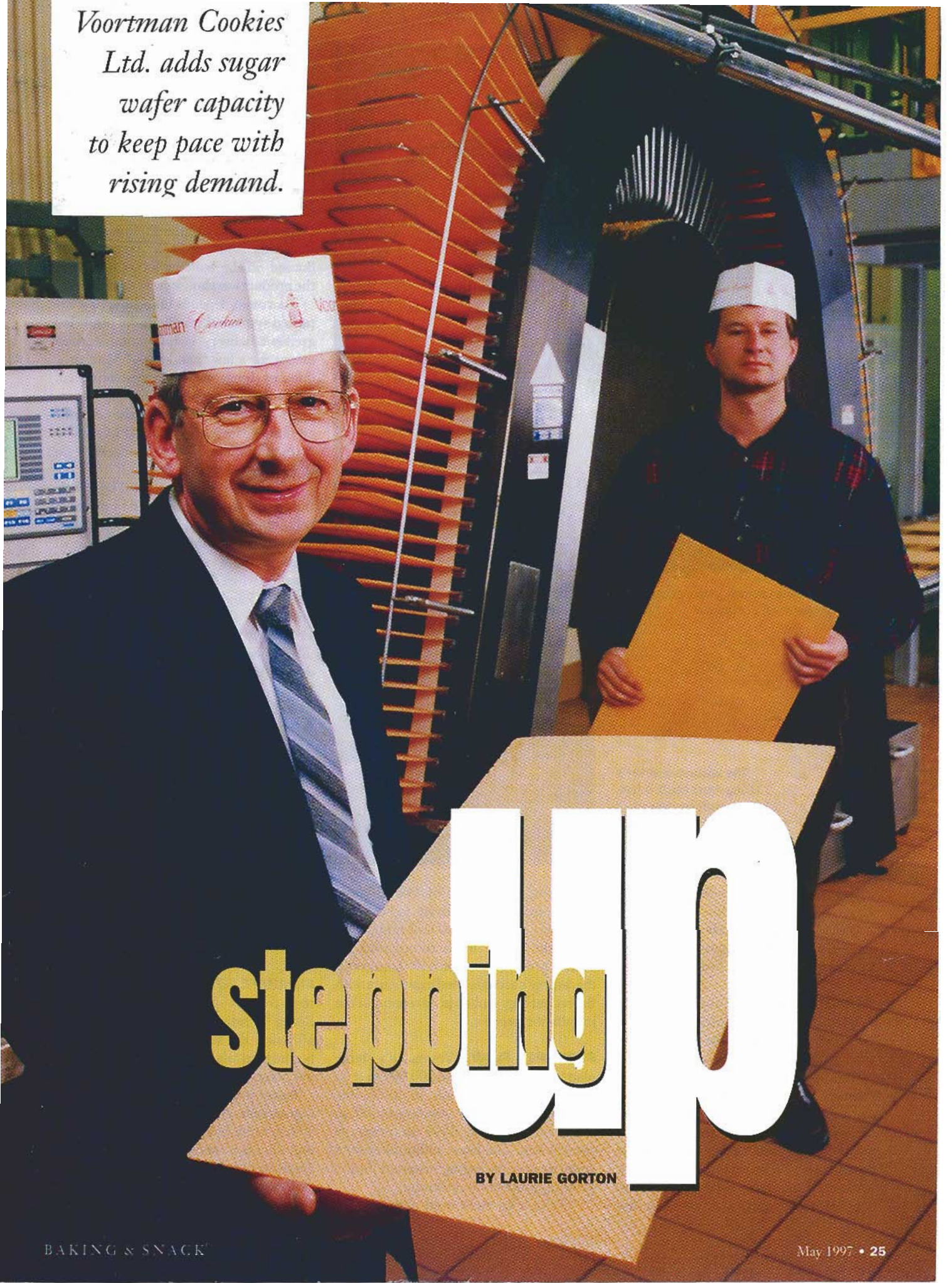


*Voortman Cookies
Ltd. adds sugar
wafer capacity
to keep pace with
rising demand.*



stepping up

BY LAURIE GORTON



Computer controls [above] give instant read-out of operating conditions.

The vacuum-stacker's lifting head holds a two-layer wafer sandwich in place as the next creme-topped sheet moves under it.



saw at Manner that the plates vent very well in both directions."

(For an on-site report about Josef Manner & Comp. A.G., Austria's leading wafer bakery, see *Baking & Snack* of November 1995, page 17.)

Other concerns were also soon laid to rest, and today Mr. Heikamp can say, "We find that the larger the line, the more efficient it becomes for us to operate."

Voortman also chose a prototype vacuum sandwich stacker for the new line and a spiral cooler for the completed wafer stacks, a new application for spiral technology. System design and specifications became a team project involving Mr. Heikamp's engineers with those at the new line's key vendors, Franz Haas Ma-

chinery of America and I.J. White Corp.

The new line, ordered in October 1995, was commissioned and running by mid-June 1996. This is record time for such a project, possible only because of the bakery's accumulated experience with the technology and its involvement in the installation process.

STRAIGHT FLOW. Voortman's large plant occupies more than 200,000 sq ft on a 10-hectare site. Built in 1977, the 120,000-sq-ft bakery was expanded in 1989 and again in 1994 to reach its present size. The latest additions created room to store packaging materials for the growing production operation.

"We're a bit tight even now, but the

plant is very efficient for us," Mr. Heikamp said.

The 800-ft-long building houses 10 production lines, seven for cookies and three for wafers. Its floor plan employs straight-line layouts, with lines set parallel to each other.

"Our operation is a flow-through plant," Mr. Heikamp said.

Raw ingredients enter at the north end. Receiving and storage facilities are housed on the building's east side, with the product warehouse areas on the south.

Voortman depends on computer-controlled systems throughout the plant. Ingredient delivery is fully computerized except for a few "hand adds." Most production lines are computer-operated. The company employs a full-time computer specialist with expertise in programmable logic controllers (PLCs), who is responsible for systems integration on the new wafer line, as well.

A Reimelt system, operated by Allen-Bradley PLCs and monitored by personal computer terminals, controls ingredients delivery for all lines in the Voortman plant, including sugar wafers. It was first installed when the Burlington plant went up in 1975 and upgraded in 1989. It comprises four 110,000-lb flour silos, two 110,000-lb sugar silos and bulk tanks for oils, molasses and fructose, all set outdoors. Indoors, the ingredient "penthouse" holds the dispensing system — tanks and bins filled with daily stores of a dozen or so ingredients: flour, sugar, rolled oats, coconut, salt, soda, egg powder and others. These daily stores bins are supplied from the bulk silos and from a bag-dump station.

The system prepares batches by releasing the proper weight of each material into one of two pressure vessels. When all ingredients are present, the system releases the batch and pneumatically conveys it to the correct holding cone above the correct mixer. Some conveying runs cover 600 ft or more.

SEPARATE FEEDS. On demand, the system conveys granulated sugar to the Prater grinding station. Converted to 10X size, the sugar is then conveyed to holding vessels in the penthouse and at use points.

Batter preparation in the sugar wafer department starts when the ingredient system sends batched dry bulk and major ingredients to one of two A&M Process Equipment mixers. Liquids are also dispensed on computer command. Wafer room operators must add only a few mi-

The bakery's newest wafer oven, a 96-plate system, dwarfs the two 64-plate ovens previously installed.



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What do you do when demand outstrips capacity? You add more capacity. And if demand continues to grow, you add more and then even more. But you also make sure you get peak efficiency out of what you have and what you add. That's how Voortman Cookies Ltd., Burlington, Ont., handled its need to keep pace with the market's increasing appetite for its sugar wafer cookies.

When it came time last summer to add the company's third new wafer line, managers selected the most advanced technology they could find. They even chose two prototype sub-systems.

Voortman, an established international "name" in the cookie and baking business, did not offer sugar wafers until the late 1980s when it entered into an agreement with a nearby contract baking company. The wafer cookies proved quite popular.

By 1991 volume justified bringing wafer manufacturing in-house, so Voortman installed a new 64-plate wafer oven line. Demand continued to rise. A second 64-plate line was put on-stream, but again sales needs soon out-ran capacity. For the third line, the company found the largest system available — a 96-plate oven. Today all three lines run a 24-hour schedule, five days a week.

OLD-FASHIONED APPEAL. In

1951, brothers William and Harry Voortman decided to go into business baking foods favored by fellow Dutch immigrants in Hamilton, Ont. During the next few years, they tried their hands at pumpernickel and honey-cake items. After working with a number of products, they found success with cookies, introduced in 1955.

True to Voortman's heritage, the company has made a specialty of traditional products. It's well known for its Dutch *Speculaas* cookies, and the company's windmill-shaped cookies continue to be strong sellers.

After a series of relocations and expansions, Voortman Cookies Ltd. settled during 1977 into its current plant off Queen Elizabeth Way at Appleby Line in Burlington. Today, the bakery covers more than 200,000 sq ft and

produces in excess of 10 million cookies a day. Products made here reach consumers throughout Canada and the United States, as well as Puerto Rico.

When supermarkets revived bulk food merchandising a few years ago, Voortman pioneered free-standing cookie bins. The company created its "Cookie Hut" by stacking cases of bulk-packed cookies on display shelves protected by transparent hinged doors. The bins resemble displays typical of old-fashioned general stores. Shoppers select cookies in mix-and-match fashion to suit individual tastes and quantity needs. Today, more than half of Voortman's sales come through these bulk bins.

SUGAR WAFER SUCCESS. Sugar wafers

fit right into Voortman's line, complementing its range of rotary, wire-cut and drop cookies. But for the specialized wafer production technology required, the company turned to contract manufacturer Tamming Foods. When Voortman decided to bring wafer production in-house, Tamming provided vital start-up assistance, advising about formulation and process parameters.

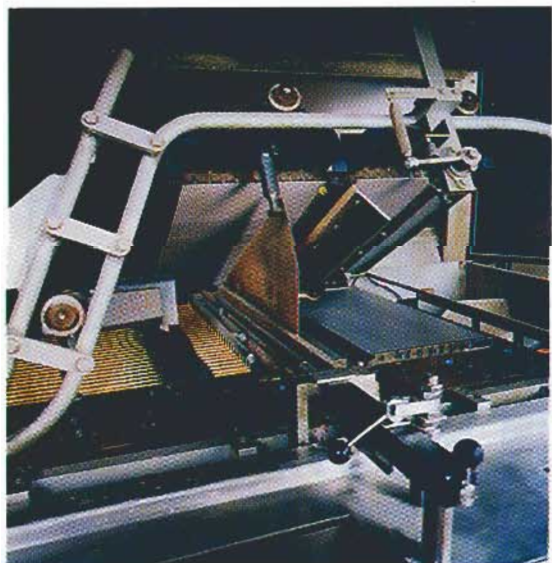
"We felt it feasible to start making our own wafers because the products had proven to be good sellers," said Fred Heikamp, plant and property manager, Voortman Cookies Ltd. "So during summer 1991, we bought our first wafer line. Today, these items are an important part of our operations."

The 1991 line was followed by the second wafer system in 1993 and the third in mid-1996, the biggest one yet.

The new 96-plate system makes almost twice the amount of wafers as either of the first two 64-plate ovens. It also bakes one of the world's largest wafer sheets, measuring 350 mm by 710 mm (13³/₄ in. by 30 in.). The line uses 1,700 lb of batter an hour and produces 52 wafer sheets a minute. Each of the previously installed lines outputs 33 sheets per minute.

Voortman managers knew they needed the biggest line possible, but they had concerns about the details. Compared with the lines already running, the new line would have 50% more baking plates, each with 14% more surface area, and would produce 57% more sheets.

"We visited Josef Manner & Comp. in Vienna, Austria, while we were researching the new line," Mr. Heikamp said. "That plant operates a number of systems this size. Initially, we were concerned about how the steam would be vented from the large plates on this oven. But we

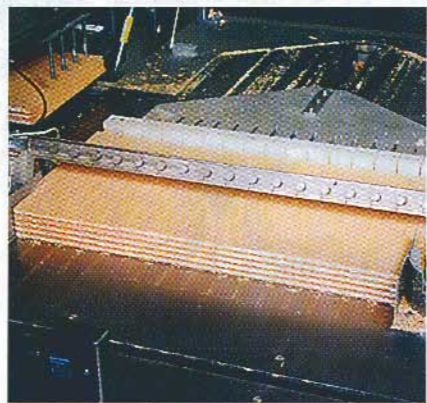


Sets of baking plates, traveling right to left, receive deposits of batter and are locked down for their circuit through the oven.



Wafer sandwiches cool and equilibrate as they travel along a spiral conveyor housed in an environmentally controlled chamber. This method minimizes handling of the sheets, which are completely at rest on the conveyor.

Thin cutting wires arranged in a harp-like configuration transform the large creme-filled wafer sandwiches into the small rectangular fingers characteristic of sugar wafers.



nor ingredients by hand, primarily lecithin, liquid flavors, salt and baking soda.

"We're working on a dispensing system for the hand-adds," Mr. Heikamp said. "It should be on-stream later this year."

Voortman operators mix wafer batters in a central area between the ovens and sandwiching lines. Prepared batters are held in tanks mounted on load cells then pumped to the oven's dispensing system.

Voortman's wafer operation is configured as two separate lines. The two older, smaller Franz Haas oven lines comprise Line No. 11. "We call them The Twins," Mr. Heikamp said of these two ovens. The new, larger Franz Haas oven anchors Line No. 12.

Each line operates separately, with its own dedicated batter mixer and holding tank, creme mixer and holding tank, and

separate filling-and-sandwiching systems, coolers, slicers and packaging machines. Batter batches average 280 kg each, while cremes are mixed by ribbon blenders in 500-kg lots. Line No. 11 produces 66 sheets a minute, using 1,900 lb of batter per hour, while Line No. 12 outputs 52 sheets a minute, taking 1,700 lb of batter per hour. Wafer sheets baked on Line No. 11 measure 350 mm by 620 mm (13³/₄ in. by 24¹/₂ in.) and on Line No. 12, 350 mm by 710 mm (13³/₄ in. by 30 in.).

"Although the systems are separate and free-standing, it's the same batter formula for both lines. We do this to keep the finished product as uniform as possible," Mr. Heikamp said.

Pumped from the holding tank to the oven infeed section, the thin, smooth wafer batter flows through a dispensing

tube, which lays down long thin lines of batter to cover the surface of each bottom baking plate. As the plates move into the oven, the top plate of the hinged set descends and is locked into place. Pressure on the plates maintains the thickness of the finished wafer sheet over its entire surface. Moisture in the batter turns into steam to leaven the wafer while heat stabilizes its structure.

Baking plates travel long-edge forward for maximum oven-loading efficiency, taking a long, single-loop path. Reaching the far end, the oven chain turns down and moves back to the front of the oven. Here, the chain carries plates back to the top level, and the locking system is disengaged. The plates open like a book. A burst of air from a carefully positioned nozzle assembly releases the baked wafer sheet. The plates can then accept a new batch of batter. Bake time averages less than two minutes.

All three ovens are computer-operated, and the newest uses a state-of-the-art control panel. The system monitors each set of baking plates. If a wafer sheet fails to release, or a double occurs, no lock-down occurs and the computer drops that set off-line. The plates continue to travel through the oven, but the set receives no new batter deposits until the problem is cleared by the oven operator.

FILL AND LAYER. Sheets emerge from the oven onto Franz Haas arch-shaped cooling conveyors. The two cooling arches of Line No. 11 release the large sheets onto a conveyor that blends the two streams of product into a single lane of sheets.

Entering Line No. 11's Franz Haas filling-and-sandwiching system, the sheets diverge along two paths. One-third move along the lower, table-height conveyor where a spreading roller covers them with creme filling. The other sheets travel along the upper conveyor, which supplies two "drop chutes." The first drop adds the sandwich's second wafer layer. An additional load of creme is applied to the top of the resulting two-layer sandwich. Then the second drop brings in the top sheet.

"Line No. 11 was our first line, so we selected a system that would allow us to put in different colors and flavors of creme," Mr. Heikamp said. A third depositing head could easily be added to this line to set up multi-colored sandwiches.

"The old line is more versatile, but the new line is more dedicated," Mr. Heikamp said.

The new Franz Haas sandwiching system on Line No. 12 includes the world's

first vacuum-style wafer stacker. After this line's wafers exit the cooling arch, they diverge, with two-thirds traveling the bottom conveyor and one-third riding on the upper level. On the lower conveyor, rollers deposit filling creme continuously onto sheets. The upper level conveyor drops a sheet on every other creme-topped wafer sheet.

A pressure belt is timed to descend and lightly seal the two layers. It rises, and the sheets continue to move forward. When

the sandwich comes under the vacuum stacker, the lifting head engages and picks up the layered set. It waits until the following sheet, a single wafer sheet topped with creme, is directly underneath. Then the head releases its vacuum to drop the two-layer set on top of the single sheet, thus creating the finished three-sheet sandwich.

"Wafer sheets on Line No. 12 are wider than the others," Mr. Heikamp said. "When such sheets run through a

spiral sandwich builder, they tend to sag in the middle from the weight of the filling. We chose the vacuum system because it supports the sheet all the way through filling and sandwiching."

The finished three-layer sandwiches move through a gauge roller and onto a checkweigher. Like the checkweigher on Line No. 11, this unit is interfaced with the filling spreader. Any weight variations are recorded, and the checkweigher sends a signal to the filling depositor to automatically re-set its dispensing rate.



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SET FOR SLICING. The creme-filled sandwiches require a period of cooling and equilibration to optimize slicing. Line No. 11 puts its sandwiches through two sections of climate-controlled vertical lifts. Line No. 12, however, uses an I.J. White refrigerated cooling system with an energy-efficient condenser package. The system controls both temperature and humidity during the cooling process, with air flow designed to cool the product evenly across the product zone.

"The new spiral is a better system," Mr. Heikamp said. "The sandwiched layers are not handled as much as they are in the vertical system."

Slicing and packaging operations follow. On Line No. 11, the sandwiched layers leave the coolers and make a 90° turn to be stacked for slicing. They move through a Franz Haas harp-style wire slicer that cuts the large sheets in two directions to create the long, thin finger shape characteristic of sugar wafers.

Such lines always generate a certain amount of scrap. Broken or defective wafer sheets, detected by sensors or removed from the line manually, drop down a reject chute before they reach the front of each filling line. They fall into an auger that breaks them up. A pneumatic system collects the broken scrap and sends it to the back of the bakery where it collects in a large waste container.

"We're working now on an automatic conveying system to bring scrap from the slicer into the Stephan grinder," Mr. Heikamp said.

Sliced, stack wafers travel down packing conveyors. Operators stationed on either side of the line pull off wafers to hand-load bulk cartons for the company's Cookie Hut program. A plastic poly bag, colorfully printed with a red-and-white gingham pattern, lines each carton.

Some sliced sugar wafers are tapped off to be wrapped as consumer-style packs. Operators group and count the wafers, manually placing them into the lugs of the

infeed conveyor on the Klockner horizontal form/fill/seal wrapper. Date codes are placed on each package dated by a Markem imprinter. Finished packages are manually loaded into cases, which are taped automatically and put onto a conveyor that leads to the automatic palletizing system.

Sandwiched wafer sheets from Line No. 12 exit the cooling spiral at the top of the unit and descend to packaging operations on a long conveyor that includes a Loma metal detector. The sheets turn 90°, stack up and then pass through a Franz Haas harp-style cutter. The slicer handles stacks that range in height from one to seven sandwiches.

As on the other packaging line, wafers are hand-loaded into the infeed conveyor of the Dobby horizontal form/fill/seal wrapper, equipped with a Markem 9840 imprinter. To improve the on-shelf appearance and rigidity of the packages, Voortman applies a slight vacuum during package sealing. This removes air and adds rigidity to the individual package.

After wrapping, each package travels through a checkweigher before it is placed into a shipping carton. Cartons run through the 3M taper system and onto the conveyor



Tub cartons manually filled with sugar wafers supplement Voortman's bulk Cookie Hut line and consumer-size packages.

leading to the automatic palletizer.

FIRST-IN, FIRST-OUT. Cases loaded with sugar wafers travel along a conveyor into the palletizing area of Voortman's on-site warehouse. The Mathews system uses two palletizers to handle cartons from 10 conveyor lanes, one from each of the plant's production lines. (The bakery actually operates nine lines. It counts the consumer-packed sugar wafers as a "vir-

tual" line, bringing the number to ten.)

Cased products accumulate on minimum-pressure roller conveyors in first-in, first-out fashion. Photoswitches count the cases as they enter the accumulator. When the number of cases reaches a preset figure, they are released to one of two PLC-controlled palletizers. These systems accept their "batch" of cases and build the pallet according to the preset pattern deemed best.

A transfer cart moves the assembled pallet into the on-site product warehouse, a first-in, first-out, gravity-fed rack system. Distribution operators assemble trailer loads from the stored cookies, sending out an average of 42 trailers a week. The company's over-the-road fleet transports cookies to local independent distributors, who deliver the packaged and bulk cookies to supermarkets and convenience stores in their service regions.

Installation of the newest line at Voortman's followed established company priorities. The important concerns that frame this bakery's capital choices ask how much, how fast, how efficient and how dependable. As a result, the bakery is assured of keeping pace with sugar wafer demand as it continues to grow. ■

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