General Dynamics' Journey to Paperless

An iBASEt MES/Quality Customer Success Story

INTRODUCTION

General Dynamics AIS Integrated Space Systems, located in Scottsdale, Arizona, has been delivering critical communications products to space programs for over 40 years including Explorer, Voyager, Space Station, Orion, NATO Satellites, Mars Pathfinder, and Mars Rover. During the thousands of mission hours supported, not one mission failure has been associated with their hardware. In-house manufacturing capabilities and expertise extend from the die-attachment level of microelectronics to end-item system integration of digital and RF hardware.

- Their **MISSION** is to provide smarter mission critical systems and products to defense, civil government, intelligence, and cybersecurity customers.
- Their **VISION** is a safer world through smarter platforms and missions.

General Dynamics AIS was presented the top award for Progressive Manufacturer of the Year by Managing Automation magazine. "The Progressive Manufacturer of the Year is a distinct honor—we chose this company from across all eight categories as the one company that best exemplifies Progressive Manufacturing," commented David Brousell, Editor-in-Chief for Managing Automation.

Location: Scottsdale, AZ

Industry: The Scottsdale facility makes microelectronics, printed circuit boards, and assemblies used in satellites.

Project Leaders: Eric Stiller, Director Production Operations; Mike Floyd, Director Mission Assurance; Markus Yatskievych, Manager Production Operations.

Core Technologies: iBASEt's Solumina Quality, MES system

ROI/Business Benefit: 90% reduction in shop floor paperwork; provides quick, top-down visibility into quality and other issues affecting equipment costing ten of millions of dollars per unit; helps avoid costly teardowns and launch delays.

The microelectronics factory can produce state-of-the-art multi-chip modules with high complexity. The printed circuit board factory for front-end assembly provides high-speed surface mount, through-hole placement, and automated testing. The back-end or module/final unit level assembly factory is highly skilled in a number of manufacturing capabilities including:

1. PWB and module assembly completion
2. Wire bonding of RF MMIC packages at the module level
3. Unit/box level integration and test
4. Panel level integration and test, and
5. In-plant testing of fully integrated panels, including thermal vacuum

iBASEt

"We would like to thank iBASEt—our partner in this journey. Back in 1999 the product (iBASEt's Solumina MES/QMS) was in the early stages; we stuck with it and drove a lot of capabilities into the product. They now have a product that is niche in this industry and there really isn't anything else out there with this functionality. We thank iBASEt for their support in this journey," commented Mark Yatskievych from General Dynamics AIS at his acceptance speech.

Hi-reliability space hardware production requires configuration control, detailed work instructions, extensive collection of part and process traceability data, and extensive documentation and disposition of any non-conformance found during the manufacturing process.

"A tremendous amount of data goes into space hardware. We are a space manufacturer, and these are very heavily controlled critical processes," noted Mark Yatskievych, CIM Manager of Production Operations at General Dynamics AIS Integrated Space Systems.

Eight years ago, the division embarked on a journey in the pursuit of the complete paperless shop floor. The division achieved major productivity improvements each year without losing sight of the end goal. The achievement of a completely paperless shop floor has been a testimonial to the dedication of the management and execution team.

Objectives Achieved include the following:

- A Common Manufacturing and Quality System
- A Paperless Shop Floor
- A repository to collect and extract from all production-related data
- Superior control of product workflow and engineering change incorporation
- Data & Metrics to support Lean, Six Sigma, Kaizen efforts
- Cost Reductions for each new Program and Contract

The data and pedigree behind the hardware is very important to troubleshooting any concerns prior to launch missions or in space. Prior to the initiative, the process was very paper intensive, with information and data distributed in many locations, and production workflow controlled with many manual checkpoints along the way.

The production facility went from a highly paper- based and manually controlled process to one where the manufacturing and quality management system, Solumina, is the focal point for building hardware. Given the complexity and criticality of the work, a comprehensive system was needed to help control workflow and to provide the checkpoints, to prevent unauthorized work and an integrated system that would house this detailed data and provide its history upon demand.

When the cost of each piece of hardware is in the tens of millions of dollars the visibility of the entire hierarchical history of each unit and the control of the build processes are critical because small mistakes can compromise the entire build. Full product pedigree can be extracted from the top-level deliverable system down to the smallest of chip-cap used on a circuit card. Gone are the days of wading through boxes of paper to exonerate the hardware due to a specific lot-date code of a part in a specific location.
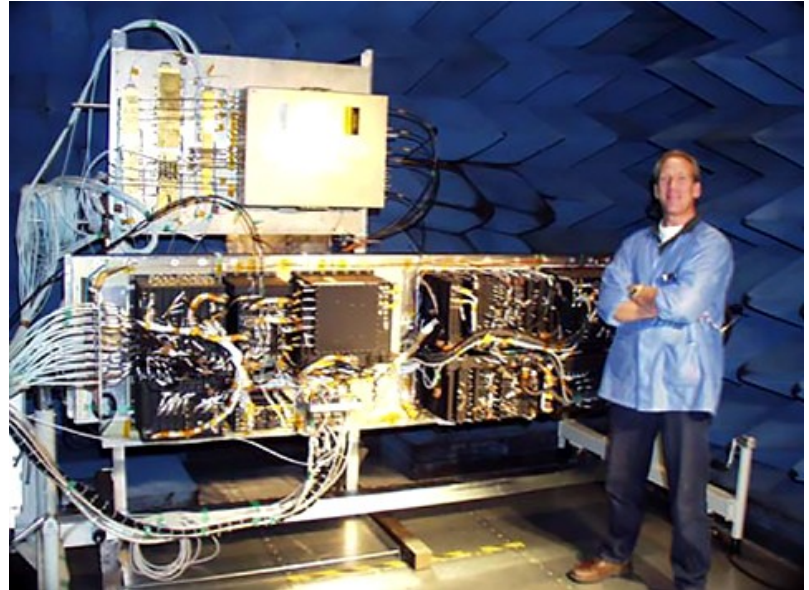
Quality and manufacturing data are also used to support continuous improvement efforts. Defect and production data are monitored to look for trends and set improvement goals. Customers are seeing the direct benefit. Automated quality metrics have eliminated the need to have dedicated person on each project focused on generating weekly/monthly reports. Cost reductions specifically centered around the new system-enabled process improvements have been proposed and achieved for each new programs and contracts.

"For our customers, the process standardization and data integrity that's been enabled have been huge," Mike Floyd, Director of Mission Assurance.

Training of users on the MES/Quality system happens one time. As users go from Project to Project, the system is the same. It takes 4-8 hours to train shop floor personnel and 32-40 hours to train the process planners. Learning curve for new personnel is greatly reduced.

Customers including Boeing, Lockheed Martin and NASA have audited the company's procedures and the systems and processes have been noted as best- in-class amongst hi-rel Space manufacturers.
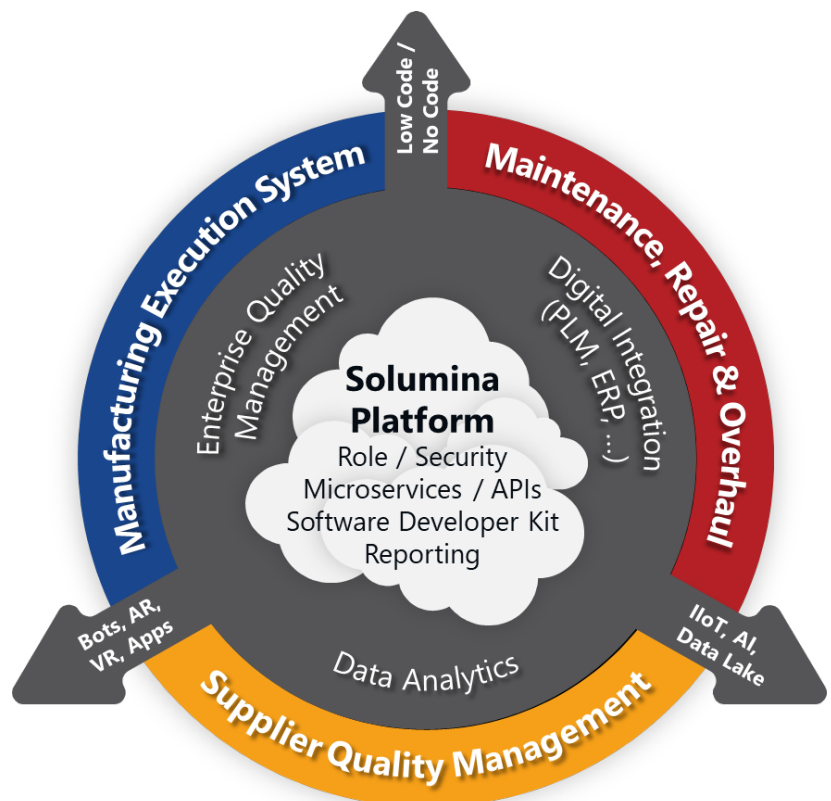
ABOUT IBASET

Headquartered in Foothill Ranch, California, iBASEt simplifies complex manufacturing. Its solutions replace disparate production, quality, and MRO applications with paperless, digitally integrated solutions. The iBASEt Digital Operations Suite synchronizes data and processes to foster collaboration by establishing and maintaining a digital thread that spans enterprise systems to internal and external teams. From process and inspection, planning to the shop floor, and the execution of sustainment activities, iBASEt's proven, pre-configured, and out-of-the-box solutions deliver real-time visibility and control that accelerates manufacturing performance.

The iBASEt Digital Operations Suite comprises a portfolio of Model-based Manufacturing applications that includes iBASEt's Manufacturing Execution System (MES), Supplier Quality Management (SQM), and Maintenance, Repair, and Overhaul (MRO) solutions. This digital suite connects the shop floor to the top floor to ensure high quality, consistent practices, continuous product and process improvement, and embedded compliance with process standards including ISO 9001, ISO 13485, AS9100, and FDA's 21 CFR Part 11 and Part 820.

With 30+ years of experience in highly engineered, regulated industries, iBASEt simplifies the complex by empowering customers to gain real-time visibility, take control, and drive velocity across their operations.

The iSeries, powered by the Solumina platform, has a cloud-native microservices architecture with open APIs that extends a digital ecosystem to drive innovation, simplify hardware and software systems integration, and deploy advanced technologies. iBASEt works closely with many industry leaders, including Lockheed Martin, Northrop Grumman, Rolls Royce, Pratt & Whitney, and Textron. Learn more at ibaset.com.