Applying Tech: Cardiovascular

How are you influencing cardiovascular devices?

Jeff Lind
President, Compliance West

As cardiovascular design surpasses Medical Standard requirements, custom test equipment providers are challenged by equipment designers to build more accurate and reliable equipment, with decreasing cycle times to handle more throughput.

Because standardized tests don’t exist for many of these new designs, custom test equipment has to be based on robust engines that can be quickly modified to provide the new test package. Since the test packages are empirical, test equipment should be flexible so it can be modified after production should official test Standards become available.

Kimberly Powell
Business Development Manager, Healthcare & Life Sciences, NVIDIA

NVIDIA is involved in a number of collaborations with developers, clinicians, and medical educators that advance the state-of-the-art in cardiovascular devices.

Collaboration between NVIDIA, Cyberheart, and Stanford University produced a device that takes MRI data from heart patients, creates vascular volumes and surfaces in 3D, then simulates and visualizes cardiac blood flow in real time. By harnessing the large graphics memory in NVIDIA Quadro professional graphics processing units (GPUs), NVIDIA CUDA parallel computing technology with OpenGL-based graphics, and a 3D-enabled stereoscopic display, clinicians gain non-invasive and interactive insights into abnormal blood flow patterns, enabling faster diagnosis.

The UCLH Heart Hospital and Glassworks leveraged NVIDIA solutions to develop Heartworks, an animated 3D model of a beating human heart used to teach cardiac anatomy and simulate the experience of transesophageal echocardiography. Using NVIDIA Quadro GPUs and their massively parallel computing capabilities, clinicians can tap complex data sets to produce an authentic ultrasound representation, animate the model to beat in real-time to show changes in the heart's shape during the cardiac cycle, and view slices of the scene to gain valuable diagnostic insights.

Dave Bird
Balluff Inc.

We are influencing cardiovascular devices on several fronts.

We are contained in many “on-board” instruments like cardiac bypass systems that use new technologies for reliable blood level sensing on oxygenation canisters where film, residue, bubbles, or froth can false trigger traditional sensing technologies.
- In error-proofing the manufacturing of stents, balloon catheters, manifolds, and related “plumbing” involved in cardiac catheterization, angioplasty, etc.
- In error-proofing the precision forming of expensive titanium and related alloys that eventually become implantable pacemaker or defibrillator cases in cardiac rhythm management disciplines. These metals are extremely expensive and if mistakes are made in the forming process, they’re very costly.
- In confirmation of specific components used in cardiovascular kits that contain a myriad of “parts” for application-specific procedures, with low-cost, yet highly functional vision sensors.

Tero Káhkönen
VP, Customized Products Business, VTI Technologies Oy

VTI Technologies Oy is a leading supplier of sensors for activity monitoring in cardiac rhythm management (CMR) applications. The company's MEMS solutions are based on VTI's proprietary 3D MEMS technology that enhances cardiovascular devices in many ways—improving intelligence about patient condition, providing better performance and well-being for the patient, and enabling smaller dimensions.

For pacemakers, accuracy, low power, and reliability are the key parameters; more accurate activity monitoring means the patient's heart rate can be adjusted to match precisely the needs of the patient. VTI's unique MEMS design, which combines single crystal silicon and glass, ensures exceptional reliability, unprecedented accuracy, and excellent stability over time. The power requirements of these sensors are extremely low, which gives them a significant advantage in small battery-operated devices. VTI's 3D MEMS technology enables ever smaller sensors and batteries to be designed, thus meeting the miniaturization requirements of the manufacturers of implantable devices.

Paul Ogden
Director of Sales, ASG Medical Systems

ASG Medical Systems is designing and building automated machinery that powers the manufacturing of disposable medical devices. Our technology makes new life-saving procedures, such as angioplasty and catheter-based surgeries, work better.

Our machines make these lifesaving instruments less costly and more effective so people can get the life-prolonging surgery they need.

Medical manufacturers today are developing surgical procedures for treatment of diseases such as cancer, cardiovascular disease, joint degeneration, and diabetes. These surgeries rely on precisely designed instruments that are inserted through small incisions to perform complex tasks like placing stents, repairing damaged tissues, removing tumors, and clearing blocked arteries. These instruments are traditionally manufactured by hand in laboratories.

ASG’s machines automate the manufacturing of surgical catheters, much like modern automobile factories build cars faster and better than humans can. Our most popular machines are the Accu-Cut 202L automatic tube cutter, and our AGF-3M automated guidewire feeder. Both can process parts much faster while holding much tighter tolerances than humanly possible.

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