Design & Product Data Management Delivers Next Generation Technologies at QinetiQ North America

Foster-Miller was founded in 1956 by three graduates of MIT who wanted to build a company that could solve difficult technical problems through analysis and design. Over the decades they built up the company to become an international technology leader in innovative products and systems that perform under demanding conditions. In 2004, Foster-Miller became a subsidiary of QinetiQ North America (QNA), itself part of QinetiQ Group plc. of the UK, one of the world's leading defense and security technology companies. The company has now become QNA's Technology Solutions Group, created to deliver high-tech research, services, and development of defense and security-related products to the U.S. and civilian governments and to commercial markets.

The company's projects are often complex and span multiple years. An important area of work has been in Advanced Naval Control Systems (ANCS), which specialize in command and control and modernization of ship's systems. Two examples of large programs where QNA is helping the Navy modernize the fleet is the new aircraft carrier launch system called the Electromagnetic Aircraft Launch System (EMALS) and the new aircraft-arresting system called Advanced Arresting Gear (AAG). In EMALS, the company has designed and built the hardware and software for the launch control system (LCS) and the power conditioning system (PCS) motor controllers. These EMALS systems are composed of 17 unique electromechanical products, seven software products, and 283 units manufactured for the U.S. Navy aircraft carrier CVN-78, to be named Gerald R. Ford.

QNA's ANCS keeps its competitive edge by maintaining the agility of a medium-sized firm while providing its customers the required processes of a large prime contractor. The organization is committed to continual improvement in technology, quality and customer satisfaction. And they are always seeking the latest tools and techniques to support technology and quality as well as cost reduction.

SolidWorks, AutoCAD and OrCAD are used to design the assemblies, parts and drawings in mechanical and electrical engineering. And for managing the CAD files and program documents,

Synergis Software's Adept engineering document management is employed. Indeed, on QNA's portion of the EMALS program alone, Adept manages almost 17,000 discrete CAD files and documents. Adept secures and controls the SolidWorks files as well. More important than these details, though, is that Adept improves processes at every level of the organization. In fact, Adept is part of the company's process improvement charter, along with Lean Six Sigma tools. Adept facilitates other process improvements too.

BUSINESS DRIVERS FOR PROCESS IMPROVEMENT

The business drivers behind the company's process improvement are similar to those in any company: Reduce costs; eliminate manual processes; and improve time to market. Eliminating waste in a project lifecycle is a serious matter. "There's always a new way to leverage technology and to measure the results of the entire engineering lifecycle for any given project," says Andrew Courier, Director of Integrated Electrical Systems in QinetiQ North America's Technology Solutions Group.

Courier and colleague Jim Swancott challenge themselves to improve their processes using Adept. Their goal: automate, automate, automate. For these engineers, the endgame is all about reducing errors in engineering change processes, eliminating paper in manufacturing, and reducing time in the review and release cycles.

According to Courier, this intense, near-obsessive focus on process improvement is an important part of his job. "We're driven toward reducing our costs," says Courier. "It's one thing to reduce our costs and make us more efficient, but we also need to be able to measure the results. Our goal is to automate as much as possible without adding on more people." He explains, "I call this 'parasitic processes' – where we derive new value from existing functions without adding anymore work."

While Courier is laser-focused on achieving better processes, he's also adamant about processes have measurable improvements. "I don't want a process in place just so I can get a checkbox or have a flag outside that says we have AS9100 or ISO9000 certification," states Courier. "The processes we do have to be real. A good process is as invisible as possible yet still delivers

significant benefits. We need to make sure that a process is driving down cost for our customers or speeding up time to market, or both."

ADEPT IMPROVES THE ECR PROCESS

In the latest round of process improvement initiatives, Courier and Swancott took on the task of automating their engineering-change request (ECR) process.

"An example of a parasitic process is what we've done with ECRs," explains Courier. "We needed to understand where our weaknesses lay and how effective our process improvements were. We soon realized that most of our issues are already being reported on the ECR form. Several months earlier, we completed a Lean Six Sigma analysis on our design process and developed a list of metrics to measure ourselves by. We added these metrics to our ECRs as fields and linked those fields to Adept as database links. By storing all this information in Adept, it's easy to identify major culprits that crop up in an engineering process. Now it's easy for people to check a box and state 'I had five drawing defects' or 'I had six requirement changes', etc."

The ECR also includes fields that capture and filter customer-driven changes. With all the data linked to Adept, extracting and collecting reports on the data are automatic. "We don't need an IT staff to get the data; it's easy enough for our group's administrative assistant to handle on her own," notes Courier. "Then all the metrics are put up on the bulletin board for everyone to see."

"Now our process improvement team can see trends and analyze metrics without any additional effort to go back and recount or re-sort the data. A key thing to keep in mind is that we have always been, and most likely will always be, required to write ECRs. Adept has allowed us to derive new benefits without adding new effort. So it's really an automated 'parasitic process'."

ADEPT IS PIVOTAL TO ACHIEVING CERTIFICATIONS

Because of the complexity and size of the projects QNA TSG bids for, it's important to obtain certifications like the National Quality Aerospace Assurance for ISO9001, ISO AS9100, Software Engineering Institute (SEI) Capability Maturity Model level 3 (CMM 3), and Capability Maturity Model Integrated (CMMI) level 3.

“We relied heavily on Adept to achieve our certification goals,” Courier points out. According to him, Adept was central to efforts to prove the company had good control of and easy access to their design documents. “Anyone has lived through an SEI CMMI level 3 appraisal knows that the appraisers do *not* enjoy struggling to find artifacts,” states Courier. “So with all our documents in Adept, they could search and instantly find any one of our project forms, locations of a standard operating procedure, or document approval status. During the out-brief of our successful CMMI I appraisal, the lead appraiser noted that one of our strengths was the sophistication and automation we have built into the Adept system to support our processes.”

REDUCING GAPS IN REVIEW AND APPROVAL PROCESSES

Another example of continual process improvement is the Adept task screen, Adept library card signature, and the Adept review process, which QNA contracted Synergis to develop. “There were several problems that our systems engineering process group (SEPG) identified which were negatively affecting our group’s efficiency,” notes Courier.

The first issue was that the old peer-review process was manual, and it took a lot of human intervention to get the review done. Working with Synergis Software, the company developed an automated process in which the author can send a link to reviewers which will allow them to sign out documents and make edits. The process also allows the reviewers to input quality metrics as well as use a password to validate who did the review. “This whole process now gets us verification that someone has reviewed it and also gives us a bit of metrics that say, 'I approve a comment, or I reject it.’ The result is a dramatic reduction in time for outstanding signatures.”

The Adept library card signature process is automation developed by Synergis Software that allows the author to send the document to a configurable reviewer list for approval and release. The author can pick from a predefined list and send it out them in parallel, and so the document is not able to be held up by one chokepoint. After everyone has approved it, Adept moves the document to a protected released directory and displays the approver names.

“The final problem we had was finding out who was keeping documents from being reviewed or released,” states Courier. “When the SEPG looked into it, we found that there was a flaw in the

process: unless reviewers acted immediately, it was likely that something else would come up and they would forget to complete the task." Synergis Software was tasked with creating a special Adept task screen that makes it easy for users to see how many items they need to review and how many they need to approve. This screen lets users quickly see what is needed from them and gives access to all of the processes involved with reviewing and approving.

Another parasitic process the company is able to get from the task screen is a report on the average time it takes to review and approve documents. "This average time is directly related to how fast we can get product to market and is therefore extremely important to watch," Courier points out. The tool also provides situational awareness: what or who is holding up the process.

PAPERLESS MANUFACTURING

Recently the company developed a 15,000-square-foot manufacturing facility to build the EMALS and AAG equipment and implemented a completely paperless manufacturing process. With a lot of people working in the facility, it's critical to give them as much information as possible to get the job done.

"We have Adept on every workstation," says Courier. "With Adept's built-in viewer, workers can look at the model, the assembly drawings, the bill of materials, and the work instructions. Keeping all of the program's documents and drawings in Adept makes it easy to distribute all information needed to purchase, inspect, integrate and test to the manufacturing floor, electronically. This way we save time and the cost of maintaining printed copies while ensuring that manufacturing is using the appropriate document revisions. There's no more paper on the floor, no more guessing if you've got the right version.

"Paper creates a configuration management nightmare," adds Courier. "With Adept, no one is asking 'do I have the right version of the drawing?' 'Did we get that in the ECR?' The version in Adept is the gold standard."

ADEPT KEEPS EXPANDING

Courier looks for continuous feedback to and from the systems engineering process group in order to improve constantly. “We’ve been very successful on our projects, We’ve consistently been delivering on time and on budget, with good quality, but we are far from satisfied.” QNA TSG will continue to look to companies like Synergis for ways of improving, and in fact have several process improvements in the pipeline leveraging the strength of Adept.

The next step is to tie Adept into the MRP system. “Now that we have a good manual process in place, we can automate it with Adept,“ explains Swancott.

“We want to take the whole model and dump it into our MRP system,” adds Courier. “The model has the quantities, the part numbers, all the things that you have to manually load up – that’s a waste of time. So when we get an ECR out of Adept, we want to push it over to our MRP system.”

“We’re also expanding Adept into contracts and pretty much all of operations, which is a pretty big chunk of our group.”

We train all of our people to use Adept to manage the whole lifecycle of the document,” says Courier. “They make a document, create approvals on their own, make a number on their own, say where it goes, check it in and out. This self-serve approach to configuration management allows us to have great traceability, change control and quality without adding an army of configuration managers.”

Adept clearly has become seamless within the organization, meaning fewer people have to manage documents and files and more time can be focused on creating QNA’s world-class design solutions for their customers. With Adept, there are fewer errors and less waste in processes. “We’ve just about eliminated the errors we had before,” Courier says. “In today’s ultra-competitive world, companies can’t afford to be inefficient. Adept ensures we are efficient.

“Our company has had its best year ever,” concludes Courier. ”We’re very busy. When we get one big project, we pretty much focus on getting the next. We don’t get to rest too long.”

# # #