

# Connection

The Lufthansa Technik Group Magazine

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Efficient maintenance

## Lean works

Regional Aircraft Services

E-Jet component support

Regional Sales

Strong in the Middle East

Lufthansa Technik Philippines

The A380 overhaul expert

Focusing resources and man power on a single C-check is one of the keys to success for Critical Chain Project Management.



# The maintenance factory

Following the **reorganization of production processes to Critical Chain Project Management**, Lufthansa Technik Maintenance International in Frankfurt has finally established itself as a maintenance factory for events through to C-checks. Customers benefit from shorter layovers and a standardized transparent reporting.



**W**e start fewer things at the same time, but allocate more capacity to individual tasks – and as a result we finish more quickly.” Such is the simplified common denominator to which Dr.-Ing. Thomas Mützel reduces the principle that has dictated the way of working in Base Maintenance at Lufthansa Technik Maintenance International since last year. Today Thomas Mützel is Section Manager Airbus A330/A340, but in his previous capacity as Team Manager, Lean Production & Quality, at this Lufthansa Technik Group company that specializes in maintenance work for international customers, he was responsible for the methodical process transition.

CCPM is the “magic formula” behind this approach, which is still relatively new in the MRO industry. The acronym stands

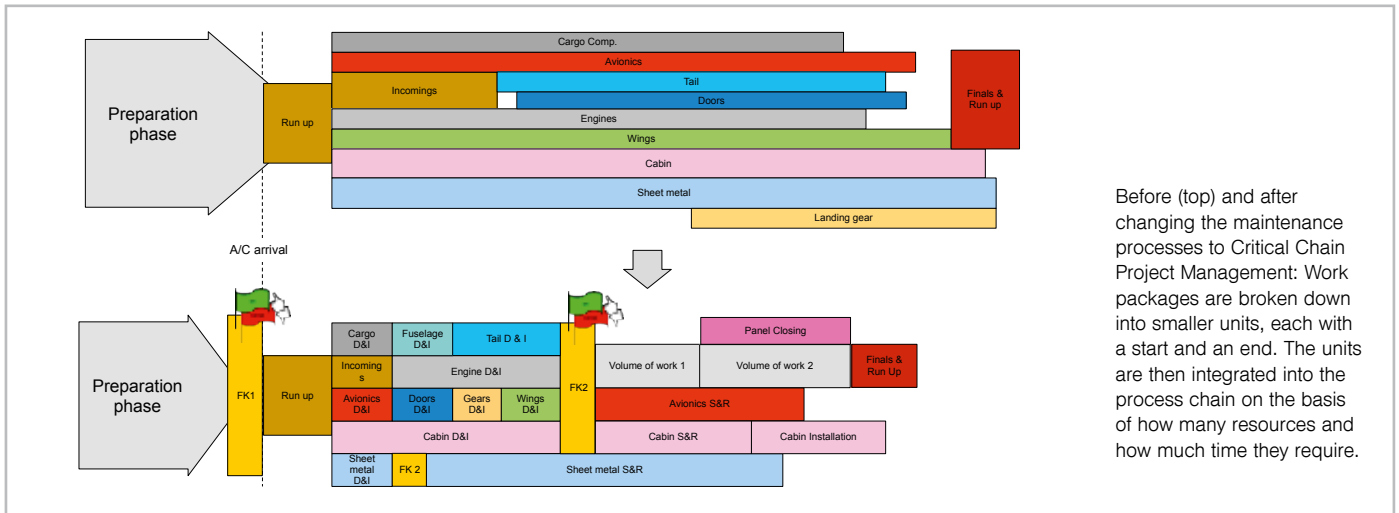
for Critical Chain Project Management, a lean method of planning and managing projects that puts the main emphasis on the resources required to execute project tasks. This contrasts with more traditional methods which emphasize task order and rigid scheduling.

#### **Last-minute, complex and difficult checks**

For Lufthansa Technik Maintenance International the possibility of switching to CCPM appeared to be the way forward if the company was to respond better than it had up to now to the growing and increasingly differentiated requirements of the market. The company which was launched on the market five years ago has positioned itself within the Lufthansa Technik Group as a

“maintenance factory” with the performance pledge of taking on complex and “difficult” checks even at very short notice.

But, as Thomas Mützel points out: “This approach significantly increases the variability of the tasks that ultimately have to be completed for a check. It’s contrary to a classic series production, for example in automobile industry, where the process and work lists and the parts that will be needed are exactly known before production gets under way. Even when we know the airplane extremely well, we never know exactly what awaits us down the line on a check.” The mix of C-checks and the shorter A-checks adds another dimension to the complexity of the work processes and also to personnel and material planning.



Before (top) and after changing the maintenance processes to Critical Chain Project Management: Work packages are broken down into smaller units, each with a start and an end. The units are then integrated into the process chain on the basis of how many resources and how much time they require.

In the past these complex framework conditions had two primary consequences. Firstly, the uncertainty made it difficult to predict where bottlenecks could be expected in the production process and sometimes the predictions were wrong. This in turn led directly to multi-tasking and as a result to inefficient use of highly skilled staff. Before CCPM, firefighting was the order of the day. And secondly, experience showed that predictions of how long a given work package would take regularly proved to be little more than speculation, with corresponding implications for planning certainty.

The success of layover planning and its application on the basis of Critical Chain Process Management depends on a few important far-reaching rules being in place and consistently followed in practice. In the closed system of all the work associated with a layover in the hangar the critical issue is always the allocation of capacity between the various work packages. At Lufthansa Technik Maintenance International this process runs according to three rules.

**Maintain low work in progress**

Multi-tasking is the primary source of wasted capacity in a project environment. This challenge is countered by the first rule, which says that the number of projects running simultaneously – the work in progress (WIP) – must be minimized. Because maintenance work is almost always performed under time pressure, there is always a feeling that projects or subtasks of projects need to be started early on. In order to finish the tasks in time highly skilled employees have to alternate between tasks.

This multi-tasking applies not only to support processes, engineering and material support but also to managers, who are overloaded by too many simultaneous tasks. “Instead of running two tasks, each at 80 percent capacity, we prefer to invest 110 percent in one task. The effect is a lot greater,” says Thomas Mützel. The classic approach to planning a project entails a series of milestones. As a matter of principle project managers determine whether the project is where it needs to be in terms of the next milestone. At the same time

experience suggests that a plan comprising a series of milestones is based on estimates. The result is that the intervals between milestones are calculated so as to incorporate a safety margin and hence are overly generous. This classic path does not allow for any early warning system. If a major problem only becomes obvious at a milestone, the plan falls apart as the next task is waiting after that milestone. Furthermore classic planning procedures are based on local efficiencies such as productivity.

CCPM follows a different path. Work packages are broken down into smaller units, each with a start and an end. These units are integrated into the process chain on the basis of how many resources and how much time they require.

**Effective buffer control**

Based on the knowledge that in the past the time necessary to accomplish a given task was planned too conservatively, the scheduled times have now been cut significantly. This “time saving” is then put into a transparent buffer. On the one hand the buffer is available when unexpected problems arise – they can now be worked through in a hassle-free fashion – and on the other hand it makes it possible to deal more effectively with situations where the work is finished ahead of time. This also has the effect of reducing work in progress significantly. Finally the change in prioritization logic from worker productivity (everyone has to perform on 100 percent) to a lead time focus (do less in a faster way) leads to a drastic reduce in WIP.

But even with these rules there is one overriding principle, as Thomas Mützel points out: “We don’t start at all until we



The hangar of Lufthansa Technik Maintenance International in Frankfurt.



The unusual approach generates directly measurable results in regards to punctuality.

have gathered together all the documentation and the materials required to complete the activity.” At the start of the project plan there is therefore an item known as “Full Kit 1”.

This coordinated start is followed by a depanel and inspection phase, in which the entire aircraft is opened up and the components and systems are inspected and, where necessary, dismantled. All the routine items are carried out during this phase. By contrast, pre-CCPM, they would already start by working through the findings and non-routine work. Once the inspection phase is over, the second part of the project plan covering all the rest of the check is drawn up. This is based precisely on the actual findings and reliably contains the actual work that still has to be carried out.

### Shop load specific management

For the purposes of check management according to CCPM Lufthansa Technik Maintenance International uses the Concerto planning and execution software from Realization. But, according to Mützel, as well as suitable software it is equally important “that we ensure on a daily basis that we maintain a project status with as low as possible a workload (low work in progress).” To make this concept work it is very important that event managers are constantly on site, find time to talk to the staff, continually analyze which tasks are necessary and constantly revise their view of the progress of the project. One major challenge here is to avoid falling into the

“old habits” and, for example, when one job is done immediately start – in uncoordinated fashion – work that does not fit into the new system. “We grew up in an industry in which firefighting was the order of the day due to multi-tasking,” says Thomas Mützel. “Trusting that at the end of the day things would go quicker if you were to start fewer things at the same time, was an unusual challenge.”

The first check based on Critical Chain Project Management was carried out in the autumn of 2011. Since then, the hangar in Frankfurt has often presented an unusual sight. Although one aircraft is a hive of activity, it may be that a second aircraft is apparently standing neglected in the hangar. Whereas in the past, given the task mix described above of A-checks through to complex C-checks involving up to 4,000 man hours, the workforce would be working on all fronts simultaneously, today a C-check is put on hold and the resources are put into a short-notice A-check. As soon as this check is finished, everyone goes back to the C-check. What’s more, C-checks are no longer carried out in parallel, but one at a time (see figure on page 10).

This unusual approach in the hangar may take some time for customers to get used to, but ultimately they are convinced by the directly measurable results of this approach: C-check layovers have been cut by between 15 and 20 percent. Punctuality, which in any case is high for C-checks, is also virtually 100 percent for A-checks. “In the final analysis we now always finish either on time or a little bit

earlier,” says Mützel. It goes without saying that Lufthansa Technik Maintenance International is gaining in efficiency and competitiveness as a result.

### Transparent reporting

With this process model it is especially important to have good communications with the customer. Standardized reporting is now in place, with customers now being notified in a highly transparent manner of the progress of the check, how much of the buffer time has been used up, the current status of the aircraft and of individual assemblies. Furthermore there is a clear focus on which problems have to be solved by the MRO provider or in cooperation with the customer.

In this way, thanks to CCPM, Lufthansa Technik Maintenance International is well equipped for the future and for stronger demand. “The more work there is in the pipeline, the more effective become the advantages of this system,” says Thomas Mützel. ☺

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### Critical Chain Project Management

// Critical Chain Project Management (CCPM) is a lean method of planning and managing projects that puts the main emphasis on the resources required to execute project tasks. This contrasts with more traditional methods which emphasize task order and rigid scheduling. //