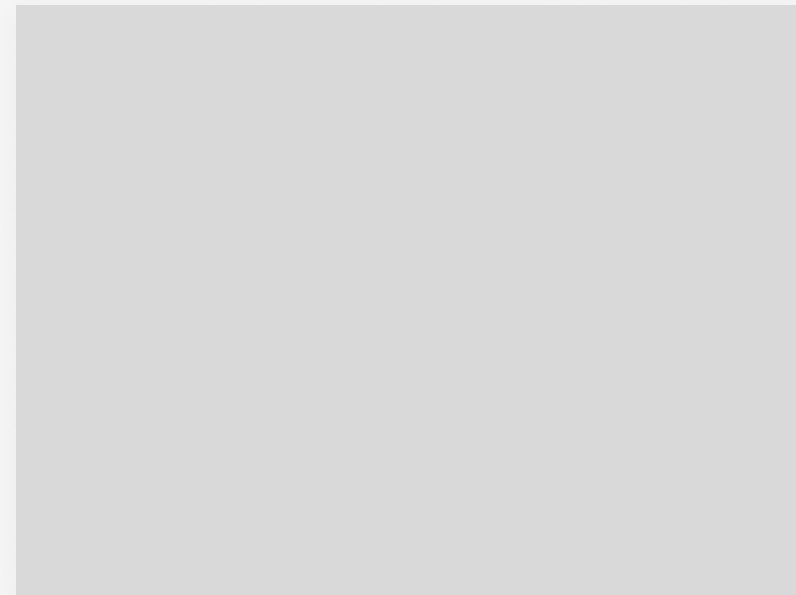# Case Studies

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### Tate & Lyle

When they faced a challenge in the process of refining corn sugars, Tate & Lyle turned to Minitab software for assistance.

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# Tate & Lyle

Helping Tate & Lyle Ensure Sweeteners
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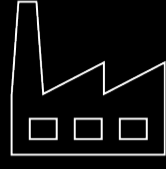
| Industry | Products Used | Solutions |
|---|---|---|
| | Minitab® Statistical Software<br>Salford Predictive Modeler®<br>Minitab Engage® | Statistical Analysis<br>Model Deployment and ML Ops<br>Services |

Tate & Lyle is a global leader in the food and beverage industry, validated by a long and impressive track record of "making food extraordinary" by turning corn, tapioca and other raw materials into ingredients that add taste, texture and nutrients to foods. One of their most recognizable products in the US is the sweetener SPLENDA® Sucralose.

When they faced a challenge in the process of refining corn sugars, Tate & Lyle turned to Minitab software for assistance.
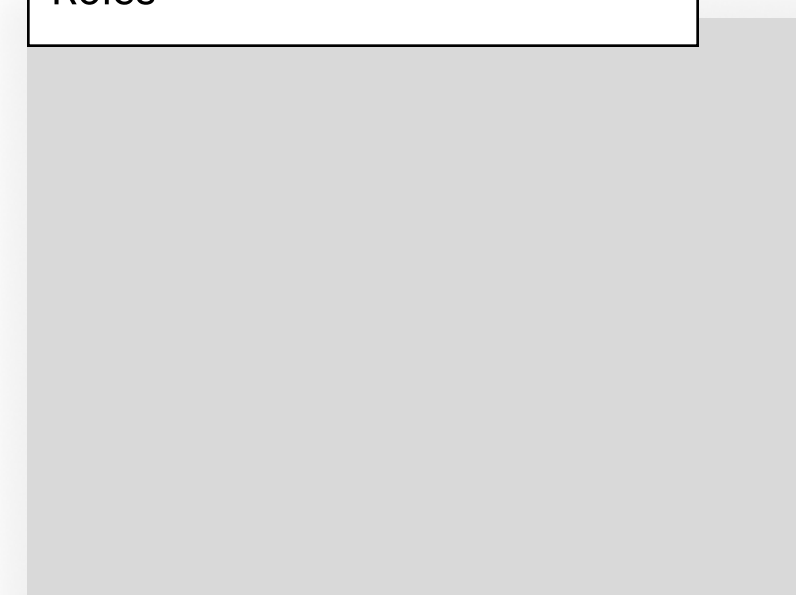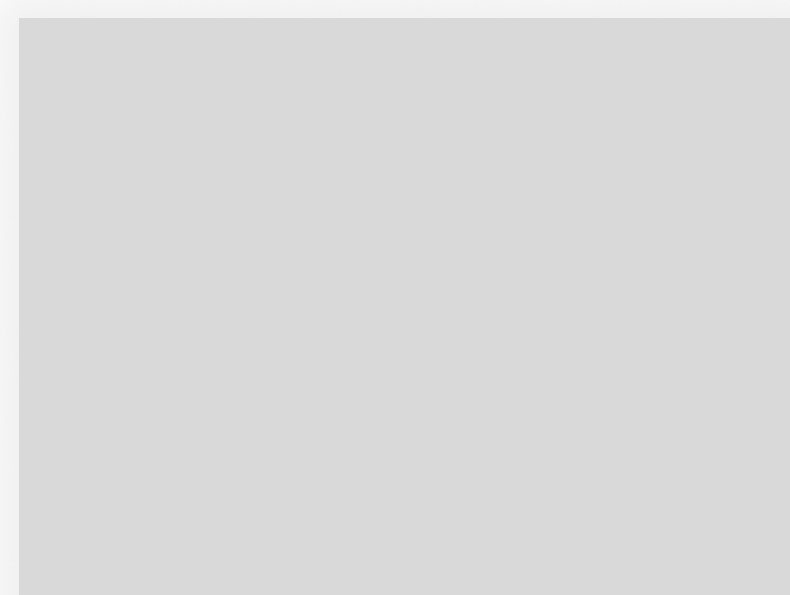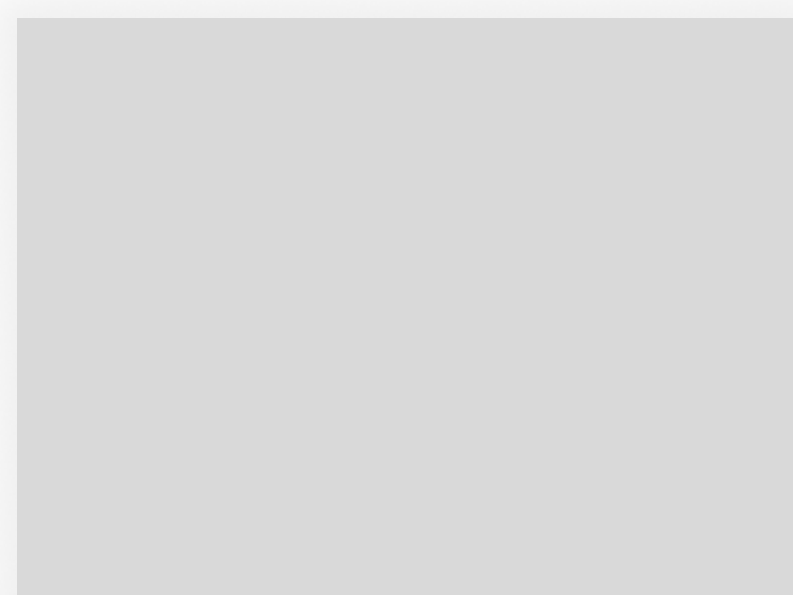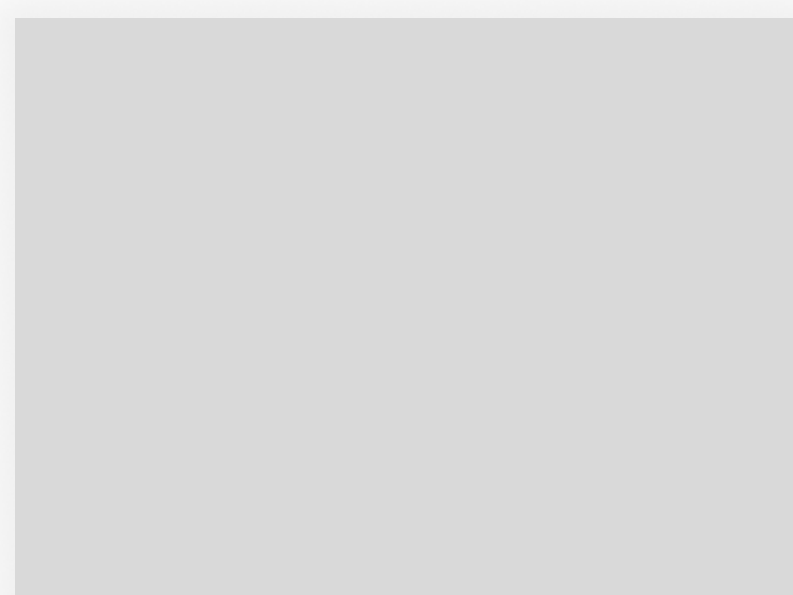
## THE CHALLENGE

Optimize a corn sugar crystallization process with 1,000+ predictors interacting with each other in infinite complex ways in order to keep the particle size distribution as uniform as possible.

## HOW MINITAB HELPED

Tate & Lyle used Companion by Minitab* to create a process map, Minitab Statistical software to visually understand the particle size data with an Xbar chart, and TreeNet in Salford Predictive Modeler to identify which predictors impacted the particle size distribution the most.

## THE RESULTS

They discovered 8 predictors were responsible for nearly half the variation. During the lag periods in the process, plant operators might change predictor based on supply and demand factors. Armed with this information, Tate & Lyle found ways to reduce the variation in particle size.

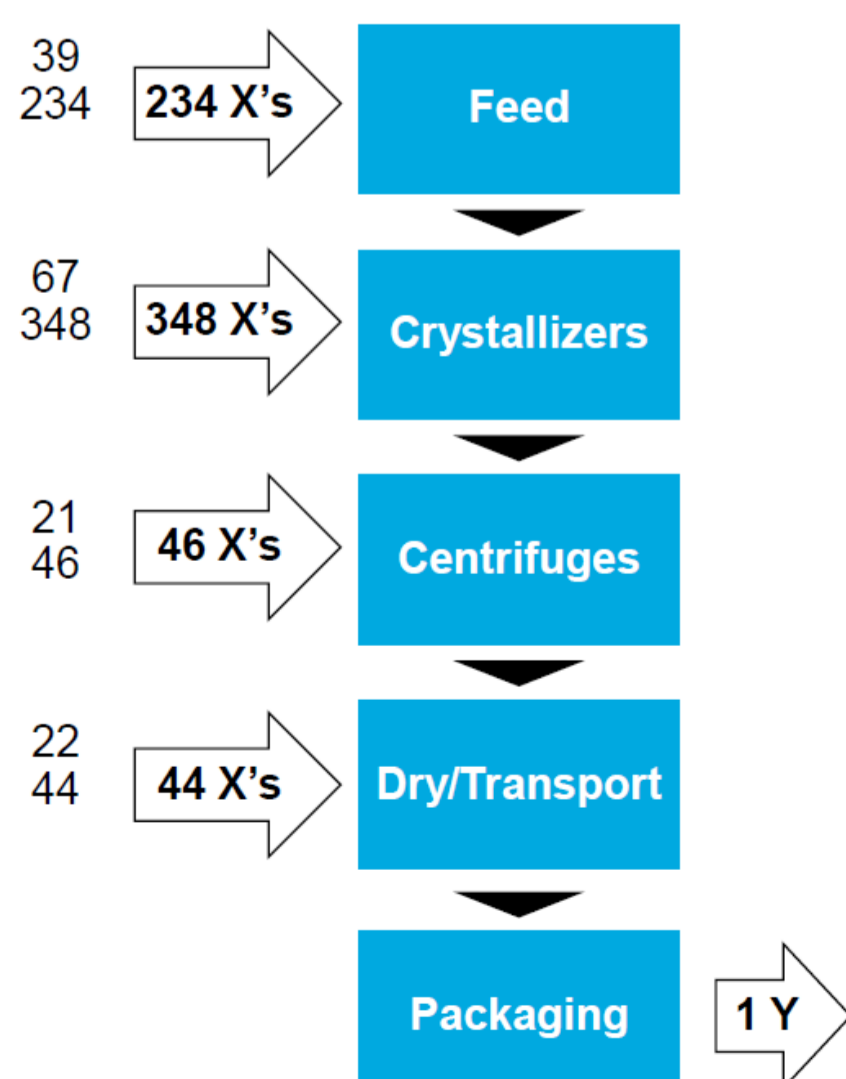## The Challenge: Evening Out Crystallization Particle Size

When Adam Russell started working as Global Operations Master Black Belt at Tate & Lyle, he was given a challenge: Keep the particle size of their corn sugars the same.
"One of the critical to quality features of one crystallization process is particle size distribution," Russell said. "Why on earth does this matter? Well, when we developed these products for consumers 20-30 years ago they wanted corn sugars to have the same taste and texture as regular table sugar or cane sugar. You have to hit within a certain particle size distribution for that situation be true."

Tate & Lyle was facing a struggle with those particles falling outside of the acceptable range, and they could not identify the reason. The company had a list of traditionally held factors they had determined impacted the particle size variation:

- Temperatures
- Pressures
- Flow rates
- pH
- Conductivity

And the list goes on.

## How Minitab Helped

```
39
234   [234 X's]   Feed
          ▼
67
348   [348 X's]   Crystallizers
          ▼
21
46    [46 X's]    Centrifuges
          ▼
22
44    [44 X's]    Dry/Transport
          ▼
                  Packaging   [1 Y]
```

A simplified version of the process map Tate & Lyle created in Companion by Minitab (now Minitab Engage®). In the corn sugar crystallization process, syrup is fed from a refinery, then crystallized (which takes many days), then centrifuged, dried and put into bags for customers.

They started by using Companion by Minitab (now Minitab Engage®) to create a process map which showed the high-level view of the crystallization process (learn more about process maps). They were not reliably hitting a tight particle size distribution, so they wanted to understand what was causing variation and how to control it.

"Everything is measured in a chemical plant," Russell said. "Every point possible has a transmitter that's providing information back to a data historian. That's a great thing, but it creates the challenge of we have so much information I don't know what to do with it."

To visually understand the particle size data, Russell and his team then used Minitab Statistical Software to create the Xbar chart shown below.

Many of the relationships between the variables were non-linear though, so it proved difficult to identify the impact any one had on another. Also, the particle size is unknown until it's placed in the bag for consumers because it is in a drying stage in a gel-like form between liquid and solid, known as "slurry."
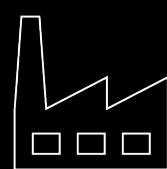
There are more than 1,000 possible inputs to a model like this. Multiple regression models alone could not lead to the answers.

# USC Consulting Group

How USC Consulting Group Reduced Overfill and Saved a Leading Candy Manufacturer $1.2M with the Help of Minitab Statistical Software

## Industry

## Products Used

Minitab® Statistical Software

## Solutions

Statistical Analysis
Model Deployment and ML Ops
Services

For over 50 years, USC Consulting Group (USCCG) has been driving operational excellence with a mission to provide real value by improving financial performance. USCCG helps companies reach their highest potential by improving processes and operations across their entire supply chain. Minitab's solutions play an essential role in helping USCCG solve problems for their customers and remain a key component of enabling their operations to continue running at optimal levels.

### THE ORGANIZATION

- Operations management consulting firm with specialty in process improvement
- Headquartered in Tampa, FL
- Employs around 200 people

### THE CHALLENGE

When filling packages, the first requirement is to meet governmental regulations for compliance with net content declarations on packaged goods. Unit fill weights must be above a specified minimum, while the average fill weight must be at or above, never below, the label declaration.

### RESULTS

- Overfill for packaged candy was reduced by more than 50%.
- More than $1.2 million of annual material savings.

## The Challenge

If you are in the business of filling packages, you know the importance of controlling fill processes. Overfill has the same net effect as giving away money to your customers. In high volume operations, this can quickly add up to hundreds of thousands of dollars on an annual basis. On the other hand, if you under-fill, the fines and the damage to your reputation can be even more costly.

When filling packages, the first requirement is to meet governmental regulations for compliance with net content declarations on packaged goods. Simply put, your unit fill weights must be above a specified minimum, according to the Maximum Allowable Variance (MAV). Your average fill weight must be at or above, never below, the label declaration.
Many companies today feel that overfilling is the only way to avoid regulatory fines and maintain customer loyalty. Thus, their goal is to get as close as possible to the declared package weight without going under it. This seems perfectly sensible, but many companies have difficulties meeting this goal. Is it because they do not fully understand their process capabilities? Or have they not adopted correct tools and techniques, e.g., Lean, Six Sigma, or technology, to help reduce variation and control processes? Perhaps it is simply a matter of execution. The answer lies in part or all the above.

Minimizing and controlling fill weight variation and performing statistical modeling can redirect a considerable amount of money to your bottom line. Minitab is the solution of choice to optimize fill weight and has helped customers across a variety of industries reduce millions of dollars of overfill.

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## Industry
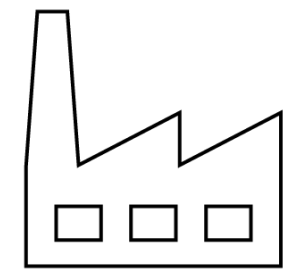
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Salford Predictive Modeler®
Minitab Engage®

## Solutions

Statistical Analysis
Model Deployment and ML Ops
Services

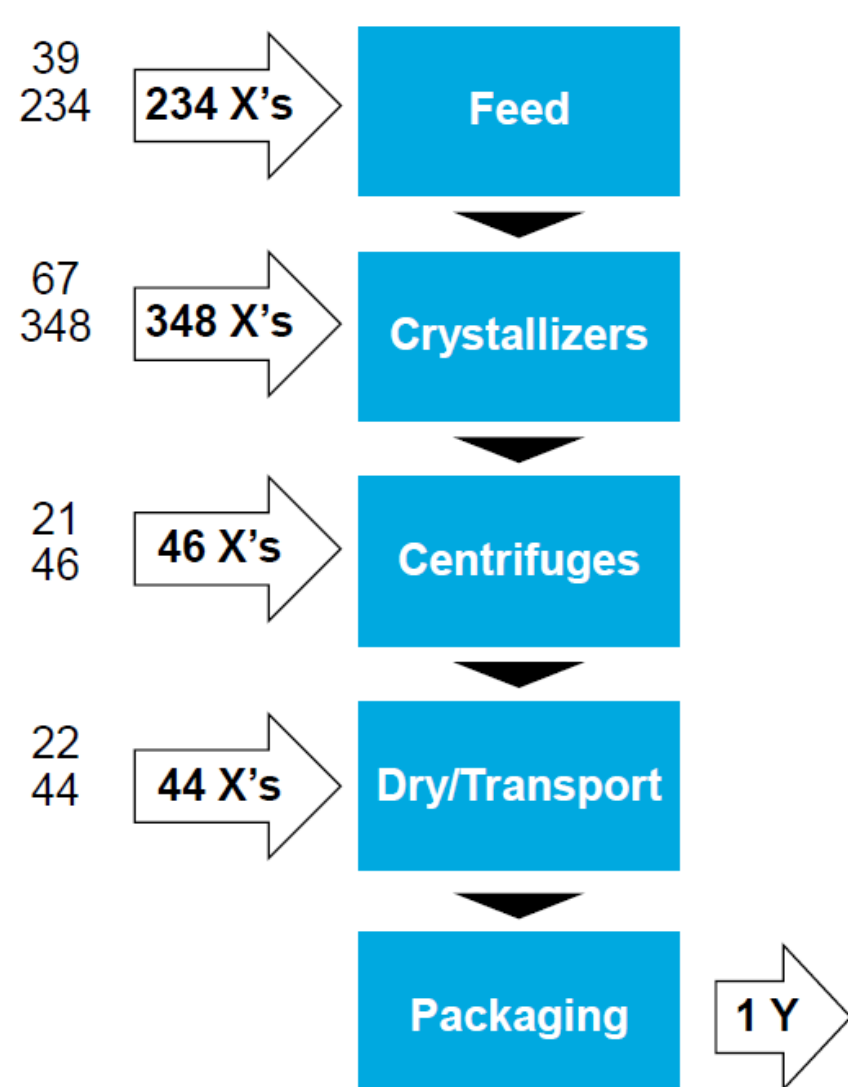## The Challenge: Evening Out Crystallization Particle Size

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## How Minitab Helped

| | | |
|---|---|---|
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| 67 348 | 348 X's | Crystallizers |
| 21 46 | 46 X's | Centrifuges |
| 22 44 | 44 X's | Dry/Transport |
| | | Packaging → 1 Y |

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