Benchmarking is one of the key ways TOPICS helps airlines understand and reduce maintenance costs.

Optimizing Airplane Maintenance Economics

Reducing the cost of operations is a major concern to airlines, and Boeing is partnering with them to understand, control, and optimize airplane maintenance economics, as well as providing tools to help airlines lower costs without compromising quality.

By Tom Buyers, Regional Director, Airline Economics

Boeing and airlines are working together to gain valuable insights into the economics of airlines' maintenance operations. The Technical Operations Performance Improvement and Cost Solutions (TOPICS) working groups and annual TOPICS regional meetings offer benchmarking, best practices, solutions, networking, and identification of key financial metrics. Participants include airlines; leasing companies; suppliers; maintenance, repair, and overhaul facilities (MROs); and Boeing.

This article details the development of TOPICS, provides examples of the types of information available to operators, and details how airlines are using this information to lower maintenance costs while continuing to improve overall maintenance performance.

THE DEVELOPMENT OF TOPICS

In 2005, Boeing began exploring ways to help customer airlines better understand their maintenance costs, the factors that drive high costs, and how their costs compare to those of other operators. The goal was to provide airlines with solutions and best practices that would help improve their maintenance operations, optimize their maintenance costs, and increase their profitability.

Figure 1: Objectives for TOPICS working group participants

There are substantial and important industry benefits for all stakeholders being actively engaged in the TOPICS working group meetings and process. Optimizing airplane economics is not just the responsibility of airlines, but takes the combined efforts of leasing companies, suppliers, MROs, and Boeing. With this participation and transparency, many benefits, including those listed in this figure, will be realized.

Airlines/ Operators/ Leasing Companies	▪ Gain a better understanding of fleet maintenance economics. ▪ Use year-over-year benchmarking to compare airline to others. ▪ Identify opportunities for improvement. ▪ Learn about best practices and solutions. ▪ Take advantage of networking opportunities. ▪ Get key financial metrics and performance indicators. ▪ Discuss maintenance cost challenges, opportunities, and successes. ▪ Learn how to optimize fleet maintenance economics.
Suppliers	▪ Take advantage of benchmarking, networking, and business opportunities. ▪ Hear customers' concerns about maintenance cost optimization. ▪ Collaborate with customers on maintenance cost improvements. ▪ Gather product in-service information and market intelligence.
MROs	▪ Take advantage of benchmarking, networking, and business opportunities. ▪ Gain a better understanding of fleet maintenance costs and the high cost drivers. ▪ Participate in discussions with customers centered on maintenance cost optimization. ▪ Listen to customers' maintenance economic challenges, opportunities, and successes. ▪ Discuss solutions with customers that will help them lower their maintenance economics. ▪ Gather market intelligence.
Boeing	▪ Help customers be more successful and profitable. ▪ Assist customers in maintenance cost benchmarking. ▪ Facilitate and lead discussions with all maintenance cost stakeholders (i.e., airlines, suppliers, MROs, and Boeing) on maintenance cost optimization. ▪ Understand maintenance cost concerns of customers and help formulate solutions. ▪ Gain a better understanding of customers' maintenance concerns.

At that time, there was no industry standard for tracking and reporting airplane maintenance costs. It was difficult for some operators to understand maintenance cost methodology, the maintenance cost performance of airplanes in their fleets, and whether their maintenance costs were in line with the rest of the industry. There was no industry forum in which airlines, suppliers, MROs, and Boeing could discuss the financial impact of airplane maintenance and opportunities for cost improvement and optimization.

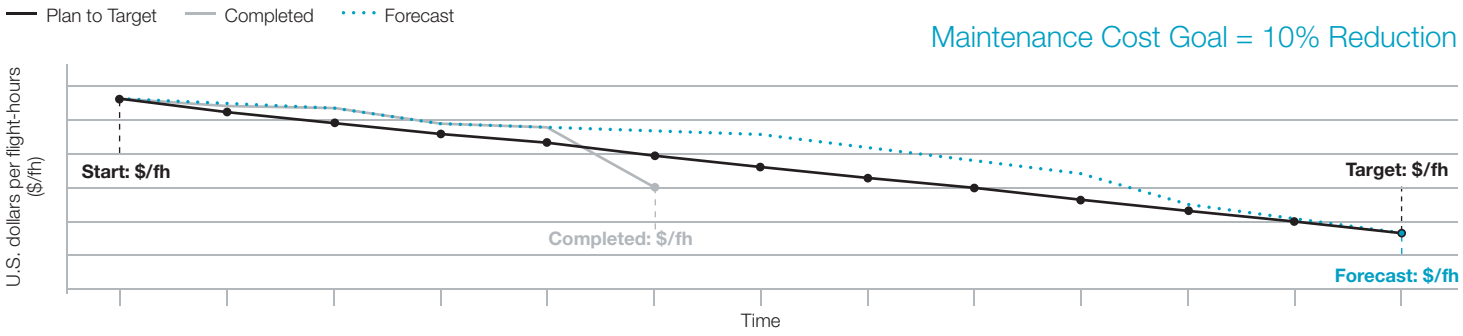
This led to the development of the TOPICS working groups, which are led by an airline steering team that guides the decisions of the working groups. The groups focus on reducing maintenance costs of Boeing airplane fleets and on leveraging Boeing's technical expertise.

TOPICS provides the venue to benchmark the maintenance costs of participating airlines annually. The benchmarking, which is completely anonymous, enables each airline to see how its maintenance cost performance compares to others; leads to an awareness of each airline's standing in the industry (best in class, worst in class, or somewhere in the middle); and provides a baseline for improvement.

TOPICS is also an open forum that allows members to share maintenance cost-related challenges, successes, and opportunities with each other. TOPICS is a way for all stakeholders — airlines, suppliers, MROs, leasing companies, and Boeing — to become involved in the process of systematically reducing the maintenance cost of Boeing airplanes.

Figure 2: TOPICS working group scorecard

Working group participants use scorecards such as this to set goals and track progress. Scorecards can be individually tailored for each participant.



Cost-Reduction Opportunities

		Forecast	Completed
Month/year	Action	$/fh	$/fh
Jan. 2007	Improve reliability of potable water pres elect viv	($0.89)	($1.32)
Apr. 2007	Escalate C check tasks ATA 52, 53, 55, 57	($2.29)	($8.31)
July 2007	Improve reliability of digital flight data recorder	($1.39)	($9.00)
Oct. 2007	Revised FOPM Procedures (Taxi Brakes)	($5.99)	($7.50)
Jan. 2008	Erosion Protection Kit	($2.25)	($5.25)
Apr. 2008	Escalate A check task ATA 24, 32	($6.81)	($8.51)
July 2008	Improve repair costs for IDG ATA 24	($5.11)	($7.25)
Oct. 2008	Improve tire and brake wear life by 250 cycles	($7.21)	($5.78)
Jan. 2009	Escalate C check tasks for ATA 32	($20.00)	($15.00)
Apr. 2009	Escalate D check structural tasks	($34.33)	($17.00)
July 2009	Improve reliability of starter air pressure sensor	($0.35)	
Oct. 2009	Improve reliability of PRSOV	($2.61)	($4.44)
Jan. 2010	Escalate A check tasks for ATA 21, 22, 23, 38	($2.78)	
Apr. 2010	Improve reliability of ADIRU	($4.12)	
July 2010	Improve reliability of TCAS computer	($5.71)	

These results are presented only as examples. Actual costs will vary from airline to airline.

TOPICS WORKING GROUP MEETINGS

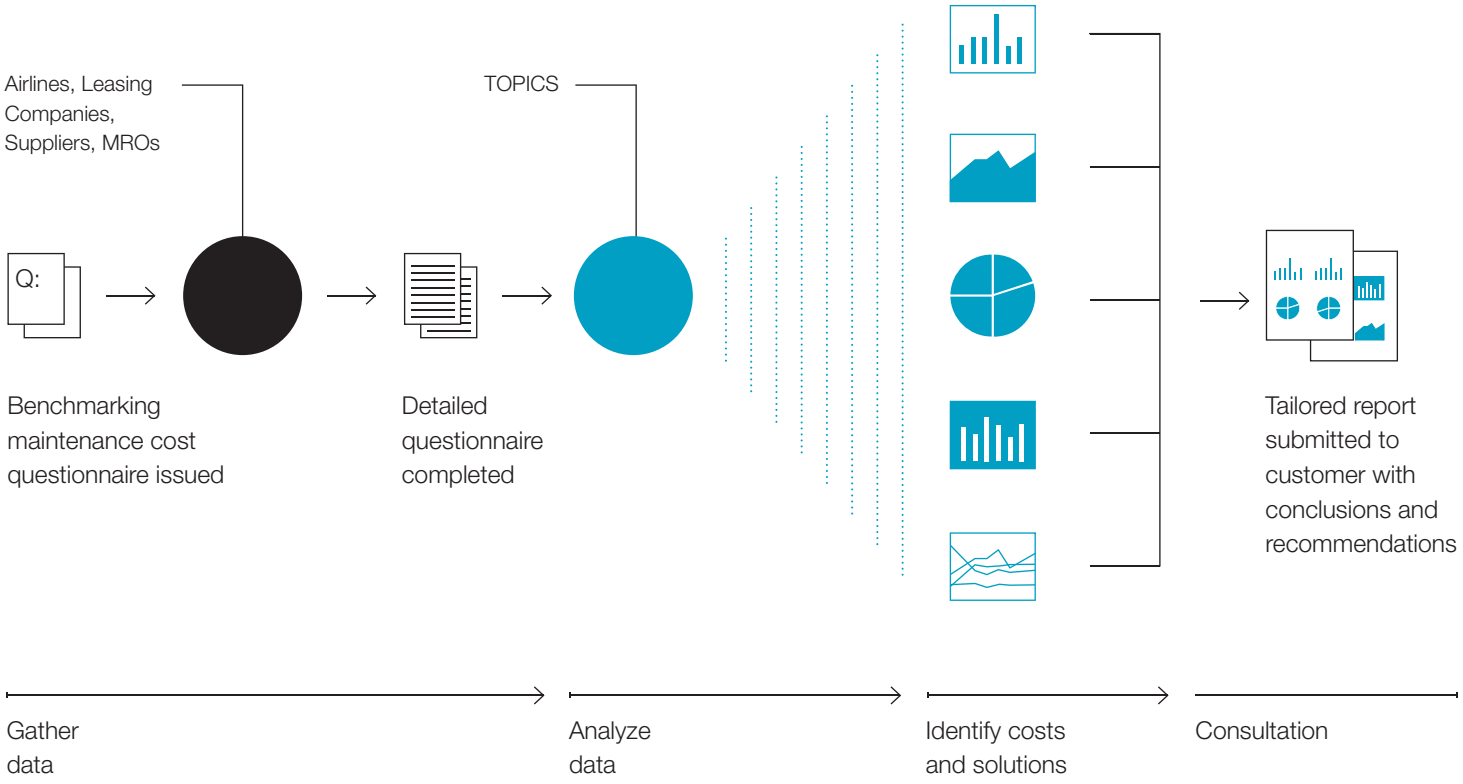
The first regional TOPICS working group meeting was held in Shanghai in 2006, followed by meetings in Berlin, Dubai, and Miami. More than 60 Next-Generation 737 operators, 10 suppliers, and 10 MROs participated in TOPICS during the program's first year. In 2007, Boeing added TOPICS meetings for 777 operators. Last year, Boeing held five regional TOPICS working group meetings: three focused on the Next-Generation 737 and two on the 777.

At the meetings, airlines, suppliers, MROs, and Boeing share maintenance cost drivers and operational experiences, with a goal of improving maintenance practices that result in reduced maintenance costs and improved utilization of the operators' Boeing airplanes (see fig. 1). Airlines, suppliers, and MROs give presentations on various topics related to maintenance cost-reduction solutions and accomplishments.

The meetings also include cost-reduction and project-tracking technical panels, and the sharing of maintenance cost benchmarking results are provided for participating airlines. Boeing helps identify maintenance costs and the sharing of opportunities for optimization and assists airlines in implementing solutions for optimizing maintenance costs. Solutions can be technical or nontechnical, such as best practices and accounting standards. A working group scorecard helps airlines track their progress (see fig. 2). Participants have reported that sharing best practices among all stakeholders often results in the biggest cost-reduction opportunities.

Figure 3: Comparing maintenance costs to the industry

TOPICS helps airlines turn data into information and identify ways to reduce maintenance costs. Boeing makes the questionnaire available to the airlines, leasing companies, suppliers, and MROs. Each stakeholder fills out the appropriate sections (yearly summary, airframe, engine, components, scheduled event checks, etc.) and submits back to Boeing for analysis and input into the TOPICS maintenance cost modeling tool. Tailored output reports are provided to each participating stakeholder showing how their maintenance costs compare to the industry in various categories (best in class, worst in class, somewhere in the middle) with conclusions and recommendations for improvements. All participants receive a four-digit code only they will know, so when they view the report they know their results but cannot identify other participants' identity. Annual working group meetings provide networking and best practices sharing for additional opportunities for improvements to maintenance cost performance.



TOPICS working groups help participating airlines:

- Identify maintenance costs and drivers.
- Identify maintenance and engineering financial metrics.
- Benchmark maintenance costs.
- Identify solutions to maintenance cost issues.
- Prioritize maintenance cost solutions.
- Implement maintenance cost solutions.
- Quantify, track, monitor, and report on improvements made in their maintenance operations.

HOW TOPICS HELPS AIRLINES REDUCE MAINTENANCE COSTS

Benchmarking is one of the key ways TOPICS helps airlines understand — and reduce — maintenance costs. Participating airlines complete and submit detailed TOPICS benchmarking maintenance cost questionnaires. These questionnaires help airlines get a better understanding of maintenance costs and the key factors that drive up those costs. Each airline receives a tailored maintenance cost benchmarking report that compares its costs to other airlines, MROs, and suppliers (see fig. 3).

Examples from a tailored maintenance cost benchmarking report are shown in figure 4.

SUMMARY

Through TOPICS, Boeing is helping operators understand, control, and optimize airplane maintenance economics. The TOPICS working groups give airlines information and insights they can use to lower maintenance costs while improving overall maintenance quality.

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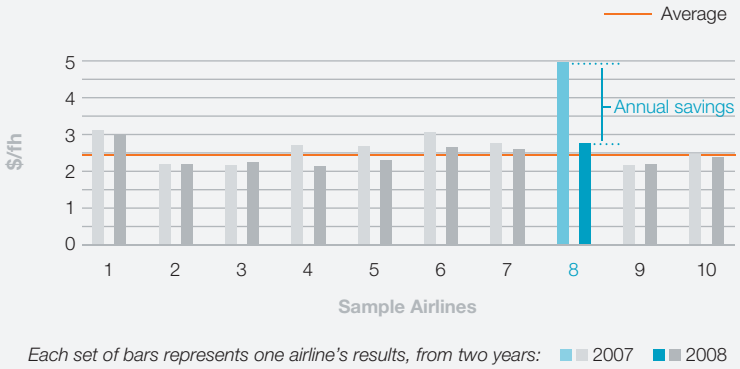
Figure 4: Examples from a tailored maintenance cost benchmarking report

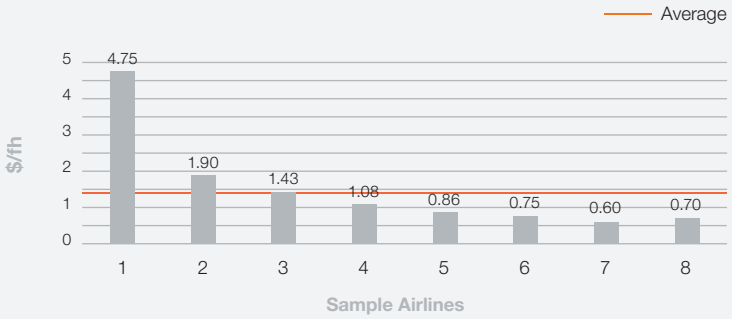
Reported scheduled event check costs

This graph shows how an actual airline (blue bars) used the TOPICS benchmarking report to lower its year-over-year maintenance costs for event check maintenance (scheduled maintenance checks). In 2007, the airline discovered that its costs were more than 100 percent higher than the TOPICS industry average for those maintenance events. After discussing and analyzing various solutions, it implemented changes in its maintenance operations that resulted in US$4 million total annual savings for this airline.



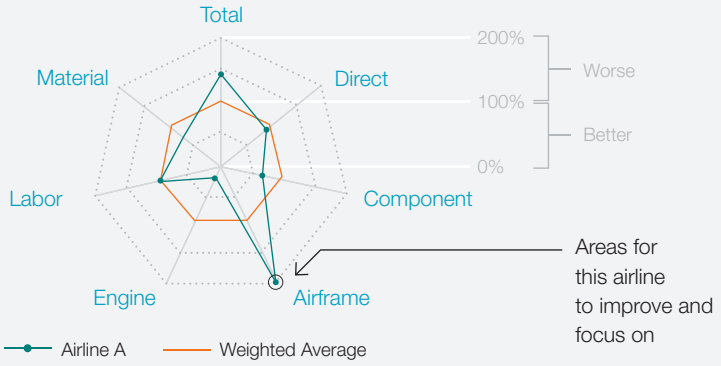
Components benchmarking report

This graph shows the average maintenance cost per flight hour (x axis) for a component on the Next-Generation 737. The y axis represents airlines. As indicated by the solid orange line, the average cost per flight hour for this component is US$1.44. Airline 1 reported costs that were US$3.31 above the average. Prompted by this TOPICS benchmarking report, the airline implemented a solution that lowered its maintenance costs for this component. This solution has the potential to save the airline more than US$8 million in maintenance costs over 15 years — on a single component.



Radar improvement chart

This chart shows an airline where its maintenance cost performance is better or worse than the baseline average cost in each of seven cost categories: total, direct, component, airframe, engine, labor, and material. Airlines participating in the benchmarking activity submit their annual costs in each of these categories, and an average is derived. Costs are normalized for flight length, airplane age, and labor. The orange line represents the average cost for each category. The chart helps airlines determine where to focus improvement efforts. Additional detailed charts are provided in each of these categories to help identify the "right" solutions.



Improvement trend chart

This chart allows participating airlines to compare their maintenance costs in various categories year-over-year to the TOPICS average. It uses the same information as the radar improvement chart, but shows trends over four years for each category. The orange line represents the TOPICS average: trends below this line indicate better than average maintenance cost performance while trends above the line indicate worse than average performance.