

# Kanban in Engineering: Aviation Supplier Reduces Cycle Times While Boosting Output

Manufacturing is a repeatable process while engineering projects tend to be one-off efforts. The following case study shows how a major supplier of aircraft sub assemblies transferred the principles of kanban/pull systems from manufacturing to engineering with great success. It demonstrates how reducing work in process and managing queues using a one-in-one-out process boost throughput and reduce cycle times in engineering and product development.

## Client Background and Business Situation

Realization's client is an established non-OEM provider of aerostructures for commercial, military, and business jets. The client contracted with a leading manufacturer to conduct engineering analysis on an aircraft for the European market.

The European Aviation Safety Agency (EASA) requires certification for the first flight of any craft operating in European airspace. The certification process involves submitting dossiers containing engineering analysis demonstrating the viability of new aircraft designs. Each dossier includes a number of chapters comprised of drawings as well as detailed stress analysis.

Since EASA certification is a non-negotiable requirement for entry into the European market, delays in the engineering analysis lengthen the entire project timeline.

## The Root Causes of Schedule Delays

The client found that documentation of engineering analysis according to the specifications required by EASA had become a bottleneck. The date for the delivery of the project was looming and numerous chapters remained to be written. A single chapter took from four to six weeks to complete, an unacceptably long cycle time.

Several related factors were causing project delays:

- Engineers were working on multiple engineering analysis for different chapters at the same time. These engineering analysis require extensive calculations on the back end of the process, which entail significant computing power. Processing times are measured in hours or days.
- Engineers were entering the data for multiple chapters into the computer system as a single batch. However, the computer performs its calculations sequentially. The completed calculations exited the computer queue in the order in which they entered, with the outcome that analytic results became available in peaks and valleys.
- While engineers were waiting for these outputs, rather than sitting idle they would begin work on additional analysis, placing more calculations into the queue and the vicious cycle of delays would repeat.
- If problems arose during the analysis, engineers would continue on to the next chapter rather than resolving the issues. These issues would accumulate and then were submitted to the team lead for resolution in batches. This approach caused interruptions in the team lead's work resulting in further delays.

## Results

Cycle time was reduced from five weeks to two weeks per chapter. Chapter completion rates improved by 41%, from 7.3 to 10.3 chapters per week.

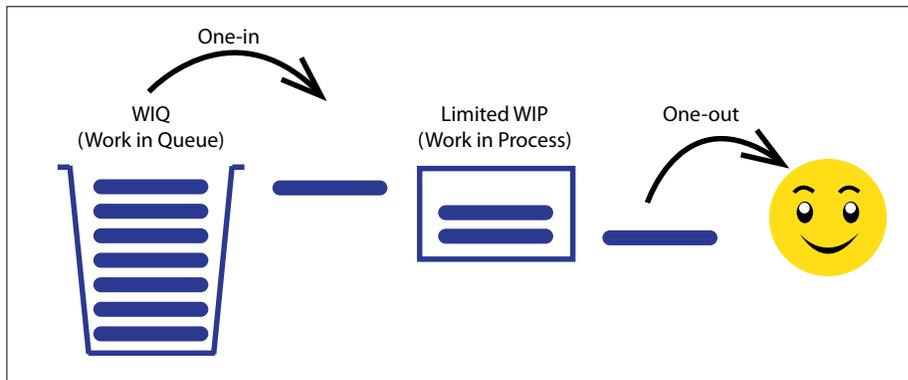


- The client's aircraft manufacturing customer added additional, unplanned analysis to the queue. Rework was also required on some chapters that had already been submitted. These additional, unexpected work streams exacerbated the delays.

## Kanban/Pull System Reduces Multitasking and Improves Performance

To solve these issues, Realization applied select principles from the manufacturing toolkit to the client's engineering challenges. These steps included:

- Creating clear project priorities: a master schedule was developed with a clear order of priority for each chapter.
- Reducing work in process: engineers were restricted to working on no more than one chapter at a time.
- Implementing full-kitting for each chapter: all data requirements and necessary inputs had to be available before writing began on any given chapter.
- Releasing work according to the one-in-one-out rule: work on one chapter would be released to an engineer only when work on a prior chapter was complete.
- Instituting daily meetings for problem resolution: each day, team leaders met with the Chief Engineer for a brief meeting of approximately 20 minutes to review and resolve any outstanding issues.



Kanban/Pull System: One-in-one-out queues accelerate throughput

## Results

Realization assisted the client in establishing the pull system. This included coaching the engineering leads in the discipline of one-in, one-out and daily issue resolution. The client realized the following measurable results:

- Cycle time was reduced from an average of five weeks to two weeks per chapter.
- Chapter completion rates improved by 41%, from 7.3 to 10.3 chapters per week.

**If doing projects 20-50% faster is vital for your organization,  
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