



Flextank has a long list of both size and shape options.

BY JANICE CESSNA

# PURE, PRECISE POLYETHYLENE

Winemakers speak frankly about fermentation and aging alternatives.

An increasing number of winemakers have adopted polyethylene tanks for fermenting and aging wine, and for many good reasons. Their economic and environmental efficiency surpasses the common oak barrel and, under skilled guidance, they produce comparable, award-winning wines.

When plastic tanks first surged in popularity in the 1980s, they imparted off-aromas that ruined vintages. Since then, dramatic material and design modifications have elevated next generation tanks to legitimate vessel status. Their resurgence began more quickly abroad, including in Australia, where two major

wine-specific polyethylene manufacturers originated, Flextank and Flexcube. U.S. winemakers seem to be warming to the tanks, although it can be challenging to find them openly talking about it — and when they do, the vocabulary is confusing: plastic, polymer, polyethylene.

The polymer family includes plastics, resins and related synthetic compounds. Within the seven-member plastics sub-family, the high-density and low-density polyethylenes are the most inert versions commonly used for transport and storage of consumables. Different wine tank manufacturers prefer different labels to describe their products, but most fermentation and aging tanks are of polyethylene origins.

Regardless of description variation, all manufacturers offer a choice of tank sizes. For example, as its name implies, Flexcube offers three sizes of cubes — 265-, 397- and 530-gallon — all matching the floor area of a pallet and increasing volume via height. The other major manufacturer, Flextank, has a long list of both size and shape options of high-density polyethylene tanks (HDPE) from 15- and 30-gallons for home winemakers to 300-gallon cube stackers, 480-gallon egg fermenters and 570-gallon stackable rectangles.

### GARY GOUGER, GOUGER WINERY, RIDGEFIELD, WASH.

“I had two or four barrels that I used once when I originally opened,” says Gary Gouger, owner and winemaker at Gouger Winery in Ridgefield, Wash. “I got rid of them and I’ve only used Flex-tanks since.” Gouger was studying oenology at University of Adelaide when Flextank was developing its design and invited him to study a

prototype. Although that version leaked — a lot — Gouger immediately liked the concept and pursued them in 2009 after returning to the West Coast.

He appreciates their mimicry of barrel micro-oxygenation while minimizing accumulation of bacteria. He compares the bacterial load of oak barrels to a pickup truck. “The more stuff you put in the back of the truck, the more it becomes weighted down and harder to control. The more bacteria you have in the wine, the harder it is to control.” He feels the lighter bacterial load of polyethylene tanks means he can lower the amount of sulfite additions. “If I had oak barrels, not only would it cost much more, but it would also cause more worry.”

A 300-gallon Flextank costs roughly \$1,000, per the company website. That’s about five times the volume of a standard oak barrel and, conservatively, the same cost. If a polyethylene tank lasts the full 20 years as claimed, and an oak barrel program rotates in new stock every three years, using polyethylene instead saves more than \$33,000 over its lifespan. Of course, most winemakers using polyethylene employ individual oak staves to replicate flavors and depth traditionally obtained via barrels, which cuts into savings.

However, 100% of a stave adjunct’s surface area contacts the wine, as compared to roughly 50% of a traditional barrel stave’s surface in contact with the wine (only on one side). Since wine penetrates



**Gary Gouger, winemaker at Gouger Winery, exclusively uses polyethylene at his winery.**

roughly eight to 12 millimeters and a barrel stave averages 25 to 30 millimeters thick, only 25% to 33% of the stave is used versus 100% of a stave adjunct. This results in less oak consumed per volume of wine.

Gouger has experimented with various stave combinations. “I blend staves because I want my wines to have lots of complexity,” he says. “You really have to understand oak: its purpose, advantages of different types, where it comes from and how it’s toasted.” When the staves have imparted the desired characteristics, Gouger simply removes them from the tank and lets the wine rest. “I don’t have a lot of space, so I only bottle as I run out of something. It’s more efficient, more predictable and I can tailor the wines.” Gouger produces a wide range of varietals with many earning awards including a San Diego International Platinum and San Francisco International Gold. “The tanks produce a very clean flavor. I just love them.”

To clean tanks, Gouger estimates using only five gallons of water and 15 to 20 minutes for each tank, conserving substantial

## AT A GLANCE

- + Winemakers offer insights in support of food-grade polyethylene tanks for fermentation and aging.
- + Research supports polyethylene permeability capable of mimicking young oak barrels.
- + Aging wine in polyethylene tanks typically involves oak staves to replicate barrel influences.
- + Polyethylene tanks are flavor-neutral, economical, durable, stackable, maneuverable and cleaner than used oak barrels.

water, energy and labor resources. Plus, you can recycle the tank, cage and metal accessories. The only negative Gouger can think of is fermentation: "Although the opening is large, you can't reach a lot of the fermentation inside of a Flextank with a punchdown tool." He adds that, if any fermentation occurs within the tank, the material stretches as CO<sub>2</sub> creates head space, making an occasional top off necessary.

### AUGUST DEIMEL, KEUKA SPRING VINEYARDS, PENN YAN, N.Y.

Like Gouger, August Deimel, winemaker at Keuka Spring Vineyards in Penn Yan, N.Y., similarly removed oak barrels from his red wine production. "I don't think barrels are appropriate for many East Coast red wines," he says. "For a long time, I was using barrels alongside Flextank and I found the

wines in barrels showed too much oak, had less color and less flavor." He began using polyethylene tanks in 2012 after arriving at Keuka Springs and observing the tanks in neighboring cellars.

Deimel finds the 300-gallon size to be ideal for his production, as it holds the must from almost two tons of fruit. "Two tons of red fruit yields 360 to 380 gallons, which means you can have a topped tank with a little left over," he says. "My Cabernet Franc program might be two tons each from four different vineyards, and I don't want to blend them all into one tank. I want to be able to separate the fruit sources and treat them differently."

He takes advantage of the stackable nature of his tanks, saving cellar space by stacking them three high in floor space slightly smaller than a pallet. Stacking tanks uses roughly half the space of stacked barrels and, if flexibility of access to tanks

inside the stack is important, installing a commercial pallet rack helps.

Although he typically limits use of polyethylene to aging and storing wine, he experimented with Chardonnay carbonic maceration by rigging up CO<sub>2</sub> canisters to a tank. "I call it Carbo Chard. There's a little skin-fermented character. It's savory and the mouthfeel is beautiful." He pumped in CO<sub>2</sub> every six hours for two days, then sealed it for two weeks. "I think it's fun; it's clean. I mean it's weird, let's be clear, it's weird." Deimel also has interest in using polyethylene for general fermentation but feels limited by the design of his current tanks. "I'm not doing fermentation right now for any scientific or ideological reason, it's just a pain in the ass." For this reason, he hopes to add the egg-shaped design to his future inventory but ponders how the shape may impact stacking and cellar space.

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## FINTAN DU FRESNE, CHAMISAL VINEYARDS, SAN LUIS OBISPO, CALIF.

Fintan du Fresne, general manager and winemaker at Chamisal Vineyards in San Luis Obispo, Calif., began trialing a Pinot Noir aging program in 2010 using 265-gallon Flexcubes with oak staves to replicate a barrel program. "We saw this as a valid option to provide the same oak profile at a much lower cost," says du Fresne, who selected low- and medium-permeability tanks for the program. "How long the wine is in there and the style and amount of oxygen you want defines which permeability to use," he says. "If making something tan-

topping is still required. "Anecdotally, I'd say the evaporative losses are less than the equivalent barrel volume, but we really haven't tracked that."

Honing the Chamisal Pinot Noir program meant experimenting with and selecting oak adjuncts of comparable sensory profiles to traditional barrels. "We found early on we had to source a product close in dimension to a stave. We've drilled down to a couple products that we like using, BarriQ by Flexcube and Magic Stave by LeGrand." Although these staves are some of the most expensive on the market and used only once, du Fresne appreciates they're still roughly one-fifth to one-eighth the cost of a full barrel.

compare results. "We're still trying to figure out our formula for how we recreate the cooperage that we like to use. We're certainly closer, but we're not at a point where we want to replace all our barrels." Based on his experience, du Fresne thinks wineries making red wines less than \$30 should explore polyethylene. "Regardless of which product you use, it's going to take a few years to figure out what's best for your program. Trial one or two [tanks] to start, and work up from there," he says.

## MITCH BLACK, BLACK KNIGHT VINEYARDS, SANTA ROSA, CALIF.

When he first used polyethylene, Mitch Black, owner and winemaker at Black Knight Vineyards in Santa Rosa, Calif., trialed a Chardonnay in a 70-gallon polyethylene tank alongside traditional barrels. "Early on, because the barrel was brand new, it imparted a lot of oak and people would react positively to that right away," he says. "With time, they actually started picking the Flextank with staves because it was more integrated. What I proved to myself is the results are close and people go both ways." He views his gold medal wines, including the 2011 Chardonnay, as proof of the quality.

Black started using polyethylene a few years ago when barrels were impossibly scarce. He now uses a strategic blend of stainless, oak barrel and polyethylene for fermentation and aging. "My cool weather Sonoma Coast [Pinot Noir] needs more aging than warmer weather Pinots," he says. "But I don't want to leave them in the barrel that long. The [polyethylene] lets it age without wearing out the fruit like long barrel aging can." He's also made Merlot, sparkling and rosé with his tanks and has a few impermeable models for long-term, non-aging storage.

Like his Pinot, Black finds the polyethylene Chardonnay on staves maintains its fruit and depth. "Aging with staves achieves almost the same thing but does a better job of preserving the middle layers, those subtle little layers we get



**Fintan du Fresne carries a container of grapes at Chamisal Vineyards.**

nic, such as a Cabernet, Syrah or Petit Sirah, you'd very likely go medium or high."

It's commonly accepted that the oxygen transfer rate of oak barrels ranges from 10 to 28 mg/L per year, old to new, respectively. Several polyethylene options tout roughly 21 mg/L per year, with the overall market spanning the wider range. In du Fresne's experience, these tanks do breathe, so occasional

The positive Pinot Noir results have led to trialing a Chardonnay fermentation program using egg-shaped models. "We're lees aging the Chardonnay and trying to replicate a barrel fermentation, so we really want a vessel that replicates the lees contact. It needs to have a curved bottom," he says.

Each time a vintage enters a polyethylene tank, du Fresne typically places a portion in barrels to

from our vineyard in the mid palate. When you blend it all together, you get this complex wine: fresh fruit from stainless, mid-palate from staves and a nice, crème brûlée finish. People love the wine because it's balanced."

The Black Knight cellar now contains 40 polyethylene tanks of

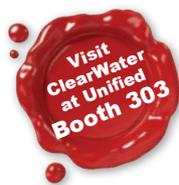
various shapes, sizes and permeability from two different manufacturers. Like du Fresne, he's tried the egg-shape for fermentation of both white and red. "You can see the whole thing rolling during fermentation," he says. He found the cap a bit tougher to punch down in the red, but thought it turned out

well. Black also appreciates the low-maintenance aspect of polyethylene and the affordability of keeping the tanks clean, noting they respond very well to ProxyClean and citric acid, if needed.

"I can't say if [aging] is slower or faster than a barrel. I think they're close, but I find it falls apart in the smaller ones. I think it's harder to manage with all that contact area." Black's experience coincides with the manufacturer's indications that tanks smaller than 1,000 liters (264 gallons) have an oxygen transfer rate closer to a new oak barrel.

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## TIME WILL TELL

Polyethylene tanks don't conjure romanticism like oak barrels, but they do have significant benefits beyond producing wine of equivalent quality. It seems only a handful of independent studies have compared tank and barrel performance. Recently, Dang-Dung et al (2010) and del Alamo-Sanza et al (2015), demonstrated wine aged in Flex-tanks embody richer color density, fewer reductive odors and micro-oxygenation rates roughly matching manufacturer claims.

Studies typically don't budge public opinion though. Only time and shared experiences within the wine community can precipitate such changes. "I think this is the first year I've heard other winemakers actually admit they're using them," says Black. Maybe the new tank color options like terra cotta and slate grey will soften their institutional appearance. "They still don't have the romance of 1,000 oak barrels all standing in a row," says Gouger. "Barrels are beautiful. So, I'm going to buy a bunch of used ones and fill them with sand."

**Janice Cessna** is a freelance writer who crafts informative content for magazines and businesses. Her experiences as a vineyard manager and cellar rat help inform her wine industry articles.

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