SIMULATION PROJECT FOR FAN & DRUM MANUFACTURING

INDUSTRY
Aerospace

APPLICATION AREA
Manufacturing

COUNTRY
Belgium

CHALLENGE
Compare a number of scenarios with different production volumes and indicators, in order to support a decision to implement one of the scenarios.

SOLUTION
A simulation model with an Excel interface, to change input parameters, run simulation and analyze the results in an easy way.

FACTS & FIGURES
- INCONTROL finished the project within 6 weeks, including model building, experimentation, result analysis and reporting.
- Techspace Aero mainly used the tool to determine amount of necessary stock and stock points.

Techspace Aero prepared their self for the future by testing improvement methods, uncertainties and variations. Without disrupting the real operation!

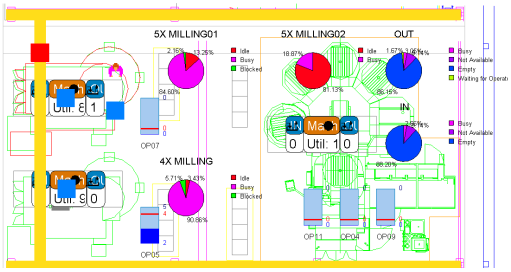
TECHSPACE AERO

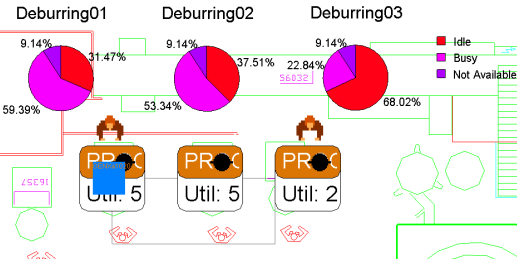
Aerospace manufacturing is a high technology industry where quality and safety get the highest priority in design and production processes. INCONTROL carried out a simulation project at Techspace Aero, partner of the world's major aerospace engine manufacturers. Techspace Aero designs, develops and produces modules, equipment and test cells for aircraft and space engines.
Their basic activity is the design and manufacturing of modules and components for aero engines, with a particularly strong expertise in low–pressure compressors and high tech parts.

Techspace Aero faces increasing demand volumes in the next years. Therefore they need to expand production capacity and install additional production utilities. A key condition for successful production management is the streamlining of existing production lines, as well as optimal integration of new production utilities. The logistic performance has to be improved at several points:

- Substantially increase production volume.
- Significant reduction of lead times.
- Cost reduction by reduction of work in progress quantities.
- Contribute to organizational and cultural change.

Aerospace manufacturing is a high technology industry, where quality and safety get the highest priority in design and production processes. Therefore, at all times the production quality should be kept at the highest possible levels.





OBJECTIVE

To meet the described challenges, a number of expansion scenarios were developed for the Fan & Drum manufacturing shop. The production of the fan and drum parts is spread over a range of production stages, including machine and manual operations and several inspections. The complexity of interactions between the production stages makes it difficult to predict which scenario will result in the best performance. The indicators to measure are:

- Productivity (produced parts per week).
- Lead times per product type.
- Work in progress quantities.
- Utilization rates for machines and operators.

The objective for the simulation project was to compare a number of scenarios with different production volumes on these indicators in order to support the manufacturing managers in their decision to implement one of the scenarios.

SCOPE

The simulation model contains the fan disk and drum production line for the parts GEnx Fan, GP7000 Drum and GP7000 Fan. The production flow is implemented from the start of the line where spare parts are taken from the warehouse until the last inspection step before the parts are sent to the assembly line. Processes like special treatments and processes that are outsourced are implemented as a black box. As the production volume for these parts will vary in the coming years, the defined scenarios contain quantities for the years 2009–2011.

RESULTS

The initial results from experimentation showed a very high load on some specific machines. By a reallocation of production steps on these machines, the results for production volumes could be improved significantly. Further experimentation is done to compare different scenarios for strategies in the line, such as push, pull and mixed push–pull.

Particularly the mixed push–pull strategy showed a good performance in controlling the number of parts in the line (influencing work in progress and lead times), supplying the bottleneck machines in order to keep them running all the time and to guarantee the required production targets. The simulation model can be used to define the required quantities in different parts of the line.

Together with the simulation model an interface in Excel has been developed, which enables the user to change input parameters in an easy way, run the simulation and analyze the results in Excel. In the coming years the production volumes per product type will vary from time to time. The user can use the simulation application to test whether the production line is able to produce the different quantities, but also to analyze the influence of breakdowns and rework or the allocation of production stages on different machines.