

SIEMENS

Ingenuity for life

Medical devices and pharmaceuticals

Hung Chun Bio-S

Using CAM Express, medical specialist reduces time to process single customized bone plate from six hours to two

Product

CAM Express

Business challenges

Cut bone-plate processing time by one third and significantly improve productivity

Keys to success

CAM Express to improve customization capability

Strong support from Siemens PLM Software partner CADEX Technology

Easy-to-use software interface

Results

Time needed to process one customized bone plate reduced from six hours to two hours

Simulation prevented potential collisions

Customization substantially improved with ability to quickly and skillfully adjust parameter setting and jig

HC Bio-S uses Siemens PLM Software solution to quickly design high quality fixtures and jigs for small volume, customized production

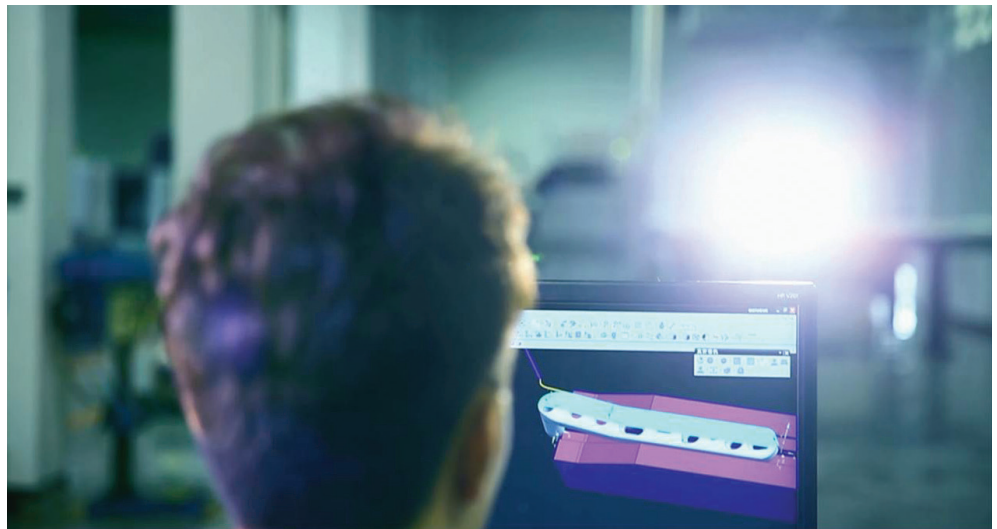
Focus on quality and speed in producing artificial bone plates

Hung Chun Bio-S Co., Ltd. (HC Bio-S), founded in 2006, is located in the special zone for biotechnology medical devices in the Southern Science Industrial Park in Luzhu, Kaohsiung, Taiwan. The company specializes in research and development (R&D) and production of medical implants. HC Bio-S has obtained GMP certification, class III dental implant examination by and registration with the Taiwan Ministry of Health and Welfare, United States FDA

certification and Europe's CE marking. Bio-S is the first company with the capability to develop, design and manufacture dental implants in Taiwan, and also the only maker of the dental implant system in the country.

With a solid foundation for artificial tooth implants and related applications, HC Bio-S also started concentrating on the development of artificial orthopedic implants (including artificial bone nail, bone plate, bone spicule and relevant devices) and fillings. The development of artificial bone plates was first among its successes.

Some orthopedic clinical surgeries, such as involving a bone fracture of a joint surface or osteoporosis, use mini bone nail or plate caged in bones as an additional anchor in orthopedic treatment. Basically, an artificial



bone plate is characteristic of irregularities at multiple places, not a product that can be mass produced. From fingers to hip joints, every bone plate is different in shape.

As the location and size of bones in a human body's upper and lower limbs vary significantly, most bone plates are highly different and therefore customized in small volumes. HC Bio-S alone has developed over 20 different kinds and sizes of bone plate. In addition, as an implantable medical device, every bone plate is subject to inspection and approval by the Taiwan Ministry of Health and Welfare before use by medical facilities.

Soon after entering the commercial production market, HC Bio-S bone plates were well received by its clients and prospects for high quality. Orders backlogged because the company's production capacity could not keep pace. Frank Lin, HC Bio-S factory director, explains, "Orders kept coming in, but we just couldn't shorten the lead time, leading to the probable delay of surgeries for some patients waiting for bone plate implantation. We had to tackle this fast."

For HC Bio-S's production facility to meet such a "large-variety, small-volume" production requirement, it needed high quality fixtures and jigs and powerful CAM software. This combination would enable its engineers to make bone plates for various body parts in the shortest time. Therefore, HC Bio-S purchased licenses of Siemens PLM Software's CAM Express,

ushering in a new generation of milling machining solution.

With CAM Express, processing time cut in half

To address its production shortage, HC Bio-S first invested in more advanced and efficient production equipment, which meant bringing in more advanced software as well. HC Bio-S invited several CAM distributors to field-test their software, including CADEX Technology, a Siemens PLM Software partner. CADEX's outstanding test demonstration using CAM Express notably stood out from the competition.

"In the past, it'd take six hours to make one bone plate fitting, and we expected to shorten that to four," notes Frank Lin. To his delight, by making a few tweaks to some processes, CADEX technicians used CAM Express to accomplish the mission within three hours. The eye-opening surprise was exactly the outcome that HC Bio-S had wanted.

HC Bio-S didn't stop there. Instead, the company has been constantly striving for further improvements. By January 2016, the company had reduced the time needed to make one fitting to just two hours. The quick response afforded by CADEX's technical support team often changed perceived problems into opportunities to further improve bone plate productivity.

"CADEX's technical support director has extensive practical experience and can offer us suggestions on all kinds of

“CAM Express has enabled us to make a bone plate fitting within two hours, down from six hours using our previous process.”

Frank Lin
Factory Director
Hung Chun Bio-S Co., Ltd.

parameter setting and jig fine-tuning,” says Frank Lin. “All we need to do is tell him what needs to be sped up and what can be slowed down; then after a thorough discussion, we make some parameter adjustments and we get the shortest manufacturing cycle, as simple as that.”

Strong technical support for new manufacturing methods

HC Bio-S’s background in manufacturing dental implants is based on turning specialized pins and screws on lathe equipment. But the bone plate components require milling processes, including multi-axis milling, less familiar to HC Bio-S. Here again, CADEX’s assistance helped HC Bio-S quickly adapt to the new approach.

Frank Lin cited the bone plate for “hip joints” as an example to illustrate how HC Bio-S and CADEX created a highly effective processing method through joint discussion and collaboration. To make this bone plate, 4-axis and 5-axis machining is applied. A cut has to be made to a hexagonal anchor point at a specific location in the inner bore, which is relatively difficult. In addition, with the inner bore being fairly deep, the operation becomes even more complicated.

Previously, HC Bio-S entrusted a local university to experiment on this operation, but the carving method applied was imprecise, and it took the university numerous attempts and extensive time to get the right size and shape per HC Bio-S’ specifications. However, HC Bio-S engineers collaborated with technical support experts from CADEX to quickly work out an approach that substantially reduced processing time, and officially applied it in production.

As some of HC Bio-S bone plates are arc-shaped, integral forming can be accomplished with a thick plate of 4 to 5 centimeters (cm) for one-time cutting, but this approach is relatively time-consuming and costly, so the engineers sometimes use several thin plates of 1 cm to get the bone pattern and appearance first, and

then bend them in secondary processing in order to reduce material consumption.

Frank Lin observes, “As long as the CAD software gives us the appearance we want, all the subsequent procedures can be handled with CAM Express.” Today, all fixtures, jigs and stamping dies related to bone plate production are independently manufactured by the company using CAM Express software and milling machines.”

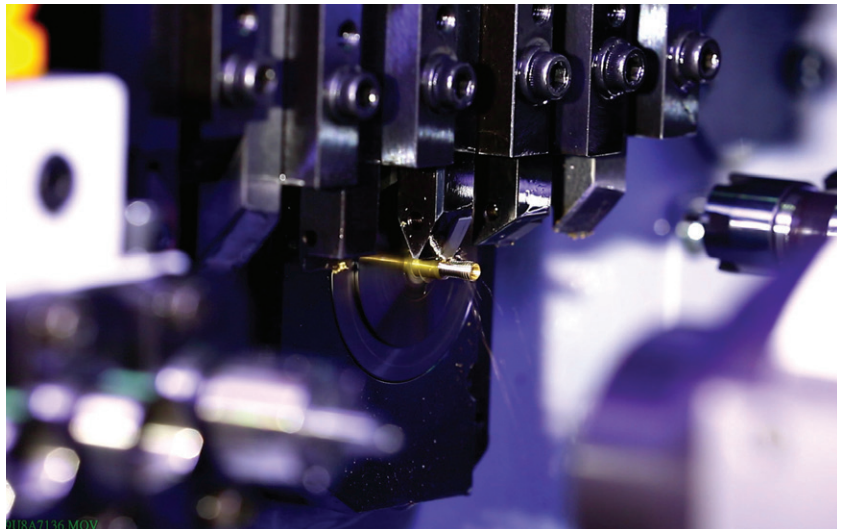
Eliminating potential collisions using simulation

With an easy-to-use interface, CAM Express also provides a library that integrates tools, lathes, cutting parameters, templates and processing, so that when creating the operating programs, machining parameter data will be invoked from the library automatically. All of these user-friendly functions come in handy at the earlier stages of milling operations for production engineers at HC Bio-S.

Kao Shengkun, an R&D engineer responsible for operating the machining system at HC Bio-S, cites his first and foremost advantage of using the Siemens PLM Software solution: “CAM Express allows you to not only directly click on and adjust cutting parameters but also simulate

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collisions between machine components. With this simulation capability, we see the machine's toolpath and the actual form of the product after cutting while simultaneously checking whether there are any issues with the programming and parameter setting."

Frank Lin concurs, pointing out that they previously had to be very vigilant about checking and watching each entry or exit transition to avoid costly machine crashes. With the collision simulation function of CAM Express, such emergencies are now effectively avoidable.

HC Bio-S uses templates that are pre-loaded with operations, tools, and methods designed for a specific machining job. This allows less-experienced workers to start a job with 60 to 70 percent of their work already done. Company best-practices are maintained, and NC programming time is reduced; a true win-win situation.

Milling technique extended to bone nail production, opening up new markets

Currently, about half of the company's products are manufactured directly on turning and milling machines programmed with CAM Express. The other half require tooling in the form of fixtures, jigs and

stamping dies, which are also manufactured with CAM Express. Frank Lin explains, "To make a proof within the shortest time possible has always been what we expect from CAM Express. Thanks to the extensive technical experience of Siemens PLM Software and CADEX consultants, we have been able to accomplish our mission in less time."

HC Bio-S is extending its experience building tooling with CAM Express to making bone nail stamping dies. "Bone nails are quite complicated with special specifications or shapes and may require two-section or three-section bending depending on different human body parts," says Frank Lin. "Then bores at different directions have to be drilled in the bends. The stamping die needed during the bending process can be efficiently made with CAM Express and a milling machine."

HC Bio-S began marketing its bone plates at the end of 2015, with medical facilities in Taiwan its main customer base. Now with United States and European certifications of its dental implants as an entrance ticket to international markets, HC Bio-S is poised to further expand by obtaining certification for medical device imports as required by each destination country.

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Kao Shengkun
R&D Engineer
Hung Chun Bio-S Co., Ltd.

Solutions/Services

CAM Express
www.siemens.com/plm/camexpress

Customer's primary business

Specializing in R&D and production of implantable medical devices, HC Bio-S is the first company with the capability to develop, design and manufacture dental implants in Taiwan, and has obtained GMP certification, US FDA certification, and Europe's CE certification. Since 2013, the company's focus includes the development of artificial orthopedic implants.
www.hc-bios.com

Customer location

Taiwan
Kaohsiung

Partner

CADEX Technology
www.cadex.com/en/technology

“With effective technical support and various suggestions on parameter setting and jig adjustment from Siemens PLM Software and CADEX, we’ve quickly adapted to milling machining, which, in turn, has improved our capability of bone plate customization.”

Frank Lin
Factory Director
Hung Chun Bio-S Co., Ltd.

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