

AVIATION WEEK

Overhaul & Maintenance

THE MAGAZINE FOR MRO MANAGEMENT

Case Study: Efficiency Improvement

Lean Enhancements By Kristin Majcher

Lean manufacturing is a concept that derived from Toyota's production system for cars, and it has since been adopted by maintenance facilities for their repair work. But using Lean for MRO can be difficult, as there are many things that can happen on the maintenance shop floor that manufacturing organizations would not have to worry about. While an introduction to Lean is still valuable to any an aftermarket organization, a few consultants have found ways to tailor efficiency initiatives for the maintenance industry to address some unique problems.

CRITICAL CHAIN AT DELTA

Realization, a software manufacturer and consulting company that specializes in executing efficiency projects, has its own complement to Lean that has saved a number of commercial and military MROs time and money. The company teaches the Theory of Constraints and Critical Chain, concepts that can integrate into organizations' ongoing Lean and Six Sigma trainings to drive even more results.

The Theory of Constraints is a body of ideas developed by Dr. Eliyahu Goldratt that emerged into popularity in the 1980s. It provides insight for making better business decisions and was followed up by Critical Chain, which he taught to businesses in the 1990s. The rules of Critical Chain include reducing project timelines based on resources available and blocking off "buffers" of protective time. When tasks consume the buffer, management can direct attention to those tasks. This allows individual tasks to be late if they do not consume more time than in the buffer zone. Realization is aware that these rules sound counterintuitive, but it swears that they work.

According to a case study from Delta Airlines, the rules have merit. Delta implemented Critical Chain in three areas and saw results in all of them: the engine overhaul shop in Atlanta, base maintenance in Atlanta and line maintenance at

several locations. It had two clear goals: decrease turnaround time, and increase production. In this case, production meant increasing the volume of engine overhauls that it could finish in a given time and decreasing the amount of time it took to do maintenance checks.



Kevin Duggan
Duggan Associates

"The next level is getting management out of those value streams."

Delta adopted Critical Chain at a time when market pressures forced it to become more efficient. In 2006, the company was facing bankruptcy. A few years later, this task was complicated further with the acquisition of Northwest, which had its own fleet and maintenance structure separate from Delta's. Despite these challenges, the MRO was still able to see results from Critical Chain.



Sridhar Chandrasekaran
Realization

"The productivity is low if you constantly change priority—it's that simple."

According to Delta's presentation at Realization's 2011 Project Flow conference, it saw a 23% increase in engine throughput and a 30% reduction in completion times after implementing Critical Chain.

Sridhar Chandrasekaran, Realization's VP for strategic services, says that one of the main problems that Delta saw at first was that it had too many works in progress. Although no changes were made to the total number of people working

at Delta to achieve the above-mentioned results, the shop workers were not using their time as efficiently as they could have been because they were not always sure what they should be working on. Sometimes they did not have all of the parts that they needed to finish engines right

before their schedules deadlines approached. These problems were not the results of workers not doing their job—each employee was working as hard as they could. Instead, a clear system was not in place to tell employees which task priorities could benefit both them and the entire maintenance process, thus smoothing the flow of work.

Under pressure, Delta was inducting too many engines at one time, says Chandrasekaran. "That means that there are too many engines on the shop floor. The productivity is low if you constantly change priority—it's that simple."

By implementing Critical Chain, Delta reports that it saw a 73% increase in revenue, or a jump from \$312 million to \$500 million.

Delta also saw success with its line maintenance operation, which has different challenges



than the engine shop does. Because line maintenance must happen overnight, turnaround time is not an issue—either it is done in that period, or it is not. Delta said at the conference that in the summer of 2010 it saw an average of 29.3 flight cancellations per day due to line maintenance timelines, when its goal was to have no more than eight.

The MRO says that much of that problem was prompted by parts availability issues because parts were not in the right place. Much of that was due to the merger. There were parts shortages caused by insufficient ordering lead time, a result of aircraft moving to new locations. Its goal was to speed up replenishment cycles and to reduce the amount of work in progress at any time.

Those efforts paid off, and the MRO was able to reduce the cancellations from 29.3 at the end of 2010 to 11.2 per day by the spring of 2011. That's a 62% decrease in delays. The airline is continuously improving and hopes to reach the 8-per-day goal.

OPERATIONAL EXCELLENCE

Consultant Kevin Duggan has been teaching companies how to transform their businesses into Lean-friendly operations for years, and his group

Duggan Associates teaches advanced courses to businesses in every major industry. But out of all the companies that he has worked with, Duggan notes that only a few have been able to implement his optimal phase of Lean implementation: Operational Excellence.

In Duggan's book, operational excellence is essentially the highest tier of the Lean process. The idea is that companies can create a "self-healing" flow in their workplaces that can cause shop floor technicians to eliminate bottlenecks without intervention from managers, just by doing what they are supposed to do. Managers can then focus on growing the business.

Duggan has identified eight principles to strive for to achieve operational excellence, which focus on making Lean value streams that flow, making it easier to see flow that is not working properly and performing more "offense" activities that focus on growing revenue instead of fixing problems.

"The next level is getting management out of those value streams, running them every day, and letting people who work in those value streams—people who actually build, overhaul the products and fix it—create a self-healing flow or value stream," says Duggan.

So far only a handful of companies have been able to achieve this method of operational excellence. One of them happens to be a small aviation MRO company called Wood Group Turbopower, which overhauls turboprop engines such as the Pratt & Whitney PT6A. The Florida-based MRO was having undesirable throughput and longer turnaround times than it would like to see.

Wood Group's VP and GM Rana Das was in the middle of implementing Lean in his workplace when he first learned about Operational Excellence in 2008. He realized that a crucial part of understanding how to achieve Operational Excellence was to know that the flow of maintenance was on time just by watching the shop floor work. After working with Duggan Associates, Wood Group was able to cut down on turnaround times by 45% in six months and it continues to improve its operation with the method.

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