



The Hidden Profit Driver

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- ARTICLE

How can maintenance training be used as a strategy for profitability? Dr. William Cox examines how airlines can make this work.

In 2017 airlines generated total revenues of \$754 billion and a net margin of a mere 4.6%. 2018 revenues are expected to reach \$834 billion (IATA, 2017). While airlines have recently led other sectors in revenue growth (9.4% 2017/2018), they are among the weakest in profitability. In other words, even in good years, airlines are too expensive to operate and thus are in constant search of new profit sources.



The ability to troubleshoot more effectively was the main proficiency

which helped in engine removal decisions. Image credit: Pratt & Whitney.

Few, if any, studies by IATA, ICAO, OEM's or even consultancies present data on how maintenance training can drive profits. In this article, we do our best to balance between our non-disclosure commitments to clients and the desire to deliver some meaningful facts on how maintenance training can be used as a strategy for profitability.

But just how profitable is maintenance training? We take the example of a classic line & base training for A320 engines at an OEM. Engine maintenance took the largest share of the MRO pie at \$29.6 billion in 2017 (Wyman, 2018), and the A320 family accounts for the highest maintenance budget of any aircraft platform at \$18 billion in 2017. This is projected to rise to over \$26 billion by 2027. In addition, roughly 5,500 A320neo's are expected to be delivered by 2027, making it the number one platform in terms of deliveries.

Prevented Unscheduled Maintenance

The greatest financial impact of the L&B training was on unscheduled engine removals (UER's) which drove the average return on investment (ROI) per trained professional up to an average of \$179,000 within a period of four months after completing the training. For each participant decisively preventing a UER, the ROI was typically over \$1 million. Therefore, if the 648,000 new technicians projected to enter the MRO workforce by 2036 (Boeing, 2018) received an OEM L&B training, they would produce a cumulative ROI of \$116 billion in prevented UER's alone.

For the A320neo values were over 20% higher because participants acquired a lot more new knowledge, which they applied to preventing UER's. In fact, prevented UER's were more frequent in the neo's because less trained personnel were unsure of how to solve problems on wing. We adjusted the values of UER's differently according to how much they learned in the L&B course.

The ability to troubleshoot more effectively was the main proficiency which helped in engine removal decisions. Aside from this skill, participants improved their knowledge of ATA chapters by an average of 53.0%. Better knowledge of the engine's mechanical arrangement was cited most as a source of ROI in maintenance.

Indeed, this kind of data could be the cheapest form of predictive maintenance because airlines can stress training on subjects which produce the highest ROI. In a survey of MRO executives, 51% cited preventive maintenance as an area requiring more focus in training.

Operational Disruptions

A ROI of \$21,000 per L&B course participant for preventing operational disruptions such as delays & cancellations (D&C's), aborted takeoffs (ABTO's) and air turn backs (ATB's), can be added to the \$179,000 for prevented UER's, yielding a subtotal ROI of \$200,000 per technician.

But there are obvious limits to how much training is financially and operationally feasible. The labor market for MRO professionals is tight and expected to become more difficult within the next five to seven years. Demand for personnel is expected to outpace supply by 9% in 2027. The main drivers behind this development are a growing fleet of aircraft, retirement and a larger number of older aircraft requiring more routine and heavy maintenance. Ten thousand aircraft are expected to be added by 2027 and the current average age of MRO professionals in the USA is 51 (US Bureau of Labor Statistics). While maintenance intensive vintage aircraft comprised 9% of the global MRO market in 2017, by 2027 they are projected to make up as much as half of the world fleet. All these factors will increase demand for maintenance professionals.

Studies by Management & Excellence (M&E) for Pratt & Whitney indicate that consistent training of a critical number of personnel over a certain number of years massively reduces the cost of operational disruptions. Data on ten major airlines in the USA, Europe and Asia since 2008, show that the cost of operational disruptions was \$14/cycle for airlines which trained for 6-8/10 years, while for carriers which only trained 2-3/10 years in total, the cost was \$27/cycle.

The data were even more indicative when considering the number of people trained. Airlines which trained over 150 people since 2008 incurred event costs of \$14/cycle while those which trained fewer than 50, the event cost was \$90/cycle.

However, the top performers included big Chinese carriers, who operate the most modern fleets. The average age of fleets in China was 6.1 years in 2017-2022 compared with 11.1 in Western Europe and 14.0 in North

America. Even so, as a matter of policy the Chinese trained more consistently than other regions.

Maintenance Processes

According to M&E data, the L&B training improved MRO professionals' daily work efficiency by an average of 65%. Most cited a more punctual dispatch as the result of this improved efficiency, which is likely to impact the following processes:

- Maintenance work orders spent on improving equipment
- Maintenance time and effort spent removing breakdown causes
- Maintenance time and effort spent improving maintenance procedures
- Maintenance time and effort spent improving maintainer skills/knowledge
- Maintenance time and effort spent reducing operating problems
- Time spent removing wasted effort and cost from maintenance processes
- Efforts spent improving stores management processes and stored parts reliability
- Maintenance work orders spent improving safety

Applying this productivity data to total labor maintenance costs per block hour of \$163 for large carriers with revenues of \$1 billion or more (FAA, 2013), the same maintenance labor performance would cost airlines \$99 per block hour. Or put differently, this improved productivity could easily absorb labor shortages, absenteeism and higher wages among MRO professionals. Even better, this higher maintenance productivity could translate into shorter down times and higher aircraft utilization rates.

Measuring& Raising Maintenance Training ROI

Proper maintenance training can therefore impact aircraft performance in at least the following ways:

- Less unscheduled & heavy maintenance such as UER's
- Fewer operational disruptions such as D&C's and thus lower operational disruption costs per flight cycle
- Lower labor maintenance costs per block hour
- Higher aircraft utilization rates

It thus makes operational and financial sense to measure, calculate and monitor the ROI of maintenance training and to make this process a part of an airline's overall cost and quality control strategy. This will also allow an airline to pinpoint the optimal "training dosage".

About the Author

Dr. William Cox is CEO of Management & Excellence SA, Madrid (www.smart-roi.com; www.management-rating.com) – a company specialized in the ROI of human capital in aviation and other sectors. Cox received his PhD from the London School of Economics and an advanced finance degree from Oxford.

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