



# Implementing the future of manufacturing using simulation

Simulation empowers today's manufacturers to design efficient plants and processes, optimize resources and increase throughput.

[www.SIMUL8.com/manufacturing](http://www.SIMUL8.com/manufacturing)





# Supporting the next wave of manufacturing innovation with simulation

Manufacturing has changed dramatically since the first Model T automobiles rolled off Henry Ford's assembly line in 1908. At that time, Mr. Ford famously stated that *"Any customer can have a car painted any color that he wants so long as it is black"*.

Ford's assembly line was an incredible innovation from the "artisan" approach that had been used prior, allowing cars to be produced at a low enough cost to dramatically change people's lives.

Now more than ever, we enjoy the many benefits that manufacturing creativity and innovation continues to deliver; from ever more powerful smartphones in our pockets, to the planes in the sky that allow us to reach anywhere in the world, faster than ever.

This speed of technological change in manufacturing is reaching unprecedented levels, with digitization and Industry 4.0 set to usher in a new era of smart production.

Faced with the challenge of intense global competition and the implementation of new production technologies, more and more manufacturers are turning to simulation software tools to help make long-term, evidence-based decisions.

*"The future of manufacturing will be driven by the most **agile** and **innovative** companies."*

# Why is simulation used by manufacturers to drive decision making?

A simulation is a computer model that mimics the operation of any real or proposed system, like the running of an assembly line.

While other analytical approaches can estimate operations at a high level, simulation is the only technology that can account for the behavior of individual tasks and resources. This allows simulations to accurately represent and measure what will happen in a manufacturing system over time.

Many of today's manufacturers use simulation tools to thoroughly assess the impact of their process improvement ideas and new system configurations in a risk-free environment. Simulation provides a virtual, visual sandbox to test 'what-if' scenarios, without interrupting the current capability of manufacturing operations. Days, weeks, months and even years into the future can be played out in a matter of minutes.

Simulation also replicates random events which can effect manufacturing lines, like equipment downtime, absenteeism, and cycle times. This allows manufacturers to fully understand their effect, ahead of any investment, on KPIs like Overall Equipment Effectiveness (OEE), inventory levels, and throughput.

Simulation is complimentary to many of the business and engineering techniques you may already be using, including:

- Line balancing
- Lean six-sigma
- Value stream mapping
- Business process management (BPM)
- Supply chain planning
- Product lifecycle management (PLM)

Popular uses of simulation in manufacturing include:

- Identifying effective, flexible plant layouts
- Understanding the impact of investment in new equipment, resources or staff
- Highlighting and removing waste and variation
- Planning for and minimizing the effects of downtime
- Responding more effectively to customer demand

*"Simulation can **save you from making costly assumptions** in commitments to customers, as well as reducing the risk of buying new equipment without knowing the outcome of that purchase."*

**Ben Van Straten**, Industrial Engineer, Plexus Corp.



# What are some of the key benefits of using simulation for manufacturing projects?



## Provide ROI evidence, ahead of investment

Experimenting with manufacturing processes in the real world is costly. There's not only the capital expenditure of changing process, hiring new staff or purchasing new equipment, but also costs associated with the consequences of these decisions.

Traditional approaches to project management can incur unforeseen risks, extra costs or ramifications across other aspects of the production process. The only cost involved with simulation is the software and time to build the simulation.

Using simulation, financial cost metrics including capital, usage costs per station and labor can all be tracked and affordability assessed.

This enables manufacturers to build project buy-in as cost implications can be easily communicated across different scenarios. For example, when assessing if high cost technology stations are worth the return on investment.



## Proving and achieving throughput

Proving throughput is a top priority for assessing the overall efficiency and success of any production design concept

Achieving optimum throughput is essential for manufacturers. Overproduction wastes resources and jeopardizes budgets, while not meeting customer demand negatively impacts revenue and market share.

Simulation is an essential tool for identifying, comparing and improving manufacturing design concepts that will meet projected production targets on time and within budget.



## Improve production reliability

Unplanned downtime costs industrial manufacturers an estimated \$50 billion annually, with equipment failure causing 42% of unplanned downtime.

With an increasing reliance on state of the art machinery throughout manufacturing production processes, there is also risk of equipment failure.

Simulation plays a vital role in understanding the effects of equipment failure throughout the production process, as well as the follow-on impact on overall throughput and earnings. It can also be used to plan and test contingency processes or machinery to alleviate the impact of downtime.



## Resource utilization and employee input

Staff, including line-side operators, shared task operators, forklift drivers and maintenance workers are key to driving manufacturing processes.

Simulation is also effective for determining staffing requirements, placement and shift patterns, as well as optimizing the balance of resource tasks.

With advanced robotics playing an increasing role in supporting human operators, interaction between them is becoming more seamless, enabling line operators to collaborate with, train and manage robots on the production line.

Simulation can also account for these complex shared tasks, including travel and walking times, as well as the ability to distinguish between 'automated' and 'manual' tasks within a cycle time.

For example, simulation can highlight whether a station is waiting for a part, or waiting for an operator. This allows manufacturing engineers to design robust work stations that won't pace the line, or become a bottleneck due to overloaded operator utilization.

With simulation, skilled trades such as millwrights, electricians, pipefitters, and tool-makers can also be added to models to determine an optimal on-site maintenance crew. These skilled trades can be added to activities where breakdowns occur, thereby gaining critical insight into repair and maintenance strategies.

*"Using SIMUL8 lets us stay **flexible** when planning resource to cope with demand fluctuations."*

**Joy Boath**, Virtual Manufacturing Engineer, GM Holden

As these examples demonstrate, utilizing simulation can improve the success and economic outcome of an organization's plant operations or capital projects.

**With simulation, you will shorten the time to project completion, strengthen stakeholder buy-in, and guarantee the impact of proposed changes even before you pilot.**

# Examples of manufacturing simulation success with SIMUL8

Simulation consistently delivers significant value - from strategic to operational, top-line to bottom-line - to organizations that use it.

Take a look at some examples of how SIMUL8's simulation software has helped our manufacturing users worldwide.

## CHRYSLER

### Meeting demand without increasing costs

Leading automotive manufacturer Chrysler improved throughput by 39 units and increased revenue by \$1,000,000 per day using SIMUL8.

*"SIMUL8 is fast and easy to learn. It's quick to use which makes it an ideal tool for getting the results we need to make fast but thorough decisions."*

## FMC Technologies

### Eliminating manufacturing bottlenecks

To meet a sharp increase in market demand, FMC Technologies utilized SIMUL8 to find and remove bottlenecks, increasing production throughput by 50%.

*"If we hadn't used SIMUL8 and couldn't measure capacity; that would mean not being able to deliver on time and therefore erode profit."*



### Reduce resourcing costs

Global manufacturer Plexus achieves simulation results within days using SIMUL8; guaranteeing production capacity, identifying optimum staffing, and saving \$5,000 in equipment costs.

*"Simulation enables us to create multiple scenarios where we can test our assumptions, validate variances between processes, and see how our distributions affect our manufacturing line. It also allows us to blatantly see any issues in the process versus having to find them."*



### Identifying effective set-up

HP simulated production lines to determine the most effective set-up and illustrate delays and constraints within the process, saving \$100,000 per year by eliminating non-value adding activities.

*"Simulation is particularly speedy at highlighting the major constraints within critical processes and thus enabling the model builder to construct the correct event sequence and buffer sizes to keep the major constraints fully utilized."*



### Reconfiguring maintenance to increase throughput

By using simulation to develop smarter maintenance rules, GM increased throughput by 5% to meet an increase in demand, without increasing costs.

*"Vehicle manufacturing is a highly competitive industry and we need to remain flexible to cope with fluctuations in demand. SIMUL8 has been a highly effective tool for us in achieving that flexibility."*

Read the full case studies and learn more about how simulation can improve processes and increase ROI: [www.SIMUL8.com/case-studies](http://www.SIMUL8.com/case-studies)

# SIMUL8 is the manufacturing simulation tool of choice

SIMUL8 is used *by over half of the world's top 100 manufacturing organizations* to make better decisions and maximize ROI.

Why SIMUL8? No other simulation software matches SIMUL8's speed, flexibility and ease of use. Whether you are just starting out with simulation as a decision making tool, or have a team of experienced simulation practitioners, SIMUL8's powerful software is the tool of choice.



## Rapid simulation building

With SIMUL8's intuitive software, you can rapidly model any manufacturing process, no matter the size of complexity.

Quickly create simulations with a user-friendly drag and drop interface and utilize Visual Logic coding language to customize any aspect of SIMUL8 to your exact needs.



## Utilize existing data

Run accurate simulations that reflect the real-life variability that can affect your processes.

Utilize SIMUL8's built-in statistical distributions or connect your own manufacturing data from Microsoft Excel, VB, and C++, to thoroughly evaluate the impact of process changes.



## Fast, in-depth results

With the fastest simulation results engine available, you can quickly get insight to make effective decisions.

SIMUL8 provides extensive results in a range of exportable formats, as well as the ability to customize reports to analyze the results most relevant to you or stakeholders.



*"SIMUL8 gave us the ability to evaluate a wide range of process improvement options, all with potentially large financial or engineering implications, **without spending any significant money or time** to investigate."*

Eric Kurtz, Project Manager, FUJIFILM Imaging Colorants

# What challenges could simulation help you solve?

At SIMUL8, we're always happy to talk through your unique challenges and discuss how they could be solved using simulation.

With powerful software and years of experience of improving processes and reducing costs for manufacturing organizations, we can help you to launch, grow and optimize successful simulation programs.

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