MRO INDUSTRY LANDSCAPE 2012
MARKET DYNAMICS CREATE NEW POINTS OF LEVERAGE

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In our annual aviation Maintenance, Repair, and Overhaul (MRO) Survey, Oliver Wyman surveyed executives from airlines, airline and independent MROs, and OEMs to gauge their views of the aviation MRO market. We received more than 100 responses, and they showed an impressive degree of diversity and experience. Respondents hailed from every corner of the globe, including North America, Latin America, Eastern and Western Europe, Asia, and the Middle East, with roughly half the responses originating from geographies outside of North America. More than 72% of all respondents held the position of Director or above, and all major disciplines within the aftermarket value chain were represented. The companies represented were also diverse, with annual revenues ranging from less than $50 MM to more than $1 BN. However, about half of responding MRO and OEM companies had revenues greater than $500 MM (see Exhibit 1). Among airline respondents, there was similarly an even distribution of MRO spend, with nearly 40% of respondents reporting spend greater than $500 MM. A mix of carriers was also represented at the airline level, with fewer than half coming from mainline carriers.

Our analysis of the survey responses suggests that the MRO industry is rebounding as expected in 2012, with carrier maintenance costs increasing and the aftermarket ramping up once again to take on this increased demand. This year’s survey also highlights the ever-increasing strength of OEMs in the aftermarket. In the face of this dynamic, carriers have less leverage than ever in negotiating their aftermarket deals. Many respondents noted that one of the few ways by which airlines can better dictate the terms of their maintenance relationships is to move some of these discussions and decisions upstream, back to the point of purchase. While this is an acknowledged opportunity for airlines, few are seizing it.

Also interesting, the survey responses show that airlines noted a diminished overall satisfaction with the services provided by OEMs and MROs. This could well stem from the fact that what maintenance service providers seemed to believe is most important to airlines was often not aligned with what those customers reported as their highest priorities. In short, the survey points to an opportunity for OEMs and MROs to better tailor their offerings to their customers’ needs and forge more mutually beneficial relationships in the future.

In this article, we examine some of these themes more closely and offer perspectives on aftermarket dynamics today and in the future.
EXHIBIT 1: SURVEY RESPONDENT DEMOGRAPHICS

2012 GEOGRAPHY PROFILE (ALL)
- Asia/Pacific: 4%
- Eastern Europe: 3%
- Western Europe: 30%
- North America: 51%
- Latin America: 7%
- Middle East: 5%
- Other: 1%

TITLE OF RESPONDENTS
- Other: 1%
- Manager: 27%
- Director: 31%
- Senior Executive and above: 41%

MRO/OEM REVENUE PROFILE
- Under $50 MM: 15%
- $50–100 MM: 15%
- $501 MM–1 BN: 12%
- $101–500 MM: 19%
- Over $1 BN: 39%

Source: Oliver Wyman 2012 MRO Survey
MAINTENANCE COSTS RISE; LCCS’ COST ADVANTAGE ERODES

Low-cost carriers (LCCs) and mainline carriers alike have sharpened their focus on controlling costs in the face of a lengthy recession. However, despite their efforts, maintenance costs per available seat mile (CASM) are rising at the fastest rate in recent history. In 2011, US carriers’ maintenance CASM reached $1.02 for LCCs and $1.29 for mainline carriers — up from $0.82 and $0.99, respectively, in 2004. These rising costs are driven by several factors, including aging fleets, accumulation of deferred maintenance, rebuilding of rotatable inventories (through repair of unserviceable parts) that were depleted during the recession, inflationary pressure, and OEMs’ increased dominance in the aftermarket.

To be sure, LCCs’ maintenance CASM is still significantly lower than that of mainline carriers (especially when only domestic costs are considered). However, we see evidence suggesting that the low-cost players may be losing this advantage. Since 2007, for instance, mainline carriers have seen their maintenance CASM compounded annual growth rate cut in half. This is thanks in part to their increased scale. But it has also resulted from strategic moves to include more savvy use of outsourcing, consolidation, and migration to “best-in-class” contracts with MRO providers.

By contrast, LCCs’ maintenance CASM growth rate has increased more than seven-fold during this same period (see Exhibit 2). Aging aircraft fleets help explain some of this trend to parity. For example, since 2006, the fleets of LCCs have aged at nearly four times the rate as those of mainline carriers. Meanwhile, mainline carriers have slowed the aging of their fleets through a marked fleet-renewal strategy. If these trends continue, we believe that the LCCs’ long-held cost advantage (which hit its peak in 2007) could evaporate over the next 10 years.

OEMS STRENGTHEN THEIR HOLD ON THE AFTERMARKET

Not surprisingly, engine and component OEMs are continuing to expand and consolidate their control of the aftermarket. Since last year, MROs have noticed more OEMs limiting access to technical publications, initiating license agreements, and making service authorizations harder to come by. Exhibit 3 shows the leading tactics employed by OEMs as well as the impact that these tactics have on their MRO competitors and their airline customers.
EXHIBIT 2: RISING US CARRIER MAINTENANCE CASM AND ERODING LCC COST ADVANTAGE

NORTH AMERICAN CARRIER MAINTENANCE CASM 2004 – 2011
MAINTENANCE CASM (CENTS)

NORTH AMERICAN AVERAGE FLEET AGE BY CARRIER TYPE 2004 – 2011
AVERAGE FLEET AGE BY YEAR (YEARS)

Source: planestats.com, Bureau of Labor Statistics, and Oliver Wyman analysis
* Mainline carriers: Alaska, Continental, Delta, Hawaiian, Northwest, United, US Airways
† LCCs: AirTран, Allegiant, America West, AIA, Frontier, JetBlue, Southwest, Spirit, Virgin America

EXHIBIT 3: OEMS’ COMPETITIVE MOVES

PREVALENCE OF OEM TACTIC
MRO PERSPECTIVE

IMPACT ON BUSINESS
1 = NONE, 5 = MAJOR

Source: Oliver Wyman 2012 MRO Survey

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The overall success of OEMs in the aftermarket is evident by the survey findings: While carriers continue to indicate their intent to use alternate parts, actual and projected use of these parts has fallen far short of stated expectations (see Exhibit 4).

Finally, MROs and airlines overwhelmingly predict that airframe OEMs will play an increasing role in the aftermarket over the next three years. Emboldened by OEM successes in the engine and component aftermarkets, more than 70% of airline and MRO respondents see the role of airframe OEMs in the aftermarket significantly expanding. While there is strong consensus that this role will increase, there is much less consensus among MRO and airline observers as to where in the aftermarket value chain the airframe OEMs will focus or find success. In general, executives within large carriers speculated on OEMs’ ability to provide more data and tooling to allow more in-house repairs, while executives of smaller carriers suggested that OEMs will increasingly provide integrated fleet and materials management services. There is a general consensus from respondents that airframe OEMs will be most successful in building from their core areas of strength (such as parts provisioning, engineering, etc.) and will likely be more challenged providing services, or bundles of services, further from these core capabilities.
**EXHIBIT 4: EXPECTED VERSUS ACTUAL AIRLINE PMA SPEND**

WEIGHTED AVERAGE SPEND ON PMA PARTS*

% OF TOTAL SPEND (RESPONSES IN 2011 VS. 2012)

<table>
<thead>
<tr>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW-TECH e.g., expendables, consumables, low-tech rotables</td>
<td>In three years</td>
</tr>
<tr>
<td>10%</td>
<td>-27% change</td>
</tr>
<tr>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>5%</td>
<td>-25% change</td>
</tr>
<tr>
<td>0%</td>
<td>Now</td>
</tr>
<tr>
<td>HIGH-TECH e.g., rotating and non-rotating engine components, high-tech rotables</td>
<td>-56% change</td>
</tr>
<tr>
<td>-48% change</td>
<td></td>
</tr>
</tbody>
</table>

Source: Oliver Wyman 2011 and 2012 MRO Surveys

* Weighted average calculated by adding the midpoint for each spend tier multiplied by the total % of responses for each tier

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**EXHIBIT 5: ROLE OF AIRFRAME OEMS IN THE AFTERMARKET**

AIRFRAME OEMS’ FUTURE FOCUS

AIRLINE AND MRO PERSPECTIVE

- Airframe maintenance
- Engine MRO
- Component MRO
- Engine condition monitoring
- Rotable pooling/inventory mgmt
- Integrate MRO services
- Vendor or owned inventory
- Component reliability monitoring
- Spare parts
- Other engineering services
- Reliability improvement advisory
- Primary developer of service bulletins

Source: Oliver Wyman 2012 MRO Survey
CARRIERS STRUGGLE TO FIND LEVERAGE IN THE AFTERMARKET

As OEMs’ control in the aftermarket expands, airlines have fewer true choices available for their maintenance sourcing. Survey respondents did note one largely untapped opportunity for airlines to assert themselves in the aftermarket: selecting and negotiating ongoing maintenance requirements at the time of aircraft purchase.

In Boeing’s Current Market Outlook 2011-2030, the company predicts that there will be 33,500 global deliveries over the next 20 years — with more than half of these deliveries intended for fleet growth rather than replacement (see Exhibit 6). All of these deliveries represent a great opportunity for airlines to secure competitive costs over the lifecycle of the aircraft.

Next to fuel, which makes up nearly 50% of an aircraft’s lifecycle costs, maintenance constitutes the lion’s share of the total cost of aircraft ownership over 20 years (see Exhibit 7). And as an aircraft ages, the commensurate investment in rotatable assets and other material to maintain the same level of reliability grows significantly. Given its importance, maintenance should be a primary factor that carriers take into account when selecting a new fleet. Several executives in the industry state that their carrier’s aircraft acquisition process was informed by a number of departmental committees, including M&E. While these committees shaped views and informed the process, they typically did not play a significant role as a ‘decider.’ Many respondents suggested that the decision process would need to change to reflect the prominence of aftermarket costs.
**EXHIBIT 6: GLOBAL AIRCRAFT ORDERS AND DELIVERIES**

**TOTAL AIRCRAFT ORDERS BY YEAR (AIRBUS AND BOEING) 1990-2011**

<table>
<thead>
<tr>
<th>Year</th>
<th>Orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>3,000</td>
</tr>
<tr>
<td>1992</td>
<td>2,500</td>
</tr>
<tr>
<td>1994</td>
<td>2,000</td>
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<tr>
<td>1996</td>
<td>1,500</td>
</tr>
<tr>
<td>1998</td>
<td>1,000</td>
</tr>
<tr>
<td>2000</td>
<td>500</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
</tr>
</tbody>
</table>

**BOEING GLOBAL FLEET FORECAST 2010-2030**

**GLOBAL AIRCRAFT DELIVERIES**

<table>
<thead>
<tr>
<th>Year</th>
<th>Deliveries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>3,000</td>
</tr>
<tr>
<td>2020</td>
<td>30,000</td>
</tr>
<tr>
<td>2030</td>
<td>33,500</td>
</tr>
</tbody>
</table>

**EXHIBIT 7: AIRCRAFT LIFECYCLE COSTS**

**ILLUSTRATIVE LIFECYCLE COST BREAKDOWN* 10-YEAR VS. 20-YEAR OWNERSHIP LENGTH**

<table>
<thead>
<tr>
<th>Age of Aircraft</th>
<th>Fuel Share*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-year</td>
<td>47%</td>
</tr>
<tr>
<td>20-year</td>
<td>48%</td>
</tr>
</tbody>
</table>

**ILLUSTRATIVE ASSET REQUIREMENT BY AGE OF THE AIRCRAFT TREND FROM AIRCRAFT AGE 1 TO 20**

* Shows percentage breakdown of lifecycle costs excluding fuel, which makes up nearly 50% of total lifecycle costs

Source: Boeing and Airbus websites, Boeing CMO 2011-2030, and Oliver Wyman analysis
Despite the importance of maintenance cost considerations on aircraft purchases, few carriers include their maintenance organizations to the extent that they could and should. Our survey shows that in a selection process typically dominated by finance personnel, maintenance organizations were on the senior selection team at only 50% of carriers, on the working team at only 33% of carriers, and had limited to no involvement at the remaining 17% of carriers.

It is also worth noting that more than 80% of airlines base their purchase decisions and total cost of ownership analyses largely on OEM-provided maintenance forecasts. However, the survey suggests that less than two-thirds of airline executives draw maintenance-cost comparisons to similar fleets. Slightly over half compare OEM-forecasted costs to actual maintenance costs after current fleets have been in service for a period of time, even though, historically, original OEM forecasts and actual costs differ wildly.

Independent total cost of ownership analyses and sourcing of long-term maintenance requirements at the time of aircraft purchase would give airlines an opportunity to lock in lower maintenance costs. Today, only 41% of our survey respondents report using this approach, with the sole exception being the sourcing of long-term engine maintenance contracts (see Exhibit 8).

What explains a carrier’s failure to use its leverage when it is available? We believe that those present during aircraft purchase negotiations may not understand the changing aftermarket landscape and the implications on long-term maintenance costs. But whatever the explanation, a carrier’s failure to take a more strategic approach to maintenance sourcing is contributing to OEMs’ tightening control over the aftermarket. The result is fewer choices and higher costs for airlines.

CARRIERS GIVE MROS AND OEMS MIXED REPORT CARDS

Overall, MRO and OEM respondents alike feel renewed optimism about the industry’s future. For example, 28% of our survey respondents said they expanded their headcount in 2011 — some by more than 10%. Only 11% of those surveyed decreased their headcount, a major change from the 22% we saw in 2010. These businesses are also investing heavily in organizational changes aimed at sharpening their competitive edge. Such changes include standardization of processes, enhancement of cross-unit collaboration, and expansion of their global footprint, to name just a few (see Exhibit 9).
**EXHIBIT 8: MAINTENANCE SOURCING ACTIVITY AT AIRCRAFT PURCHASE**

**AIRCRAFT PURCHASE: MAINTENANCE SOURCING ACTIVITY**
% OF ALL AIRLINE RESPONDENTS

Most carriers rely heavily on OEM-provided maintenance forecasts. Given this reliance, fewer than two-thirds make comparisons to similar fleets. Even less compare promised DMC costs to what they actually incurred. Only 41% lock in long-term contracts at acquisition, when they have the most leverage in sourcing these deals.

- 82% OEM-provided forecasts
- 64% Extrapolations/comparison to similar fleets
- 55% Comparison of promised DMC costs with actual costs
- 41% Sourcing long-term maintenance contracts

Source: Oliver Wyman 2012 MRO Survey

**EXHIBIT 9: MRO AND OEM HEADCOUNT AND ORGANIZATIONAL CHANGES**

**CHANGE IN MRO IN MAINTENANCE HEADCOUNT**
% OF TOTAL RESPONDENTS

- Decreased by >10% 4%
- Decreased by 6-10% 7%
- Increased by >10% 14%
- Increased by 6-10% 14%
- Remained within 5% of prior year levels 61%

**TOP ORGANIZATIONAL ADJUSTMENTS TO INCREASE COMPETITIVENESS REPORTING RESPONDENTS**

- Process management, harmonization, standardization
- Interfaces between organizational units
- Cultural change
- Global footprint
- Accountability at the front line
- Overall architecture (e.g., roles, layers)
- Management of critical resources and competencies
- Level of centralization/decentralization
- Operational governance
- Operating principles between business and support functions
- Resource allocation across functions
- Decision making and escalation principles
- Incentive system

Only 11% of companies decreased their headcount in 2011, compared with 22% in 2010.

MROs and OEMs are making widespread organizational investments to increase competitiveness.

Source: Oliver Wyman 2012 MRO Survey
However, in spite of such investments in staffing and organizational improvements, MROs and OEMs have received a mixed report card from carriers on their performance in the service categories that carriers value most. Indeed, we found that carriers universally rated their top maintenance provider’s performance lower than they did last year. Furthermore, across the industry, there is a significant variance between the performance of providers (see Exhibit 10). The bottom line? Despite investments MROs and OEMs have made, there appears to be vast room for improvement in the eyes of carriers.

Maintenance providers do not share this perception when it comes to evaluating their own performance. The most significant gaps in perception are in the areas of support services, quality, and customer service (see Exhibit 11). In general, we found a similar gap between what carriers find important when evaluating potential providers versus what these same providers perceive as important. This gap could lead providers to emphasize the wrong categories of service. For example, when it comes to airframe service, airline respondents weighted “materials supply chain performance within the check” (support services) and “during the check progress reporting and communication” (customer service) as far more important than their MRO providers did. This may explain the performance gap we see around these two categories. Carrier respondents repeatedly reinforced the need for their service providers to be responsive in terms of “minutes and hours, not days and weeks.” Larger carriers pointed to the large-scale complexities of their M&E requirements, and noted that few MROs were equipped to handle these kinds of issues well. While many MRO respondents admitted that there was work to do in the above areas, they were confident that improvements were being continually made. And they seemed to think that from a total cost perspective, outsourcing to an MRO partner would provide a clear cost benefit. This year’s survey findings suggest that MROs and OEMs have an opportunity — if not a mandate — to improve their performance.
EXHIBIT 10: CARRIER EVALUATIONS OF THEIR TOP THREE MRO PROVIDERS

ABSOLUTE MRO PROVIDER PERFORMANCE RANKINGS BY ORDER OF IMPORTANCE
QUESTION: PLEASE RATE TOP THREE PROVIDERS ON A SCALE OF 1 TO 5
(1 = VERY POOR, 5 = VERY GOOD)

<table>
<thead>
<tr>
<th>AIRFRAME</th>
<th>ENGINE</th>
<th>COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Quality</td>
<td>Quality</td>
</tr>
<tr>
<td>Support</td>
<td>Support</td>
<td>Support</td>
</tr>
<tr>
<td>services</td>
<td>services</td>
<td>services</td>
</tr>
<tr>
<td>Turn time</td>
<td>Turn time</td>
<td>Turn time</td>
</tr>
<tr>
<td>Customer</td>
<td>Customer</td>
<td>Customer</td>
</tr>
<tr>
<td>service</td>
<td>service</td>
<td>service</td>
</tr>
<tr>
<td>Lowest cost</td>
<td>Lowest cost</td>
<td>Lowest cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographic presence</td>
<td>Geographic presence</td>
<td>Geographic presence</td>
</tr>
<tr>
<td>Warranty</td>
<td>Warranty</td>
<td>Warranty</td>
</tr>
<tr>
<td>PMA offerings</td>
<td>PMA offerings</td>
<td>PMA offerings</td>
</tr>
</tbody>
</table>

Source: Oliver Wyman 2012 MRO Survey

EXHIBIT 11: MRO PROVIDER PERFORMANCE PERCEPTION GAP

AVERAGE MRO PROVIDER PERFORMANCE RATINGS: MRO AND OEM VS. AIRLINE PERSPECTIVE, RANKED BY IMPORTANCE TO AIRLINES
QUESTION: WHAT IS YOUR PERCEPTION OF YOUR PROVIDER’S/YOUR COMPANY’S PERFORMANCE AGAINST THE FOLLOWING ATTRIBUTES?
(1=POOR, 5=EXCELLENT)

<table>
<thead>
<tr>
<th>AIRFRAME</th>
<th>ENGINE</th>
<th>COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Lowest cost</td>
<td>Support services</td>
</tr>
<tr>
<td>Support</td>
<td>Quality</td>
<td>Total mix support</td>
</tr>
<tr>
<td>services</td>
<td>Turn time</td>
<td>Quality</td>
</tr>
<tr>
<td>Turn time</td>
<td>Customer</td>
<td>Warranty</td>
</tr>
<tr>
<td>Customer</td>
<td>service</td>
<td>Lowest cost</td>
</tr>
<tr>
<td>service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest cost</td>
<td>Geographic presence</td>
<td>Turn time</td>
</tr>
<tr>
<td>Geographic presence</td>
<td>Warranty</td>
<td>Customer service</td>
</tr>
<tr>
<td>Warranty</td>
<td>Total mix support</td>
<td>Geographic presence</td>
</tr>
<tr>
<td>PMA or DER offerings</td>
<td>Support services</td>
<td>PMA or DER offerings</td>
</tr>
</tbody>
</table>

Source: Oliver Wyman 2012 MRO Survey

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CONCLUSION

The landscape of the maintenance industry is evolving rapidly, and the stakes are high for both mainline carriers and LCCs. If carriers want to become more competitive or maintain an existing comparative advantage in terms of overall operating costs, they need to be more conscious than ever about maintenance dynamics and about their relationship with maintenance service providers. Additionally, if we consider the predicted growth in airline fleets over the next 20 years, carriers need to be more strategic and forward-looking in their aircraft acquisitions and pay close attention to total lifecycle maintenance costs. Competition between MROs and OEMs in the aftermarket is rising, and as these two try to increase their market share and become more attentive to their customers’ needs, airlines have a unique opportunity to use that rivalry to their advantage when negotiating maintenance agreements for both current and future fleets.
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