

Zygote Media Group, Inc.

PUMPING UP CARDIAC PRODUCT DEVELOPMENT WITH SOLIDWORKS



Using SolidWorks software, Zygote has accelerated the development of soft-tissue anatomical models, such as the heart.

→ Zygote Media Group, Inc. is the premier provider of 3D human anatomy content. Based just south of Salt Lake City in American Fork, Utah, Zygote has built a library of licensable 3D human anatomy models for visual and product development. The company delivers anatomical modeling, texturing, rigging, animation, rendering, compositing, and visual effects to world-class companies, and boasts the most comprehensive and integrated collections of anatomical models and textures available today. Zygote has licensed anatomical models for entertainment and educational venues, including the movie *Hollow Man*, The Discovery Channel, academic textbooks, and product development such as cardiac and orthopedic devices.

As a leading provider of 3D human anatomy content, Zygote Media Group, Inc. recently began receiving numerous customer requests for accurate 3D CAD models of human body parts, including bones, organs, arteries, nerves, skin, and muscle tissue. For much of its history, the company produced graphics, visuals, and animations using a variety of imaging, rendering, and animation tools for entertainment or educational applications. In recent years, however, Zygote has experienced an increasing demand for accurate anatomical CAD models to serve as templates for medical device manufacturers that are developing new lifesaving technologies.

According to David Dunston, Zygote executive partner and designer, "Instead of relying solely on cadavers, 2D magnetic resonance imaging (MRI), and computer tomography (CT) scan data as reference points for designing medical products, manufacturers are now beginning the development process by acquiring information-rich 3D CAD models of soft-tissue organs like the heart. Although most of the initial CAD model requests were orthopedic related," he explains, "recent requests for soft-tissue models prompted us to evaluate available 3D CAD modeling and surfacing technologies so we could respond to this growing demand."

After evaluating several leading 3D CAD systems, Zygote selected SolidWorks® 3D CAD software because of its ease of use, advanced surfacing capabilities, broad data compatibility, and widespread use throughout the medical device industry.

"We decided to make SolidWorks a part of our pipeline not only because of its compatibility with other formats, but also because most designers and engineers who request human anatomy models are SolidWorks users," Dunston notes. "For those who use different CAD systems, SolidWorks is adept at translating, importing, and exporting a variety of data formats."

Knitting scanned surfaces into models

With SolidWorks software, Zygote is able to accelerate the creation and manipulation of digitized surfaces and develop anatomical models more efficiently. On the Zygote heart model, for example, designers used a handheld digitizer to scan coordinates from an actual physical model. Using this scan data, designers built detailed, high-quality IGES surfaces that correspond to the various internal and external regions of the heart, such as the ventricles, atria, valves, veins, and arteries. Zygote engineers then imported the scanned surfaces directly into SolidWorks software.

"With SolidWorks, I efficiently merged, edited, and manipulated the multiple IGES surface scans to create an anatomically accurate model of the human heart," recalls Mari Truman, Zygote's principal engineer. "The productivity gain I realized by using SolidWorks software to model these complex, organic shapes was on the order of 300 percent. We were quickly able to create a much more precise CAD template of the human heart that our customers can utilize as the basis for cardiac device development."



- Realized productivity gain of 300 percent
- Improved ability to model complex, organic shapes
- Facilitated cardiac product development by customers
- Developed first anatomically accurate heart CAD model

→ As a leading provider of 3D human anatomy content, Zygote Media Group, Inc. has experienced an increasing demand for anatomical CAD models to serve as templates for medical device manufacturers that are developing new lifesaving technologies. The growing number of requests for soft-tissue models like the heart prompted the company to evaluate available 3D CAD modeling and surfacing technologies for producing licensable, parametric CAD models.

→ The company selected SolidWorks 3D CAD software because of its ease of use, advanced surfacing capabilities, broad data compatibility, and widespread use throughout the medical device industry. By implementing SolidWorks, Zygote realized a productivity gain of 300 percent; improved its ability to model complex, organic shapes; facilitated cardiac product development by its customers; and developed the first anatomically accurate CAD model of the human heart.

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Parametric templates support model evolution

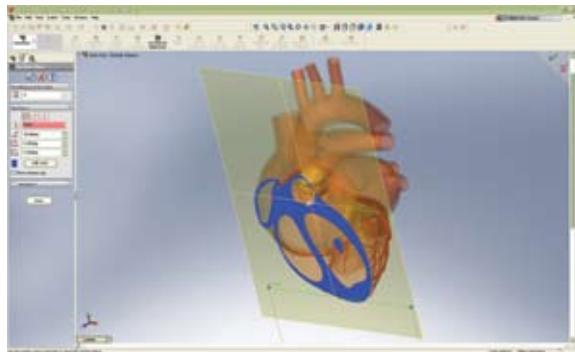
By developing a parametric model of the human heart in SolidWorks, Zygote was able to enhance the value of the heart template for product developers by allowing them to alter the model to meet unique, specific, and real-world conditions. Heart size and geometry vary greatly, as do the conditions of interest to device manufacturers. With a 3D parametric CAD model, however, researchers and product developers can utilize actual patient x-ray and scan data to morph the heart model to match a specific patient and condition or to represent a more generalized group.

"The Zygote template also enables engineers to modulate material properties and multiple strain rates to simulate heart-muscle contraction properties accurately, conduct computational fluid dynamics (CFD) studies of blood flow, or perform other types of complex analysis," Truman points out. "Having access to a parametric heart model gives designers the flexibility to study the model completely and simulate the organ's multiphysics behavior fully. As a result, they gain a greater understanding of their specific design requirements."

Supporting cutting-edge cardiac applications

Developing a parametric heart model in SolidWorks allows Zygote to support a range of customers that are pursuing cutting-edge cardiac applications. Companies that have licensed the Zygote heart model include: Heartware, Inc., to develop a family of miniaturized, continuous-flow heart pumps for the treatment of advanced heart failure; W.L. Gore & Associates, to produce cardiothoracic products; Sutura, Inc., to manufacture minimally invasive suture placement devices; and St. Jude Medical, to develop a variety of cardiac devices.

"SolidWorks software has helped us deliver a high-quality model that our customers can use to save and extend lives and to improve patient quality of life as well," notes Dunston.



With SolidWorks, Zygote can offer parametric heart models to its customers for use in the development of cutting-edge cardiac applications.

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