Old Dutch Foods designs "dream plant"

With energy nightmares looming in the future, this new Winnipeg plant, opened last October, is the answer to an energy manager's dream.

by Joanne Hvala, editor

Since 1974 and the Arab oil embargo, many snack food companies have been tussling with the problems of energy management within their plants. New equipment has been installed, alternate fuel sources explored and employees made aware of energy conservation, but these have been largely stopgap measures. Few companies have been in a position to design an energy-efficient plant from the ground up.

Old Dutch Foods, Ltd. of Canada did exactly that when it began designing its Winnipeg, Manitoba plant in March 1976. In the planning stages for seven months, the plant was begun in September 1976 and opened in October 1977.

The company's potato chip and corn meal operations are housed in the 136,000 square foot plant which replaces an older building in the same city. The new plant and a seven-year-old plant in Calgary, Alberta supply a marketing area which includes, in addition to the vast Prairie Provinces, Ontario, British Columbia and the Yukon and Northwest territories.

Designing on two levels

Eric Aanenson, operations manager for the Canadian corporation and its sister corporation headquartered in St. Paul, Minn., provided a guided tour of the dual-level plant.

"We've built the plant on two levels," Aanenson began, "to maximize process efficiency." The plant design also isolates the heat-generating operations such as frying from the packaging and warehouse areas to facilitate efficient and economical temperature control.

Packaging lines, the warehouse and shipping areas, the corn meal production room and the potato receiving areas are on the lower level along with the heat exchanger and pump, oil filtering and storage, and starch recovery and water pollution control systems. Located on the upper mezzanine is the potato processing operation—peeling, washing, slicing, inspection and frying; the accumulating conveyor system and the quality control lab.

The plant structure itself is well insulated with over three inches of insulation in the roof, while the cavities of the concrete block walls have been filled with ureufoam.

Re-using fryer heat

"Nearly two-thirds of the cooking system heat escapes up the stack," Aanenson estimated. "That's about nine or 10 million BTUs that go to heat up the outside atmosphere."

Rather than sending this valuable heat into the neighborhood, a heat recovery system on the roof reclaims some of this heat for use in one of three ways, back inside the plant. "The heat recovery system utilizes a closed ethylene glycol system which recovers the heat from the 280°F steam and puts it back into the building."

The heat recovered from the stack can be used either to heat the makeup air coming into the plant from outside, or to heat the hot water used in the plant's heating system, or, to heat the slice rinse water in the slice washer before frying.

The recovered heat used to heat the makeup air is most effective when the outside temperature is under 30°F below zero, since heat transfer is more efficient when there is a large temperature difference, according to Aanenson.

When the recovered heat is used in the plant's hot water heating system, it boosts the temperature of the return water before the boilers bring it up to full operating temperature. Therefore, reheating the hot water takes less of the boiler's energy.

In summer, the potato slice water is heated by this reclaimed heat, raising the temperature of the slices and saving heat during the frying operation.

Other energy-saving devices

In addition to using fryer stack heat to heat water for the hot water heating system, Old Dutch has taken some other measures to ensure the optimum performance from its temperature control system.

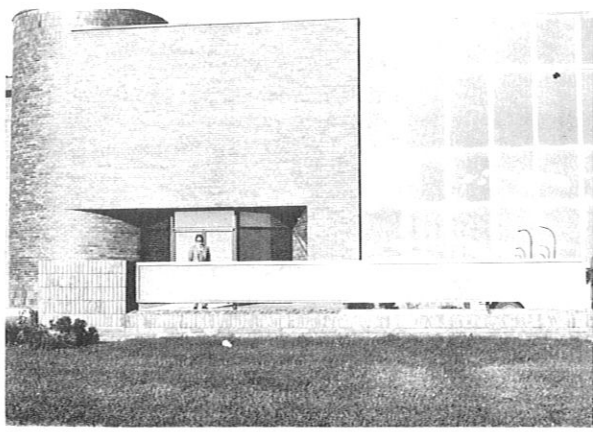
"We've installed several, big, Casablanca-type fans in the warehouse," Aanenson pointed out. These ceiling fans are rheostat-

Vernon Aanenson

Margaret Aanenson

Curtis Aanenson

Eric Aanenson



Eric Aanenson stands behind the sign in front of the Winnipeg plant.

operated and circulate the heated air, to eliminate the temperature gradient in the high ceilinged warehouse. "This way we keep people below warm and we're not melting snow on the roof."

Proof of the fans' efficiency came in December 1976 when the warehouse was closed in for further construction. "The construction foreman said that ordinarily, for the 35,000 square feet of warehouse space, he would need three large space heaters to keep the area warm enough to pour the concrete. With the ceiling fans operating, he needed only one large space heater, or one third of the energy."

Another energy-saving device is the fin tube design of the Heat and Control heat exchanger which is saving Old Dutch more energy. The finned tubes increase the surface area of the heat transfer surface within the heat exchanger and therefore increase the heat going into the pipes and reduces the heat that is lost up the stack.

"While we don't have any empirical evidence on this yet, we were told that we can either save 17 percent of the energy used by the 3,200 lb./hr Heat and Control fryer or increase production by running more product through the fryer for the same amount of energy," Aanenson said.

An air-knife, located before the slice inspection table on the fryer, evaporates some water from the washed potato slices. The somewhat drier slices require less frying, and less energy usage, to become chips.

The Heat and Control fryer uses natural gas for fuel. While natural gas is not cheap, according to Aanenson, it is still cheaper than alternate energy sources. The Old Dutch plant, assured of its natural gas supply, has not provided for any alternate fuel sources.

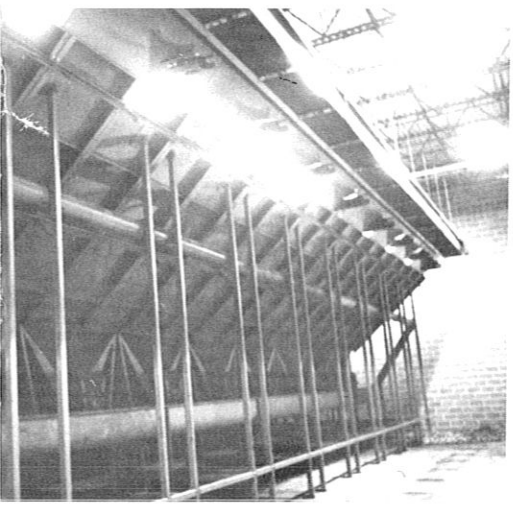
Efficient production

Attention to efficient energy management wasn't the only point given consideration when Old Dutch began planning its "dream plant." Efficient production methods were also awarded a high priority. From potato receiving to inventory management, the plant has been designed for smooth-flowing operation and pleasant working conditions.

Potatoes are received by truck or rail car, but in deference to the average 25°F below zero temperature that the Winnipeg winters bring, all receiving is done indoors. The Phelps hydraulic truck dumper manages the potatoes if they are delivered by truck, but regardless of whether they come by truck or rail, the potatoes are conveyed by Vanmark's bucket conveying system to the In-Flow Resometric belt-type scale conveyor which weighs the incoming potatoes very accurately. With this device, the company can check the "potato shrink" and arrive at a more meaningful ratio of yield of raw to finished product.

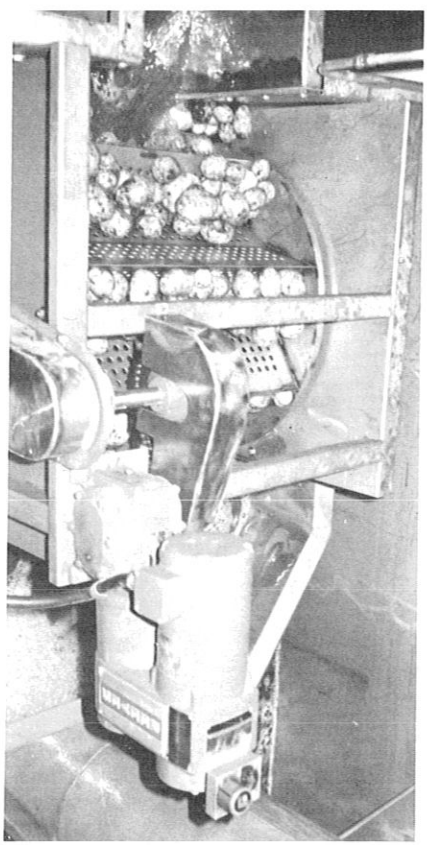
From the belt scale conveyor, the potatoes travel to one of nine Vanmark storage bins; each of which holds 55,000 lbs. of potatoes. "That comes to about one truck per bin," Aanenson calculated. "We like to isolate different loads for quality checks and to isolate potential problems."

Since the potato receiving and storage area is on the ground level and the processing area is located on the mezzanine level, the potatoes must be conveyed upstairs. Old Dutch selected a flume system supplied by Starr, Inc. which prewashes the potatoes while carefully conveying them from the



Above, nine potato storage bins help isolate each truckload. The trough below the bins is one part of the flume system which pre-washes and conveys the potatoes past the destoner up to the processing level.

Right, the potato peeling system features a potato metering wheel that controls the flow of potatoes into a pumping system which conveys them upstairs to the peeler. The metering wheel creates a positive, even flow of potatoes, enabling the peeler to run continuously. By avoiding haphazard starts and stops in the peeling system, a chipper can save money by minimizing water usage and conserving energy.



Right, the 3,200 lb./hr fryer is located in this room with the easy to clean tile walls and floor.

storage bins, down a trough, through the destoner and to the mezzanine level peeling line.

The potatoes travel through a Vanmark abrasion peeler and on to an inspection table and then, by auger, to the Urschel slicer. The slices drop into Heat and Control's 3,200 lb/hr. frying line which features a slice inspection table so that potato slices with internal defects can be removed before the energy and the cooking oil is expended to fry a defective chip.

Upper level processing operation

The frying room, unlike the other plant areas, has glazed tile on the walls, quarry tile on the floor and ceramic tile on the ceiling, making clean-up easier. A large door in the side wall of the mezzanine level frying room will allow equipment to be hoisted directly into this area should future plans call for an additional frying line.

From the fryer and salter, the chips travel to an Aseeco vibrating conveying system and on to an Aseeco accumulating conveyor. The chips are inspected once again while on the vibrating conveyor table. Then, they travel up an inclined belt and to the accumulating conveyor which can hold 45 minutes of production based on a 3,200 lb./hr. fryer. The accumulating conveyor permits the fryer to continue operating even if the packaging lines are down, permitting a more efficient use of time and energy, as well as helping "quality continuity."

The accumulating conveyor holds the chips until they move to an overhead conveying line above the packaging line after passing through Allen Machinery's chip sizer which separates the large chips from the small for more uniform packaging. If the chips are to be plain, they fall directly from the conveyor to the packaging machines below. Flavored chips pass from the conveyor through a drum which dispenses seasoning directly on the chip. This seasoning drum was designed by Finn Henrikssen, plant manager at Old Dutch's St. Paul plant, with the assistance of Darrel Skogen.

The packaging operation

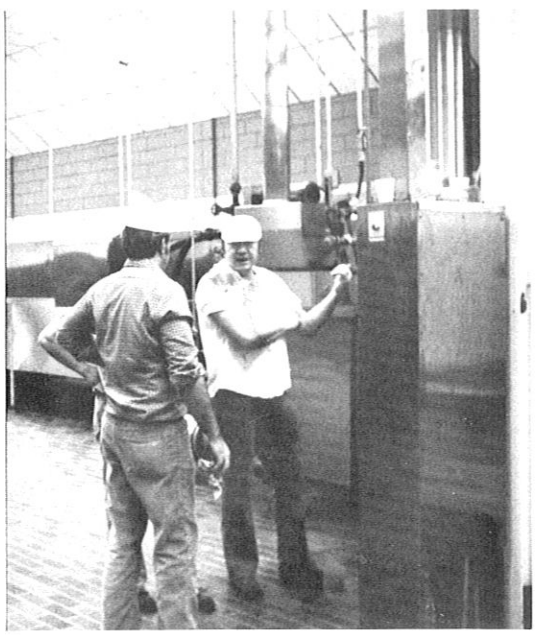
The packaging line is comprised of ten machines which handle the various packages of chips ranging in size from 20 grams to 250 grams. Over 40 percent of their business is in the flavored chips which include ketchup, sour cream and onion, dill, barbecue, bacon and the front-running salt and vinegar.

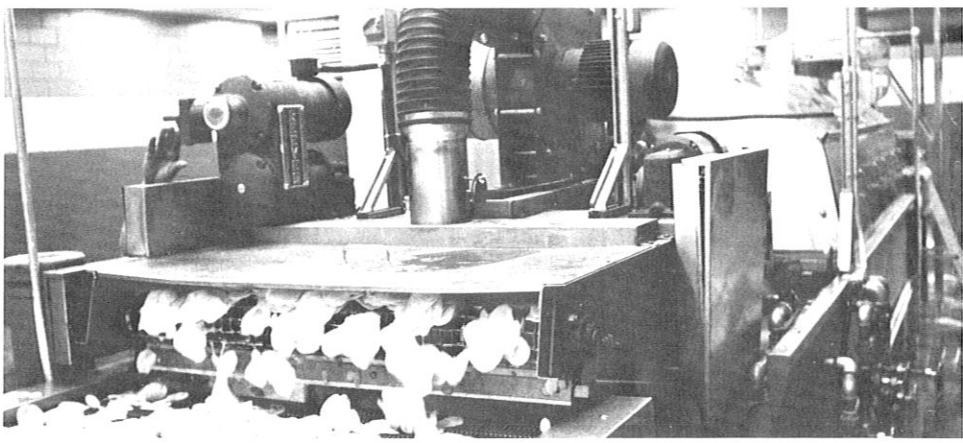
Three Mira-Pak Super G, one Mira-Pak Model M and six Woodman machines measure and bag the chips.

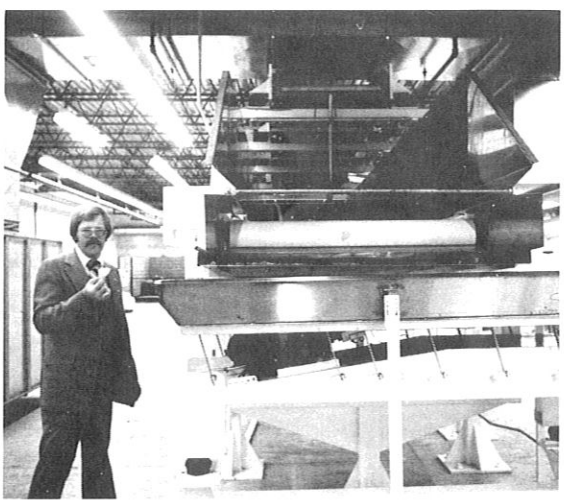
Three Woodman machines handle Old Dutch's corn-based products—baked cheese curls, popcorn twists, corn balls and onion rings.

Storage of packaging materials and cartons is on the mezzanine level so, in order for the materials to arrive at the packaging line when needed, carton chutes carry the cartons from the upper to the lower packaging level. Once filled with chips, the cartons travel on a conveyor to the strapping machine. Currently, the cartons are strapped with plastic on a Signode machine and sent by conveyor to the warehouse.

Flow tracks carry the product from the warehouse where one side is reserved for the manufactured product (potato chips and corn-based snacks) and the other for resale items (fried

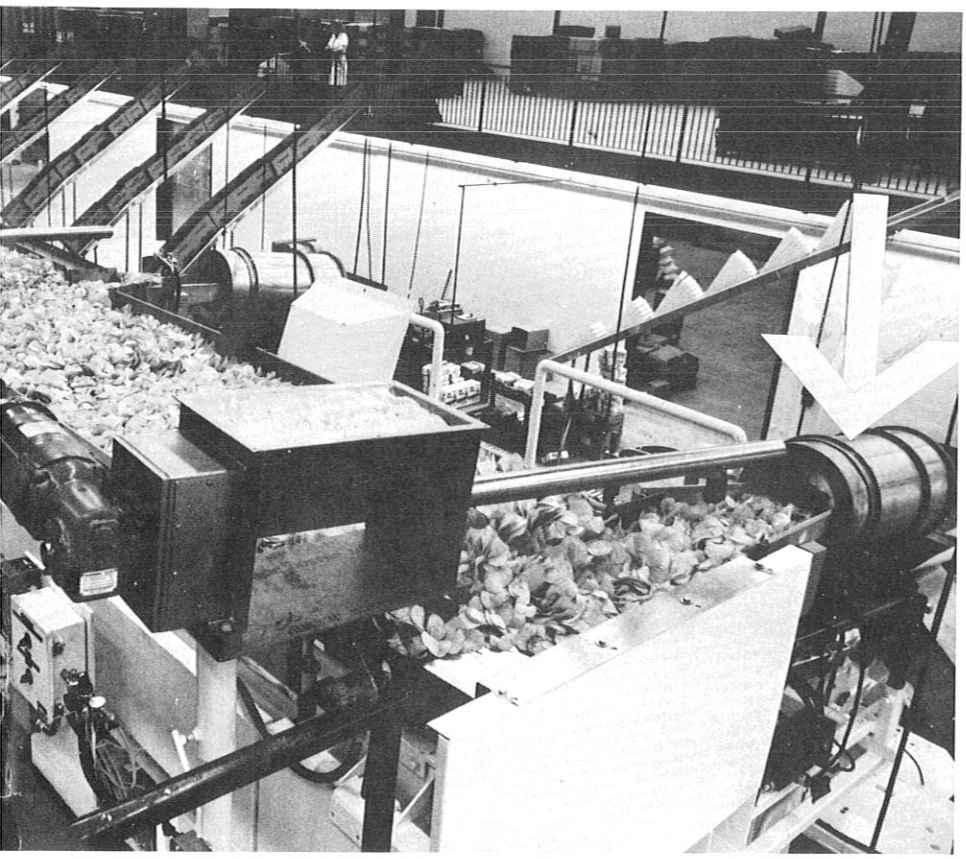






Above, an inspection table for pota slices is an energy-saving feature of t cooker. Defective slices can be remov before heat and oil are used to fry the into defective chips.

Left, Operations Manager Eric Aanens inspects a hot chip taken from the a cumulating conveyor system which hol 45 minutes worth of production.



Above, the chips are separated by a chip sizer before entering this conveyor above the packaging lines. Note how the chips are channeled through a seasoning drum which applies the seasoning powder to the chips (see arrow).

Right, looking down from the mezzanine level to the packaging level below, one sees line workers packing poly bags into the familiar Old Dutch boxes.

cheese curls, taco and tortilla chips, nuts and meat snacks).

Two central take-out conveyors move the product into the shipping room. The warehouse's flow tracks and separate areas for manufacturered and resale products facilitate the first-in/first-out inventory system so essential for product freshness.

Finally the route trucks are loaded through one of the nine small doors in the shipping room. Three larger doors—two for shipping and one for receiving—are used to load semi-trucks or to receive jobbing items.

Water and oil

One other area that Old Dutch has monitored is the water system. Located on the lower level are both the "clean water" and "dirty water" systems.

In the clean water system, water from the slice washer, containing a high concentration of starch, passes over a Bauer screen to separate out the solids. The starch is then removed by a Heat and Control starch recovery system. The clear water is recirculated through the same slice washer system.

The dirty water system receives the wash water from the peeler. Potato solids are screened out of the water which is then fed into the sewage system. The separated solids are carried away for animal feed by a local farmer.

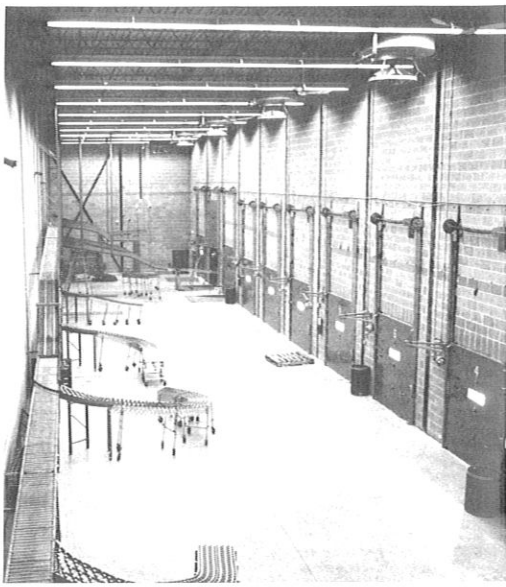
The plant essentially uses two types of water—well water and city water. The well water is used for the processing and heating while the city water is used in the office plumbing and as a back-up to the well water system.

In the summer, the air conditioning coils, housed in the same unit on the mezzanine as the heating coils, take the well water at about 41°F and circulate the naturally cool water through the air conditioning coils for further cooling. Principle plant areas, except the frying room, are air-conditioned with this cool water method. In the winter, the well water goes directly into the processing operation.

Located in the same room as the starch recovery and water clean-up systems are several brightly painted oil storage tanks. A Star Tank and Filter oil filter nearby is used daily.

Extending good design to the office area

One can imagine that if Old Dutch took such pains with the design of its production, warehouse and shipping areas, that the corporate offices would be as well-planned.



Above, the shipping area features a conveying system to bring product from the adjacent warehouse to load the route trucks from individual docks.

The warehouse has 28 foot ceilings so the Casablance style fans come in handy to equalize the room temperature. Cartons of manufacturered and jobbed product are isolated on either side of the room and travel through the end wall by means of a conveying system which links the warehouse and shipping areas.

Old Dutch's corporate offices, in the front of the plant building, are also constructed on two levels. A meeting room, complete with storage alcove for audio-visual equipment, a built-in screen and blackboard provides an ideal site for corporate planning sessions. A huge board table constructed from solid walnut blends well with the walnut paneling that is found throughout the lower level offices. The paneling, taken from one tree, was sliced paper thin, according to a Japanese process.

The Aanensons have their offices on this level. Vernon Aanenson, president of both the American and Canadian companies, has a comfortable office complete with adjoining meeting room.

Curtis Aanenson, Vernon's brother, is executive vice president of both corporations. His office, as well as Eric Aanenson's, who is operations manager for both companies, is also located on this floor. Margaret Aanenson, vice president-public relations, works from the St. Paul location.

Passing through an elaborately worked wooden door, one reaches the reception area with its raised, two floor high ceiling. A small fountain, tucked in the nook of a circular staircase, adds humidity to the heated air, provides a background murmur to obscure upstairs office activity and adds a decorative touch.

At the top of the circular stairs are located more offices, including those of the sale staff and a separate room for the computer.

While the upper management—Vernon Aanenson, Curtis Aanenson, Eric Aanenson—is the same for both the Canadian and American operations, dividing its time between the Canadian and American operations, the middle management levels are distinct.

At Winnipeg, Joseph La Monica, vice president of sales, and Peter Scinocca, director of marketing, coordinate the sales operation while Marcel Dion manages the plant. Donald Karnitz procurs potatoes; Emily Smith handles purchasing; and David Reid manages the office.

The Winnipeg plant employs over 160 production people working on two shifts and a third clean-up shift.

Sales are handled through 156 independent route distributors as opposed to the company-owned route truck system that is used stateside. About 35 routes are served out of the Winnipeg warehouse. Nine branch offices—in Thunder Bay, Edmonton, Regina, Saskatoon, Vancouver, Calgary, Brandon, Kelowna and Winnipeg—round out the sales and distribution network.

Old Dutch has expanded tremendously in the 20 years the company has operated in Canada. The new plant is a far cry from the vacant St. Paul fire station that housed the first snack operation and from those early days when Scott's Potato Chip Co., of East Grand Forks, N.D., started the ball rolling by shipping 200 cases of ten cent Old Dutch potato chips up north to Canada.

Old Dutch Foods, Ltd. has helped keep western Canada in chips and snacks ever since. PSF