

# A New Tool for Maintenance Organization Design: Workload-driven Resource Forecasting

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Determining the right size and functional mix of an airline's maintenance organization has become a perpetual challenge. The maintenance organization must balance airline operational goals with maintenance cost control/reduction, all while maintaining the highest standards of safety and quality. In addition, constantly changing economic and regulatory conditions, merger and acquisition activities, facility expansions, fleet changes, third-party work considerations, and outsourcing decisions affect the business, operational, and ultimately, resource requirements of the maintenance organization. These constant changes necessitate a strong organization design strategy—one that uses a methodical, flexible, fact-based, and repeatable approach to determining appropriate organizational requirements.



The key objective of any organizational design strategy exercise is to position the organization for performance excellence. One of the major challenges is to understand how many resources are required given various functions and activities. While a ground-up method of activity-based resource planning is theoretically attractive, seldom do the data and organizational patience exist to complete this accurately or in a reasonable timeframe.

Another common method is to benchmark total headcount against similar companies. For example, *How many maintenance employees does Company X, Y, or Z have? How many aircraft? What is the employee/aircraft ratio? Based on my number of aircraft, how many employees should my organization have?* While this is an attractive method due to its relative simplicity, it is dependent on finding comparable organizations. For most airline maintenance organizations, this is nearly impossible given that the number of factors to consider is significant. These can include fleet size, number of fleet types, fleet age, level of in-

house/outsourced work, maintenance programs, and IT systems, among others. Even when some of these factors are taken into account, at best you achieve a directional sense for overall maintenance organization size (Exhibit 1).

More importantly, applying this methodology to a given airline can be misleading if used in isolation, as it fails to inform whether the correct staffing levels are in place for any given function within the organization. Only by drilling into specific departments can overall size, skills, and resource allocations be assessed. This challenging endeavor can be accomplished using a method called *workload-driven resource forecasting*.

**Workload-driven resource forecasting: A four step approach**

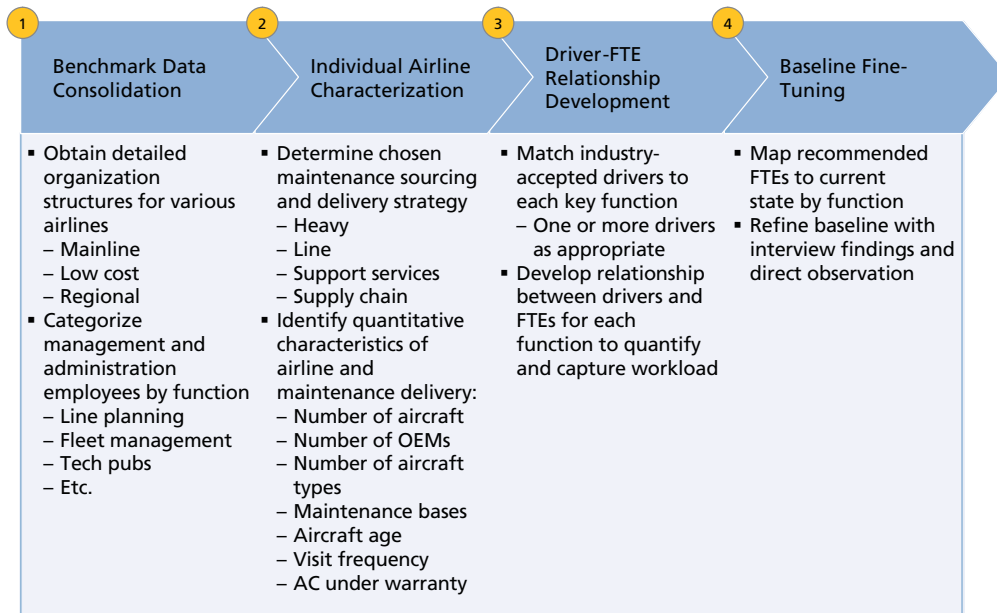
This approach combines aspects of traditional benchmarking and activity-based resource planning to create a flexible model that can be used to determine current organizational requirements, as well as support scenarios to assess the impact of anticipated changes to

**Exhibit 1 Industry benchmarks: How does your airline compare?**

	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6	Carrier 7	Carrier 8
Overhead FTEs	140	20	40	240	240	110	900	1,050
Line	Out	Out	In	In	In	In	In	In
Heavy	Out	Out	Out	In	In	In/Out	In	In
Engines	Out	Out	Out	Out	Out	In/Out	In	In
Components	Out	Out	Out	In	In/Out	Out	In	In
Fleet Age	4	3	12	7	12	6	12	10
Fleet Size	170	20	30	150	140	55	350	350
Fleet Types	2	1	4	3	4	2	6	4
FTE/AC Ratio	0.8	1.0	1.3	1.6	1.7	2.0	2.6	3.0

Disguised airline data.  
Source: Oliver Wyman research.

## Exhibit 2 Workload-driven resource forecasting



Source: Oliver Wyman.

the airline on the maintenance organization. There are four major steps in the approach: Benchmark Data Consolidation, Individual Airline Characterization, Driver-FTE Relationship Development, and Baseline Fine-Tuning (Exhibit 2). By taking each functional area and its key drivers as a starting point, it is possible to categorize individual airlines by various strategic and operational characteristics. These characteristics, workload drivers, and their relationships to each maintenance function can be used to estimate expected skill sets, workload, and resource requirements. Fine-tuning the results based on airline-specific interviews and observations round out the process and provide a solid baseline.

**Step 1: Benchmark Data Consolidation.** The first step in this approach to properly design an airline's maintenance department involves building a base case at the FTE-per-aircraft level. Collecting detailed organizational and operational data for various types of commercial airlines

is necessary in order to build a general base case. Employees can be categorized into the different maintenance departments by their function (e.g., line planning, fleet management, tech pubs). Drilling down to a comprehensive set of core maintenance functions is critical, as these same functions must be mapped to the maintenance departments of all of the commercial airlines used in collecting the benchmark data.

**Step 2: Individual Airline Characterization.** In addition to the organizational data, the airline's overall maintenance strategy along with fleet, operations, and maintenance delivery characteristics can be used to profile each of the airlines in the benchmark population. The strategies are kept to a fairly broad level and describe the airline's mix of in-house and outsourced work by major maintenance area (line, base, components, and engines). The various fleet, operations, and maintenance delivery characteristics help differentiate the airlines included in the benchmarked study.

## Case Study: Right-sizing the Maintenance Organization Amid Strategic Business Moves

A mid-size airline operated nearly 50 aircraft with three distinct fleet types. Other than line maintenance, all maintenance work was outsourced. Airline leadership had made two strategic decisions for the business:

1. Move the corporate headquarters to another part of the country to consolidate operations
2. Reduce the fleet size by approximately 30%

Airline leadership knew they needed to right-size the maintenance division as these strategic moves occurred, but was unclear about how much or in which functions they would need to reduce headcount.

The airline first conducted a high-level benchmark analysis using data from similar airlines around the world. The airline estimated that its current maintenance organization might be overstaffed by less than 10%; however, with the planned fleet reduction, future resource requirements in the department would be decreased by a further 30%. Several questions still remained: Where within the department should reductions occur? Should resources be taken out of every function? How will this affect operational performance and ensure safety and regulatory standards are maintained through the transition?

Then, using workload-driven resource forecasting, the airline found that certain functions such as base reps, engines, legal, and warranties were not overstaffed and would not be affected by the fleet reduction or the move. Areas such as quality, tooling, line planning, technical publications, and stores required fewer FTEs as aircraft were removed from the fleet and the operations were consolidated in a new location. However, certain functions within the maintenance department actually required *additional* resources, as they were previously understaffed based on the workload volume.

As a result of the workload-driven resource forecasting, the airline achieved total annual savings of USD \$5 million through overhead reductions. Operational performance was unaffected throughout the reorganization, and was forecast to improve over time since each maintenance function had the optimum number of FTEs. The airline developed a thorough understanding of the key headcount drivers for each function within its maintenance department and will be able to use these results and the tool that was created to assess the impact of future proposed business decisions on the organization.

### Exhibit 3 Maintenance functions and key drivers

Functional Area	Typical Sub-functions	Key Drivers
Maintenance Management	<ul style="list-style-type: none"> <li>▪ Base/line supervision and surveillance</li> <li>▪ RONS</li> <li>▪ A checks</li> <li>▪ QC/Inspection</li> <li>▪ Exterior cleaning</li> </ul>	<ul style="list-style-type: none"> <li>▪ Number of in-house lines</li> <li>▪ Number of aircraft</li> <li>▪ Number of outsourced heavy facilities</li> </ul>
Technical Management: Powerplants	<ul style="list-style-type: none"> <li>▪ Engines and APUs</li> <li>▪ Borescopes</li> <li>▪ LRUs</li> <li>▪ Mods and upgrades</li> <li>▪ Spares</li> <li>▪ Repair/overhaul</li> </ul>	<ul style="list-style-type: none"> <li>▪ Number of annual engine visits per fleet OEM</li> <li>▪ Number of annual APU visits per fleet OEM</li> </ul>
Technical Services, Systems, and Control	<ul style="list-style-type: none"> <li>▪ Fleet management</li> <li>▪ Line/base planning</li> <li>▪ Maintenance programs</li> <li>▪ MCC</li> <li>▪ Records management</li> <li>▪ Training</li> <li>▪ Technical publications</li> <li>▪ Reliability</li> <li>▪ HR, Finance, IT</li> <li>▪ Aircraft acceptance</li> </ul>	<ul style="list-style-type: none"> <li>▪ Number of aircraft types</li> <li>▪ Number of heavy checks per fleet OEM</li> <li>▪ Number of aircraft in fleet</li> <li>▪ Shift size and frequency</li> <li>▪ Number of fleet OEMs</li> </ul>
Vendor Management/ Technical Sourcing	<ul style="list-style-type: none"> <li>▪ Structures</li> <li>▪ Systems</li> <li>▪ Landing gear LRUs/OVH</li> <li>▪ Materials management</li> <li>▪ Wheel and brakes</li> <li>▪ Interior</li> <li>▪ Avionics/Comms</li> <li>▪ Warranty administration</li> </ul>	<ul style="list-style-type: none"> <li>▪ Number of major suppliers</li> <li>▪ Number of in-house maintenance bases</li> <li>▪ Number of fleet OEMs</li> <li>▪ Number of aircraft</li> </ul>

Source: Oliver Wyman.

#### Step 3: Driver-FTE Relationship Development.

This step allows for major adjustments based on strategic and operational elements of the airline. Workload drivers are identified and the relationship between these drivers and each function of the department is determined. An example listing of workload drivers along with the organizational functions to which they relate can be found in Exhibit 3. Determining the relationship between the drivers and the number of FTEs for each function yields an estimate of the required resources for each area.

**Step 4: Baseline Fine-Tuning.** The last step in the process is to fine-tune the baseline. Each airline has unique characteristics that may impact the optimal makeup of its departments. Interviews and direct observation increase understanding of how to refine baseline numbers due to specific processes, technologies, or other unique characteristics. From here, the baseline model can be used to estimate the organizational and resulting financial impact from strategic initiatives such as maintenance sourcing or fleet improvement.

This type of analytical approach is not limited to airline maintenance organizations; with several modifications to account for differences in com-

plexity, it can be used to facilitate right-sizing exercises within MROs as well. The same general principles would apply, but the approach must consider the breadth (components, airframe, engines), depth (fleet types, engine types), and variety of customer requirements in an MRO's service offering. Given the vast variance in capabilities of MROs around the world, the exercise may be highly useful for MROs to understand their organizational structure and staffing models.

#### Conclusion

The continuous economic, industry, and airline operational changes that impact a maintenance organization's resource requirements may make it seem impossible to identify and implement the right organization design. However, with the proper data and a workload-driven resource planning approach, determining the right size and functional mix of an airline's maintenance organization is achievable. A methodical, flexible, fact-based, and repeatable approach can streamline this oft-maligned process and add significant value to the bottom line. ❖

## About Oliver Wyman

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## The Aviation, Aerospace & Defense Practice

Oliver Wyman has deep, international experience in all segments of aviation, including airports, airlines, service providers, MROs, OEMs, and investors. The Aviation, Aerospace & Defense Practice has consulted to nearly three-quarters of the Fortune 500 firms in these sectors, as well as to major airports around the world.

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