

PLM Enables Aerospace and Defense MRO

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Keywords

MRO, A&D, Asset Management, Commercial Air Carriers, Military Fleets & Defense Systems, Maintenance Planning, Inventory Management, In-Service Visibility

Summary

At over \$45B in 2007, Maintenance, Repair, and Overhaul (MRO) for the Aerospace & Defense (A&D) represents one of the largest markets for product MRO. Next to the high cost of fuel, maintaining and keeping fleets in the air is the largest single expense for commercial air carriers. Additionally, governments allocate significant budgets to maintain their military fleets and the cost of maintenance over the life of aircraft that often exceeds the original cost.

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Analysis

As an industry, A&D represents an extensive network of companies that make or own complex products, with extremely long lifecycles, that require long term maintenance support. Too often, this support comes with inordinately long maintenance cycle times that reduce fleet availability and increase overall costs.



Not surprisingly, MRO operations are also one of the leading cost centers in commercial air transportation. While high costs for maintenance of such complex equipment should be expected, there is also considerable inefficiency in the current operations due to silo behavior among in-service engineering and depot maintenance functions. Further, unreliable parts management and poor coordination across inventories and logistics operations, and legacy IT infrastructures offer little, if any, visibility into available parts information, maintenance schedules, service level agreements, asset performance data, or maintenance forecasts. An aging fleet and aging maintenance workforce add further strains to an already challenging situation.

A&D MRO, by its nature, is heavily dependent upon information. Historically, this need was met with paper-based maintenance manuals, service bulletins, engineering drawings, business documents and a hodge-podge of maintenance technician notes containing a wealth of critical process knowledge. Based on this information requirement, a market of one-off content management solutions emerged with a variety of ways of dealing with the vast amounts of documentation. While these solutions provided some degree of automated availability, they were rarely integrated into a centralized business system, much less to PLM-based engineering and manufacturing systems that could address design/build information, inventory and supply chain management issues.

Formidable Business Challenges Remain for A&D MRO

Service organizations that support and sustain complex capital assets such as commercial aircraft, military defense systems, ships, weapons platforms, and supporting infrastructure face a demanding set of challenges:

- Reduce MRO cycle time. Service teams must have the tools and collaborative MRO environment to minimize the turnaround time to successfully complete a service event.
- Reduce MRO costs. Airlines need to optimize inventory levels for parts, tooling and equipment that support aircraft maintenance activities, as well as the tied-up capital that they represent.
- Increase service team productivity. Service organizations need to improve productivity by minimizing the time needed for activities not directly related to performance of the service event. These activities

would include searching for and obtaining instructional information such as maintenance documents, service bulletins, engineering design models, parts catalogs and other business documents.

- Increase operational availability. Airlines and military fleets must have their assets operational to meet flight schedules, passenger demands, and planned and unplanned missions. Sustained operability serves to minimize overall service costs, as well as enable carriers to keep their assets in a more continuous state of service readiness.

Supply Chain Planning, Inventory Management, and Forecasting Are Key to Successful MRO

Like manufacturing, MRO planning in the A&D industry requires the definition of process parameters and activities:

- The maintenance tasks to be performed.
- The timing and frequency of each task.
- The procedural steps to be followed to properly perform each task.
- The resources required for each maintenance task.

But the uncertainty in when these steps will be performed creates significant differences between manufacturing and maintenance planning. While supply chains can be very complex, supply chain planning for A&D production systems is relatively straightforward, being based on pre-defined inventory requirements, capacity, and predictable customer demand. In contrast, the inherent complexity of the product in the A&D industry makes it difficult to predict what will fail and what parts will be needed for repair. And, this is underscored in many cases by the unreliable nature of fleet asset usage and the intensive maintenance and repair cycles typically associated with sophisticated aircraft and weapons systems. Dealing with this high level of complexity and uncertainty poses a significant challenge for MRO service teams in accurately managing inventory levels, estimating maintenance and repair cycle times, or guaranteeing asset readiness.

Predictability in MRO is a critical element, especially in the A&D industry. The ability to forecast spare parts requirements for maintenance schedules is what enables A&D producers and owners to survive in this very competitive market. MRO solution providers seeking to differentiate themselves

in this market must therefore ensure that their forecasts are based upon the best possible information. This requires a tightly integrated, collaborative infrastructure that provides convenient visibility to the entire base of capital assets and access to product engineering, manufacturing processes and maintenance planning, inventory and material management, and supply chain management information. Many of today's PLM-based MRO solutions offer this access.

MRO Built on a PLM Infrastructure Works Best

The A&D industry is truly a global operations enterprise and it has led other industries in establishing a global footprint from the perspective of

Asset Management
Service Knowledge Management
Configuration Management
Change Management
Maintenance Planning
Maintenance Execution
Material Management
Inventory Management
Reporting and Analytics
Records Management Integration
Compliance Management Integration

PLM Solution Capabilities that Enable MRO

collaborative product engineering, manufacturing operations and product support. MRO for this industry requires service organizations to operate in a very heterogeneous, globally dispersed environment. The good news is that the PLM solutions sets that A&D companies currently use to design and build their product will also support MRO service and operations within the same environment. MRO service teams and facilities are able to leverage the collaborative attributes as well as the broad solution set offered by PLM.

There are a number of similarities between MRO operations and actual production in the A&D industry. Both require access to engineering design, version control, and change management. Both require process planning, work instruction generation, e-BOM integration with ERP, shop floor execution solutions, and supply chain planning. Most of these capabilities should be available in a robust MRO solution set that is an integrated component of a comprehensive PLM offering.

Managing asset information in a secure, collaborative PLM environment or simply integrated with PLM provides maintenance service teams with the ability to operate successfully in the four primary areas of A&D MRO: In-Service Visibility to the entire base of assets, including product history and configuration knowledge; Maintenance Planning capability for assets ranging from parts to entire fleets; Maintenance Execution capability to enable service teams to perform auditable maintenance processes while retaining maintenance knowledge history that can be retrieved on demand; Material

and Inventory Management that enables companies to track and manage all the parts, assemblies, tools, and equipment required for the MRO process.

Recommendations

- Successful maintenance planning and execution depends upon having immediate and timely asset information. Producers and owners in the A&D industry should leverage their current PLM solutions when implementing MRO solutions.
- Other industries would do well to look to the current robust MRO solutions in the A&D Industry when evaluating product MRO requirements for their global operations.

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