Chrysler
Automotive Manufacturing

SIMUL8
CASE STUDY

Chrysler on target to save $5 million using SIMUL8

The Throughput and Simulation team at Chrysler is on target to save $5 million using a Line Speed Reduction tool created using SIMUL8 software.

The team was challenged with improving efficiency and reducing costs in their busy manufacturing plant and used the tool to balance the lines in the assembly shop. Following the success of the project the practice has been rolled out to 8 Chrysler plants and more simulation projects are underway

The ability to quickly experiment with various scenarios without the risk and cost of testing those ideas on the actual lines is a key benefit of simulation.

Line balancing to improve efficiency

Faced with improving efficiency and increasing throughput in their busy manufacturing plant, the Throughput and Simulation team at Chrysler used SIMUL8 simulation software to balance the assembly lines in the TCF (Trim, Chassis, Final) center of the plant.

The plant builds three popular minivan models; Chrysler Town & Country, Dodge Grand Caravan, and the VW Routan and is capable of building 70 minivans every hour. There are 12 assembly lines in the TCF centre, with an average of 1000 operators working per shift.

Steve Lin, Throughput and Simulation Specialist at Chrysler said, "The challenge was to identify the bottlenecked lines and improve their throughput. We wanted to look at the impact of slowing down the best performing lines as people on these lines were always waiting for work from slower lines in the process, and that's just waste."

> ❝❞ **The challenge was to identify the bottlenecked lines and improve their throughput. We wanted to test the idea of slowing down the best performing lines to improve efficiency.**
>
> **Steve Lin**
> Throughput and Simulation Specialist
> Chrysler

Approach

SIMUL8 simulation software gave Chrysler the perfect platform to test line improvement ideas in a fast and risk free environment. With a simple simulation of the assembly line operations they could identify system bottlenecks, run different production schedules, and evaluate the impact of design and scheduling decisions, such as buffering requirements and product mix.

The first step for the team was to create a simulation of the assembly shop in SIMUL8 (figure 1). The flexibility of SIMUL8 allowed this simulation to form the basis of a Line Speed Reduction (LSR) tool created by Lin and his team.

With a large amount of vital data already stored in their own databases it was important that it could be quickly imported and used in SIMUL8 to make the simulation match reality. Lin used SIMUL8's *import from excel* functionality to easily import all relevant data, including; availability of operators, size of line buffers, sequence and mix of product, delivery rates and volume.
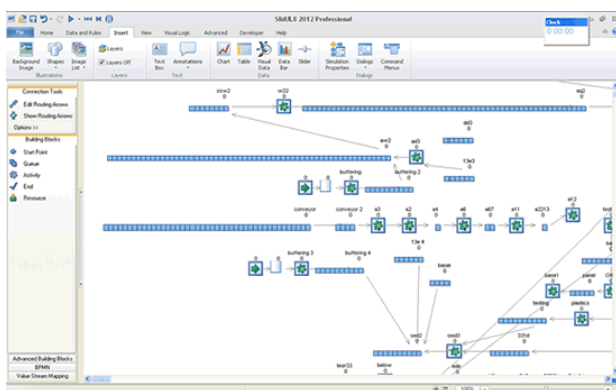

Figure 1

Line balancing to improve efficiency

The simulation was then validated by comparing the results and outputs of the simulation to historical data from the real system. This created the baseline for improvements. Once validated, Lin could then analyze the percentage of blocked and starved lines to identify the *best performing lines* and the *bottlenecked lines*(figure 2) in the system.

An interface was then created to utilize the current process flow layouts of the system (figure 3). Lin said, 'The interface gives a quick and easy way for anyone to change Cycle Time, Mean Time to Repair (MTTR), and Mean Time between Failures (MTBF) for any line selected.' A variety of scenarios were then experimented with on those lines to find the line with the greatest improvement potential. Lin said, 'We tried slower cycle times on the best performing lines and monitored the overall throughput (Stand Alone Job per Hour). If this didn't change, we knew we could safely slow these lines and reduce the manpower cost on it.'
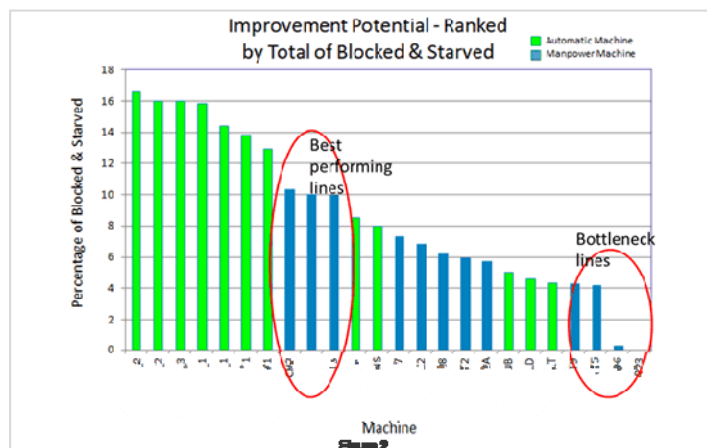
Figure 2

> ❝ ❞ **The interface gives a quick and easy way for anyone to change Cycle Time, Mean Time to Repair (MTTR), and Mean Time between Failures (MTBF) for any line selected.**
>
> **Steve Lin**
> Throughput and Simulation Specialist
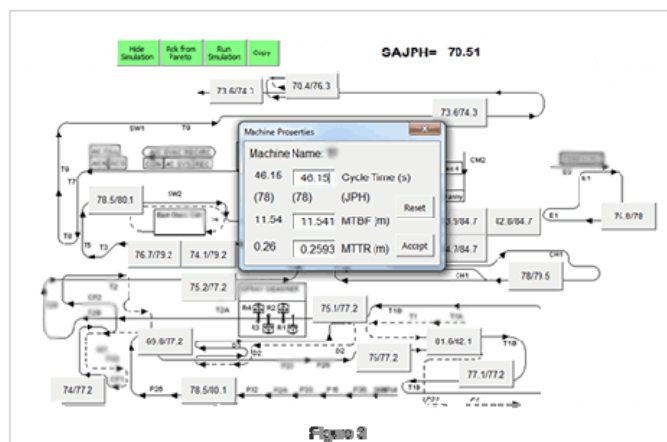> Chrysler

Results

The ability to quickly experiment with various scenarios without the risk and cost of testing those ideas on the actual lines is a key benefit of simulation.

Using SIMUL8 and the LSR tool, Lin and his team could identify the best performing lines, and experiment with slowing them down. They realized that a reduction in manpower on these lines would have no effect on overall throughput and remove the waste on the line. 'We reduced 2 people a shift on one line. So, with 3 shifts a day we effectively reduced manpower costs by 6 on that line, saving us $600,000 per year', said Lin.

The simulation gave the team, and management, the confidence they needed that any changes they put in place would have the desired impact. The Line Speed Reduction tool has now been rolled out to 8 more Chrysler assembly plants with cost savings projected to be around $5 million.

Lin and his team are now using SIMUL8 on other improvement projects including; the carrier number optimization for two other Chrysler assembly plants, and a project to determine the optimum number of lift-gate racks for a 10 model-mix body shop panel line.

Figure 3