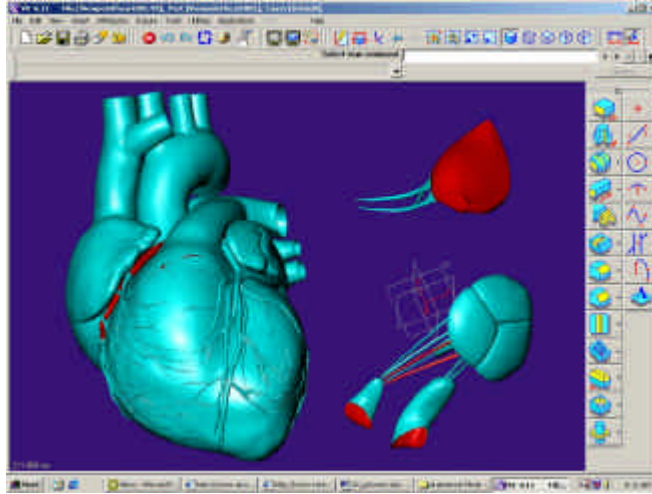


VX to Model Cardiac Devices

Until very recently, it was nearly impossible to surgically repair the human heart. In World War II, following extensive experimentation on living animal hearts, the first big advances made it possible to remove shrapnel lodged in the hearts of soldiers.

Coronary surgery has made huge strides since then, but despite the development of heart-lung machines, new drugs, balloon angioplasty, and devices such as pacemakers, stents and artificial hearts, surgeons have still relied on living animals and patients for training to become proficient in treatment options.

Clearly, surgeons would prefer a life-like learning environment in which they could practice a wide range of procedures on a variety of cardiovascular conditions. Traditional methods, however, have been expensive, not always readily available, and sometimes dangerous. Thanks to new technology being pioneered by Guidant Corp., surgeons are now better able to tackle challenging procedures without life-threatening consequences- and Guidant is able to design a refined new generation of minimally invasive coronary devices.



Surgeons, cardiologists, and electrophysiologists learn more quickly and confidently when they can explore a variety of scenarios similar to what they might encounter in the operating room or cath lab," says David Wolf-Bloom, manager of in-vitro pre-clinical R&D at Guidant. "Doctors want to avoid situations where a medical device has to be removed from the body because it doesn't perform as needed. The life-like models that we create help physicians avoid this problem and help us to design and build devices that better address the clinical challenges they face."

In developing anatomical models to test new coronary products, Guidant begins with 3D medical images- typically a model based on normal anatomy from a set of CT (computerized tomography) slices stacked up so that they can be reconstructed as a whole organ. Guidant, in collaboration with outside research groups, transforms the CT scans using front-end algorithms that threshold the images to produce an IGES file.

At this point, the IGES file is read into VX CAD/CAM software and a mold-ready surface is quickly created. For Guidant's product development staff, the textbook "idealized" anatomical structure is just a starting point. Diseased organs undergo a series of changes in shape, structure and tissue thickness, and Wolf-numerical control can perfectly alter an anatomical model according to any unique clinical data.

To streamline the process, Wolf-Bloom's team has "modularized" certain organic structures that can be fitted into new assemblies that correspond to the various disease scenarios. Some of these structures are then deformed or moved with VX's modeling tools. Other organic structures such as smaller branching arteries can be simply drawn free hand.

"Some product designers talk about 'organic' shapes when referring to consumer products, but no manufactured product is

"VX handles organic forms so well."

Guidant's products and training benefit from a new realism based on a combination of life-like polymers molded from an unusual application of CAD/CAM technology.

Traditionally, CAD/CAM software has been used to create consumer and industrial goods such as cell phones, TVs and cars. However, Guidant is now using powerful freeform modeling in VX CAD/CAM software to create the organic shapes of the human heart and its surrounding arterial "tree" to achieve a level of realism previously unavailable to physicians and medical product designers outside of a living body.



as uniquely challenging and odd-shaped as a human organ," says Wolf-Bloom. "There are no standard geometric forms such as you'd start with in a typical solid modeling program. VX has been especially useful in our work because it handles these organic forms so well. It's also been easy to use, and having mold making tools directly integrated into the software has been important to us because we need to mold a number of variations without a lot of back-and-forth with mold makers and translators."

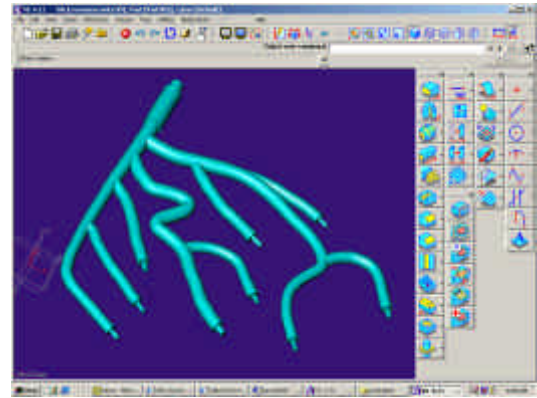
The VX mold making tools help Guidant through a lost wax process in which complex geometries and varied wall thicknesses help mimic the realities of the human anatomy. VX software also allows the necessary offset from the center of the cavity to further establish the realism and tactile experience so vitally important in surgical training and in the development of the latest generation of medical devices.

"We're pleased with the degree of realism that we've been able to achieve with VX."

While many are now familiar with Guidant's pacemakers and the tiny mesh tubes known as stents that keep open clogged blood vessels, Guidant has also developed a number of more exotic devices such as implantable defibrillators that monitor and regulate hearts that race out of control, and pumps and stabilizers that enable safe beating-heart surgery-as opposed to surgery with heart-lung machines that stop the patient's heart.

Physician feedback on Guidant's newest devices and the surgical training with its molded anatomical models has been uniformly positive. The new models are used daily in a training facility in Brussels and because the models are easily portable-unlike patients or living animals-Guidant personnel can easily conduct training and testing in physicians' offices and hospitals.

"We're pleased with the degree of realism that we've been able to achieve with VX," concludes Wolf-Bloom, "but the next step is to produce a beating heart to even more accurately simulate the real clinical environment. We expect to use our VX software to develop these and other mechanical devices that enable better cardiac care."



About VX CAD/CAM

VX CAD/CAM software offers premium-performance capabilities typically available only in expensive enterprise-level products. VX is the only value-priced, premium-performance CAD/CAM software that integrates design and manufacturing to eliminate the traditional gap between CAD and CAM. Manufacturing planning and CNC machining routines are integral parts of the VX engine and provide synchronization between design and manufacturing. In addition, VX provides sophisticated functionality such as advanced Class A surfacing, intelligent sketching, photo-realistic rendering, and history editing.



VX Shaping the future of CAD/CAM™

VX Corporation
2350 Commerce Park
Drive
Palm Bay, Florida
32905
Tel: 321.676.3222

VX Corp. (Europe)
Innovation House
Bridgend Road
Llanharan
CF72 9RP UK
+44(0)1443 661060

sales@vx.com
www.vx.com