
Boosting Productivity With Mobile 3-D Product Visualization Technology



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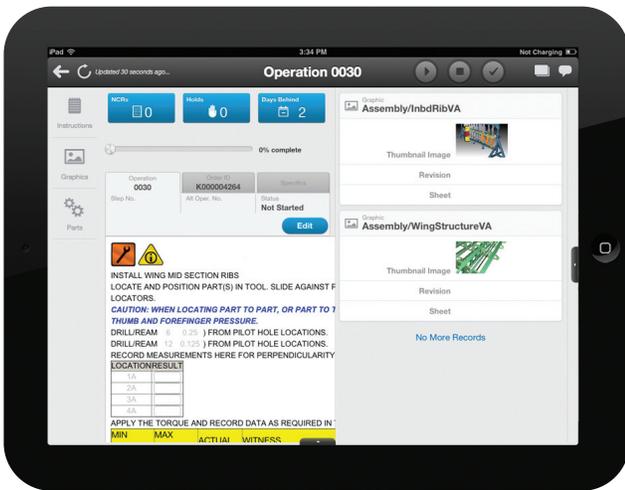
Like every industry, productivity is key to profitability in aerospace and defense (A&D), especially now when companies are increasingly conducting high-tech manufacturing, assembly and repair operations in an environment of growing cost pressure. With cutbacks underway in many defense programs, and sequestration looming in the U.S. on Jan. 2, 2013, defense contractors are redoubling their efforts to increase productivity and improve operational efficiency in order to maintain or expand profitability. On the other hand, the commercial aviation sector is looking ahead at years of unprecedented levels of production backlog. These businesses see revenue growth being limited by current levels of throughput and productivity.

SAP, known globally as a leader in the enterprise software sector, is partnering with the defense and commercial aviation sectors to address these issues by bringing new solutions to market. Since the early 1990s, SAP has steadily grown its footprint across A&D and is now the top supplier of business software used for running integrated financial, human resources, manufacturing, supply chain, procurement and aftermarket processes. More recently, SAP has accelerated its delivery of capabilities specifically targeted to productivity enhancements on the A&D manufacturing shop floor by way of some strategic acquisitions, including former software market leaders Visiprise-HMS, Sybase and Right Hemisphere. The result of this spate of integrated innovation is a unique solution that digitally integrates engineering, manufacturing and supply chain operations while transforming the delivery of information to the shop floor.

The Fruits of Co-Innovation

SAP's customers, which include all of the top A&D OEMs, have long histories of adopting lean manufacturing principles and Six Sigma quality standards in an effort to improve manufacturing efficiencies and quality. Several of these companies have been investing in projects with SAP to develop new-technology enablers for these initiatives in a process SAP calls "co-innovation." Through co-innovation, SAP and A&D manufacturers are working closely together to take lean manufacturing and Six Sigma to the next level.

As an example, SAP has co-innovated a new comprehensive mobile shop-floor solution together with a leading A&D OEM company that takes advantage of the latest in mobility technology. In a similar way that mobility has forever changed the ways that consumers access and consume information with hand-held devices, SAP is now transforming the way product information is distributed to critical manufacturing assembly operations. Technicians, mechanics and supervisors — whether on site or remote — can now access and complete work orders, review technical documentation and production progress and raise non-conformances directly on a mobile device. The elimination of unnecessary worker movement between computer terminals and an aircraft, as well as error-prone paper-based processes, has a direct correlation with lean manufacturing's relentless focus on removing waste from processes.



Mobile Work Order

To take this even further, SAP is enabling advanced visualization of product and business information at the point of work on standard mobile devices. Technicians on the shop floor now can utilize interactive 3D product content that enables them to easily view, zoom, pan and rotate CAD-generated images without CAD knowledge or licenses. This software, primarily for assembly, maintenance and service technicians, improves productivity through delivery of 3D animated step-by-step instructions, permits immediate corrections of workplace problems, accelerates learning, and facilitates business and operational decisions through online graphical data that can be updated and disseminated in real time. Designed for a range of applications, early users of SAP Visual Enterprise solutions cite substantial gains in productivity, along with major improvements in uptime, time-to-market and quality metrics — all of which have resulted in greater customer satisfaction, companies report.

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The technology is innovative — even unique — in its ability to combine 3D visualization capabilities with business data delivered on mobile platforms. The software comprises a suite of products developed by SAP: Visual Enterprise Generator, Visual Enterprise Author (which enables the creation of 3D animations) and Visual Enterprise Viewer. The suite is integrated with a broad range of SAP analytical tools. A key component is the ability of VE Generator to quickly load and transform nearly any CAD engineering file into a lightweight format that is readied for use outside engineering. Leveraging this file, 3D animated work instructions and procedures are developed, training curriculum is designed and technical documentation is published in multiple formats, including those supported on mobile devices.

The technology is relatively new to the A&D industry but has been successfully adopted by companies in other complex manufacturing industries, such as heavy equipment, industrial machinery, automotive and medical device manufacturing. With “model-based definition” (the practice of using 3D digital data without the need for 2D drawings to manufacture products) now having achieved critical mass in the A&D industry, the software will have a transformational impact on A&D operations as companies find that visual information is easier for workers to understand, improves learning and retention, maximizes productivity and reduces costs.

The software is for use on Apple’s iPad version 2 and 3 tablets, which run the iOS 5.1 operating system. The software suite will also be available for Android tablets beginning in 2013. SAP plans to expand the number of mobile devices that run the software, with the goal of making the technology system agnostic.

Moving Toward a Paper-Free Workplace

SAP’s vision for the A&D industry is one of paper-free workplaces, where workers turn to mobile devices, rather than computer terminals and other legacy information systems, to access accurate, up-to-the-minute data. Paper-based environments are outdated, often poorly illustrated, prone to rapid obsolescence and content mistakes, and lack clarity when it comes to resolving issues related to components, assemblies and quality.

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Workers will literally have at their fingertips all the data necessary to see what the job requires, address questions that arise and complete work on time. Each 3D-viewable graphic represents the most current configuration-managed CAD data available, and is complemented by real-time status updates and business information that assure precise decision-making. In an environment such as A&D, where processes and designs keep evolving for each unit, access to accurate product and business data through a mobile device in real-time is a game-changer for manufacturing.

Since images can be manipulated, workers view a component or assembly from the perspective that best meets their needs. In cases where a maintenance or repair team in the field encounters an unfamiliar aircraft component or assembly, workers will be able to immediately download relevant 3D images. SAP believes that bringing information directly to the point of work through mobile devices is a significant advantage. In the end, technicians are better equipped to do the work knowing that the information they are working with is current and reliable.

Visualization is also beneficial for supervisors and managers, who now have real-time visibility of the work that is underway and can monitor operations from their own mobile devices using the software. This gives managers an ability to rectify product or quality issues as they arise without having to be on site, saving time, cost and process delays. Additionally, worker productivity is improved by posting job completions online with the software, gaining immediate access to additional work orders and detailed 3D procedures for their next project.

In addition to increased productivity, there are other advantages of this technology that have a positive impact on operations and workers. One is safety. Using this software in a mobile device means that workers don't need to move around a work cell to check product specs, assembly procedures, inventory and other data at a central location, such as a computer terminal. This can be a major timesaver in workplaces as large as aircraft assembly and maintenance areas. It also means that workers are not repeatedly climbing up or down scaffolding, moving in or out of airplanes, or negotiating potential plant hazards when referencing information. When using the software, an employee can enter a work area, focus on the task at hand and remain there .

Another advantage is effective learning. Various studies, including one by Harvard University in 2009, show that the use of graphics and animation — instead of words, numbers and static images — helps employees learn faster and achieve greater rates of comprehension. The Harvard study, for example, found that the use of graphics and animation reduces learning time by more than 50% compared to printed materials, increases learning retention and engagement by 10%, and improves understanding by 30%. Other studies demonstrate an 89% median gain in learning when image-rich content is used. Researchers also conclude that the animation of graphics is better than static images when it comes to clarity of communication.

Meanwhile, the Aberdeen Group has conducted market surveys and reports that best-in-class companies have made substantial operational gains with SAP's Visual Enterprise software. These include a 19% increase in

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product revenue, 14% increase in lead conversion/win rate and a 12% increase in mean time between repairs. Moreover, total service costs decreased by 7% for these companies.

At the end of the day, this visualization technology will improve productivity throughout the A&D industry by eliminating work barriers and making the tasks of mechanics and others easier. It will provide new opportunities for the A&D industry to be far more efficient, and it will become an investment that is required for companies to operate at the most optimal levels of efficiency and profitability.

The Northrop Grumman Experience

An example of how effective SAP Visual Enterprise Solutions have been for one A&D company can be seen in the experience of Northrop Grumman Corp., which is using the software in the production of its Global Hawk unmanned aerial vehicle and in making components and assembling the fuselage of the Lockheed Martin F-35 Joint Strike Fighter.

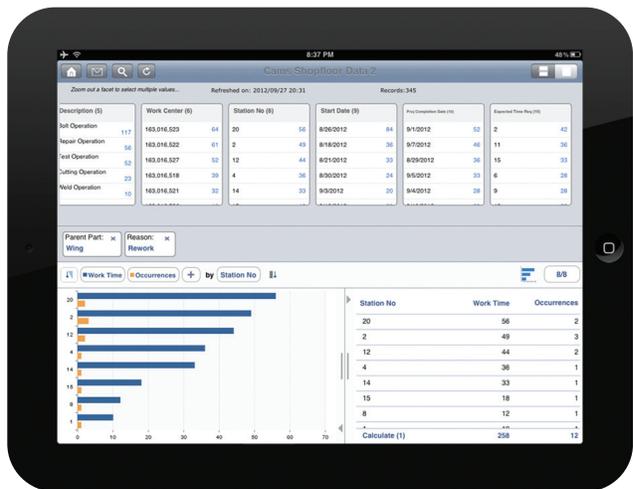
John Patrick Batache, director of lifecycle logistics and support at Northrop Grumman and the corporate horizontal lead for logistics, says the software is used in three areas: manufacturing, technical publications and training. "The reason we elected to use it, is we are trying, in this economy, when budget pressures are increasing, to think, act and execute differently when it comes to operations, while staying focused on delivering the highest-quality products at the least possible cost."

Batache sees the software as an important and economical tool in efforts to improve operational efficiencies and reduce labor across departments. When personnel in manufacturing, maintenance and training, for example, accessed legacy or paper-based data for their work, it was a project that each department repeated multiple times. "There was a lot of going back and forth and adjusting for data gaps and user errors with legacy data," he says.

In contrast, using the SAP software — with its back-end integration, interactive graphics and real-time updates — means that everyone is on the same page in terms of content and accuracy when data is extracted, and each version is modified uniformly as changes occur. Different groups thus use the same extract for their work, Batache says, whether it's manufacturing and assembly, maintenance or development of training manuals. "Each group leverages a common data environment with a lot less touch labor, greater clarity and more accurate outputs," he adds.

Batache cites three important benefits of the software.

- 1) A substantial improvement in data consistency across departments and functions.



Mobile Supervisor Analytics

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- 2) A reduction in labor hours, since every user now works with and understands the latest data without having to attend update meetings or refer to manuals that may be inaccurate.
- 3) Cost reduction from the elimination of redundant graphics. The software's 3D visualization technology means one image can be manipulated to meet the needs of any user.

Significantly, delivery times have been reduced by 15-20% for work in which the software is used. Batache credits this to less rework and more efficient operations.

Northrop Grumman began phasing in the Visual Enterprise Viewer software three years ago, and it's now about 50% deployed throughout the company, according to Batache. The software is being integrated into current programs where it makes sense to do so, and is part of all new programs the company undertakes.

"Validation of the software takes time," he concedes. It's a good tool, but one of many that engineers, technicians and others at Northrop Grumman employ. Before embracing it, users need to see how efficient the mobile visualization software is, and how it makes people and processes more productive. "In aerospace, we are creatures of habit and risk-averse," Batache says. "Failure is not an option, success is a must; so validation of new tools takes time. Eventually, though, everybody will be using this software."

In summation, SAP believes that its Visual Enterprise Solution will have an outsized material impact on the A&D industry because of its ability to generate uniform, accurate data among multiple users, streamline operations and upgrade quality. The initial A&D users are uniformly pleased with the results they have achieved. As the system becomes compatible with more mobile devices, it will be ubiquitous and indispensable to the efficiency and productivity of A&D companies.

To learn more, please go to:

http://www.sap.com/campaigns/2012_10_aerospace-defense/index.epx

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