure Medical Inc., Naples, FL, finished or nearly finished parts are typically produced from bar stock in one setup whenever possible.

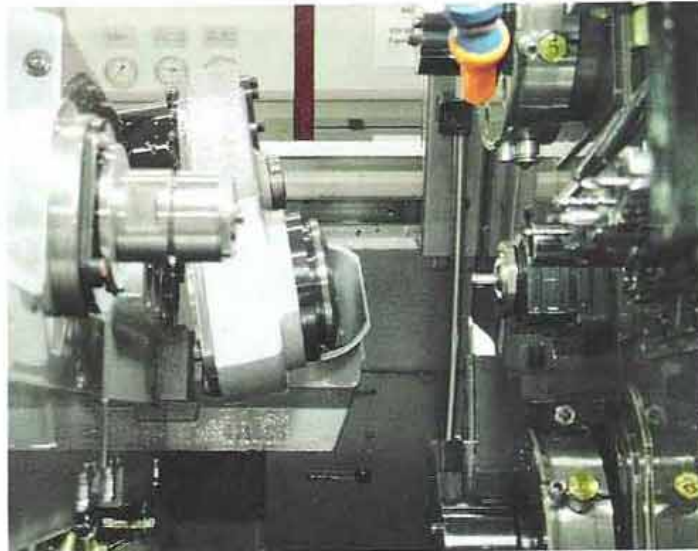
The approach to precision machining adopted by the company combines the latest technology with automation solutions of its own design to produce very complex parts typical medical devices. The combination of technology and automation has enabled Structure Medical to build a true “lights out” manufacturing model for production of medical implant devices that enables it to compete with low-cost producers—wherever they are found.

As a result, Len Zaiser, the company’s founder and CEO, believes that the company has gained a significant competitive advantage.

“We found that most orthopedic device manufacturers are using the same



Structure Medical relies on a combination of fixed and sliding headstock turning machines and milling centers for machining complex medical parts.



Traub TNL 12 Swiss-type turning and milling centers with thread whirling mounted on the turret allows nine hours of continuous, unattended bone screw thread whirling.

technology that they were using 20 years ago,” Zaiser says. Structure Medical has taken a different tack from suppliers who take on outsourced medical jobs and tend to emulate the dated manufacturing systems and processes of their customers.

“When some suppliers seek to earn an outsourced job from those companies, they tend to emulate the manufacturing systems and protocols they see in their customers’ plants,” he notes. “We do not. As an OEM supplier to those companies, we look forward and think about the best process based on the available technology,” he says.

The company, which was started in 2004, machines titanium, primarily in two facilities that feature 5-axis milling and Swiss-type machines plus a dedicated quality assurance and programming department.

“When we go to talk to people in purchasing, we show up not only with experience in machining, but with a list of machine tools that is far beyond the level of most shops—with highly skilled people operating them,” says Kevin Confoy, general manager.

Structure Medical likes to say “the more complicated the part, the more

confident we are that we can make it better than anyone else,” says Confoy. “What is important for the customer is that we can provide them a high quality part consistently. Our customers simply give us a drawing, tell us the material, and we produce to print.”

## Equipped for success

Structure Medical has invested in Swiss-style turning and advanced milling centers. The lineup includes two Traub TNL 12/7 mm Swiss-type turning and milling centers with whirling heads mounted on the turret that allows nine hours of continuous unattended bone screw thread whirling. A Traub TNL 26/36 32 mm Swiss-type turning and milling center provides similar capabilities. The Traub multi-axis turning machines are configured with main and sub-spindles, two turrets, and two slides that allow as many as four tools in the cut at the same time for major cycle time savings.

The company also operates three Traub TNK 36 turning and milling centers and two Traub TNL 12K fixed headstock turning and milling centers. Purchased in the last couple of years, they work alongside the other high-end

machine tools in an extremely clean and well-lighted 7,000-square-foot machining facility.

"By investing in the very best multi-axis machinery and coupling it with more than 50 years of management experience creating high-tolerance parts for the Department of Defense, NASA, and the oxygen regulator industry, we have developed a medical manufacturing business that delivers exceptional manufacturing quality at costs comparable to that of offshore manufacturers," Zaiser claims.

For its precision machining jobs, Structure starts with a drawing from a customer of a tight tolerance part, for example, diameters and shapes  $\pm 0.001$ ". "This is not too bad, but we required a machine that could achieve those tolerances consistently without having to rely on machine offsets," Confoy says. "The Traubs were a good choice because they exhibit the required accuracy and can do complex milling which other, less rigid machines, cannot."

For example, titanium bone screws must be machined precisely to tolerance with no burrs or rough edges. Structure produces thousands of these a year. Often in the 2 mm diameter range, screws are produced in a variety of lengths in typical lot sizes of 150-500 parts.

"For long screws, we use the Swiss-style machines. For production of spine and wrist plates, most of our business, we use another machine," Confoy says. To help visitors understand where exact-

ly these high-tolerance parts are used, there is a full-size model of a human skeleton in Structure Medical's conference room.

## Thread whirling perfection

On several of the Traub machines, Structure Medical ordered thread whirling attachments to achieve the tight tolerance specifications of the bone screws—typically, no burrs and micron tolerances. "Thread whirling permits extremely long threads to be produced in tough material on very small diameters without the need to support the part, and threads can be cut into solid material without the need to pre-turn," Zaiser explains.

The Traub tool for external thread whirling consists of a thread whirling head with several carbide cutting inserts. The whirling head can be mounted on the turret or in the end-working carrier. To produce a specific thread profile, a cutting tool form is calculated and produced for that thread. On the machine, the head is positioned directly at the guide bushing and is tilted to match the desired lead angle of the thread. When cutting, only one carbide cutting edge is engaged at a time. The whirling head runs at a high RPM, and the spindle (the C-axis) determines the feed rate, thus generating the thread lead.

Self-tapping bone screws made by Structure include threads made with the Traub thread whirling attachments. The titanium bar is fed right into the attach-



Titanium bone screws in 2 mm diameter range and a variety of lengths are machined precisely to tolerance with no burrs or rough edges in typical lot sizes of 150 to 500 parts.



ment. There is no need to first turn the bar down to the major diameter of the thread. "This saves processing time and provides a clean thread, generating the best whirled thread I have seen," says Confoy.

Most conventional thread machining utilizes single-point tools, and typically the tool bearing on the small part will push it away, resulting in out-of-round parts. Whirled threading avoids this, Confoy points out.

## Quality assured

For an order of 150 self-tapping screws in 30 different sizes, eliminating the time it would take an operator to inspect each self-tapping screw under a microscope saved two to three minutes per piece. "The part we machine required very little post-processing, and, in fact, we didn't even have to tumble it. We found we can take the parts off the machine, make sure there were no broken threads on the self-tapping feature, and ship them, knowing that the threads were good," Confoy says, adding: "The time savings due to thread whirling, one setup, and high part quality meant that we could ship our orders six weeks faster."

A related item is a piece of a titanium backplate that is a  $1/4$ " chip that prevents screws from backing out once implanted. Only a few thousandths of an inch thick, it is produced on one of the Traubs in a single operation.

"It's important for us to be able to make parts in one step," says Confoy. Handling the part more than once in-

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roduces the possibility of error, and secondary operations require operator attendance. "Our intent has always been to make parts complete in one operation," says Confoy. "The net result will be reduced labor, faster cycle times, and better quality. One machine will make concentric diameters better than will two," he says.

Another example of machining in one operation on a Traub is a titanium lumbar hook that helps connect vertebrae to a rod put into a damaged spine for support. "This hook form requires X, Y, and Z-axes, which the Traub has, so we can complete the entire form without secondary operations and without burrs," Confoy says. "The Traub was a good choice because there is a lot going on with this part—shapes, profiles, radii, and the like. Using end- and side-working end mills, drills—up to 18 tools—we have a 15-minute cycle," he says.

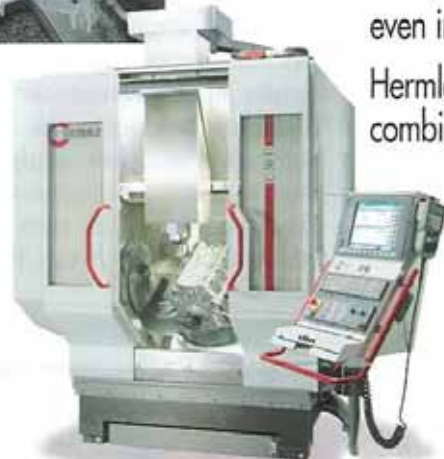
The programmable guide bushing drive of the Traubs is very effective in reducing setup time. If a guide bushing is not adjustable, it would have to be set precisely for the material going through it and bar stock would have to be ground to 0.002" tolerance. Without an adjustable guide bush, burrs on the end of the bar would prevent the bar feed from retracting easily back through and would stop the machine.

The Traub machines have three operating modes on the programmable guide bushing drive: 1) open position; 2) machining position where it grips the material with a prescribed pressure; and 3) locked, which for a sliding headstock machine used for milling, eliminates the torque that results from application of the milling tool that can cause tool wear and inaccuracy.

"For our purposes, the Traubs have a unique combination of features that have helped us win contracts and provide very high quality parts: speed, rigidity, and precision," Zaiser says. "Traub's twin turrets have Geneva indexing mechanisms, assuring very fast indexing, and the construction is the most stable we have found, contributing to extreme precision. It's the type of capability we shopped very carefully for, the kind of capability that sets us apart as a contract shop," Zaiser says. "The Traubs fit our strategy very well." **INDEX Corp., [www.rsleads.com/510tp-168](http://www.rsleads.com/510tp-168)**



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