

Packing Technology Into the Timeless Barrel

By CLAY RISENAUG. 27, 2016



Credit

August Kryger for The New York Times

SALEM, Mo. — Standing on a wooded hillside in the Ozarks, about 100 miles southwest of St. Louis, Brad Boswell watches a chain-saw-wielding logger make several deft cuts at the base of a 100-foot white oak. The logger points to a clearing down the slope and, with one final, quick slash, sends the tree falling, exactly where he pointed.

Mr. Boswell scrambles over to look at the swirls and loops that make up the tree's cross section. If they're consistent, and the wood doesn't show scars from fire damage or disease, it will most likely end up in some of the hundreds of thousands of barrels that his 1,500-person company, [Independent Stave](#), turns out every year.

His great-grandfather, T. W. Boswell, founded Independent Stave in 1912, and Brad Boswell now runs it with his brother and sister. Based in Lebanon, Mo., it is the world's largest barrel manufacturer, at a time when demand for wine, whiskey and beer — all of which rely on barrels for aging — is skyrocketing.

The United States is now the largest market for wine barrels. Domestic whiskey production is up 41 percent in the last decade — and, thanks to a quirk in federal law, almost every drop has to be aged in a new oak barrel.

The demand has come on so suddenly and vertiginously that barrel prices are up 70 percent since 2012, and some cooperages have 12-month waiting lists.

As a private company, Independent Stave does not release revenue or production numbers, but industry experts estimate that its output has doubled in recent years. “It all happened really fast,” Mr. Boswell, 45, said. “There’s a craft boom everywhere.”

The barrel industry — which includes about 15 companies, most of them, aside from Independent Stave, quite small — stands as an exception in a mainly dismal American manufacturing industry: Despite an overall robust July employment report, the country [lost 33,000 manufacturing jobs](#) in the previous six months.

Bucking that trend, several new cooperages are in the works, and existing companies have all expanded production. “It’s definitely a good problem to have,” said Heidi Korb, the owner of Black Swan Cooperage, in Park Rapids, Minn.

Not long ago, though, the world didn’t think much of American oak barrels. The bourbon industry cratered in the 1980s and ’90s, while American winemakers preferred to import expensive French oak barrels, the better to craft the Bordeaux-style reds coming out of California.

A big part of the problem was the barrels themselves, which were often full of imperfections because of frequent forest fires and arboreal diseases. “Back in the day, you’d see fire scars, knots, timber streak, all sorts of things,” Mr. Boswell said.

Photo



Barrels outside Buffalo Trace Distillery in Frankfort, Ky. Because of a quirk in federal law, nearly all whiskey is aged in new barrels.

Credit

Low-tech American cooperages didn't do much to improve the situation. An American barrel in 1990 looked, and performed, about as well as a barrel from 1790.

But alongside the bourbon boom of the last decade has come a technological revolution in American barrel making, led by the Boswells and Independent Stave. Computers, cameras and a better understanding of the science behind barrel aging have taken much of the guesswork out of the process, and allowed an explosion in customization and innovation.

"When I started, you couldn't run your hand over the barrels or else you'd get splinters," said David Pickerell, a whiskey industry consultant and former master distiller at Maker's Mark who has worked with two generations of Boswells at Independent Stave. "Now, they're like furniture."

A century ago, when T. W. Boswell founded Independent Stave, the wood barrel was the equivalent of today's aluminum shipping container, a workhorse used to haul products as diverse as whiskey and wood nails. He was following in a long and little-changed tradition: Evidence of barrel making dates back to the Celts in third-century B.C. Spain. Coopers were valued craftsmen in colonial America and into the postindependence expansion westward.

Between uses, merchants would burn their barrels' insides to sterilize the surface and remove errant smells or flavors. Somewhere along the way, customers noticed that wines and spirits that spent a few months in a barrel lost some of their edge and took on a pleasant color and flavor. Barrel aging was born.

At first, Independent Stave just made staves — the slats that make up a barrel, hence the name — because many distilleries fashioned their own barrels. It was a good business to be in, thanks to the 1935 Federal Alcohol Administration Act, passed two years after the end of Prohibition, which requires virtually all American whiskey to be aged in new barrels. Once a barrel is used, no matter how short the aging period, it must be replaced.

Whiskey and wine consumption picked up through the postwar years, and the company expanded with it. In 1951, it opened its own cooperage, aimed at the expanding whiskey industry. In the 1980s, as American drinkers turned from whiskey to unaged, supposedly "cleaner" spirits like vodka, it began selling to wineries as well.

But outside the foundering whiskey industry, sales were anemic. American barrels tended to be viewed as solid but unrefined. "Up until the 1990s, we made just three kinds," Brad Boswell said.

No wonder American wineries preferred the sophistication of French oak. In France, coopers dried their wood for up to three years, while Americans tended to stop at a year. French coopers applied small flames to the inside of their barrels to lightly toast them, turbocharging certain flavors. Americans practically set their barrels on fire, giving everything, whether whiskey or wine, a charred, intensely vanilla flavor.

John Boswell — T. W. Boswell's grandson and, like most men in his family, an engineer — decided to do something about it. He put quality-control systems in place, from random sampling to laser measures, to weed

out low-quality logs. He started drying his logs longer.

Photo



Credit

Luke Sharrett for The New York Times

By the time his son Brad joined the company in the 1990s, in-house chemists and engineers were overhauling every aspect of the company's barrels and production lines. Working with forestry experts, they developed more sustainable harvesting practices, which also made the business more efficient and brought in higher-quality logs.

Independent Stave also dived deep into the science of wood aging. It started a series of organic-chemistry symposiums that brought together industry and academic researchers, and it began offering no-strings-attached gifts — barrels, staves, anything — to universities with strong wine- and spirit-making programs.

Such efforts helped the entire industry, and also fed a stream of data and insights back to Independent Stave — for example, helping the company fine-tune its barrel-toasting program for grape varietals.

The result is a company that makes an age-old product but operates like a tech start-up. “There aren't a lot of companies out there that can do what they do in terms of capability and flexibility,” said Harlen Wheatley, the master distiller at Buffalo Trace, a whiskey maker in Frankfort, Ky., that buys most of its barrels from Independent Stave and often collaborates with it on research projects.

Recently, the two companies completed the decade-long Single Oak Project, in which they made 192 barrels, each using the wood from a single log, to find what constituted the “perfect” bourbon. (Among other things, they found that wood from the bottom of a tree made for the best aging.)

Much of Independent Stave's innovation occurs at its main cooperage in Lebanon. Computers track each stave as it moves through assembly, while sensors analyze staves for density and moisture content. Instead of guessing how much to toast a barrel, operators use lasers and infrared cameras to monitor the temperature of the wood and the precise chemical signature that the heat coaxes to the surface — all subject to the customer's desired flavor profile.

“They've developed technologies so that if we say we want coconut flavors, they can apply this or that process” — like applying precise amounts of heat to different parts of the wood to tease out certain flavors — “and we'll

have it,” said Charles de Pottere, the director of production and planning at Jackson Family Wines, which makes Kendall-Jackson wines and is a longtime customer of Independent Stave.

Independent Stave isn't the industry's only innovator. Black Swan makes barrels with a honeycomb design etched on the inside, which increases surface area and reduces a whiskey's aging time. Brown-Forman, which owns the Jack Daniel's and Woodford Reserve distilleries, uses cameras at its in-house stave mills — where logs are cut into staves before going to a cooperage for assembly — to measure each log and decide the most efficient way to cut it, said Larry Combs, the general manager for Jack Daniel's.

“Twenty-five years ago, it was more art than science,” he said. “Now we have a healthy dose of science in with the art.”

The barrel's reinvention comes at a time when American oak is gaining newfound respect in wine circles. Along with Jackson Family Wines, prominent wineries like Silver Oak and Ridge use American oak for at least some of their products. And while there is no hard data on exports, American barrels are increasingly popular overseas, particularly in Australia and in Spain, where they are used to age Rioja and sherry.

Photo



Kyle Guyer prepared to flip a barrel during toasting at the Missouri Cooperage operation of Independent Stave in Lebanon, Mo. Lasers and infrared cameras have refined the toasting process to give the customer a desired flavor profile.

Credit

August Kryger for The New York Times

“The quality of American oak barrels today is the best we’ve ever seen,” said David R. Duncan, the president of Silver Oak Cellars, which operates its own cooperage in California and uses American oak almost exclusively to age its reds.

But the biggest benefit for American barrel makers has been the explosive, global demand for American whiskey, and the proliferation of craft distilleries, almost all of them in need of barrels.

“I was at the American Distilling Institute annual conference in 2010, and there were maybe only 200 distilleries running or in the works,” said Ms. Korb, who founded Black Swan in 2009. “Now there are probably 3,000.”

The whiskey boom was, at least initially, too much of a good thing for cooperages. The timing was certainly unfortunate: The biggest driver in the American hardwood industry is home building, and when the housing market collapsed in 2008, so did demand for wood. Hundreds of logging companies shut down, along with 40 percent of the country’s independent stave mills, just as bourbon was getting hot.

By 2013, a real shortage combined with wild rumors to create what Mr. Boswell calls “the Great Barrel Panic.” One story claimed — falsely — that Independent Stave had cornered the market in stave logs to keep would-be competitors out. Orders from smaller and newer companies went half filled or were put on back order. Insiders began to wonder if the whiskey boom might go bust.

Independent Stave responded by acquiring one stave mill in Ohio and opening another in Kentucky (for a total of five, along with its two cooperages). Other companies added employees and equipment: Brown-Forman, which already owned a cooperage in Kentucky, built another in Alabama to meet internal demand, and Black Swan opened its own stave mill. Loggers returned to the industry.

Eventually the panic subsided, but things still aren’t back to normal. At \$575, the average price for a barrel-quality log in Missouri is more than twice what it was four years ago. American barrels cost about \$450, on average — against \$700 or more for French barrels.

And there are long waiting lists. “We have a lead time of 12 to 15 months, and I’m hoping we can get it down to 10 months,” said Ms. Korb, from Black Swan. “We have some very patient customers.”

That’s in part because to age quality whiskey and wine, there’s really no alternative to a barrel. And no matter how much technology companies like Independent Stave apply to barrel-making, it remains a time- and labor-intensive craft. Skilled coopers still build the barrels, by hand. Each tree, each stave, each barrel is a natural product, with its own nuances.

“You can’t just computerize it,” Mr. Boswell said. “You can use some automation, but in the end, every barrel is going to be a little different.”

A version of this article appears in print on August 28, 2016, on page BU1 of the New York edition with the headline: Packing Technology Into a Barrel. [Order Reprints](#) | [Today's Paper](#) | [Subscribe](#)