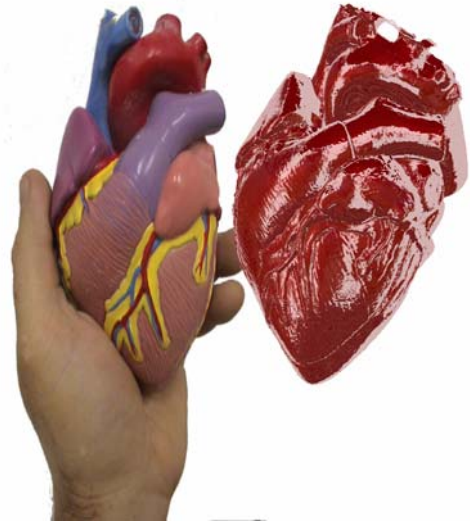
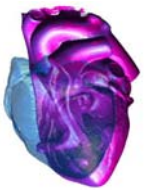
Super Sized Heart for Science and Education



Exported replication of a gigantic 10-foot tall human heart for an Egyptian science museum is due to vision, capability, process and technology advancements. This huge heart is an excellent example of originality and complexity using time compression technology methods. Millit5 (www.millit5.com) was contacted to perform a 3D scan and reverse engineer a fist-sized human heart model, and then create a 10-foot tall walk-through heart. The science museum piece had to be perfect in shape as well as facilitate several functions. The human heart is by far one of the most complex objects to understand, much less scan, replicate, and build such a large working model.



Millit5 typically does automotive scanning and milling projects for the world's leading automakers. One of its recent weekly workloads involved scanning an entire HVAC unit for a Toyota Avalon; the next day, they ended up scanning this human heart for the Egyptian science museum. Millit5 president and CEO Kim Gruber states: "The free form shape geometry of the human heart is like the class-A surface of an automobile with all the blends and contours that make up the car body." Kim used the best methods, practices and processes his company taught to Ford Motor Company's Product Development stylists and clay modelers over the past 12 years, insuring that the huge heart was authentic to form and shape −all based on ISO 9001 standards− and held the milling data to a tolerance of ± .03 mm. The heart project's design required 7 different proposal theme concepts for management reviews. Once the final theme selection was nailed down, the huge heart theme model was morphed and tweaked using the industry's latest technology.

Scanner Tech:

VxScan, Creaform's data acquisition software that powers the REVscan laser scanner, produces a real time surface rendering visualization on a computer monitor as you scan. The scanning method requires a technique similar to spray-painting a model. You see what you're scanning in real time, and can repair any holes or voids in the data or satisfy any other specific requirement on the spot. This eliminates the need of having to rescan. Moreover, VxScan automatically generates .STL files instead of point clouds. REVscan's new technology and better algorithms have also improved the 3D morphing process and the eventual milling of the final results. The STL's new mesh aspect ratio quality needs no post processing for CNC milling, CFD software requirements, or even model morphing, thus saving time at each step. The REVscan's lightweight and compact design, as well as its ability to scan concave and convex shapes, produce outstanding flexibility when scanning holes. The REVscan scanner has an umbilical cord, which facilitates a 360-degree capture of data for hole openings or the most complex surface contour. All scanning is based on line of sight during data capture, which is the same as 3-axis view dependant CNC machining. The scan data captured with a single scanning of

the object with the REVscan were used to do all the engineering data changes, data morphing, digital rendering, 3D walk through video and CNC machining for the finished 10-foot tall heart.

Pumping Through the Heart Project:

Once the heart model was scanned and the data perfected, the next challenge was to modify the heart data so that it would sit in the museum on a stand that would encourage visitors to walk through it. A human heart is not the optimum shape to fit on a platform. It took some innovation to first morph and shape the data until it would fit onto one. Then, the heart model had to be evaluated to provide a door opening that someone could walk through, while retaining as much of the interior detail as possible. The challenge was to create a museum model representing a realistic human heart that would be enhanced with light and sound as a person walked through it. All the heart's chambers and valves are realistic and facilitated the enhancement of lighting and the sounds of a real heart beating. When standing inside the finished heart, looking at the valves, the heart chambers, the "plumbing", and hearing all the sounds vibrating, you can easily imagine that you are standing inside someone's chest. It is amazing to realize that this is actually inside our bodies. Thanks to Millit5' ingenuity and the REVscan's accuracy, the finished product was a resounding success. The finish product is truly awesome!

Benefits:

Quick and reliable 3D scanning data capture, quick surface reconstruction methods, deviation analysis, morphing and 5-axis milling process implementation tools will accelerate a company's design project strategic direction. By using .STL files that are directly generated by the REVscan for prototype wood, metal, and clay milling, processing time can be cut by 60-80%. This time saving is realized by using flat end mill tools over ball end tools. Every 60 minutes of milling a surface with a ball tool represents only 12 minutes of milling using a flat tool! When it comes to surface cutting or .STL manifold topology, the time saving factor to mill is 5. Time saving of approximately 80% is obtained by using a flat cutter whether the model is a car exterior or even a human heart. With quicker reverse engineering data collection methods, .STL generation, and Class A surface generation, industry is turning out 5-axis milling products in record time. This industry has pushed software suppliers very hard to develop some of the tools as well. Very few companies offer the ability to scan, surface, and 5-axis mill leading industry quality prototypes all under one roof. Millit5, based in Michigan (248-939-0940), uses the REVscan to do on-site 3D data capture. The laser scanner allows companies to do on-site 3D measuring and shape acquisition of large parts that are not economical or timely to ship, saving the clients shipping costs, time, part teardown and setup, and preventing them from loosing possession or control of a tool, part, or confidential design.