White Paper

Lean Six Sigma to Reduce Aircraft Turnaround Time and Improve On-Time Performance

By Martin Harrison

In the simplest terms, airlines need to maximize the value of their aircraft by increasing profits from time in the air while decreasing the costs and time on the ground.

Efficient aircraft ground operations are fundamental to meeting customer service expectations and maximizing aircraft utilization. Unfortunately, the turnaround of a modern aircraft in a congested airport is a complex, cross-functional operation. Until existing processes and value streams are truly understood, systemic improvement is impossible. ICF has successfully applied Lean Six Sigma methodology to streamline and standardize processes, resulting in shorter turnaround time, and associated quantifiable benefits. Lean experts and professionals from each airline function work hand-in-hand with the airline's personnel to drive each phase of the project—Define, Measure, Analyze, Improve, and Control (DMAIC)—to gain the highest degree of efficiency and repeatable success.

A BROAD TEAM OF EXPERTS SUPPORTS THE LEAN DMAIC

The following table outlines the theoretical elements of each DMAIC phase, along with the practical application of these concepts in the airline context.

	Define	Practical Application in Airline Context
PHASE 1	▪ Teaming and working norms; joint reviews ▪ Validating the project goal, success metrics ▪ Define high level 'as is' value stream map, current standard work	▪ Representatives from all functional areas participate in workshops to create current state process maps, which highlight the dependencies between functions and formulate group discussions to start identifying opportunities for improvement. ▪ This value stream mapping is done to provide a big-picture visualization of the flow of information and activities.
	Measure	
PHASE 2	▪ Establish baselines for ground time performance ▪ Document current turn processes & interviews ▪ Identify the current standard work plan and its critical path	▪ Ground time observations are conducted to get a preliminary view of the mean timing to help validate the critical path and individual processes and activities to focus on. ▪ A Critical Path Model tool is used to define critical paths, using mean cycle time, providing a visual diagram of each swim lane and to highlight those in the critical path. The tool also allows users to vary cycle time and dependency and observe how the overall process will change.
	Analyze	
PHASE 3	▪ Develop a discrete event simulator model of current state performance ▪ Identify potential 'bottlenecks' & improvement opportunities ▪ Simulate multiple future-state scenarios	▪ Observations from aircraft turns and other data gathering feed a Ground Time Model (GTM) to show variations in the critical path and identify optimization opportunities. ▪ Multiple 'what-if' scenarios provide insights into how to re-sequence activities or prepare for certain activities to eliminate/reduce time to execute. ▪ Simulations are conducted to produce statistically reliable results for each baseline and 'what if' scenario. The measurement data and model construction go through a rigorous process of cleaning and validation.
	Improve	
PHASE 4	▪ Prioritize opportunities for improving performance ▪ Continuous improvement events with key stakeholders & implementation improvements	▪ Outputs from the GTM determine new performance targets that require changes to process, resources, and culture. ▪ A Lean laboratory and analytical rigor assess tradeoffs of additional resources in certain areas. ▪ Implementation phase is based on risk and reward.
	Control	
PHASE 5	▪ Framework to monitor and control future ground time performance ▪ Correct trends that indicate a sustained deviation from target levels	▪ Successful implementation depends on a clear understanding communications requirements and the establishment of processes including performance tracking, issue identification, and accountability.

About ICF

ICF (NASDAQ:ICFI) is a leading provider of professional services and technology-based solutions to government and commercial clients. ICF is fluent in the language of change, whether driven by markets, technology, or policy. Since 1969, we have combined a passion for our work with deep industry expertise to tackle our clients' most important challenges. We partner with clients around the globe—advising, executing, innovating—to help them define and achieve success. Our more than 5,000 employees serve government and commercial clients from more than 65 offices worldwide. ICF's website is **icf.com**.

For more information, contact:

Martin Harrison
Leader,
Airlines Practice, ICF

martin.harrison@icf.com +44 (0) 20 7421 1561

Realization of Project Benefits

Optimizing ground operations has the potential to bring a number of significant benefits to meaningfully enhance an airline's profitability and competitive positioning. Five areas of potential benefits include:

- **Operational Performance:** Optimized use of an airline's physical assets, notably aircraft, ground equipment, and support infrastructure with view to improving return on capital employed (ROCE). More robust and resilient operations with fewer last minute changes and more predictable flying program
- **Customer Satisfaction:** More reliable product through increased On-Time Performance (OTP), reduced average delay minutes, and reduced misconnections
- **Employee Satisfaction:** More effective deployment of an airline's human resources, which in turn can bring improved employee satisfaction
- **Commercial Benefits:** Strengthened commercial position of the airline with a more robust and reliable hub with new and stronger connection opportunities, providing a competitive advantage to an airline
- **Safety and Compliance:** More systematic and standardized approach to operations, reducing the stress on individuals and helping to alleviate risks or errors due to time pressures

Bottom Line

Using a Lean Six Sigma approach to ground-time optimization, previously unseen opportunities for improvement can be identified, which can then lead to the establishment of new aircraft turn around processes.

Even the smallest improvement in turnaround time can make a substantial difference to the fleet's utilization, to an airline's OTP and their ability to connect passengers efficiently.