Moving to 3D Model-Based Inspection Improves Shop-Floor Quality Control

Manufacturing Engineering: What’s new in the recently updated X8 inspection software from Verisurf?

David Olson: The Verisurf X8 release adds many new coordinate metrology automation features that make portable and stationary CMMs more productive for all users across the manufacturing enterprise. For example, a CMM programmer benefits from Verisurf Automate object-oriented drag-and-drop inspection planning, new 3D rendering and visualization, as well as DMIS and I++ DME standards support. Out on the shop floor, a CNC machinist performing in-process inspection will enjoy the new touchscreen CMM operation and upgraded Align-Inspect-Report automation. Meanwhile, MRO Inspectors out in the field will utilize the latest drivers for new portable CMM arms, 3D scanners and laser trackers from API, Faro, Hexagon, Nikon and Creaform. At SME Prime schools, manufacturing educators will appreciate new application specific curriculum, online training, and affordable training licenses so students can earn coordinate metrology certificates at home. Most importantly, quality managers are rewarded with consistently improving coordinate metrology software that is easy to train new staff and maintain across their manufacturing enterprise.

ME: What are some advantages in automating inspection techniques that help improve manufacturing productivity?

Olson: Model-Based Definition (MBD) for inspection, CMM-independent inspection plans, lean in-process inspection, and democratizing inspection are major trends helping to improve manufacturing productivity.

All manufacturing industries can benefit from 3D Model-Based Definition and inspection. Rapid inspection to 3D CAD models with MBD is the future and hand measurements referencing 2D drawings are on the way out. To be more specific, most manufactured parts inspected to a 3D CAD model nominal with associated MBD data are faster, better and cheaper than hand-measuring the same part and comparing it to a 2D paper drawing. All manufacturing industries see this trend and are making the transition with new inspection hardware, software and training.

Resource-independent inspection plans allow different people to run the same inspection plan on different CMMs and obtain repeatable results. For instance, a highly profitable first article can be inspected by a machinist with a manual portable CMM on the shop floor and the machinist does not need to wait for the CMM bottleneck in the quality room. Lean in-process inspection means you eliminate unnecessary part movement by inspecting the parts at the point of manufacture rather than routing them all to and from the quality room. Democratizing inspection means that more manufacturing employees can learn much of the specialized coordinate metrologists’ knowledge and process by building it into the measurement software, which can be learned with online video training and practiced at home with downloadable training licenses.
ME: What manufacturing industries are using automated inspection and reverse engineering to improve part quality?

Olson: There are a lot of industries implementing reverse engineering to improve quality, but the major industries and applications we see are legacy product maintenance, repair and overhaul, automotive aftermarket accessories, and customized biomedical prosthetics. Legacy product maintenance, repair and overhaul includes parts with long lifecycles and/or high replacement costs manufactured before the 3D CAD model made manufacturing faster and easier such as power generation systems, and most of the aerospace and defense systems in place today. Automotive aftermarket accessory manufacturers produce wheels, body panels, exhaust systems and custom components that must mount to a stock vehicle and make it a more personalized and higher-performance vehicle. Another application where we see a lot of reverse engineering automation investment is at the human prosthetic interface of biomedical products. Biomedical prosthetics have been completely revolutionized by 3D scanning, CAD, CAM and reverse engineering.

ME: Model-Based Definition (MBD) has made great quality improvements for aerospace manufacturers. Describe this area, and is it being implemented in other industries?

Olson: MBD is a simple concept—the 3D model is the single source of data that provides all information for planning, manufacturing, sourcing, and inspection. At the core is the digital model, which includes the 3D CAD model, annotations and attributes. MBD also includes related information used throughout the enterprise, such as parts lists, materials, finishes, processes, notes, analytical data, test requirements and revision history. Simply stated, MBD is a single-source data authority.

Making the model the authority removes ambiguity, conflict and doubt that arise when drawings and models share control. With revision after revision made to drawings, the usual outcomes are outdated drawings floating around the manufacturing floor, and discrepancy between the CAD model and 2D documentation. MBD eliminates errors that result from referencing an incorrect source, and makes processes more efficient—no more searching to determine correct revision levels.

However, there is much more to the value proposition. MBD is the single information source to build and maintain products, and it integrates into processes from cradle to grave. Providing definition for operations throughout the product lifecycle, there are simply too many benefits to name.

Companies leading the way in MBD are in the aerospace industry, where they are constantly developing new technologies, methodologies and approaches to pursue better ways to conduct business across a global supply chain. Traits that make the case for MBD include complex assembles with large bills of materials; complex surface profiles; mission-critical components; long product lifecycles; global supply chains; and stringent regulatory (documentation) requirements.
MBD gives companies centralized control of the design, manufacturing and inspection data for mission-critical components. When failure is not an option, as is true with commercial aircraft, the single-source data authority ensures the entire supply chain is working to the latest, most accurate product definition. MBD is taking in automotive, biomedical, heavy equipment, and power generation, and others.

More CAM Consolidation

Additive systems builder 3D Systems Corp. (Rock Hill, SC) announced Nov. 24 that it had signed a definitive agreement to acquire all of the outstanding shares of CAD/CAM software developer Cimatron Ltd. (Givat Shmuel, Israel). The agreement calls for 3D Systems to pay $8.97 per share in cash, subject to certain adjustments for Cimatron transaction expenses, in an all-cash purchase valued at approximately $97 million.

The move is the latest in a string of recent CAD/CAM software acquisitions by larger manufacturing builders or software developers in the industry. In July 2014, metrology giant Hexagon AB (Stockholm) bought UK-based CAD/CAM developer Vero Software, and in November 2013, Autodesk Inc. (San Rafael, CA), developer of AutoCAD software, announced its deal to buy CAM-centric software developer Delcam plc (Birmingham, UK) for about $286 million.

Acquiring Cimatron will strengthen 3D Systems’ portfolio in 3D design and manufacturing, add complementary products and technology, and extend 3D Systems’ direct and reseller sales organizations. Cimatron’s product line includes integrated CAD/CAM for 3D production of molds, tools and dies, as well as the production machining capabilities of GibbsCAM, which Cimatron acquired in 2008 when it bought Gibbs and Associates (Moorpark, CA).

The transaction is subject to closing conditions, including requisite regulatory approvals and approval of Cimatron’s shareholders. The Boards of Directors of both companies have unanimously approved the proposed transaction, and the deal is expected to close in the first quarter of 2015.

New Releases

Simulation developer Ansys Inc. (Pittsburgh) on Nov. 19 announced an updated version of its Ansys SpaceClaim 2015, which adds many improvements for speeding the development of product geometry and adds new flexible 3D printing...
capabilities. It features improved product development and manufacturing workflows that enable engineers to work faster on editing and management of faceted models and improved toolpath functionality for machinists.

Other improvements include imprint and wrap tools for easier simulation edits, clean and detection functionality, and improved integration with Ansys Workbench, which enables engineers to focus their time and expertise on simulation analysis instead of geometry preparation.

SpaceClaim’s 3D Printing module now includes more tools for repairing models and analyzing print success. Direct editing of meshes with intuitive Pull and Move tools are now available, making it faster and easier for users to get models ready for printing.

Gibbs and Associates (Moorpark, CA) announced Nov. 12 that it will offer a no-cost license of VoluMill Wireframe for GibbsCAM with each new license of GibbsCAM Production Milling. VoluMill Wireframe for GibbsCAM is a high-speed machining process that helps shops achieve the high material removal while extending tool life through smooth transitions and constant tool loading. Customers have reported cycle time reductions as high as 70% and tool life extension of five times.

Openings

CAM developer Delcam plc (Birmingham, UK) has opened a new office, Delcam Quebec, which will support its growing customer base throughout French-speaking Canada with Delcam’s former reseller, Technologies C.F.A.O. Inc. (Sherbrooke, Quebec, Canada). The office joins existing sales, support and training network for Canada in Windsor and Toronto. The company’s other offices in North America are located in Salt Lake City, Utah; Fort Washington, Pennsylvania; Rockford, Illinois; and Pasadena, California.

Software Update is edited by Senior Editor Patrick Waurzyniak; e-mail pwaurzyniak@sme.org.

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