

## Solutions

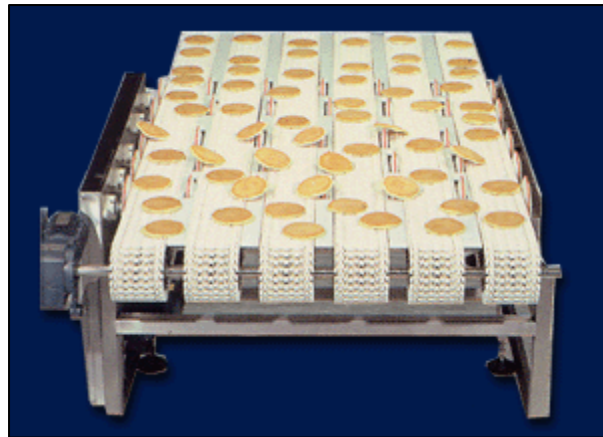
- **Simulation software**
  - Used in developing initial design concept
  - Helped calculate project variables
  - Allowed manufacturer to see the operation dynamically and increased the customer's confidence
  - Assured project viability

## Results

- **Reduced start-up time**
  - Start-up time, which can often take months, took less than four weeks
- **Maintained product quality**
  - Reached goal of product damage not to exceed 0.2 percent
- **Met efficiency goal of 96 percent or better**

## Arena Simulation Helps Reduce Conveyor Line Start-Up Time by 75 Percent for Food Manufacturer

**New design meets goal of 96 percent conveyor run-time efficiency and less than 0.2 percent product damage**



### Background

In business, success often depends on taking calculated and measured risks. Span Tech LLC, based in Glasgow, Ky., is a company that understands the benefits of taking educated risks.

Since 1976, Span Tech has developed chain-curved conveyors to fit the specific needs of clients in the food, packaging, pharmaceutical and manufacturing industries. The company also produces a line of transfers for handling products from the beginning phases of manufacturing to final packaging. Span Tech's clients would like to reduce the time spent handling product during manufacturing in order to reduce labor costs and product damage, and increase overall plant productivity.

### Challenge

A frozen pancake manufacturer contacted Span Tech to develop a conveyor system that would reduce the number of pancake jams when multiple lines of pancakes merged into the stacking area. The jams of frigid flapjacks resulted in excess scrap, reduced line efficiency and increased labor costs, since the manufacturer needed to employ several additional people to

manually keep the pancakes flowing freely into the stackers.

Span Tech's challenge was to help the manufacturer find a better way to handle the pancakes from the spiral freezer into the wrapping machines. The spiral freezer, about 20 feet in diameter, 18 feet tall and built around a large rotating drum, has a 36-inch-wide spiral conveyor that carries products within. Moving at speeds of 60 feet per minute, the conveyor spirals up the outside diameter of the drum, so that the pancakes stay in the freezer for 30 to 40 minutes at -20 to -40 degrees Fahrenheit. With the existing conveyor system, pancakes exit the freezer randomly distributed onto a 42-inch-wide conveyor at a rate of about 720 pancakes per minute.

Span Tech first determined that, to meet its goals of decreasing product scrap and labor costs with higher efficiency, they needed to channel the pancakes into six controlled streams as they emerged from the freezer rather than have them come out haphazardly. Next, they needed to stack the pancakes six high and merge the stacks of six onto a single-file conveyor to a wrapping machine.

The pancake manufacturer set goals for Span Tech with tight productivity parameters. Product damage directly attributable to the new system could not exceed 0.2 percent. And the system needed to have a run-time efficiency of 96 percent or better.

## Solution

Before embarking on the project, Span Tech needed to know if they could be successful. With such tight parameters, the company didn't want to take a risk without knowing the chances of success. Any failure of the initial system would result in continual modifications (which would eat away at the project's profits) or a reduction in the contracted amount for the project if it wasn't fully successful. Neither result would end up with a happy customer, or supplier.

To reduce the risk of the unknown, and create a "picture" of success, Span Tech turned to its technology partner, Rockwell Automation. The company's Rockwell Software® Arena® simulation software is a tool that Span Tech has used since the 1980s to solve its most complex engineering projects. Using Arena, Span Tech could create an initial design concept to solve the pancake manufacturing issue, and then use Arena to help calculate the many variables that can occur in the process as product is manufactured.

According to Leo Schroeder, president of Span Tech, "We chose Arena for this project because we needed to determine the project variable specifics as well as minimize our risk. We wanted to know that when we

accepted the client contract we could achieve all of the project goals."

Span Tech first prepared an AutoCAD® layout of the project and sent it to Simulation Modeling Services, LLC in Lisle, Ill. Simulation Modeling prepared a schematic with the flow rates, frequencies and product distribution of the pancake manufacturer and programmed the simulation using Arena.

As Arena ran the simulation, Span Tech engineers viewed the data to spot problems in the suggested processes and modify the design. Span Tech discovered that by timing the speed based on the travel length of the conveyors, the manufacturer could eliminate the pancake collisions that occurred using a typical gating system on a single conveyor.

"Arena's simulation capabilities allowed the manufacturer to see the operation dynamically and increased the customer's confidence in the project," said Rainer Dronzek, president of Simulation Modeling Services. "It also assured Span Tech that its design solution would work, and it showed what kind of improvements would result in the manufacturing process, even before it was installed." The Arena-driven simulation convinced the pancake manufacturer that this was a viable project, and Span Tech completed the engineering phase.

## Results

Span Tech installed the new conveyor system at the pancake manufacturer, as designed using Arena, and successfully met both its goals and the customer's goals.

With Arena, Span Tech had created a simulated environment and optimized the process virtually, so installation and start-up time for the project were streamlined. Because all the process changes and tweaks were done online, the start-up took only three to four weeks, rather than months. In the end, Span Tech significantly reduced its educated risk using Arena and ensured that the project could be successful.

For the customer, the end result was a manufacturing process that decreased pancake product damage within the requested parameters not to exceed 0.2 percent. And Span Tech designed the system with the requested run-time efficiency of 96 percent or better. The solution also reduced the number of employees required to monitor pancake production from four people to one, saving on labor costs.

"Developing the simulation took more time at the beginning of the project, but it saved considerable time during installation, start-up and debugging," Schroeder said. "The start-up phase took us three to four weeks, but it could have taken us three to four months if we hadn't had a solid solution with Arena. Arena saved us time and effort on the start-up and debug phase. It was money well spent and the customer is happy."

*The results mentioned above are specific to Span Tech's use of Rockwell Automation products in conjunction with other products. Specific results may vary for other customers.*

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