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## PROJECT MANAGEMENT TECHNOLOGY

Keeps Critical Chain Bright

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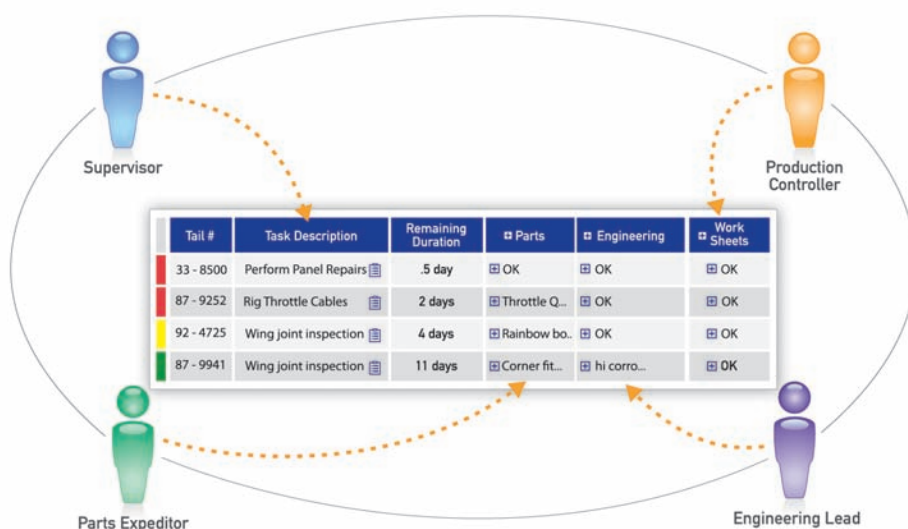


What do Delta TechOps, Lufthansa Technik, the Navy's Cherry Point Fleet Readiness Center (FRC) and the Air Force's Ogden Air Logistics Center (ALC) have in common? They have adopted critical chain business rules and use Realization's critical chain project management (CCPM) software.

**F**or an MRO running behind schedule, critical chain might mean roping off all of the airplanes in the hangar except the most urgent ones and finishing those first. Although mechanics don't like this counterintuitive approach at first, projects get done faster because labor and materials are used more efficiently. Critical chain also means staggering projects and constantly evaluating tasks, based on metrics such as time buffer consumption vs. degree of completion.

Delta TechOps' Engines and Components unit was the first TechOps group to work with Concerto, Realization's project management software. In the period from 2006—before the Realization engagement began—to 2008 the group's engine turnaround times (TATs) decreased by an average of 30 percent and engine production increased by 23 percent, thanks in part to the CCPM technology.

*Realization says real-time synchronization is to projects what just-in-time was to manufacturing. It helps projects get done faster by making sure the required resources, inputs and decisions are available when needed - which cannot be achieved through "static" Gantt schedules.*



Synchronized & uniform priorities for all production & support departments



TechOps' line maintenance operation, which engaged Realization in 2010-2011, also improved performance. In the summer of 2010, when Delta was dealing with the Northwest merger, the maintenance completion factor was "less than stellar," said John Laughter, senior vice president for maintenance operations, at a recent Realization conference. There were 29.3 cancellations/day in the summer of 2010. But by the following summer these were down to 11.2 a day, a more than 60 percent improvement.

Maintenance-related cancellations typically occur when deferred minimum equipment list (MEL) and time-controlled maintenance items expire before completion and no substitute airplanes are available for a flight. Expirations, in turn, can be traced back to problems such as parts shortages and misalignment of people, parts and aircraft. To address this problem Delta decided to cut work in process (WIP) and focus on throughput, Laughter said.

Before the changes were adopted, each of the 350 aircraft that came into one of the maintenance stations every night—about half the fleet—received a kind of "customized" treatment, Laughter said. The workers did as much as they could for each one, but resources were spread thin. Part of the new plan was to "clean up" expiring items for 15 days rather than the previous 2.5-day period.

When the new implementation began, TechOps still did lower-order checks on all 350 airplanes every night, but focused more on MELs—on 200 rather than 350 aircraft. This reduced the work of the materials team almost in half and sharpened the focus on aligning people, airplanes and parts. Eventually WIP was reduced to the point where a substantial time buffer was available to deal with the unexpected.

Delta TechOps also revamped base maintenance. C-check throughput for MRO customers increased by 35 percent from the summer of 2010 to summer of 2011.

The launch phase, which begins seven days before the aircraft arrives, includes "full kit 1" on the dock before work begins. This is all the material that maintainers anticipate will be required to complete a normal C-check.

Inspectors are then "poured" onto the airplane to complete that task in a "couple days," said Gary Taylor, a TechOps manager. Then comes the assessment phase, when mechanics evaluate non-routine needs for "full kit 2." This customer inventory has to be received quickly because there is only a short time from identification to use. The attack phase also pours on maximum manpower.

Delta TechOps found that, when working on an aircraft while other planes are in the hangar, it's important to stagger the planes, so that no more than one aircraft is going through a critical function at the same time. The base operation has implemented Concerto and is using it to measure not only progress on the critical chain, but also buffer consumption, Taylor said. "It's key that customers understand buffer consumption and how they affect that." If customers fail to provide parts quickly it means we're consuming buffer, he said.

## Ltmi

Lufthansa Technik Maintenance International (LTMI) has been implementing Concerto since August 2011, said Thomas Muetzel, LTMI team manager for Lean production and quality. LTMI has started applying CCPM concepts to C-checks and A-checks for non-Lufthansa customers.

LTMI adopted CCPM to increase productivity and revenues after the loss of a large integrated

customer. The unit realized that too many projects were in progress at the same time, so that mechanics were not being efficiently used—only 30 percent of their time was being applied to production. Greater efficiency would increase throughput and allow LTMI to price its services more competitively and win more business.

LTMI followed "CCPM rule 1"—targeting WIP and focusing resources within checks and across the hanger, Muetzel said. The unit decided, for example, to do no more than one C-Check at a time and to limit the number of active workgroups within a check to five. By reducing WIP, CCPM also helps LTMI identify real constraints, such as management capacity and qualified mechanics, so as not to overload them, Muetzel said.

The unit also focused on clear, global priorities, issue resolution and buffer management. This allows, not only mechanics, but also their management and support staff, to concentrate on the same work and get it done quickly, he said.

One high-level priority was that A-checks should take precedence over C-checks, Muetzel explained. If an A-check comes in while a C-check is in progress, resources are shifted to the A-check until it is completed and then returned to the C-check. Both checks get finished faster since workers are not multitasking between the two projects. LTMI uses buffer management to adjust priorities dynamically, based on actual execution, and to pinpoint areas where issue resolution is required. The unit also adopted full kitting.

As of early November 2011, LTMI had completed two C-checks under CCPM. The first took 20 days and the second, 11.5 days, compared with as long as 23 days previously. All told, TAT decreased by 15 to 20 percent,



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said. "Instead of playing whack-a-mole, clean the whole house across the board." The FRC also uses "drum buffer rope."

Over the course of a weekend, the FRC reduced component WIP by 65 percent and aircraft WIP by 33 percent. On Friday there were 51 aircraft in process; but the following Monday 17 aircraft were roped off with big signs saying "commanding officer does not authorize any work" on them. Although the mechanics knew the change was coming, it was nevertheless scary, Gatt said. "People feel more comfortable surrounded by work."

But the move sped things up because the people who'd been working on the now-inactive aircraft were focusing on the priority aircraft. From FY 2010-2011 the facility reduced overclocking by 45,000 hours, Gatt said. (Overclocking is when the actual hours to complete a job exceed the hours bid on a job.) Hourly throughput increased by about 20 percent from October 2010 to October 2011. Gatt is projecting a \$14/hour cut in the negotiated cost rate this year, from \$127 to \$113/hour. He plans to get down to \$105/hour by 2014 and is "well ahead of the glide slope."

The downside of the implementation was that initially on-time delivery fell from 34 to 22 percent. But it recovered later in 2011 and Gatt expected to get on-time deliveries above 50 percent by spring of 2012.

### Ogden

When Mann arrived at Ogden ALC in the summer of 2009, his marching orders were to focus on aircraft throughput and let the financials take care of themselves. He first put some basic critical chain rules in place. Things were chaotic when he got there. Mann recalls a production manager who had enough resources to staff three airplanes efficiently but was working on seven. When asked why he was doing that, the manager replied, "I just can't stand to see those other [airplanes] sit idle." Mann "took away" four airplanes and left the manager three.

The situation also called for a strong issue resolution program. Communications boards were put at the nose of every airplane so mechanics could tell managers what they needed to get the job done. Production meetings also

take place right in front of the airplanes.

Mann described the issue resolution system in action. At one meeting a mechanic had written on the board that the aircraft needed a widget of some kind. "All my support people were with me at the walk-around. So I say, 'everybody recognize we need this widget, right?' They say, 'yep,' but nobody was working on it."

At that point Mann assigned the task to somebody in front of the staffer's colleagues. That person "owns" the job until it's resolved or a clean handoff made. So now that person feels "a little peer pressure to come through and keep the airplane moving," he said. Before the system was devised, it could take two to three months to resolve an issue. Now it's a lot faster, he said.

The changes got quick results. From August 2009 to September 2010 the facility was producing almost one extra aircraft per month, Mann said. On-time-delivery, however, took a 20 percent hit during this period because, although the pace had quickened, so many airplanes had been waiting for attention.

The next step was to bring in Concerto software. The software is particularly helpful in synchronizing the work of shared resources like non-destructive inspection technicians, Mann said. Partly because of the software, on-time delivery climbed to 38 percent in Q1 of 2011, 56 percent at midyear and 85 percent by Q4. In fact, for the last three months of FY 2011 on-time delivery hit 100 percent. The freed-up capacity allowed the unit to take on \$60 million in additional work through the Foreign Military Sales program.

Nevertheless there are constraints somewhat beyond the ALC's control. The supply chain, for example, depends on actions by the Defense Logistics Agency (DLA). The Ogden ALC has identified 150 critical parts that would help keep things moving if DLA kept them in stock.

DLA has made progress. It takes the agency about 25 rather than 100 days to find and commercially procure and deliver parts, Mann said. That's still too long, however, so Ogden is working on better forecasting its needs in order to have items at hand when they're needed.

Ogden has learned from the past that its critical chain program needs to be self-sustaining. To this end, members of Mann's chain of command—all the way up to his two-star general—have been trained and certified in the methodology. Any new managers are trained, as well. Upper management also has access to Concerto, so they can see where the constraints are and help to deal with them. **AM**

mechanic utilization rose to about 45 percent and worker satisfaction improved. LTMi plans to fill up the pipeline and to apply full kitting to A-checks as well as C-checks.

### Military Experience

Both the Cherry Point FRC and the Ogden ALC have gone through two turnarounds, illustrating the tendency of processes to deteriorate without a continuous focus on improvement.

After the revamp of its H-1 and AV-8 lines—for which it won two Shingo awards—the Cherry Point facility noticed "a little tarnish on our shiny programs," said John Gatt, FRC East industrial IPT director.

"When you focus everyone on one line or another, you can have miraculous results, but at the expense of something else," Gatt said. In their case, the component program had deteriorated and the rate the FRC charged was not competitive.

Like Cherry Point, Ogden is on its second tour with critical chain. In 2007 there had been a CCPM implementation with "great results" in reduced WIP and flow days," said David Mann, director of the 572nd Aircraft Maintenance Squadron at the Ogden ALC. The hitch was that new leadership rotated in with a focus on business financials rather than schedule adherence. As a result, WIP built up, throughput suffered and on-time delivery declined.

### Cherry Point

Cherry Point pulled Realization in a second time to "drain the swamp all at once," Gatt

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