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Doug Capri, Manufacturing Engineering Manager,
American Science & Engineering

The Company

AS&E manufactures sophisticated X-ray products used to inspect parcels, baggage, vehicles, pallets, cargo containers and people. Its customers are found in 137 countries and include border security authorities, military organizations, commercial and government facilities, aviation agencies and legal enforcement.

The Billerica, Mass.-based company posted a record-breaking year in fiscal 2010, growing 11 percent and posting a 25 percent increase in earnings per share over 2009. Further, by reducing the cost of quality, production expenses of existing products and time to market for new products, AS&E’s revenue per employee reached \$590,000 in fiscal 2010 -- a \$45,000 per employee increase over 2009.

AS&E KEEPS LEAN WITH SEQUENCE SOFTWARE

As the demand for new homeland security technologies continues to increase, so too does the competition among private companies vying for a piece of the market. These companies know that if they cannot supply products on time, even with impossible delivery dates, their customers will go somewhere else.

One thriving company meeting these time-sensitive demands in the homeland security market is American Science and Engineering, Inc. (AS&E).

Providing innovative products, keeping up with changing customer demands and optimizing manufacturing processes have given AS&E a leg up on the competition in this multi-billion dollar, global arena.

GOING LEAN

AS&E’s impressive revenue per employee metric grew out of a 2008 lean manufacturing initiative that continues to focus on increasing factory output and revenue while improving operational efficiency.

Doug Capri, AS&E’s manufacturing engineering manager, says the lean initiative looks at every aspect of the manufacturing process. One of the low hanging fruits identified as needing immediate attention was the way the company documented its manufacturing processes.

In 2008, Capri decided it was time to improve the documentation process with a computerized, paperless system. Capri says each step of manufacturing -- including keeping a production record book, test procedures, quality inspections and visual work instructions -- was done manually in a paper-based system.

He says the documentation process represented 1.5 personnel headcounts over an eight-hour shift. “There was tremendous waste of time and paper,” Capri says. “We had to manually maintain, audit and laminate each document on a daily basis before we started a build.”

Additionally, Capri says the paper-based system required several pieces of software to develop the work instructions. “We had to use Word and an editing software pack-



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Barry Lucas, President & CEO, FFD, Inc.

age for the digital pictures,” He says. “So we would normally take a picture, crop it, and then paste into Word. That was very cumbersome and hard to work with.”

CHOOSING SEQUENCE

After a review of potential suppliers, AS&E chose FFD, Inc., a Knoxville, Tenn.-based software company specializing in manufacturing work instructions for paper and electronic applications.

One of the reasons FFD’s flagship software product, Sequence, was selected by AS&E is because it allows easy capture of AS&E’s core manufacturing knowledge and eliminates the need for an inefficient text editor and a third party graphics packages.

“Sequence is an efficient tool for knowledge capture, organization and management.” says FFD President Barry Lucas. “We have put all of the editing tools for text and graphics at the user’s fingertips to eliminate multiple software packages. Additionally, authors of instructions aren’t creating and formatting a document. They simply organize information on a visual process flow tree and Sequence takes care of the deployment.”

“We were skeptical that the software would do everything we required,” Capri says. “So

we rolled it out as a pilot project on one product line and then on our more simple and stable products. It went better than expected. Now we use it throughout our plant on all three product lines.”

GOING PAPERLESS BOOSTS EFFICIENCY

Today, the 1.5 person headcount once needed to maintain the different work documents have been redeployed elsewhere supporting the plant’s lean initiatives. Capri says that the newfound benefits and efficiencies of switching to a paperless system were immediate, adding that AS&E recouped its investment in the software within the first year.

“From both lean and quality standpoints, we eliminated the need to stop work and wait for an inspector to come to the workstation and sign in,” Capri says. “Now we have a qualified operator verify other assemblers’ work online. So now we have quality accountability that is digitally logged in the production workbook.”

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“Sequence’s ability to be integrated with our Oracle ERP system has dramatically improved our capability to incorporate process and quality improvements into our production documentation.”

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SYNCHRONIZATION WITH ERP

The paperless deployment capability of Sequence allows AS&E to selectively access information in a controlled and validated manner and present it to personnel on the shop floor. Every work order that is released from the company’s MRP system represents a serial number. When a work order is released from MRP, Sequence ties a specific set of instructions to that work order. The work instructions are accessed on the plant floor by work order number and become the core of their production record book for the customer. In fact, the product will not ship without a report from the Sequence software.

“There are a lot of visual and visual software packages that create nice, pretty pictures and can do all the graphics, but they have no link to MRP,” Capri points out.

Capri says if the MRP changes, or if there is a design change or the bill of material changes, the paperless system sends an e-mail that shows up in the Sequence bill of materials. “That feature has allowed us to become more efficient implementing changes,” Capri says. “Just as important, it has improved consistent product processes,

accountability and traceability with serial numbers to track defects back to root cause quicker.”

REDUCED TIME TO MARKET FOR NEW INNOVATIONS

AS&E also utilizes Sequence software to document and speed up new product innovations, even at the prototype stage; dovetailing with AS&E’s goals of developing options and adaptations to meet specific needs of customers.

“Now we can have the framework of a project when we do our first build,” Capri says.

“Before we had to wait until the prototype was built and document after the fact. “

AS&E uses solid modeling for new product prototypes. Working in a three-dimensional, virtual world, AS&E can complete work on the model before ordering parts. Photographic images captured within Sequence give engineers the ability to tweak the design as the prototype evolves. As a result, significant time is saved because of concurrent engineering.

“We can determine the manufacturability of a product by using the model,” Capri says.

“We can develop a document even in the prototype stage. That has helped reduce deployment and engineering time by 15 percent.”



ENHANCED TRAINING

Because of the nature of the homeland security business, Capri says some customers require an almost impossible delivery schedule. “Sometimes we have to go to a second shift and bring on new people,” Capri says. “This is highly sophisticated, custom built equipment that goes to certain locations because of security concerns. Because operators can see everything on a computer monitor, it helps with the learning curve. This has allowed us to also have a more flexible workforce. We now have a consistent process for moving people from one area to another quicker with less training.”

JUST IN TIME LEARNING & AUDITING

Additionally, the paperless system allows AS&E to implement lean changes more quickly than a paper-based documentation system. Capri says if a new way to improve efficiency is found in one assembly cell it is easily adopted into the Sequence software system, speeding up engineering and deployment times.

“We have a value stream mapping process,” Capri says. “If the guys on the plant floor come up with a new way to do something, we can document that very quickly and release it to the next work group quickly.”

These changes, as well as the entire production record, are instantaneously available to Department of Defense (DOD) inspectors as well.

“The old production record books were handwritten,” Capri says. Now we’ve implemented bar code readings to record serial numbers right into Sequence. That reduces the chance for error when we get audited by DOD.”

THE BOTTOM LINE

Capri says the company’s lean initiative is on track for even more improvements. But the bottom line is this competitive international market oftentimes comes down to cycle times and deployment. **“Sequence is part of the overall process that has helped reduce cycle times by two weeks,” Capri says. “Our customers want the products right away and if we can’t deliver they will go to somebody else.”**

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