



## **Value chain maturity**

### Focus on commercial aviation spares forecasting best practices

*Opportunities to incorporate leading practices into commercial aviation spares forecasting*

In the \$50 billion commercial aviation maintenance, repair, and overhaul (MRO) market, the area of spares forecasting has significant opportunities for improvement. With an asset and working capital intense environment, the ability of companies to react to a changing demand is paramount for continued growth and customer satisfaction.

PwC, with the encouragement of several major original equipment manufacturers (OEMs), worked with industry leaders from around the world to understand current leading/next practices to improve spares forecasting. Understanding these improvements is foundational to supply chain and MRO excellence throughout the OEMs, operators, and third-party MRO/spares value chain.

- Better leading indicators for future demand signals for repairs and spares
- Improved information to reduce lead times on aircraft parts turnaround time
- Opportunities to reduce spares inventories across the value chain
- Better organizational alignments enhancing communication

In addition, PwC identified opportunities to incorporate leading practices into commercial aviation spares forecasting as well as next practices that should be considered.

#### **Critical to quality of spares forecasting**

PwC categorized findings and recommendations by organization accountability, business processes, data requirements, and information technology needs to ensure critical to quality elements of spares forecasting were addressed. The results deliver a comprehensive discussion in the following areas.

#### *Organizational accountability*

Utilizing a Six Sigma tool called RACI (Responsibility, Accountability, Consulted, and Informed), responses were segregated by multiple functional areas. The Integrated Supply Chain (ISC) function was recognized as being accountable by all segments of the survey population. When looking at the financial forecast responsibility results, we saw an equal split reported among finance, sales, and aftermarket. However, ISC was accountable to both of these functions.

# Spares forecasting

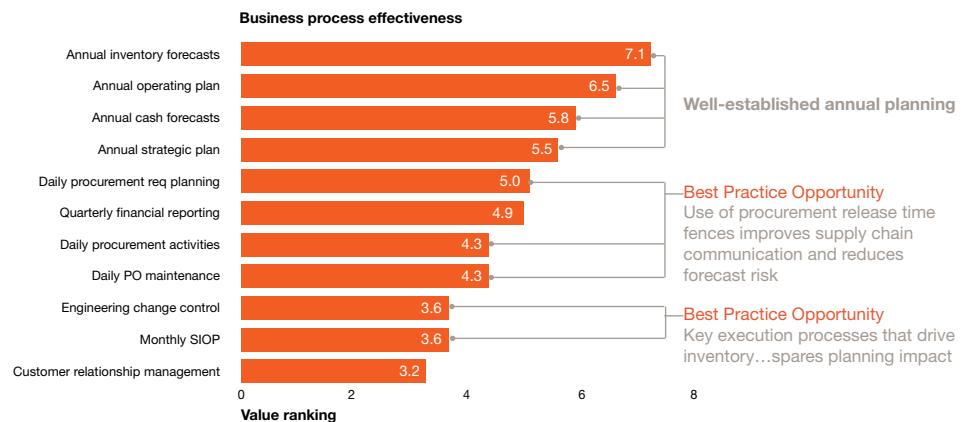
As seen throughout results, engineering data impacts are a common improvement theme.

## Business process importance

Spares forecasting has both strategic and tactical components, and it is a critical component within other business processes. Based upon organizational accountability results, ISC executives responsible for spares value chain excellence will need to focus on:

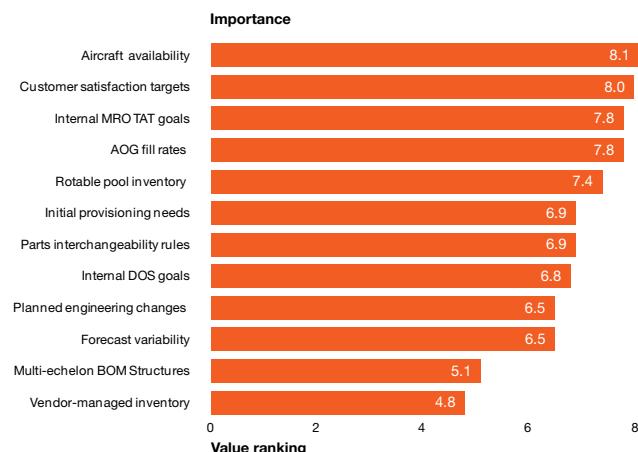
- Business processes impacted by spares forecasting
- Effectiveness of these business processes
- Customer and internal business drivers important to these processes
- Business process improvement tools

Figure 1: Key business processes impacted by spares forecasting



Disturbing is the low business process effectiveness of the monthly sales, inventory, and operations planning (SIOP) process and the engineering change control process, as shown in Figure 1. Both of these processes are impacted by spares planning and can be significant inventory drivers. As will be seen throughout results, engineering data impacts are a common improvement theme and, along with SIOP, can impact the business drivers noted in Figure 2.

Figure 2: Key business driver considerations in spares planning



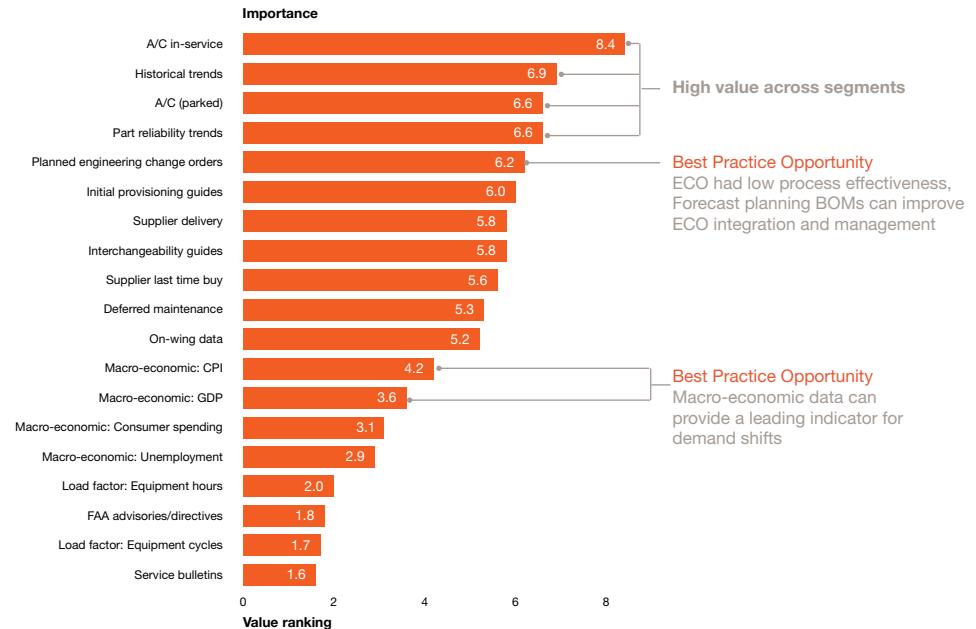
# Spares forecasting

Value chain collaboration and internal operations should be considered important sources to drive improvements in SIOP and ECO control.

## Business process data, special factor and data source drivers

Spares forecasting requires various types of internal and external data collection prior to using manual and/or statistical-based forecasting tools. Executive awareness of the timeliness, accuracy, and proper weighting of the internal and external data is critical to forecasting accuracy and mitigating downstream supply chain risks.

Figure 3: Overall ranking of spares forecasting data drivers



When correlating planned engineering change orders (ECOs), value to bill-of-material (BOM) integration maturity, and ECO business process effectiveness, improvement opportunities exist—especially in BOM integration. To improve ECO process effectiveness, one needs to consider usage and integration of various MRO BOM types such as as-built, as-maintained, master parts list, etc., as critical inputs to spares planning BOMs. Note that service bulletins provided little value in forecasting. However, this is an opportunity for engineering and ISC executives to improve the lack of maturity in spares planning BOM usage, which should include issued and pending service bulletins involving hardware changes integrated from various MRO BOM types.

High-ranking data sources, such as value chain collaboration and internal operations, should be considered important sources to drive improvement in SIOP and ECO control.

## Business process software enablers

Business process drivers and their importance in the spares forecasting process were shown in Figure 2. Spares forecasting application software capabilities can enable these drivers.

Although we have seen excellent alignment between business drivers and software capabilities, there has been a slow adoption rate of business driver software capabilities. Note that:

- 50% of the respondents have implemented software enablers, while
- 30% of the respondents plan to implement within the next 36 months, and
- 20% of the respondents have no plans to implement at this time.

OEMs have the highest maturity level of software capabilities.

# Spares forecasting

Most disturbing was that only 41% of responding companies have demand aggregation across their enterprise.

## Risk mitigation

Multiple business process maturity factors can impact spares forecasting risk mitigation and hinder overall asset utilization. Four maturity factors that influence risk in the spares planning process:

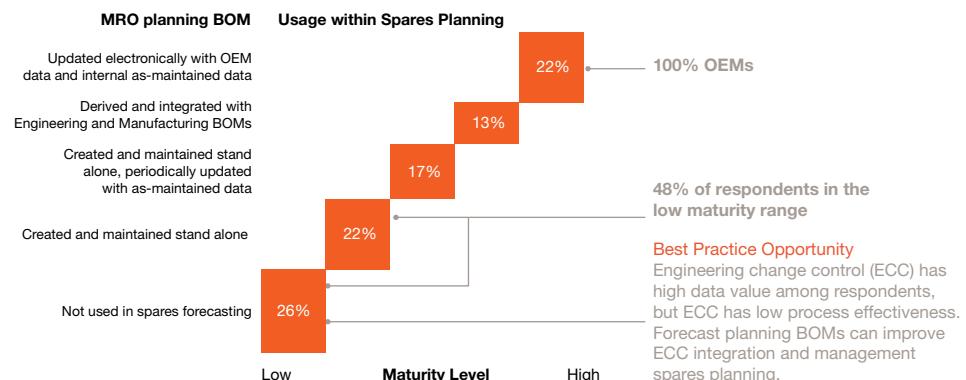
- Scope of spares planning
- Demand aggregation
- MRO planning BOMs
- Supplier communication methods

Most disturbing was that only 41% of responding companies have total customer demand aggregation across their enterprise. Coupling the 59% of respondents having limited or no customer demand aggregation across the enterprise with the scope of spares planning at the program or location level can cause:

- Loss of visibility to the customers' total needs
- Negative impacts to downstream procurement processes

Engineering change control (ECC) has a high data value across all respondents. However, due to low ECC process effectiveness, 48% of the respondents continue not to integrate MRO planning BOMs into the spares forecasting process, as shown in Figure 4.

Figure 4: Bill of material life cycle across value chain



This lack of integration impacts the timely release of changes and again has a negative impact on downstream procurement processes. The causes of low ECC process effectiveness were not collected in this survey. However, several items may be contributing:

- Organizational responsibilities for maintenance of BOM across the BOM life cycle
- Technology barriers to aggregate and integrate BOM data across various BOM life cycles
- Importance of MRO in the overall revenue of the enterprise

Finally, as discussed in business process importance, respondents recognized the importance of effective procurement processes, especially daily procurement demand add, change, and delete releases.

However, responses indicate that further improvements can be made by utilizing procurement release with time fences to improve planned requirement communication and reduce forecast risk. Results of respondent procurement time fence utilization across the three segments indicated:

- 50% usage of traditional firm procurement release practices with no time fencing
- 30% usage of procurement release practices with time fencing
- 20% usage of procurement release practices with time fencing and just-in-time (JIT) signals

# Spares forecasting

Time fencing can enhance long-range procurement windows with material and labor commitments controlled by agreed-upon periods between buyer and seller.

## Findings

The lack of collaboration and sharing of information (fleet data, engineering change orders, part reliability, service bulletins, etc.) across the supply chain impacts the efficiency of spares planning and forecasting.

The low maturity levels of spares planning BOM, demand aggregation, and improved communications adopted in the forecasting process impacts internal and external key performance indicators across the service value chain.

## Recommendations

- Utilize collaboration events to focus on high-value data and special factor drivers to compress data sharing cycle time, improve data quality, and remove barriers.
  - Aggregate fleet data
  - Macroeconomic indices
  - Engineering data drivers
- Utilization of the following leading practices will improve the overall maturity of the spares forecasting value chain.
  - Ensure monthly SIOP process is used to integrate the overall customer demand.
  - Forecast planning BOMs can improve integration and management of changes over the entire spares planning time line.
  - Procurement release time fences improve supply chain communication and reduce risk.

## How PwC can help

The Spares Forecasting survey received timely and relevant responses, thanks to approximately 100 highly-qualified participants representing OEMs, airline operators, third-party MROs, and all other groups within the spares work stream.

As a result, industry input helped provide useful recommendations to companies in the spares arena. The information provided in our survey can help improve the flow of information, lead to reduced lead times on aircraft parts and turnaround times, reduce spares inventories across the value chain, and define indicators for future demand signals for repairs and spares.

As the economy improves and aviation traffic returns to prosperous levels, the industry must prepare to support deferred, delayed, and accelerated maintenance of the fleet. Driving improvements in spares forecasting through better communication and collaboration across the supply chain limits these cyclic influences of reduced supply when demand increases.

You can download the final report at the following link from [pwc.com](http://pwc.com): *Spares forecasting—A commercial aviation perspective*

We have presented the findings at the 2011 Aeroexchange User Conference in 2011, the Aviation Week MRO Conference in Miami, and to the SAP User Group for Airlines. One attendee at the MRO Conference called this “a ground-breaking report for our industry.” We hope you feel the same way.

We are happy to have a deeper discussion with you about the results of the survey. We also welcome your opinion about this report, so please feel free to reach out to us.

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## How PwC can help

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