

MicroDairy Designs EcoFlex Packager

by Frank Kipe, MicroDairy Designs

This is an exciting new product that I suspect many readers will find interesting!

Micro-scale and on-farm processors face many wonderful opportunities...and many significant challenges. Potential customers are naturally attracted by the availability of locally produced, nutritious and safe foods produced using environmentally sustainable techniques. However, before we can meet our customers' wishes we are confronted by a mass of regulatory, production, packaging, and marketing issues. In large companies there are departments filled with people to analyze each of these issues separately. On most small scale farms there is one person (or maybe two), to address all of them at the same time. This is not a place for the faint of heart, but there is no place I'd rather be.

The mission of MicroDairy Designs LLC is to help micro-scale farms become both environmentally and economically sustainable. We believe that economic sustainability is of primary importance because if you can't make money you won't be around long enough to help sustain the environment. To meet this mission we attempt to design equipment that meets or exceeds all applicable regulatory guidelines, that is affordable, that is very flexible and that is of the appropriate scale (that means small since "micro" is the first part of our name).

First we developed our small, legal vat pasteurizer. We wanted it to be flexible in function so we designed it to work as a pasteurizer, a cheese vat, a yogurt vat and even as a small "bulk" tank. It is also flexible in terms of capacity, processing batches as small as 2 gallons and as large as 22 gallons. Then we designed our chiller – which looks suspiciously like a chest freezer (because it is) – and made a number of modifications, including adding a stainless cover on the lid which provides a large sanitary work area for other processing activities. Most recently we addressed the next link in the "food chain" – packaging.

Choosing The Right Business Model

The packager was dubbed the EcoFlex because it was designed from the ground up to be both economical and flexible. The dairy industry at large has been built around an economic model that envisions food as a commodity. This means that speed and efficiency in production were the key operating criteria. Speed and efficiency are both very good things but unfortunately the end result was dairy industry packaging equipment designed for a single type of container that would operate at great speed but required a significant capital investment. In a commodity environment that is not a problem because the cost of the equipment is amortized over many thousands of bottles per day. I spoke to one potential customer who was offered a used bottle filler and capper that would process 300 bottles per minute for a little under \$15,000. That may be an attractive price for that piece of equipment but this farmer planned to fill around 200 bottles per batch. He thought he might use the unit for 45 seconds a day. It is important to match the equipment we purchase with the economic model of our business. Micro-scale dairies cannot be successful with a commodity-based model. We will not produce, package and market milk more efficiently than Kraft.

Fortunately there are many alternative business models available that provide the opportunity from very significant income on small farms. As I developed the business model for Old Springhouse Farm, the most eye-opening exercise for me was when I realized that a person selling the milk from 10 cows, direct marketing their product in single serving containers at the same price as generic products in convenience stores

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could make \$100,000 a year. If you can successfully differentiate your product and charge a premium price (1.5x convenience store pricing) you can do it with 5 cows. For me, the allure of 300 gallon pasteurizers and the 300 bottle per minute packagers was gone forever.

Design Criteria

The design criteria for the EcoFlex Packager were as follows:

- It must meet or exceed all regulatory guidelines.
- It must utilize safe, sanitary, tamper-evident packaging materials.
- It must use consumer preferred packaging systems – the foil sealed yogurt cup type container is the winner in survey after survey. The square paperboard carton that you remember from your elementary school cafeteria and that does not fit the cup holder of any car ever produced is a loser.
- It must be affordable for very small dairies.
- It must use industry-standard packaging materials because they are the most affordable and are readily available from local suppliers almost everywhere.
- It must incorporate operator ease-of-use...so it is really used... and properly
- It must be flexible in several aspects:

Most of us starting up micro-dairies have a dream of a product we would love to produce but until we get started we don't know which products will sell. We can only survive in business if we produce something that sells...that someone will buy. Equipment must be flexible enough to change and adapt to new markets...or we will have a very expensive cup holder in the living room of our new apartment in town after the farm is sold

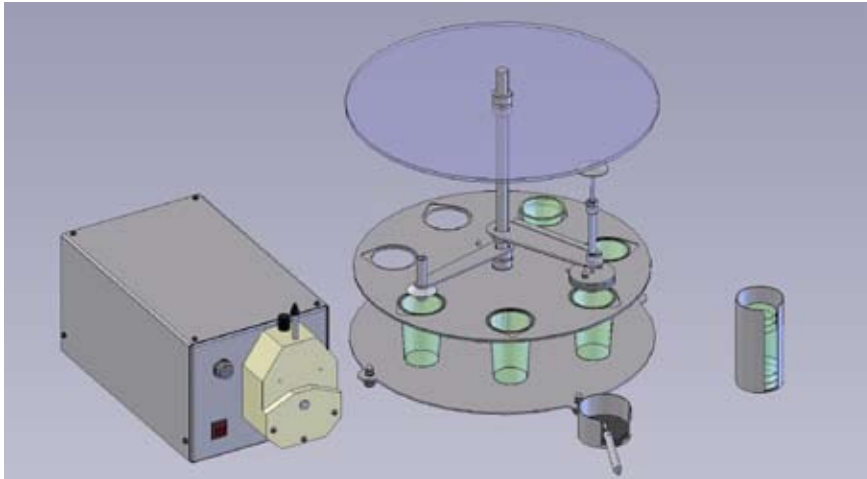
 - » It must have product flexibility
 - Fluid products (milk, flavored milk, eggnog etc.)
 - Viscous products (yogurt, some soft cheese, ice cream)
 - Small solids (hard cheeses, dry ingredient mixes e.g. nuts and granola for yogurt)
 - Non-dairy products (bottled spring water, maple syrup, apple cider etc. etc.)
 - » It must be flexible in terms of the size and shape of the containers it can handle
 - As small as half-and-half creamers
 - As large as half-gallon jugs
 - » It must be flexible in terms of the types of packaging that it can handle
 - plastic cups with foil seal (hot seal) like yogurt cups
 - plastic bulk containers like those in the deli departments of grocery stores
 - plastic bottles with snap-on reclosable caps
 - glass bottles with snap-on reclosable caps
- It must be expandable in a variety of ways:

As businesses grow it is important to be able to increase capacity as much as possible without having to purchase new equipment. Expandability can be accomplished in a number of ways.

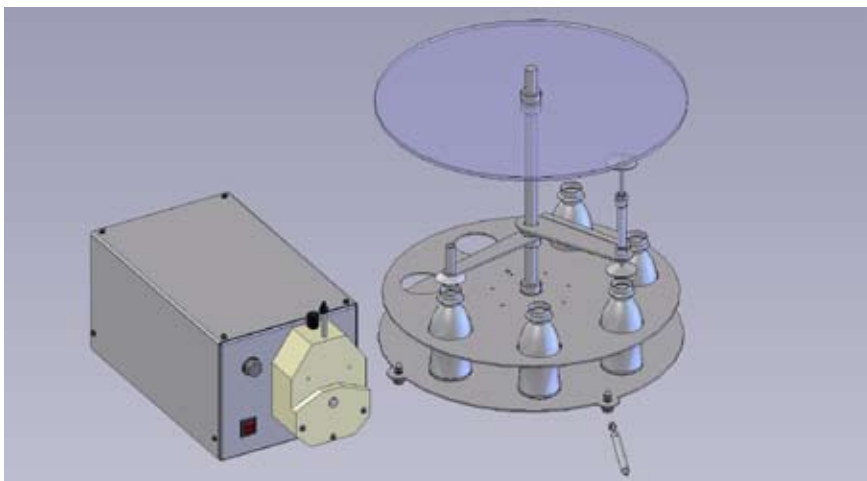
 - » Adding an additional operator should significantly increase throughput
 - » Adding automation to allow the operator to accomplish more.

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Characteristics of The EcoFlex Packager



EcoFlex with Foil Seal Setup and Optional Peristaltic Pump on the Left



EcoFlex with Snap Cap Bottle Setup

The packager is designed with a stainless steel base and a central support arm that supports all the attachments. The attachments include the filler arm, the plunger arm, the clear sanitary shield and the carrier to position the containers. A tube set is provided that includes a stainless steel “dip stick” that inserted into the vat or storage tank containing the product, a short length of flexible tubing that goes through the peristaltic tube pump and connects to the stainless steel tube on the filler arm. The plunger arm can have either the snap cap head or the hot foil seal head attached. The carrier assembly is designed so that a spring actuator indicates when the carrier is properly positioned under the filler arm and the plunger arm.

The central support arm allows the attachments to be adjusted vertically to allow for any size bottle or cup and also allows them to be adjusted radially to allow left handed or right handed operation. The unit comes with two carriers of your choice for different sizes or types of containers. To increase the variety of packages that can be processed you just add new carriers, the rest of the unit stays the same. Our approach is “Send us the container you want to fill and we’ll design a carrier for it.”

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To keep the initial cost low, the unit is designed for manual operation while including everything necessary to meet regulatory requirements. The operator manually loads the bottle or cup, manually rotates the carrier under the filler tube, using a foot pedal control, fills the container, manually rotates the carrier to the capper position, where the cap is placed on the container with the use of a vacuum pencil, manually rotates the carrier to the plunger which is manually depressed to seal the container. Depending on the size of the container to be filled and the dexterity of the operator typical speeds will range from 5-10 containers per minute.

There are a variety of ways, built into the design, to allow the operator to increase throughput. Since the unit is of a rotary design, an additional operator can be loading and unloading containers while the first operator is filling and capping. The spring-loaded plunger on the plunger arm is actually an air cylinder; hooking up an air compressor and valve would allow this part of the process to be automated. The peristaltic pump is used in laboratory applications in the pharmaceutical industry as a metering pump so it can be used for very precise filling applications. Upgrading the pump with a stepper motor would allow very precise automated filling. A stepper motor can also be added to the carrier assembly to automate the process of rotating the carrier to the various stations. The key point is that the packager is designed to be flexible and affordable when you are getting started, be able to grow as your business grows and can pay for the upgrades and be versatile enough to still be in use for niche packaging applications when your business is full grown.

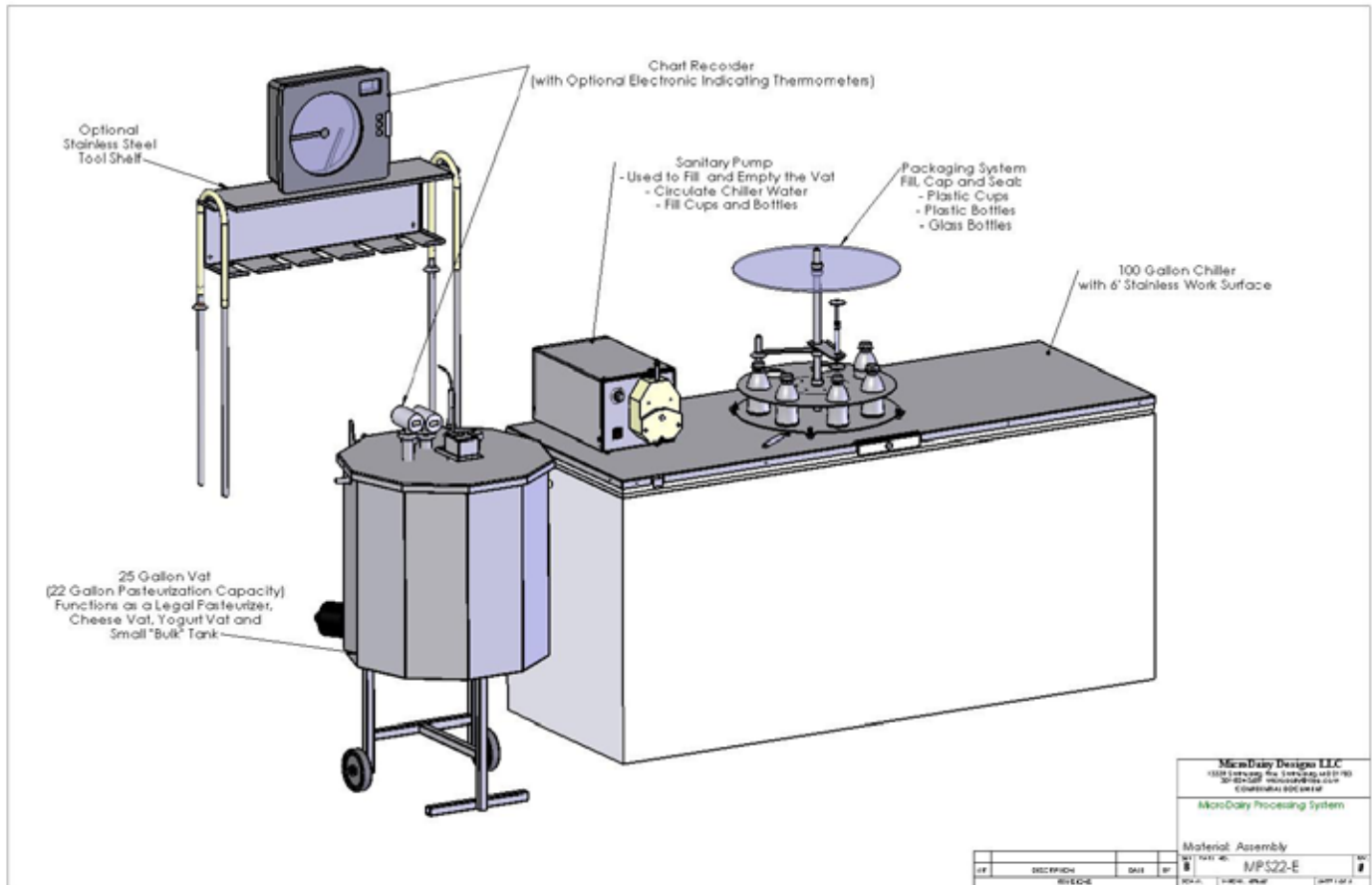
EcoFlex packager enables the use of a variety of containers and lids

Vacuum pencils are used in laboratory environments to manipulate the glass slides and slide covers you probably remember from biology class. They are also used in the electronics industry to position components on printed circuit boards. On the EcoFlex they make it very easy to manipulate and position caps and foil seals in a sanitary way.



The EcoFlex Packager can be purchased as a component of a complete MicroDairy Designs Processing system or separately for those who have already acquired other processing components.

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Pricing

The EcoFlex Packager comes standard with the base, filler arm assembly, plunger arm assembly, sanitary shield, snap cap head, hot foil seal head, vacuum pencil, fill tube set and 2 carriers of your choice for \$1500. Additional carriers cost between \$150 and \$300.

If you already have a MicroDairy Designs Vat Pasteurizer, the peristaltic pump is included in that system. If you do not have that system or a suitable pump, you can purchase our sanitary, positive displacement, variable speed, peristaltic pump with foot pedal control for \$1500.

A complete system including a 22 gallon vat pasteurizer (which can also function as a cheese vat, yogurt vat or small bulk tank), mercury thermometers, chart recorder, chiller, pump and EcoFlex Packager for \$12,500.

Contact Information

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