

3D SCANNING TOOLS - UTILIZING THE LATEST TECHNOLOGY TO COMPLEMENT RMS EXPERTISE

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The experienced RMS engineering team continues to employ the latest technology to augment RMS' ability to deliver high quality solutions for our customers. One piece of this tech is the FaroArm 3D scanning tool, which RMS uses at both the Bethlehem, PA and Houston, TX shops. This important tool has a number of applications which include inspections, reverse engineering, and assisting RMS in producing the best possible results for its customers.

- **Reverse Engineering:** Acquiring precise digital measurement data on parts or assemblies for which blueprints or CAD drawings do not exist.
- **CAD-Based Inspection:** Quickly identifying deviations from nominal CAD data with 3D metrology solutions from FARO.
- **Dimensional Inspection:** Quickly capturing measurements, performing inspections in 3D, and ensuring proper tolerances are achieved with FARO products and expertise.
- **First Article Inspection:** Ensuring first article parts meet design specifications and tolerances before accepting them and putting them into production.
- **In-Process Inspection:** Inspecting parts in-process, directly on or at the machine producing them. Eliminating inspection bottlenecks. Saving the time and effort required to pull the part off the machine, transport to inspection, send back to the machine, re-mount (and re-align), and re-inspect.
- **Incoming Inspection:** Preventing out-of-tolerance parts from reaching assembly and ensuring high-quality products.

As parts arrive, RMS compares the part against the drawing (where applicable) to ensure the dimensions are correct. Depending on the tolerances, if outside the FaroArm tolerance, we will use regular inspection tools along with the FaroArm. Parts that we have a solid model are imported into inspector software where RMS scans the part and overlays the polygonal

model to determine if there are any deviations, which includes GD&T (Geometric Dimensioning and Tolerance) measurements. Upon completion of these inspections, a final report is drafted up and the part proceeds to its final destination.

In addition to inspection capabilities, RMS' engineers use the FaroArm to reverse engineer parts and gather the required data to baseline components. This data is then used by RMS engineers to upgrade and improve upon current designs using the latest in engineering techniques and decades of experience. The FaroArm's ability to gather the crucial data needed to reverse engineer components makes it a critical tool used at both RMS shops.

Houston, Texas Case Study

RMS was contacted by a customer who wanted to replace their impeller/rotor in a single-stage overhung centrifugal compressor with an upgraded design. The RMS Houston shop used the latest in FaroArm technology and scanning programs to scan the customer's current impeller/rotor so that the RMS engineering team could reverse engineer and then improve the design.

RMS used the scans from the FaroArm to create a 3D model of the impeller that was then analyzed by the RMS engineering team. The team used this data to start working on the improved design. RMS in-house aerodynamicist also used this modeling data to design the replacement impeller. The final improved impeller design also benefited from RMS AC Compressor engineering experience and intellectual property thanks to decades of experience designing impellers for similar applications.

Thanks to the data gathered with the use of the FaroArm, RMS will supply the customer with an impeller that will fit while also providing improved performance. The ability to reverse engineer components allows RMS

to service and upgrade any component regardless of access to engineering drawings.

Bethlehem, PA Case Study

RMS had an Ingersoll-Rand 3000 frame axial compressor in the Bethlehem shop for a routine overhaul. The customer had a complete spare unit and was able to ship the entire axial compressor—casing included—to RMS at the completion of its operating campaign.

The inspection found that the first and second stage rotor blades and discs had suffered corrosion damage

and should be retired from service. RMS and the customer took advantage of this opportunity to modify the design of the replacement blades and discs to rerate the compressor to achieve 3% increased flow capacity.

As part of the repair and rerate, the existing compressor casing flow path was laser scanned with the FaroArm laser scanner. Using this data, RMS was able to optimize the tip height of the replacement rotor blades to balance the need for maximum efficiency with the requirement to minimize the potential for an in-service blade tip rub.

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