Using CT Scanning to Test/Inspect Medical Devices in the Design or Production Phase

CT scanning for test and inspection of medical products continues to grow.

NVision, Inc., Coppell, TX

The rapid advance of medical technology has created a growing need for ever more precise technologies to measure and inspect medical components. One of the most accurate scanning technologies, and one whose use is growing in the medical equipment community, is CT scanning.

WHAT IS CT SCANNING?

Figs. 1 and 2 – These show the original scalpel to be scanned and its stereo lithography format file.

Computed Tomography, or CT scanning, is a process that utilizes x-rays to produce 3D representations of both internal and external components. It is typically utilized when a customer's modeling or inspection requirements exceed the capabilities of laser scanning. Such is often the case with medical devices and components, which frequently contain internal geometry, which would be obscured for laser scanners. Another advantage is detecting hidden flaws in plastic moldings and castings.

CT scanning provides measurable data that can then be compared with a component's original design data so as to inspect for deviations or material flaws that may have occurred in the manufacturing process.

Excellent results from CT scanning can be achieved on non-metallic components fitting within an envelope of 150mm diameter. Small plastic medical components are therefore ideal candidates for CT scanning. However, larger metal parts can also be CT scanned.

HOW CT SCANNING IS APPLIED IN TEST AND INSPECTION APPLICATIONS

Typically, when a medical device or surgical tool is CT scanned, the output received from the CT scanner is an STL (stereo lithography) format file, which is then opened in specialized software for inspection against the device's original CAD file or used to create a CAD file in the customer's required native format such SolidWorks, Siemens NX, Catia, Pro E, and Inventor. (See Figures 1-2)

Utilizing the results of CT scanning, medical engineers can compare one physical part to another part to determine where differences may exist. (For example, comparing one scalpel to another.) CT scanning can also be used to compare an actual, physical part to its original computer- aided design (CAD) file to determine if and where any deviations between the original CAD design and the actual manufactured object may lie.

In cases where a CAD file of the part is lost or otherwise unavailable, the STL file produced by a CT scan provides engineers with the necessary data for reverse engineering or to quickly reproduce exact duplicates of the part.

Since CT scanning allows measurement and inspection of both the interior and exterior features, the output enables engineers to measure all critical dimensions—no matter how complex the geometry. These measurements can then be applied to detect flaws or defects in the scanned object's design, materials or assembly. Engineers can also determine the clearance of internal parts relative to one another. Results of a CT scan can thus be used to analyze and optimize an object's design and even its manufacturing process. A further benefit of CT scanning is that it allows engineers to see an object's internal components in their working position without requiring disassembly of the object.

This article was written by Steve Kersen, VP of Sales and Marketing, NVision, Inc., Coppell, TX. For more information, e-mail sales@nvision3d.com, or visit https://www.nvision3d.com