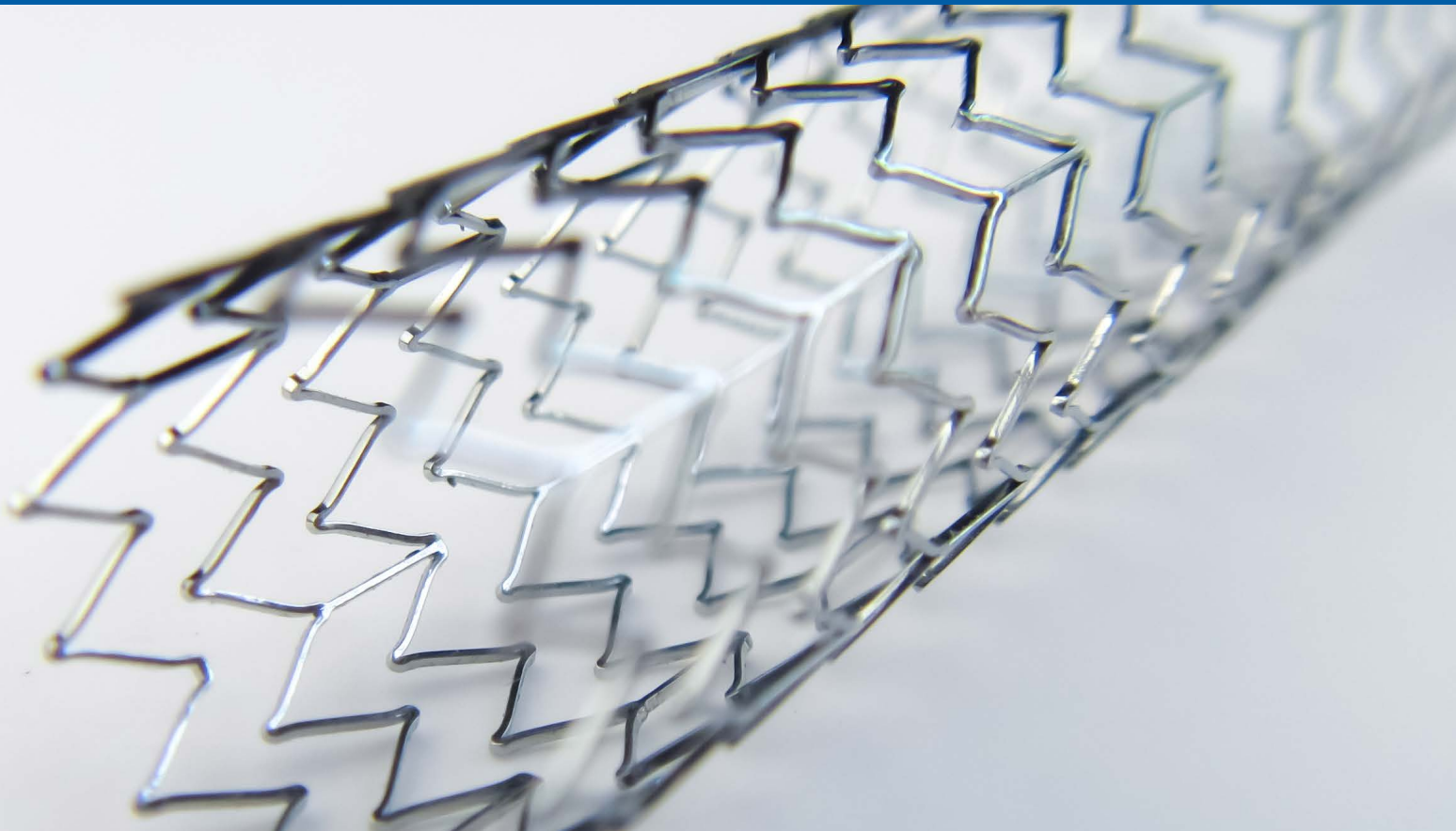


Laser Cutting Machine Enables Vertical Manufacturing of Nitinol and Other Metal Components



Success Story

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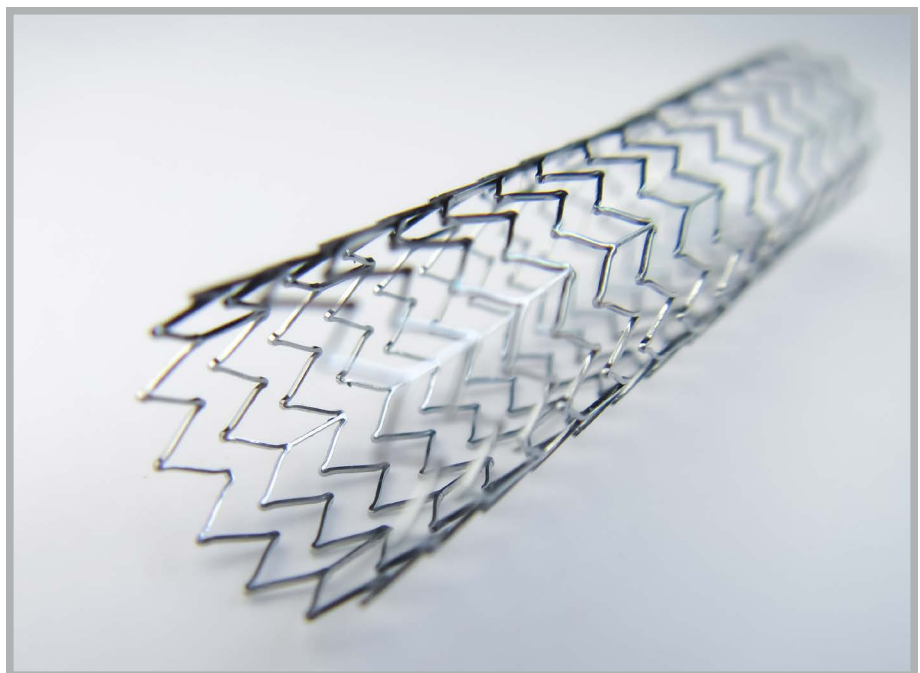
NIT, the only supplier of nitinol in Taiwan, brought precision laser cutting in-house with a StarCut Tube to ensure high quality and fast turnaround for their contract manufacturing business.

NIT – Experts and Pioneers in Nitinol

Nitinol Innovative Technology (NIT), located in the city of Kaohsiung, Taiwan, is the only supplier of Nitinol wire and tubing in all of Taiwan. The company was founded in 2016 as a spin-off from the Metal Industrial R & D Center (MIRDC) to promote the use of Nitinol for medical devices and similar precision components. This gave NIT immediate credibility in this next-generation material thanks to a technical lineage tracing directly back to Dr. Frederick Wang, the inventor of Nitinol, via his association with the MIRDC.

In addition to supplying raw material (i.e., wire) the company set out to be a contract manufacturer of finished components for medical devices and other applications. However, they soon found that outsourcing laser cutting created a bottleneck, slowing their customer response while also presenting quality control challenges. So they decided to invest in laser cutting technology in-house. After extensive investigation and research, NIT acquired a StarCut Tube in 2019.

NIT supplies nitinol wire and finished nitinol components.



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Unique Properties of Nitinol

Yi-An Chen, Vice General Manager at NIT notes, "Nitinol is a marvelous material that actually has two very important physical properties that are particularly useful for applications in minimally invasive medical procedures. First it is super-elastic, with an incredible amount of flexibility and kink resistance. This is perfect for guide-wires and similar devices that have to be remotely threaded through blood vessels and other small ducts in the human body. Nitinol also exhibits strong shape memory, which is why it is often referred to in the media as 'memory metal.'" Mr. Chen explains that after a shaped nitinol device is cooled below a certain temperature, it can be safely bent and deformed. When it is warmed above that temperature, it magically returns to its original shape. Nitinol is a nickel-titanium alloy and this so-called Af temperature is determined by the exact composition. In medical implants, it is designed to be slightly below body temperature. This allows, for example, a stent or coronary valve prosthesis to be folded to allow non-surgical insertion. It is then warmed by the body or warm water in a closed catheter that perfectly restores its original shape.

“ Nitinol also exhibits strong shape memory, which is why it is often referred to in the media as ‘memory metal.’ ”

Mr. Chen adds that while medical devices are a major application for nitinol, these properties also make it valuable for other applications. These include notebooks and other compact smart devices, where the shape memory allows placement of components in confined spaces that can't be directly accessed.



NIT creates finished nitinol components for medical devices and other applications.

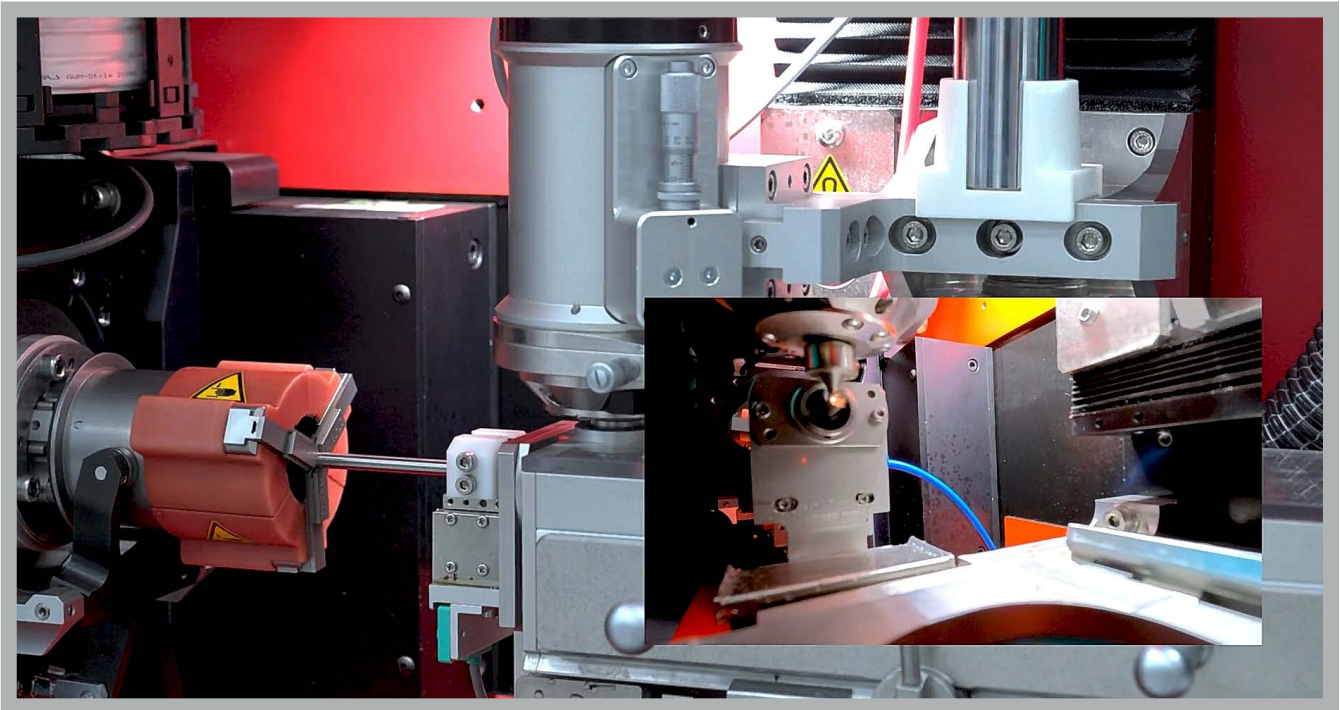
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Bringing Laser Cutting and Engraving In-House

To encourage wider use of nitinol, NIT knew they would have to lower the barrier to its use which often means supplying finished components. Mr. Chen explains that they want to convince potential users that nitinol is a superior material for many applications and that NIT understands this newer material very well and so can deliver the best results. He adds, "These arguments critically depend on our ability to deliver parts with exceptional precision and edge quality. Moreover, the medical device industry is characterized by frequent customized prototypes and smaller batches, so fast response from contract manufacturers like NIT is just as important as superior product quality."

At first, NIT outsourced laser cutting and engraving tasks. But they soon realized they would have to bring these capabilities in house for better control over quality and delivery scheduling. They then looked at several machines and machine suppliers.



NIT brought laser cutting in-house for better control over quality and turnaround time.

“

We also needed a machine supplier with experience in the medical device business to work as our partner with ongoing support and service.

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Choosing StarCut Tube

Mr. Chen explains, "We had identified several critical machine requirements including precision, stability, versatility, reliability, and ease of use/automation. We also needed a machine supplier with experience in the medical device business to work as our partner with ongoing support and service." Mr. Chen explains that automation and ease of programming were critical to support orders for prototypes and small batches with fast turnaround. An experienced machine vendor was needed because at first although NIT were experts in the Nitinol material itself, they only had limited knowledge of laser cutting and engraving. Versatility to switch between wet cutting and dry cutting was a prerequisite to enable NIT to support customers who often needed devices including other materials such as stainless steel. And lastly, Mr. Chen states that precision and stability were critical considerations because Nitinol is a high-value material, meaning manufacturing errors and scrap product need to be minimized or they could negatively impact costs for NIT.

He says, "We chose the StarCut Tube from Coherent as the best solution to meet all of these requirements." StarCut Tube is actually available with a choice of fiber lasers or a femtosecond laser or as a hybrid with both laser types. NIT chose the fiber laser as the best option for their needs. In conjunction with the machine's ultra-stable mineral-cast cutting platform, this laser provided the precision, repeatability, and edge quality that their customers require. At the same time, the high power of the fiber laser ensures fast processing, which minimizes the real cost of cutting each part.



The StarCut Tube has enabled NIT to become a vertically integrated contract manufacturer.

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Located in Kaohsiung, Taiwan, NIT today is a successful growing company servicing medical devices and other markets.

“
StarCut
Tube
has also
proved its
reliability
at NIT, with
virtually no
unscheduled
downtime.
”

The Result

Since 2019, StarCut Tube has proved to be a very effective and versatile workhorse machine for NIT. The company has produced an incredibly diverse range of products including stents, guidewires, specialty pins, sponge braces, and more. A lot of their products range from single unit to batch sizes <1000 units. But the company is structured for growth and higher volumes; they expect to soon fulfill orders as large as 50,000 units/year. Currently, most of their nitinol tubular products are in the 3-6 mm diameter range. However, they have worked with nitinol tubes as small as 0.56 diameter, where the machine's Teflon grips are critical to avoid any crush damage to the tubes. At the other end of the size and material spectrum, NIT has cut large stainless steel tubing with StarCut Tube: up to 12 mm diameter. StarCut Tube has also proved its reliability at NIT, with virtually no unscheduled downtime.

Mr. Chen summarizes, “This machine has helped NIT to become a successful vertically integrated contract manufacturer. We can now perform every step from design through sourcing the material, cutting, polishing, shape setting, testing, etc. Moreover, we do every step to the same exacting standards our customers now expect.” Not surprisingly, Mr. Chen sees a very bright future for Nitinol and for NIT, with StarCut Tube playing a strong supporting role.



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