Maintaining the chain reaction

Solutions for ensuring the integrity of the maintenance, repair and overhaul (MRO) supply chain are wide and varied, and smart management of that chain is key. Bernie Baldwin reports.

Whether you're an airline maintenance department or independent third-party MRO provider, keeping an optimum inventory level to enable just-in-time maintenance is demanding. The solution is to ensure smart management of the supply chain.

According to Erik Goedhart, senior vice-president, aerospace at logistics specialist Kuehne + Nagel, the key challenges for the supply chain are visibility and predictability.

"In the dynamic world of daily operations, optimum inventory is difficult to define. What is optimum if you achieved a world-class standard but still that specific part of that particular Aircraft On Ground (AOG) is not there?" he queries. "Overall the visibility of inventory is increasing, but there are still areas for improvement, especially in repair management and the visibility of on-site stock."

Kuehne + Nagel offers full inventory management and can take responsibility for inventory levels and managing vendors and repair cycles. "The airline manages the contractual agreement with their parts service providers. All ordering, managing inventory levels and repair part management, however, can be managed by us," Goedhart says. "Specifically for airlines we can be the full logistic 'in-house' company managing the warehouses, local transport, as well as inbound and outbound logistics."

He continues: "A key element in that is repair logistics, where there is an opportunity for cost reduction. Parts taken off an aircraft still take too long to be sent to the shop and repaired. Repair parts stay at gates, technical offices at airside and outstations too long. It is beneficial to leave that task with the logistic provider as a core KPI. This includes the whole repair cycle. In doing so, parts are back in the pool faster and, as such, fewer parts are needed in the overall supply chain."

UNPLANNED MAINTENANCE

Tony Louw, IFS's MRO expert in its aviation and defence business unit, identifies unplanned maintenance as one of the biggest challenges.

"Inventory represents an essential, yet costly component of service operations. To achieve optimum performance while keeping costs low, organisations must carefully balance stock levels, locations, spare parts, service levels and more," he explains.

"Even with a complete and real-time view of an airline's entire operations, it can be almost impossible to predict what spare parts are needed, where and when," he adds. "However, using advanced analytics, with input from a combination of IoT [Internet of Things], big data and predictive maintenance, allows for greater understanding of the potential effects of not having an effective supply chain eco-system in position.

"With advanced data analytics and machine learning, airlines are far more transformative in their approach to spare parts management. As more OEMs look to shift their main focus from manufacturing to through-life support, the need for better demand forecasting has increased – driving profitability from the minimum inventory level required while maintaining or even improving acceptable service levels. The old 'run Initial Procurement and let the users buy sustainment stocks' process just won't do if profit margins are to be maintained."

Louw says IFS's service parts and logistics software is designed to do such work

Smart management of the MRO supply chain is critical, especially as the 'just-in-time' inventory required to support ageing aircraft and their systems changes over their life cycle.

for product-based businesses. "IFS Applications provides airlines with 100% visibility into spare part inventory levels, including serial number traceability," he emphasises.

SUPPLY CHAIN CHALLENGES

At AJW Group, chief strategy officer Boris Wolstenholme noted that supply chain challenges range "from the accurate forecasting of operations and maintenance, to the availability of parts, the challenge of storing stock in the right location to varying AOG requirements.

"The availability of accurate data on stock levels is also critically important, providing the intelligence that can inform future purchasing decisions," he observed. "Finally, there is the complexity of modern airlines having a range of procurement options to choose from – from ownership, to leasing, pooling and exchange.

"The good news is that through effective planning and efficient maintenance practices, there is much that can be done to reduce the amount of capital tied up in stock and AOG parts. We operate several inventory pools in support of operations: station inventory (located at the Main Base Kit), regional inventory located to optimise logistic solutions in region (main inventory held at HQ in Slinfold, UK) and work in progress or repair (WIP) inventory.

"Optimising the model and understanding the impact on service levels and logistics whilst maintaining an efficient WIP is something that we constantly strive for," said Wolstenholme. "We combine this with an extensive vendor network of OEMs and MROs, which, together with our supply chain management and efficient maintenance service, ensures our customers have the optimal level of stock, ultimately helping towards the on-time performance of their aircraft."

OPTIMISING INVENTORIES

Graham Smith, head of spares business, BAE Systems Regional Aircraft, sees several challenges when optimising inventories. "First, understanding where the aircraft and its systems are in their life cycles is very important. As aircraft and systems age, the inventory required to support them changes," he said.

"Next come the airline's operational requirements, changes in routes, and who does the maintenance, which can all impact the inventory required and where it should be located. Then, thirdly, there is supplier performance, system/parts reliability and obsolescence to consider. We introduced our Jetspares Rate Per Flight Hour programme 25 years ago and have therefore built up a very strong business model that takes advantage of our pedigree and applies it to the kind of challenges detailed above," Smith stated.

There are still logistics hurdles to overcome though, and Smith and his colleagues have been considering how to deliver an even better service. "We think data management needs further development – as more data becomes available it is imperative that it is managed properly. Spurious notifications are still an issue, tracing the true fault and avoiding unnecessary parts removals is a challenge. Real predictive failure management will deliver a step change in reducing costs for airlines as they reduce the risk cancellations and delays," Smith remarked.

SOPHISTICATED TOOLS

Deepak Sharma, president, integrated supply chain solutions – commercial at AAR, says his company uses "very sophisticated tools, years of experience and over 150 million hours' worth of data on almost every aircraft platform to plan for optimum inventory level".

AAR also has one of the industry's largest in-house parts markets, as well as, says Sharma, "the flexibility to manage the best solution for each customer since we are not part of an airline or OEM, we are independent".

He added: "Tight timeframes, geography, routes, flight availability and customs clearance are all hurdles that exist today. There are a number of different initiatives out there on the delivery method, but the key will be to have the stock on hand, in close proximity, based on strong forecasts and planning, so you only need to manage the exceptions via an urgent delivery method."

FUTURE SOLUTIONS

Kuehne + Nagel's Goedhart believes the aerospace world is set to change significantly and it will be the same for logistics, which is seeing the development of drones and self-navigating ships and trucks.

"Any logistic solution is 60% generic, 20% industry-specific and 20% customer-specific. Kuehne + Nagel has the 'Supply the Sky' portfolio of services for the aerospace industry. As such we developed specific solutions for spare part management, engines, in-flight services, vendor management and others. Solutions development is a continuous process so there are new innovations to come," Goedhart reports.

AJW's Wolstenholme confirmed that among several logistics hurdles, the company's primary focus is reducing

touchpoints between component installations/removal and component repair, very much like Kuehne + Nagel. "The ability to ship direct relies on robust processes and IT interfaces between the service provider and the customer, but the benefits are immediate if they are implemented effectively," he commented.

"AJW creates bespoke logistics solutions tailored to individual customers, by utilising its extensive relationships with suppliers worldwide. The hurdle in this environment relates to a potential lack of alignment between the maintenance planning and logistics. Suppliers like AJW do align their logistics services with the airline planning environment to achieve optimal efficiency," Wolstenholme added.

'MUST HAVE' TECHNOLOGIES

IFS's Louw believes the future supply chain will feature the current hot topic among developing technologies – 3D printing. "This is quickly becoming a 'must have' for manufacturers, with the potential to save millions of pounds in manufacturing costs," he explains.

"Spare parts are prime candidates for 3D printing, as part demand is hard to calculate at the best of times, with most spares having to be kept in stock or within reach of procurement at short notice. With 3D printing, spares could be produced on demand, helping avoid expensive set-ups and large quantities of stock – streamlining the entire support chain," Louw continues. "But 3D printing brings with it a new threat from counterfeit parts getting into the supply chain. [Such] parts from easily accessible 3D printers, coupled with the endless amount of designs available on the internet, could fuel a black market of counterfeit parts," he warns.

"Companies need software which can search and locate exactly where each part came from, requiring software with a very high level of granularity in its design. We know this first hand because we have one of the few solutions able to track and trace parts in order to comply with international export regulations."

Airlines and MROs therefore have a vast array of options when creating a just-in-time culture for their maintenance. They just need to ensure that each link in the chain does its job. ■