

Major vegetable processor reduces waste

To design an efficient system, you have to dump some vegetables.



Vegetable waste is dumped into a prototype flume to test hydraulic behavior.

leaves must be conveyed away from the processing area.

In a search for the most efficient means of conveying the wet, bulky waste, Redi-Cut and its designer/builder, McShane Builders of Rosemont, Ill., visited other vegetable processors to survey the potential range of solutions. They stopped at plants in Georgia, California and North Carolina, only to find no readily available, easy solution to dealing with the waste.

The need to try something new led back to an industrial building in the Chicago area. A collection system needed to be designed from scratch, and that meant building a prototype to test hydraulics and establish design parameters.

A mock-up flume system was constructed out of plywood, complete with piping, pumps and valves required to move the waste. Fifty-five-gallon drums of vegetable waste from the existing production operation were brought to the site to dump into the flume. By varying the flume's size and shape, the material used for the flume bottom, and the output of the valve at the head of the flume, design specifications for a full-scale system were determined.

Several important engineering criteria were established during the prototype testing. A round-bottom design originally was proposed by a consultant with extensive experience in designing recreational water slides. Testing confirmed that the waste is carried most efficiently when the bottom of the flume is round. And a smooth epoxy coating on the bottom

H. Russell Ritchie, Associate Editor

What do you do with nearly 1 million pounds of waste lettuce leaves your plant discards every week? The local public treatment works won't let you put it down the sewer, at least not without assessing a huge surcharge. And garbage haulers want a steep price to carry the waste to a landfill.

Redi-Cut Foods in Franklin Park, Ill., faced this problem in designing its new 88,000-sq-ft plant. Scaling up production meant increasing the

plant's waste load. New solutions for collecting, treating and disposing of the waste had to be found.

Collection and conveyance

Raw vegetable processing takes place in a wet environment. The vegetables are washed and conveyed with process water that is removed from the product before packaging. Vegetable waste, such as lettuce leaves, potato, carrot and onion peelings, and celery

of the trench is essential to efficient conveyance.

The path of the trench through the processing plant also would play an important role in the waste system design. Redi-Cut and McShane discovered that the bulky vegetable waste frequently collected at 90-degree bends and three-way intersections in the flume. Both of these situations were eliminated in the new plant's waste collection trenches.

Construction of the trench system presented one final problem—how to install a half-round trench throughout the floor of a food processing plant. Again, prototype testing provided the solution.

Redi-Cut and McShane tried a variety of fabrication techniques on a small scale. They found the best choice for construction was to lay out the trench with half-round styrofoam molding and pour concrete around it. After the concrete set, the molding was removed and only the open trench remained. After adding layered stone-

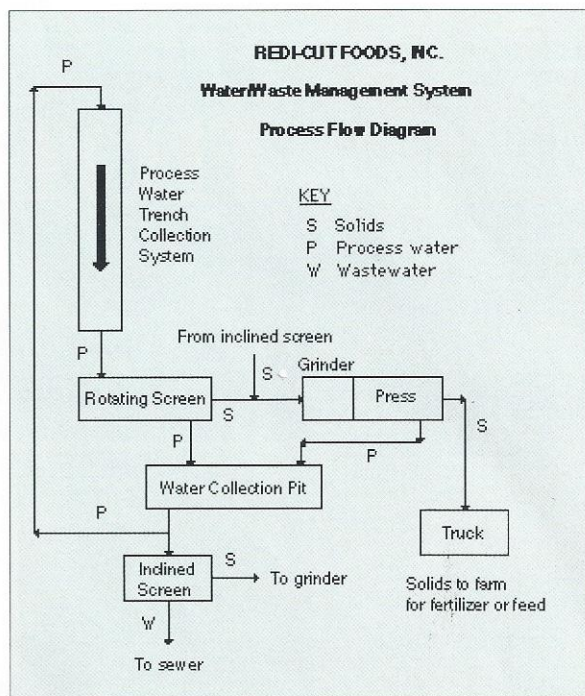
hard and an epoxy coating, the system was ready to go.

Treatment and reuse

Having found viable solutions to collecting and conveying the waste, the next question was what to do with it. One problem Redi-Cut encountered during site selection was finding a municipality to provide the large volume of fresh water required for its processing operation. Twenty-two thousand gallons of make-up water were needed every day. Most of the water was being discharged to sewer after a single use.

During design, it was decided that process water could be reused in the waste collection system to carry vegetable waste from the processing floor

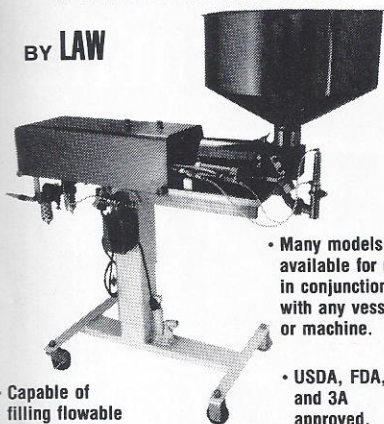
to a treatment area. This concept is the heart of the Redi-Cut waste management strategy: Collect the waste, grind it, press it and move it out, while returning treated water to the processing area to pick up more waste.



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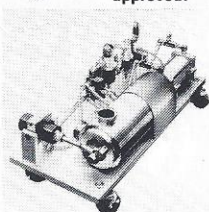
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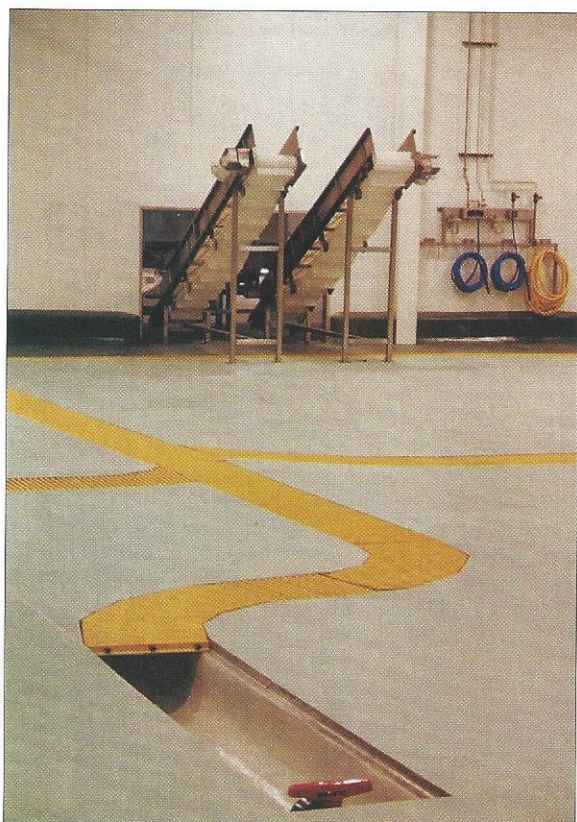
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The finished trench with epoxy-coated round bottom is ready to carry processing waste to treatment.

Waste-laden water from the trench collection system reaches the treatment area and is passed through a rotating screen for bulk solids dewatering. The separated water is collected in a pit to be reused. Process water not needed by the trench collection system is pumped through an inclined screen and discharged to sewer.

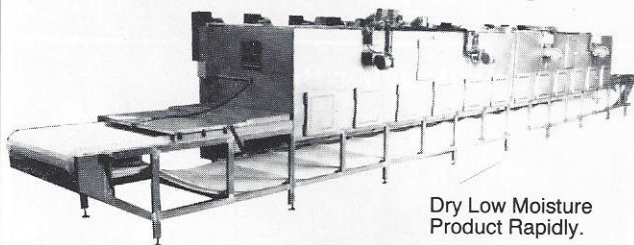
Waste solids separated by the rotating screen go through a grinder to produce a uniform particle size and are pressed to remove additional water. The dewatered solids are conveyed to a trailer for removal from the plant.

Disposal and payback

Two waste streams are discharged by the Redi-Cut plant—biodegradable solid waste and process water overflow. The solid waste in the trailer is hauled to a farm where it is used as both fertilizer for natural soil rebuilding and feed for livestock. Recovering the waste and reusing it as a farm product provides significant savings over the cost of landfill disposal.

The largest payback lies in the plant's water usage and wastewater discharge. By reusing the process water to convey waste, water consumption is reduced from 22,000 to 2,000 gal/day. The corresponding reduction in the volume of the wastewater discharge, combined with reduced BOD and TSS loadings achieved by treatment, substantially lowered the company's monthly surcharge burden. The net result is an outstanding return-on-investment for Redi-Cut's custom designed, environmentally sensitive waste management system. **FP**

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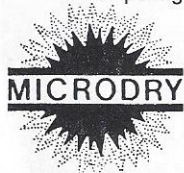
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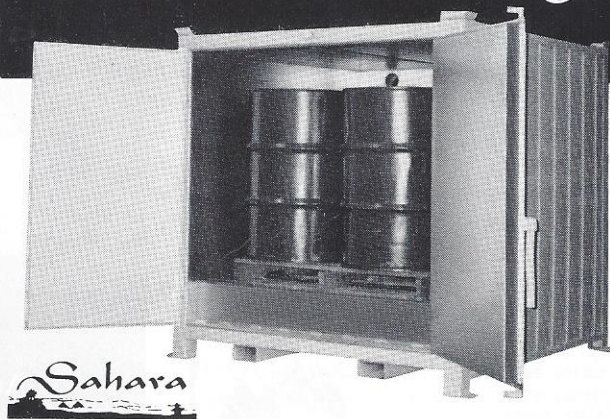
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