Critical chain project management

Critical chain project management flies

In 2004, the Warner Robins Air Logistics Center in southernGeorgia was flying high. Officials had significantly reduced the number of daysrequired for the repair and overhaul of the C-5 Galaxy aircraft from nearly 360in late 2000to about 240 today. The reduction was accomplished through aconcerted lean initiative that established cell teams, standard work withineach cell, parts kits, materials at point of use, modified 5S initiatives,method sheets, and pull systems.

These efforts also reduced the workin- process, namely the numberof aircraft in the center awaiting repair and overhaul. In 2001, the averageWIP was 16 aircraft. By end 2004, it was 12.5. These efforts led to the airlogistics center winning the Shingo Gold Prize in 2005, marking the first timeit was awarded to an organization in the public sector.

Despite these improvements, the center faced pressure to reduceflow days and WIP further. The U.S. Air Force had only 114 C-5s in its fleet.The 12 to 13 aircraft in WIP accounted for more than 10 percent of the entirefleet. To address the need of the Air Force, the Air Logistics Center revisitedthe C-5 repair and overhaul process to assess where improvements could be madefor other aircraft projects.

Fightingprocrastination

A study in December 2004 revealed a number of problems. In thepresence of resource contention, the tendency was to give priority to workingon aircraft that were closest to completion even if they were ahead ofschedule. Such a decision, however, delayed other aircraft that warranted higherpriority because they were behind schedule.

As delays mounted, a firefighting mode of operation promoted atendency to begin work on aircraft or tasks as soon as possible, which led tomany aircraft in various stages of repair. The resulting competition formechanics, parts, and other elements led to more firefighting, multitasking,and delays.

Due to uncertainties in task durations, task times had beenbuffered to protect against uncertainty. Furthermore, all tasks were scheduledand managed using milestones that specified when they should begin and end.That led to numerous behavioral problems, including Parkinson's Law — thetendency for work to expand to fill the time available for completion — and theStudent Syndrome, in which people put off working on a task until the due datedraws near.

Amid the operational disillusionment, a C-5 aircraft was scheduledto arrive for repair and overhaul approximately every 22 days. The mechanicstook 22 days in the disassembly phase even though they could have done it muchfaster because they knew the next aircraft would not come for 22 days. Whensome personnel postponed working on tasks, others were forced to multitask.However, multitasking only served to delay each of the tasks being worked on.With the C-5, the study revealed a lot of multitasking with sheet metal work.

Criticalchain gang

In January 2005, the Air Logistics Center decided to adoptcritical chain project management to manage the repair and overhaul process.The center contracted with Realization Technologies to implement the projectmanagement method.

The first step in the implementation was to form a dedicatedcross-functional core team. After considerable discussion, the core team arrivedat an aggressive target of 160 flow days (including the project buffer) forrepairing and overhauling the C-5. A network incorporated a critical chainlength of 105 days and a 55-day project buffer.

Implementation sparked numerous challenges, the first of which wasto reduce WIP without incurring additional overtime or personnel. A secondchallenge was to break a cultural barrier by moving away from aircraft-levelpriority to tasklevel priority. This was especially difficult when an aircraftwas at functional test ready for test flight, but the information indicatedthat scarce resources should go to an aircraft that just arrived and the jet atthe functional test should sit idle. A third challenge was to overcome adatedriven mentality, dislodging the notion of working toward milestones.

Prior to the implementation of critical chain project management,each cell had its own cycle time and milestone end date. That resulted inParkinson's Law and the Student Syndrome, with each cell using up at least theamount of time allotted to the cell. After implementation, the facility movedaway from cell cycle times to one cycle time for the entire aircraft. The AirLogistics Center now works with just one date in sight: the customer deliverydate.

Freeingup time

Through critical chain project management, flow days were reducedfrom 240 to 160 within eight months without additional overtime or personnel.Much of the credit for that goes to the elimination of multitasking. Thereduction in flow days allowed the Air Logistics Center to release fiveadditional C-5 aircraft back to the Air Force's operational inventory andprovided additional revenue to the Transportation Working Capital Fund,estimated at $49.8 million annually. The replacement value for these aircraftis estimated at $2.37 billion.

The implementation provided numerous additional benefits. Itre-energized lean and corrected process inefficiencies. For example, personnelresources were aligned by skill for much better task completion efficiencies,resulting in a faster pace of maintenance. The implementation also yieldedefficiencies in labor that routinely allow the C-5 team to address additionalunexpected work for the aging C-5fleet. Critical chain project management identified the paint barn as a constraint,leading to a reduction in lead-time for aircraft in the paint barn by 45percent. The Air Logistics Center is now able to paint the C-5 in less thanhalf the time of the benchmark commercial facility, and for much largeraircraft. The increased efficiencies allow other aircraft to be painted in thebarn.

Energized by the success with the C-5 line, plans are under way toimplement critical chain project management in other critical areas thatrequire better performance to meet growing demands in the future.

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