

- Experience and trial-and-error methods won't be adequate to optimize complex operations.
- Optimization models are the most efficient way to reach maximum profitability.



BACKGROUND

Processes can be complex; many process variables can play a role in the final output. As some variables interact with each other, the optimization of equipment settings becomes almost impossible with a trial-and-error strategy.

THE SITUATION

Natures World Inc*. is an organic breakfast cereal company that employs over 250 people. The product is dried under a continuous production. The final moisture and other outputs vary depending on the setpoint that are constantly adjusted to maximize the throughput. The process variability caused the moisture to be out of specification and affecting the production rates. Also, the outside temperature that was drastically affecting the operation throughout the year.



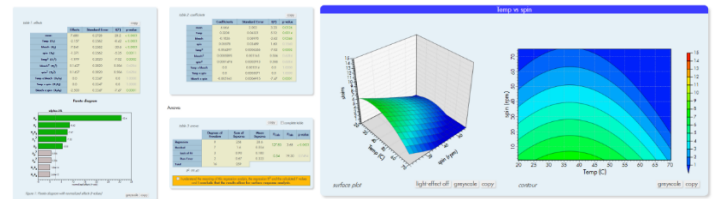
Five variables and 3 output targets, a daunting task to optimize without the proper approach and experimental design.

THE SOLUTION

First, we had to learn from the process. We created a process map, interviewed people from the three shifts, and identified five variables that were often fine-tuned to achieve the QC specifications: density and moisture level. The goal was to achieve the highest output (productivity) in within the QC specifications.

The team developed a solid problem statement and conducted an experimental design and optimization model.

In the traditional way, it was required to run at least 60,480 trials! With experimental design it was required only 16 tests and replicate them 4 times.



Experimental design and optimization modeling.

The results were tested and optimized to achieve the target values whilst at the same time keeping the process costs to a minimum.

Using the optimization modeling, two variables were removed as they showed to have a low influence on the outputs. All this information came out from the trials and prediction models tested on the dryer.

THE SUCCESS



Eventually, all three shifts ran under the same equipment targets and achieved the output targets 96% of the time. This supported an optimal throughput, 12% more than previously recorded.



The savings were calculated at over \$340,000 mostly in the reduction of out specification product and rework. Throughput improved and was more consistent through the runs, thus reclaiming production capacity and facilitating better production planning.

* The company's identity has been disguised for the sake of privacy; however, the case study is genuine.