Whirlpool and University of Michigan Simulate Their Way to Success

Whirlpool /University of Michigan

Success Story

Consumer Goods

ProModel Optimization Suite

SITUATION

Global manufacturing operations face unique challenges when it comes to improving system wide operational efficiency. With personnel scattered across numerous domestic and international sites, there's a broad knowledge base to call on, to be sure, but the use of different suppliers and products and different plant configurations at each location can make it difficult to identify, let alone implement to scale, production best practices. Almost all their facilities aren't greenfield – they don't have a chance to start over. They have to fit things in where they can fit.

That's the issue that Whirlpool Corp., with 97,000 employees, 70 manufacturing and technology research centers worldwide, and $21 billion in annual sales has worked to tackle with its Advanced Manufacturing (AM) organization. The AM organization provides research, process technical guidance, and new process technology development to Whirlpool's businesses in North America, South America, Europe, and Asia.

"A lot of the manufacturing decisions and how we approach the market are very regional in nature, and that's for a reason – so (we) can be close to the consumers" said Mike Anthony, Director of Advanced Manufacturing. Still, the company wants to be able to understand and leverage efficiency opportunities at individual sites or in a given region as well as identify and address any more-widespread issues, and that's where the AM team comes in.

The organization is charged with three main tasks:

1. Develop process technologies that enable manufacturing and product leadership
2. Ensure common manufacturing processes and approaches across the world
3. Resolve knowledge gaps

"If there is an issue with how we make something," Anthony said, "it's our role to go out and either partner with universities, partner with external suppliers, (and/or) develop pilot programs to try to resolve manufacturing gaps."

OBJECTIVE

The second and third tasks above led the AM organization recently to identify latent capacity in the cabinet foaming area of its refrigerator assembly process. This discovery resulted in a project to help resolve the following issues.

- Traffic flow management of getting the refrigeration products into and out of the foam process system varied greatly around the world – it varied by region, by plant footprint, by supply phase.
- There were different performance rates out of different suppliers as well as how the plants are configured.

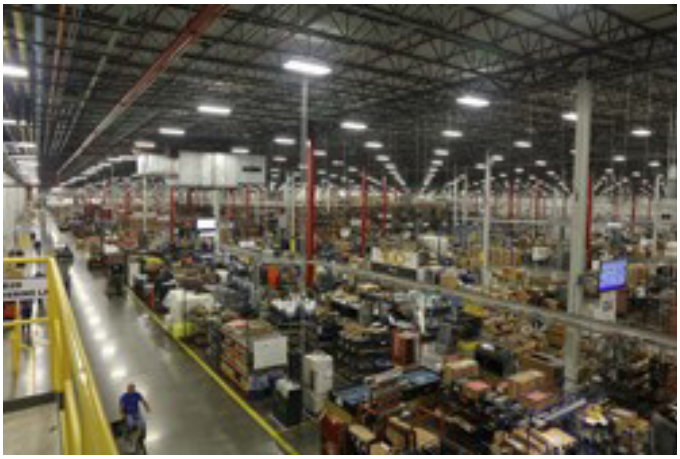
SOLUTION

The solution? Simulation modeling – testing tweaks to processes and configurations based on plants' unique footprints to find out how small changes could have a significant impact on throughput.

"We thought, 'How can we prove what is the best approach?' We thought simulating it would be the best way" according to Anthony.

Effective simulation would call not just for advanced technology to power the simulation models themselves, but also business and engineering expertise to make sense of the results and evaluate the feasibility of possible line changes. At this point, Anthony and the AM team – recognizing their third task of resolving knowledge gaps – turned for assistance to a graduate student team from the University of Michigan's Tauber Institute for Global Operations. The two-person student team consisted of John Klocke, an MBA candidate, and Nick Walker, a member of the university's Engineering Global Leadership Honors program pursuing BSE and MSE degrees in chemical engineering, as well as faculty adviser Brian Talbot.

Based on-site with Whirlpool Corp. in St. Joseph, MI, last summer, the student team used ProModel computer simulation software to develop current-state models of cabinet foam lines in the company's Amana, Iowa, and Joinville, Brazil, locations – the latter being Whirlpool's largest in the world, according to Anthony. The students also traveled to both locations and to a Whirlpool Corp. site in Ottawa, OH and interviewed local subject-matter experts, finance leads, and engineers. It was "lots of interaction and face time with the plant … to understand not only how the (refrigeration assembly) process works but also all the costs and indirect costs associated with it," he says.



So while software enabled the development of sophisticated simulation models, local expertise allowed for the input of real-world, from-the-floor insights to enhance decision-making. The Tauber Institute team and company employees analyzed timing, changeover, and production scheduling data for assembly lines at each site and then created future-state models incorporating equipment layout changes that would still fit within each plant's configuration.

RESULTS

"Through the use of the simulation at a very detailed level … we were able to find where we needed to alter pieces of equipment, where we needed to alter programming, where we needed to learn how to (move) components into the system differently," Anthony says. Students Klocke and Walker demonstrated that placing two additional sensors on critical equipment and altering timing logic could increase capacity 23% – about 6,000 to 10,000 units per year.

The future-state models that the students developed will guide Whirlpool Corp.'s efforts to implement best-practice cabinet foaming processes in 50 lines worldwide, and the work "will ultimately provide multimillion-dollar benefits to Whirlpool," said faculty adviser Talbot in a release from the Tauber Institute.

The corporation now is able to prove that by revising two or three pieces of equipment, revising conveyor belts, and altering sequences slightly, throughput can increase by double-digit percentages, Anthony says. "The reason this is important," he adds, is you're able to release latent capacities that we have in our facilities that otherwise we'd spend millions of dollars to fix."

And the benefits go beyond identifying opportunities to improve current layouts, equipment, and processes. As the company looks forward, it's relying on simulation to inform buying decisions and operational plans. Site teams now "realize that the investment into working on a simulation package is almost mandatory" before new equipment is purchased or line changes are made, Anthony says. "I think everybody kind of knew about (simulation) in the past and everybody said, 'Yeah, it's a toy, it helps.' But this program helped prove that the return was 100-fold."

Article originally written and published by Plant Services and can be seen at the following link:
http://www.plantservices.com/articles/2016/what-works-simulating-their-way-to-success/?show=all