



**TECHNICAL
ARTICLE
SERIES**

Converting Peroxide Waste into Profitable Sewage Disinfectant

ARTICLE # TL-164

INDUSTRY: Pharmaceutical

ENTITY: Foremost Machine Builders, Inc.

SOLUTION(S) PUMPED: Hydrogen peroxide

PUMP TYPE(S): FLEX-I-LINER Sealless Self-Priming Peristaltic Pumps

Vanton Pump & Equipment Corp.
201 Sweetland Avenue
Hillside, NJ 07205 USA
Telephone: 908-688-4216
Fax: 908-686-9314
E-Mail: mkt@vanton.com
www.vanton.com

Vanton Pumps (Europe) Ltd
Unit 4, Royle Park
Royle Street
Congleton, Cheshire, UK CW12 1JJ
Telephone: 01260 277040
Fax: 01260 280605
www.vantonpump.com

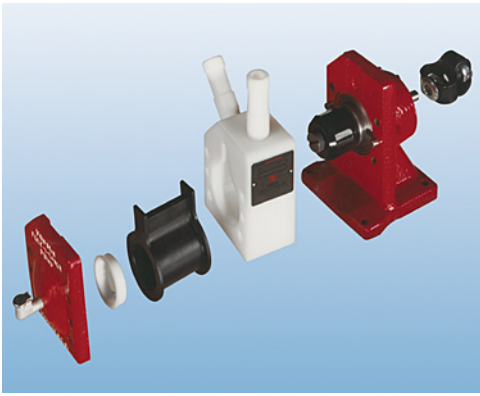


Figure 1. Exploded view of the Vanton pedestal mounted FLEX-I-LINER® pump showing basic simplicity of construction.

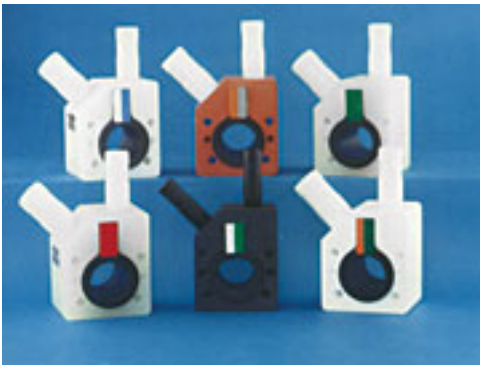


Figure 2. FLEX-I-LINER® pumps are available in a variety of engineered rigid plastics and elastomers enabling them to safely handle just about every corrosive or hazardous fluid over the full pH range.

Converting Peroxide Waste into Profitable Sewage Disinfectant

Reprinted from PROCESSING

By Anthony Lawson, Director of Engineering, Foremost Machine Builders, Inc.

Creative processing system converts hazardous peroxide waste into profitable sewage disinfectant

A large international supplier of medical devices approached Foremost Machine Builders, Inc., of New Jersey with a serious problem: How to extract a 50 percent solution of hydrogen peroxide from used and unused pre-packaged caplets. The hydrogen peroxide caplets were used in their line of medical device sterilization equipment, but some of the caplets were never used, and even those that were used contained hazardous residue that required special handling with high waste disposal costs.

Despite being recognized as a creative developer of customized process equipment systems, this request presented multiple challenges involved with handling a dangerous and toxic active oxidizing agent that can burn those in contact with it before they become aware of the danger. The system created had to accomplish the following:

- Gather and convey bulk amounts of the caplets from storage to a granulator,
- Break open the caplets and reduce the plastic to small flakes,
- Separate the liquid from the solids and transfer both the fluid and the flakes to separate holding tanks,
- Transfer the hazardous liquid from the system holding tank to a portable container.

This is a true resource recycle application. Knowing hydrogen peroxide's germ and bacterial killing abilities, and troubled by the high cost of hazardous waste disposal, they realized that recovery of the hydrogen peroxide could result in a saleable product for use by municipalities for sewer sanitation treatment.

Design considerations included personnel safety since no contact with the solution was permissible and special care in material selection was required to ensure inertness to the corrosive chemical. The key components of the system designed to convert hazardous waste into a useful product includes:

1. An in-feed conveyor to gather bulk quantities of caplets and convey them to a Foremost Granulator.
2. A granulator to break open the plastic caplets and reduce them to small flakes.
3. A solid/liquid separator to direct the hydrogen peroxide liquid to a designated filter/holding tank, and the plastic flake to a solid waste container for disposal.
4. A discharge pump station to transfer the hydrogen peroxide from the filter/holding tank to a portable container.



One of the most critical decisions involved in selection of the liquid handling pump for which the following specifications had to be met:

1. The pump must be sealless to avoid leakage into the atmosphere or onto the floor.
2. Self-priming was essential because of the stop-and-run intermittent operation. In addition, the pump had to have run-dry capability to avoid severe damage to the pump or motor in case of extended fluid stoppage.
3. All fluid contact components were to be inert to hydrogen peroxide at various concentrations.
4. Dependable operation had to be ensured under conditions of intermittent service emptying 45 gal (170 L) drums at 7 gpm (26.5 lpm).

After reviewing a wide variety of chemically inert pumps that might be suitable for these difficult service conditions, Foremost system designers selected a thermoplastic, sealless, self-priming rotary peristaltic type design. Key to its selection was the fact that only two pump components, the pump body and an elastomeric replaceable liner, were in contact with the fluid (Figure 1). Both of these components were available in a wide selection of non-metallic materials (Figure 2) with a history of successful service in corrosive and other aggressive environments.

Pump specifications called for a portable close-coupled, single-cavity, flexible liner pump driven by a $\frac{1}{2}$ horsepower (.37 Kw) , single-phase, 60 Hz, 1,800 rpm TEFC motor. The fluid path and proprietary design of this pump isolates the chemical to the channel formed by the outside surface of the flexible liner and the inside wall of the pump body. The pump features linear replacement, which requires no special tools and can be accomplished in a manner of minutes at the job site.

The decision was made to specify the heavy-sectioned pump body in virgin, homogenous Teflon, and the rugged, flexible liner in the fluoroelastomer Viton. These two DuPont fluoropolymer materials provide the required chemical resistance to the corrosive, hazardous hydrogen peroxide solution. Of equal significance was the assurance against leakage provided by the unique design of these pumps. Any leakage that might occur in the unlikely event of liner failure would tend to be inside the pump and present no danger to plant personnel. The result of such internal leakage would be a reduction in flow, but there would be little danger of leakage or drippage onto the floor.

