HOW DIGITAL TECHNOLOGIES ARE TRANSFORMING THE AEROSPACE SECTOR

L&T Technology Services

Praduman K. Tickoo, Vice President of Digital Manufacturing Services and Solutions at L&T Technology Services, will address how digital technologies are transforming the aerospace sector at the Aerospace & Defense Summit 2018. Ahead of the summit, we spoke with Praduman to discuss how aerospace companies can leverage technology and digitization to maximize their ROI and stay competitive in an ever-changing landscape.

How can aerospace companies use digitization to stay competitive in an ever-changing landscape?

In the aviation sector today, an effective digital strategy is critical for long-term success. The role of digital technology has changed from being a source of marginal efficiency gains to becoming the foundation for transformation. Increasingly, companies are recognizing the need to innovate -- both to stay ahead of legacy competitors and to pre-empt the disruption of established business models by ambitious and nimble digital natives.

Redesigning customer interaction: Digitalization is transforming the expectations of consumers across the globe. Its pace and scale mean companies need to re-evaluate and transform the customer experience to adapt, using new products, apps and tools to enhance customer interactions.

Business systems and processes: Businesses are re-designing their internal processes, transforming their back-end systems and refreshing their supplier contracting structures to integrate and streamline operations. In addition to creating operating efficiency gains, such changes typically play a crucial role in the achievement of a company's strategic aims, which increasingly include maintaining business agility for quick adaptation to changes in the marketplace and generating new revenue streams.

Nurturing innovation: Many businesses in the aviation sector are investing in specialized departments or group companies, or engaging in partnering arrangements, in order to ensure that they stay ahead of the curve and are well placed to anticipate upcoming changes. This can range from creating new innovation "labs" and "hubs" which bring together different parts of a business, to partnering with innovative companies and consultants.

Big data and advanced analytics: With the emergence of increasingly sophisticated technology, the ability to capture –- and extract value from –- ever increasing amounts of data is rising. 'Big Data' can help companies understand customer preferences and buying behavior to transform relationships. However, as the volume and variety of data increases, so to do the challenges associated with the use of Big Data. For many organizations, navigating the complex landscape of data protection, privacy and cyber security laws will be key to unlocking the full power of Big Data, advanced analytics and machine learning.

As per PwC, an advanced level of A&D digitization will increase from 32% today to 76% by 2020.

The technologies those are shaping A&D industry are:

Additive Manufacturing: 3D Printing that enables decentralized production and improves productivity

Augmented Reality: Information displayed within worker's visual field which reduces the need of training and support and increases quality

Big Data and Analytics: Evaluation and analysis of data from multiple sources which enables real-time decision making and optimization

Simulation: Simulation for complex assembly

Computerized Maintenance System (CMMS): A collaborative approach in the management of Maintenance Repair and Overhaul which results in a longer asset life reducing operational expenses

Repair Technology: Essential requirement to ensure that aircraft are maintained in pre-determined conditions of airworthiness to safely transport passengers and cargo

Intellectual Property Life-cycle Management: Ensures minimizing IP maintenance costs, increasing productivity and optimizing IP maintenance expenses

How can aerospace manufacturers leverage digital technology to maximize ROI?

Digital technologies can boost A&D companies' revenue by 5% to 15% and lower their costs by 5% to 10%. Like other manufacturing industries, the leverage of digital technologies in A&D industry is to improve operations and increase revenue, which are main two components affecting the ROI.

Improving Operations

A&D companies are applying digital throughout all aspects of operations:

a. Design and Development: 3D prototyping and simulation-based design have been introduced to support upstream research and technology, development, and prototyping.

b. Production: A&D companies are deploying new digital technologies in manufacturing to speed up production and reduce costs. For example, they are using augmented reality to perform quality inspections, autonomous guided vehicles to move parts within factories, and additive manufacturing to produce spare parts and thereby avoid stockouts.

c. MRO Services: Companies are providing their field engineers with detailed information and technical documentation on mobile devices. They are also starting to use augmented reality to guide operators in making repairs, thereby significantly reducing the turnaround time of their products

Increasing Revenues

Applying Predictive Analysis to boost the uptime of equipment and using Artificial Intelligence to optimize sales of spare parts and manage inventory. Using of "Digital Twins" (digital representations of physical objects) combined with Augmented or Virtual Reality to involve customers earlier in the design process, thereby minimizing the need for expensive late-stage design changes.

Per a survey by BCI, 81% companies invested in digital to improve operations, compared with 49% to increase revenue and 52% to innovate. Among companies that invested in all three categories, 58% are frontrunners of digital technology deployment.

How can data enable real-time decision making?

By improving the quality of decisions, real-time data is revolutionizing manufacturing.

Following are 10 ways of adopting digital to your technology:

Continually improve product quality by using real-time data for Statistical Process Control (SPC).

Knowing which production processes, machines, work centers and product lines are operating at high-quality levels and which aren't is essential for keeping shop floor operations running smoothly. Having real-time data to use in SPC for continually tracking, controlling and fine-tuning manufacturing processes is key.

Attain higher levels of compliance and traceability by receiving data directly from any machine on the shop floor in real-time.

Given the rapid advances in PLC-based monitoring and Machine to Machine (M2M) interfaces, it's possible to capture real-time data on metrics and Key Performance Indicators (KPIs) of interest. Collecting data across the shop floor in real-time and looking for patterns, trends and predictive insights form the foundation of Manufacturing Intelligence. It's possible today to capture item number, manufacturing number, work order details, lot numbers, date, time and additional KPIs to make traceability one of the strongest aspects of a manufacturing operation.

Improve production plan performance by attaining greater schedule accuracy.

It's best to consider fixed production times on the Bill of Materials (BOM) as an average or median estimate that can vary widely depending on work center assignments, parts availability and many other factors. By having real-time data, the production time on BOMs can be fine-tuned and checked for accuracy. Without it, long-standing assumptions of fixed production times can hold an entire production line back from accomplishing more. Greater schedule accuracy based on real-time data from the shop floor makes production plans more efficient, increasing work center productivity and improving machinery utilization as well.

Manufacturers are gaining up to a 6% improvement in Overall Equipment Effectiveness (OEE) when they rely on real-time quality metrics.

By relying on real-time data, manufacturers are gaining quicker insights and can determine which areas of availability, performance and quality are most impacting performance. LNS Research found that manufacturers who rely on real-time data gain a significant competitive advantage over their peers.

Prolonging the life of equipment, machinery and tools using real-time data to predict when maintenance, repair and overhaul need to take place.

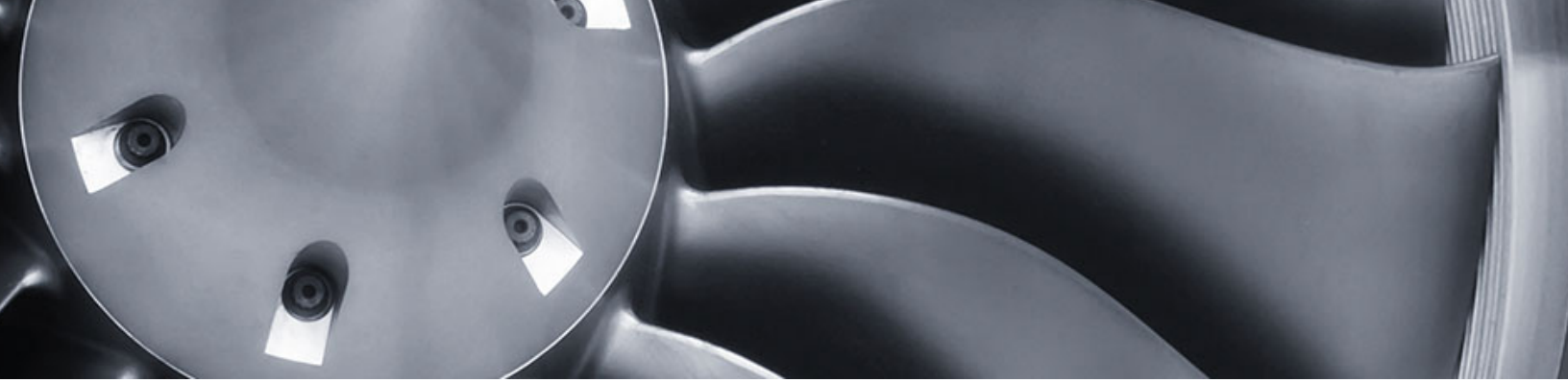
Real-time monitoring is providing an entirely new series of insights into how manufacturing equipment and machinery life spans can be improved. By combining real-time data with predictive analytics, it's possible to determine when a given machine will need repair. Best of all, long-standing assumptions regarding preventative maintenance are changing due to greater insights gained from real-time data. All of these factors contribute to better business results, driving up Return On Invested Capital (ROIC) as machinery lasts longer.

Enable higher levels of inventory control accuracy and performance across all production locations.

Batch-oriented approaches to inventory control, while economical and delay decisions are prone to errors. Migrating to real-time inventory control delivers a wealth of benefits including eliminating overstock of raw materials, increasing inventory turns, and drastically reducing physical inventory from weeks to days. Manufacturers are also reducing inventory holding costs and safety stocks while optimizing inventory levels for their most in-demand products. The bottom line is that real time data is the lifeblood of any world-class inventory control system and manufacturing operation.

Improving cycle times and reducing scrapped parts by using real-time data to better manage and optimize against constraints.

Attaining higher levels of cycle time performance often requires redefining and reengineering parts of the production process. Constraints that get in the way of gaining greater cycle time improvements are integrated into the production process itself. Knowing which plant floor processes to change and how much to improve cycle times is key. Real-time monitoring can help to quantify constraints more accurately and define plans on how to overcome each to attain higher cycle times.



How can L&T's solutions aid aerospace companies achieve this?

DMS Service Spectrum

PLM (Product Lifecycle Management)

- Design Process Management & Automation
- PLM Version Upgrade & Data Migration Factory
- ALM/Requirement Management
- Model bases Enterprise
- Extended PLM & Benefit Realization Services

MOM (Manufacturing Operations Management)

- Intelligent Industrial Automation
- Smart Execution Systems
- Enterprise Manufacturing Intelligence
- Design Simulation

ICM (Integrated Content Management)

- Enterprise Content Practices
- Integrated Content Solutions
- Virtual Authoring

IAM (Integrated Asset Management)

- Engineering Information Management
- Engineering Tools Support
- Materials and Maintenance Support
- Enterprise Asset Management
- MOR/Repair Management

Digital Solutions

DigiServe

DigiServe is a Service Lifecycle Management framework to accelerate implementation of part traceability across product lifecycle, including aftermarket.

Shop Floor Asset Condition Monitoring

A one-stop solution for plant equipment framework standardization, monitoring and health prediction.

Design for Xcellence (DFX)

DFX is a Service Lifecycle Management framework to accelerate implementation of part traceability across product lifecycle including aftermarket

Unified Application Lifecycle Management

An accelerator solution to enable ASPICE compliance for Automotive and requirement management for other industrial OEMs.