



U.S. ARMY

Attains Lean Six Sigma Agility with Enterprise PLM for MBOM

We recognize the importance of open solutions that further improve government agility & the ability to drive efficiencies across the supply chain.

Peter Schroer,
CEO,
Aras

U.S. Army Modernization Initiative takes advantage of Aras Solutions for Lean Processes.

Today's U.S. Army modernization efforts are driving new processes and systems throughout military installations. The U.S. Army Watervliet Arsenal, WVA, is an integral component of the U.S. Army's Tank-automotive and Armaments Command (TACOM), a major command of the Army Materiel Command (AMC).

Located just outside Albany, NY since 1813, the Arsenal has long been known as America's "Cannon Factory" and is a critical source of today's high tech, high powered weaponry. Today, the Arsenal is a billion-dollar manufacturing complex certified to ISO9000 and CP2, the Army's Contractor Performance Certification Program. It occupies 72 buildings on 42 acres, encompassing 1.2 million square feet of manufacturing space.

U.S. Army WVA

- ▶ **PLM:** Aras Innovator Suite
- ▶ **Platform:** Microsoft Windows Server System, SQL Server, .NET Framework
- ▶ **ERP:** MANMAN SAP / MRP ERP
- ▶ **Costing:** Custom Legacy System
- ▶ **CAM:** Mastercam & SmartCAM

WVA is the U.S. Army's primary gun tube maker with products including cannons for the Army's main battlefield tank, the M1A1 Abrams, as well as precision components for artillery cannons, battleship guns, marine drives, scissor bridges, and rocket motors. WVA was instrumental in providing the kitting and assembly for the up-arming of U.S. Army Humvees.

WVA is also home to the Army's Benet Laboratories, a part of the Army's Armament, Research, Development and Engineering Center (RDEC). The co-location of WVA and Benet Labs allows for

complete product lifecycle management, from initial concept and engineering to tool development, prototyping, and large-scale production.



Business Systems Modernization

Command management at WVA has introduced a series of business systems modernization initiatives across the Arsenal from Lean manufacturing and Six Sigma in operations to business systems modernization for information technology.

To support these aggressive initiatives WVA needed to take advantage of modern Internet technologies through common Microsoft platforms and open standards so that data access and process integration were seamless.

Arsenal command management recognized the benefits that commercial off the shelf (COTS) software solutions provide and decided to take advantage of a single enterprise system for manufacturing process planning, equipment & tooling management, and preventive maintenance & calibration.

Doing so would enable all WVA personnel to work within a familiar, common system for improved visibility and better coordination of production processes across the product lifecycle – from initial proposal to final production.

U.S. Army Deploys Aras

To address the Manufacturing Execution System needs the U.S. Army WVA implemented the Aras Innovator® platform suite including:

- Comprehensive manufacturing process plans/manufacturing bill of materials (MBOM)
- Work instructions, set-up sheets, lot travelers, inspection & test plans, required tooling & consumables
- Secure vault control over CNC programs with association to specific products
- Equipment & tooling crib management
- Preventive maintenance & calibration
- First piece inspection for equipment qualification
- Reports for management, tracking, and status

Aras Innovator has become the core product-related system at WVA, supporting the business of engineering. Products are produced using

Lean manufacturing processes for six sigma quality. By using the PLM platform from Aras as the manufacturing execution system for manufacturing process planning, equipment & tooling management, and preventive maintenance & calibration, WVA has been able to drive Lean continuous improvement.

Aras provides a standardized foundation for operations while delivering the flexibility to adapt processes quickly driving new agility, efficiencies, and cost savings.

Business Benefits

- ▶ Single modern business system for MBOM
- ▶ Support for Lean Six Sigma initiatives
- ▶ Ability to quote more efficiently to ensure margin
- ▶ Improved visibility into manufacturing processes
- ▶ Shorter lead times and reduced cycle times
- ▶ Support for important DCAA & DCMA information
- ▶ MBOM processes integrated to ERP system

Lean Six Sigma Foundation

The WVA processes automated by Aras extend from product proposal through process planning and production.

As WVA planners receive production proposals and associated drawings from various army installations, they quickly develop a preliminary bill of materials (BOM) and start to define the manufacturing routing for the new product to move through the WVA factory.

In this way, Aras establishes the basis for manufacturing process definition enabling WVA planners to assemble costing data for quoting to customers. Aras also establishes the product process structure that will be used throughout production, helping WVA quote more effectively to



Then, WVA engineers further build out the product routing to include work stations, inspection & test control plans, work instructions, equipment requirements, and necessary tooling along with the set-up procedures and associated drawings.

Aras enables the engineers to define the work center routing cycle times necessary to produce the new product, physical equipment, tooling assets and associated labor needed to make it happen which together drive product manufacturing cost structure.

By doing so all stakeholders have access to the comprehensive manufacturing bill of materials (MBOM) with production costing information.

By initiating a new product in Aras Innovator, WVA is inherently creating the product's manufacturing structure and associated cost structure from inception. When WVA finalizes the routing for production and designates "released" status within the Aras solution, the ERP system is prepopulated with work stations, enabling MRP BOM explosion for ordering, order quantities, and production scheduling.

Aras is also integrated with WVA's legacy costing system to manage all of the standard costing associated with different manufacturing operations, work stations, and labor rates.

With Aras, WVA is able to better estimate the entire cost of manufacturing a new product, including labor, which helps profitable quoting, and because extensive online records are kept Aras supports auditability for ISO 9000:2000 quality systems requirements, the Defense Contract Audit Agency and the Defense Contract Management Agency (DCAA and DCMA).

Aras Complements Existing Systems

WVA initially selected Aras because of the comprehensive capabilities, unmatched flexibility, and open standards.

Open standards provided the ability to easily integrate all of the WVA information systems, both existing legacy systems and the SAP system implementation.

Aras is integrated with the MANMAN MRP system and the WVA costing system to provide consistent

information and a single secure version of the truth for people with access.

WVA also uses Aras to control the shop floor CNC programs for the CAM systems. Every product produced in the factory requires a series of CNC programs that govern the Mastercam and SmartCAM-enabled equipment for precision manufacturing.

WVA vaults the CNC program revisions in Aras Innovator's controlled environment and associates the appropriate CNC files with the right manufacturing process plan providing synchronization and accuracy. Then, the first piece inspection results are recorded to qualify the equipment and tooling for the production run.

Aras also produces the product lot traveler — the information that moves through the factory from workstation to workstation with the physical product lot — along with the equipment setup instructions to support Lean quick change-over.

Tooling & Calibration Visibility

WVA uses a "check-in, check-out" tool crib in Aras to manage each tool, fixture, and jig needed in the production process. When a tool change is required, the manufacturing engineer can quickly identify the location of the necessary tool providing superior visibility to eliminate waste.

Consumables such as cutting oil, lathe bits, drill bits and other items are inventoried to ensure adequate on-hand quantities for production and order points trigger necessary purchases. Because tools are part of the Manufacturing Bill of Material (MBOM) structure, the "where-used" capability drives tooling re-use, keeping costs down, and the Aras solution provides reports for visibility into the overall tool inventory asset value.

In addition to managing the tools and consumables during production, WVA leverages Aras for gauge calibration to ensure repeatability and reproducibility or gauge R&R.

Aras Innovator tracks calibration status for each instrument and manages the calibration schedule



issuing a recall notice when calibration is required. Aras workflows remove the instrument from service and send the device to the WVA metrology lab or to an outside service for calibration.

By utilizing Aras, WVA is able to more effectively attain measurement traceable to NIST standards and ensure suitable calibration status is maintained to support ongoing production thereby avoiding nonconformance scrap and rework.

Using Aras as the Manufacturing Execution System, WVA is able to manage the production processes and asset configurations necessary to manufacture the wide array of products produced by the organization, delivering online efficiencies and cost savings previously unattainable.

Future Plans

Moving forward, the U.S. Army WVA clearly understands the benefits that the flexible online workflow provides for complex Business Process Management (BPM) combined with the ability to manage file deliverables in a secure ITAR compliant format. Most recently WVA has extended Aras to automate additional Lean related processes across the Arsenal.

About Aras

Aras® offers the best Product Lifecycle Management (PLM) software for global businesses with complex products and processes. Advanced PLM platform technology makes Aras more scalable, flexible and resilient for the world's largest organizations, and a full set of applications provide complete functionality for companies of all sizes.

By rethinking the way PLM is designed, Aras has taken a fundamentally different approach with a focus on the Business of Engineering. Aras solutions support processes for global product development, systems engineering, multi-site manufacturing, supply chain, quality and more.

Companies running Aras include Airbus, Boeing, Bombardier, GE, Hitachi, Honda, Kawasaki, Magna, Microsoft, Motorola, Nissan, TOSHIBA, Xerox, the US Army and hundreds of others worldwide.



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