

NVision Saves Weeks by Reverse Engineering Turbine



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NVision, Inc. recently reverse engineered the rotor assembly, diffusers and diaphragm of a turbine for a major turbomachinery engineering firm in Texas. The full reverse engineering process only took five weeks, far less than six months that the engineering company had originally allotted for the project using less sophisticated measurement methods. "Using our own HandHeld scanner, we were able to measure the parts' geometry to extremely high levels of accuracy and produce the necessary CAD files. This made it possible for the company to perform simulations to optimize the turbine's design, substantially improving its energy efficiency," said Steve Kersen, NVision's vice president of sales and marketing.

The engineering firm specializes in industrial turbomachinery design and power generation engineering, focusing on steam turbine design and power plant engineering as well as other turbomachinery such as gas turbines, pumps and compressors. The company was tasked with redesigning a turbine so as to optimize its energy efficiency. However, in order to perform the necessary simulations it needed to have the CAD model of the existing turbine, which was not available. "This was a classic scenario for reverse engineering," said Kersen. "Lacking the original CAD file, the company needed to create a new one by collecting the turbine geometry at the highest possible level of accuracy and in the shortest amount of time."

The engineering firm contacted NVision, which sent technicians to the firm's site where they encountered difficult working conditions. The project area was outdoors without a covered structure, which posed a material concern as sunlight would interfere with NVision's scanning equipment and both the equipment and technicians would be exposed to the elements. Before scanning could begin, NVision technicians worked to drape black plastic sheeting across the top of the work area to protect their equipment and ensure the accuracy of the scanning. They then proceeded to scan the turbine using NVision's HandHeld scanner.

The NVision Handheld scanner is a powerful portable scanning device that is capable of capturing 3-D geometry from objects of almost any size or shape. The scanner is

attached to a mechanical arm that moves about the object, freeing the user to capture data rapidly with a high degree of resolution and accuracy. As a part is inspected, the scanner generates a point cloud consisting of millions of points each with x,y,z coordinates and i,j,k vectors. Integrated software that comes with the scanner is used to convert the point cloud to an STL polygon and an optional tripod provides complete portability in the field. Intuitive software allows real-time rendering, full model editing, polygon reduction, and data output to all standard 3-D packages.

After completing the scanning, which took several days, NVision processed the data to an STL format. The STL file was converted to native parametric SolidWorks CAD format so the company could begin the redesign process. The completed SolidWorks rotor assembly CAD model contained over 3,000 blades. Upon examining the rotor and diaphragm models, an engineer at the turbomachinery firm wrote to NVision and stated that their work was "very impressive to say the least" and praised the "diligence and caliber" of the NVision team's work.

Kersen agrees. "The adverse conditions at the work site were extremely challenging. Without our technicians' devoted and professional work ethic, the scanning would not have been possible. The completion of this project is a testament to our staff's dedication to customer satisfaction."