



Frozen pie line is one cool system

Delta **XR31** robots provide system efficiency of 99.7 %!

Vision quality control system

Operational staff at Bama (Tulsa, Oklahoma) are excited about the performance of the recently installed 18-robot system provided by Sigpack Systems. And, they have good reasons. The line incorporates a unique state-of-the-art vision quality control system, which ensures that only products of exact quality are accepted from the process equipment before being accurately placed into cases. Each shock frozen fruit pie is inspected for precise color, pattern, and dimensional shape. The system distinguishes very subtle parameter differences and all product information is communicated to

each of the 18 robot cells. All this at a rate of 1'400 pies per minute! Several potential suppliers were evaluated for this major automation project. Bama's Vice President of Engineering, Randy Roark, states that "Bama chose to partner with Sigpack due to the flexibility the robot system offered, by picking the pies directly from the main belt and placing them into the cases. Others were suggesting row distribution solutions, which involved multiple steps and greater complexity. Sigpack streamlined the process."

- 1 Arriving of the apple pies directly out of the freezer
- 2 1'400 products per minute – more than 2 mio per day!
- 3 Specialized vision system for quality control
- 4 Spreading of the products
- 5 Fast and gentle placing of the apple pies





Application challenges

In 2006, the challenges presented to Sigpack Systems included an application involving a frozen product and its environment, a high production rate, complex product inspection and a cinnamon topping. Production efficiency, quality control and sanitation were key considerations. Roark states that “A test at Bama showed it required six people for a proper visual inspection of the product. Prior to the design phase of the project, Sigpack Systems conducted lab tests, with actual frozen product, to review Bama’s inspection criteria, as well as to confirm the pick reliability of the gripping tool.”

The Sigpack Systems XR31 Delta robot solution

The frozen fruit pies exit the Bama freezer in rows consisting of 20 products. After a series of belt turns, the products enter the packaging room, where temperatures and humidity are controlled. The rows of pies are separated via spreader belts and proceed under an overhead camera, which examines the entire product flow.

Nine Sigpack Systems Model **XR31** Delta robots are positioned on opposite sides of the main packaging belt. This layout facilitates complete pick coverage, reduces overlap and limits excess robot movement. The design also allows for

easy operator and maintenance access to each robot within the system. The robots utilize a custom-designed vacuum picker to gently pick and place pies into the cases, which move in a counter-flow direction to the main belt. The system is also equipped with special filters to assist with the collection and removal of excess cinnamon dust. Roark describes that “The line speed was previously dictated by available staff. Now, the robots are always ready to perform and we can maintain a more consistent line speed and production flow. The added benefit is reduced product variability.”





18 Delta robots XR31:
Compact washdown design

Quality Control system

The heart of the system is the optical quality control with a specialized vision system. This system acquires a detailed image of the product carpet at the beginning of the line. Every single apple pie is then evaluated for acceptability, including minimum and maximum length and width tolerances, partial products, and overlapping or connected products. Additionally, the number, shape and position of the slits in the surface of the pies are checked, as well as the quality of the topping. The positions of all acceptable products are communicated to every robot. Each robot detects the

exact position of the good products with its own vision system and picks, based upon a sophisticated strategy, the best product for the cycle. Advantages of this centralized quality control against an individual control in each robot cell are more reliable operation through easier calibration and safer retrace ability of bad products.

Sigpack Systems' National Account Manager, Tom Pecht remarks, "The people at Bama are great to work with and have welcomed the new technology into their operation. In addition, the line has helped Sigpack Systems gain

a stronger foothold for placement of robots into frozen food environments." Bama's Plant Engineer, Duane Cook, echoes these thoughts. Cook says that, "There has been a high level of cooperation and professionalism between the two companies. Sigpack Systems is willing to listen, understand and resolve real life production issues."

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- 1 Fast and gentle placing of the apple pies
- 2 Simple and convenient operation of the quality control system



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