

Analytical
and Strategic ™
Troubleshooting System
IN AIRCRAFT MAINTENANCE

BY JAMES DORS



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Preface

In the volatile aviation industry, with generally low airfare pricing (freight or passenger) and high operating cost from fuel, labour and maintenance, operators as well as maintenance providers are seeking ways to reduce costs and increase reliability and utilization.

One of the costs associated with aircraft which can carry significant incurred cost along with its direct costs is aircraft defect rectification.

To increase reliability as well as utilization while reducing or avoiding these costs, the industry understands the need for a skilled pool of technicians to perform efficiently and effectively in rectifying the defects at hand.

The industry has also experienced a noticeable decline in the pool of skilled technicians as well as the quality of these skilled technicians due to a number of contributing factors.

Technicians alike are looking for ways to improve their skills for career advancement and personal employment marketability within the industry, as well as for personal fulfillment.

It is for these reasons that I developed and wrote the *Analytical and Strategic Troubleshooting System In Aircraft Maintenance* for both the technician and the maintenance organization.

I hope that both the technicians and the maintenance organizations find the following chapters of great benefit in improving skills and operating efficiencies.

*Jamie Dors
October 2010*

The Impact of Troubleshooting

The Analytical and Strategic Troubleshooting System has been developed as a guideline to aircraft technicians and aircraft maintenance organizations alike. It explains methods and procedures in a system that will lead to greater efficiency of any maintenance department and improve the technician's skills set through a set process of aircraft fault troubleshooting.

By focusing in on the day-to-day operation with sound troubleshooting methodology of aircraft system faults and associated tasks, incurred costs can be often avoided or greatly reduced.

Cost reduction

The opportunity to avoid or reduce costs is often overlooked by both the operator and technicians.

The complexity and dynamics of the operation, and the need to reduce individual component repair costs and battle current delays, make costs difficult to capture and prevent the day-to-day detailed actions surrounding defect rectification from taking place as effectively as they could.

This inefficiency produces repetitive defects that carve deep into the revenue stream as the incurred costs rise.

Repetitive defects increase the "No Fault Found" (NFF) costs, along with their associated incurred costs.

Aircraft maintenance is one of the expenditures that the operator can have the most direct control over, with the exception of those items that are mandated by the regulatory authorities (FAA, Transport Canada, etc.).

The methods and procedures within the Analytical and Strategic Troubleshooting System marry sound troubleshooting procedures and teamwork with supporting business processes to combat these issues.

The Analytical and Strategic Troubleshooting System both utilizes and supports the maintenance organization's existing resources in a cohesive manner. It consolidates a maintenance organization's efforts to



Growth begins when we begin to accept our own weakness.

—JEAN VANIER

efficiently return aircraft to service. This in turn has a positive impact on aircraft reliability, providing greater customer satisfaction and increasing the availability to generate further revenue at reduced costs.

Current troubleshooting success

Reports show that an average of approximately 50% of all defects troubleshoot fail to identifying the root cause. This value is a direct result of searching for a fix. This usually results in multiple component changes with many components being returned from repair stations NFF with the applicable charges and incurred costs.

Searching to identify a fault differs from what is becoming more commonplace:
“The search for a fix.”

Searching to identify a fault differs from what is becoming more commonplace, the search for a fix.

Understanding the fundamental difference is the first hurdle toward effective troubleshooting.

Return on investment (ROI)

The Analytical and Strategic Troubleshooting System directly addresses the success rate of troubleshooting. This situation results in fewer instances of component removal and NFF components, reducing expenditures in the form of bench check charges and shipping,

receiving and handling charges. Following the system in this book avoids incurred cost and reduces and/or eliminates the need for cost recovery, which itself is a cost incurred in managing the cost recovery efforts.

Figure 1-1 illustrates operational and financial impact to an operator, maintenance organization when the system is implemented. The figure also demonstrates the benefits to the individual technician.

The system further reinforces traditional troubleshooting procedures and tasks and combines them with a business process, producing an effective and efficient method of addressing system faults.

Other benefits of implementation

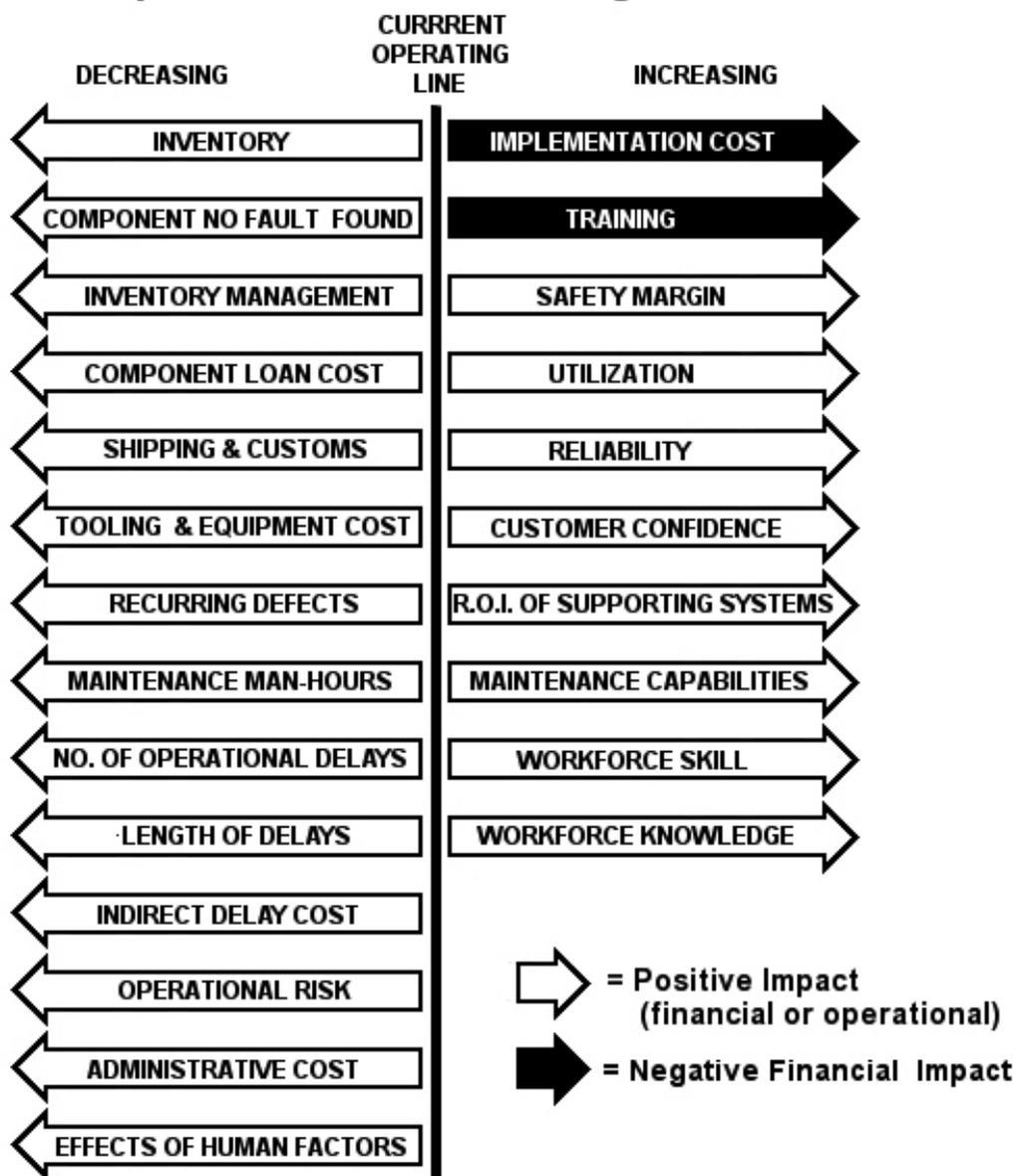
Applying the Analytical and Strategic Troubleshooting System with intermittent or repetitive faults is extremely effective in both addressing the fault and minimizing cost and down-time in doing so.

This system does not replace any manufacturers' manuals or a computer/software based aids used for troubleshooting but only enhances their capabilities.

The Analytical and Strategic Troubleshooting System and information obtained from it are used in conjunction with manufacturers manuals, company procedures, and computer/software based troubleshooting tools to return aircraft to service with minimized impact, both operational and financially. Introducing a thorough troubleshooting process reinforces the value of existing tools, increasing the operator's return on investment (ROI) for these tools.

The system also prompts post-fault actions or preventative maintenance, which may translate to procedural changes, manual revisions, reliability data,

Operator or Maintenance Organization



Technician

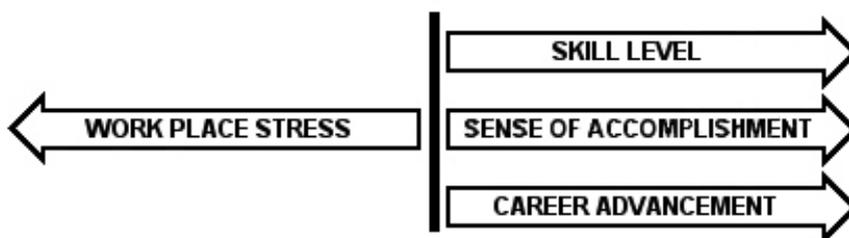


Figure 1-1



greater awareness, and an increased safety margin, providing lower operating cost.

The system has very little capital layout (training and implementation cost) and any costs incurred are quickly returned through reduced expenditures as a result of applying the system. These methods and procedures can be adapted to any operation or maintenance service provider whether it is a small shop working on light piston aircraft or major airline. The system also lends itself to SMS (Safety Management Systems) or like systems now mandated by some of the regulatory bodies as well as supporting Human Factors, the Boeing-introduced Maintenance Error Decision Aid (MEDA), the Procedural Event Analysis Tool (PEAT) and other similar investigation tools. Furthermore, it works well with what the industry now refers to as “High Velocity Maintenance.”

It is foreseen and experience has shown that the greatest hurdle to implementing this system is the cultural change or mindset required to achieve its greatest potential; however, it can produce positive results if only select elements are adapted to the current operating culture.

The changing workforce

Maintenance organizations have been and will continue to struggle obtaining and maintaining a skilled workforce, partly due to the changing demographic of the world workforce.

Another factor affecting the skilled workforce is prior training, as most aviation maintenance training institutions (as well as manufacturers) often do not provide adequate training in sound troubleshooting procedures.

Aircraft type-specific training does not always cover troubleshooting. If troubleshooting is covered in the type course it is aircraft system specific, which too has benefits.

Elevating our profession

The Analytical and Strategic Troubleshooting System is a process which can be utilized on almost any aircraft or system it contains. This transferable knowledge becomes invaluable in the troubleshooting of aircraft defects.

Critical thinking exercises in the form of real world examples are used to enable the technician to develop these sound skills. The Analytical and Strategic Troubleshooting System introduces a set process that is not product-specific but can be utilized in every system, and all fleet types. This makes the Analytical and Strategic Troubleshooting System a very unique technical training and a valuable asset to individual technicians and the maintenance organization alike.

The knowledge and use of the Analytical and Strategic Troubleshooting System plants the seed for a competitive more proactive workforce with the ability to foresee the cost and performance benefits. As the individuals work through their daily tasks with this proactive mindset and “on the scene” approach to cost savings and improved performance, the rewards will begin to mount. As this proactive approach establishes itself, it will avoid situations of “why was that part changed and look what it cost” by dealing with them correctly from the outset.

For years many have tried to raise the status of the maintenance technician, mechanic, the “wrench” or “grease monkey,” and they should be commended.

Professionalism is the ability to deliver to the highest standards, qualities and competencies of your profession with commitment and skill.

—ANONYMOUS

Often other professions in the industry overshadow their work. After all, technicians are typically in a behind-the-scenes role. Technicians are professionals and need to maintain that status by continuously providing safe, reliable and cost effective delivery of aircraft for service.

This high standard can be maintained and built upon with many of the given procedures, be they manuals, checklists or regulatory requirements. This then prompts the question “Could troubleshooting be a set procedure?”

The answer, in short, is yes. The remainder of this text details the troubleshooting procedure, the methods and the means of implementing it.