2015 SPECIAL EDITION

PW PRACTICAL Winery & Vineyard

TECHNICAL RESOURCE FOR GROWERS & WINERIES

Unraveling perceptions of wine complexity

New analysis for tannin "stickiness"

Describing white wine oral sensations

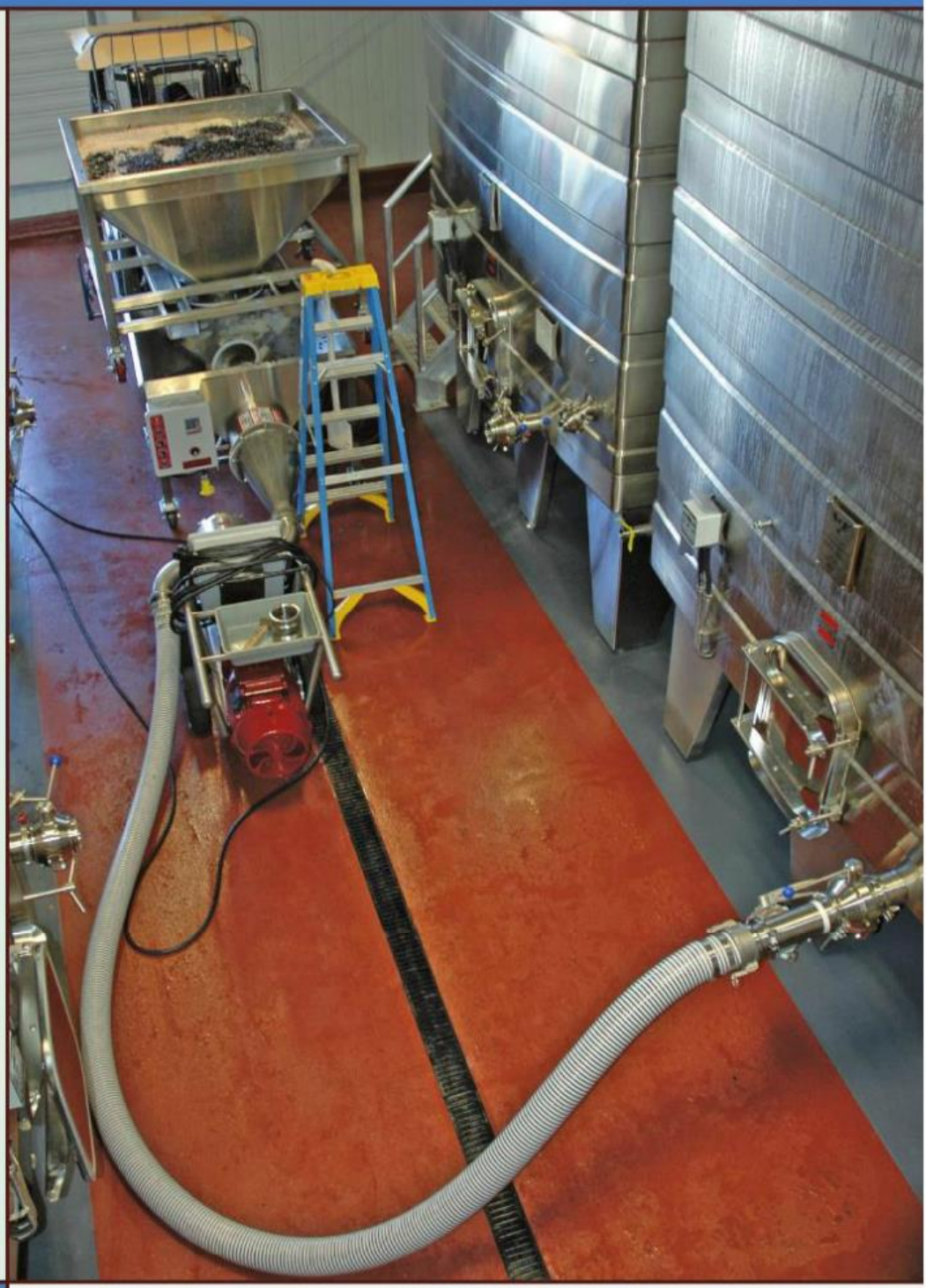
Oxygen transmission with different closures into bottled wine

Tannin: impacts, opportunities along the value chain

Microbial origins of key wine aromas, PART I: ESTERS and ALDEHYDES

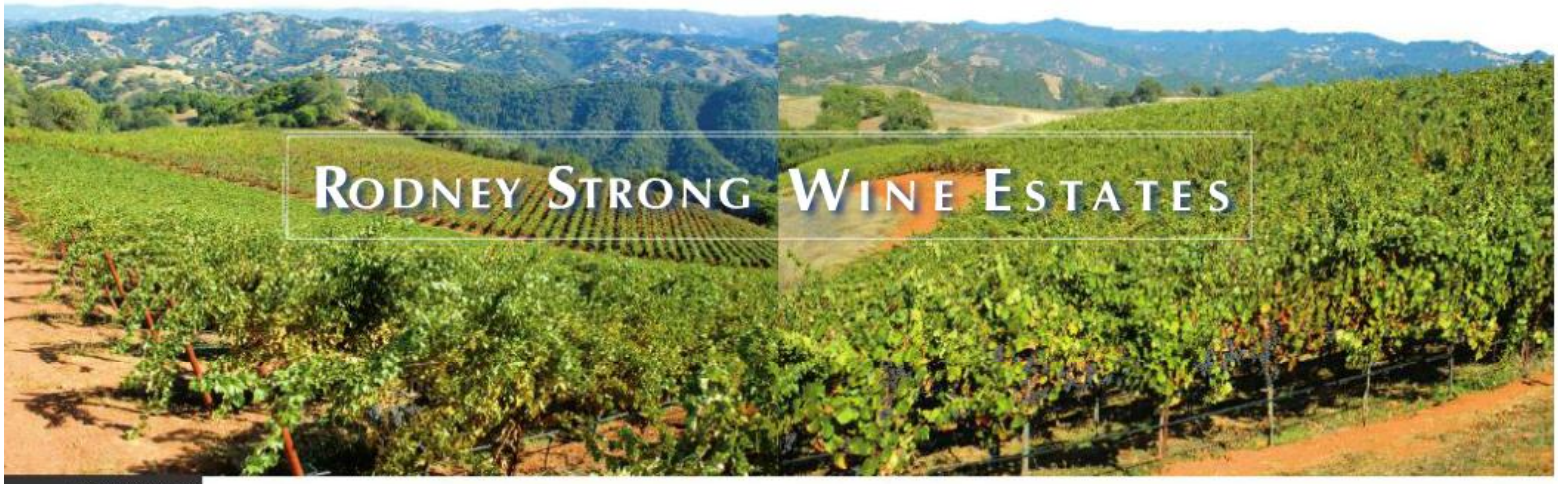
SMART VITICULTURE
Grape-specific trellises in Sierra Foothills vineyard

Myths of frost protection



New red fermentation cellar at Rodney Strong Vineyards

SUPPLEMENT TO WINES & VINES



COVER STORY

New vineyards yield grapes for red wine blend

BY **Don Neel**, Editor

A new Sonoma County red wine brand is in production at Rodney Strong Wine Estates, outside Healdsburg, Calif. The first harvest in 2013 was 350 tons from 200 acres of third- and fourth-leaf vines planted in 36 blocks over a 4,000-acre ranch. The ranch is part of a 19,000-acre ag set-aside under the Sonoma County Agricultural Preservation and Open Space District. Located 18 miles northwest of Healdsburg, the vineyard ranges from 735 feet to 2,035 feet in elevation.

"The 2014 harvest yielded an average of 3.5 to 4.8 tons per acre from fourth and fifth-leaf vines that are spaced 4 feet x 8 feet," says Doug McIlroy, director of vineyard operations. There is a vertical shoot positioned trellis, and the vines are head-trained and cane-pruned. The predominant rootstock is 101-14 with a small amount of 1103P planted.

The 2013 free-run wine will be blended from Cabernet Sauvignon (six clones) planted on 139 acres, in addition to 39 acres of Malbec (two clones), 7.4 acres of Petit Verdot (one clone), 3.5 acres of Cabernet Franc (one clone), and 2.9 acres of Merlot (one clone). There is also one clone of Zinfandel on 5.6 acres.

The 2014 harvest took 30 days to deliver between 20 and 80 tons per day to the winery.

Crush pad improvements

To handle the increased tonnage and ensure the wine quality that winemaker Justin Seidenfeld wanted, he and his team designed many upgrades to the existing crush pad.

"P&L Specialties was approached in 2013 to help find a creative and functional solution to the crush pad layout by adding both destemming capability and white grape receiving in an existing crush pad footprint," says Ed Barr of P&L Specialties. After examining many options, a creative and simple solution of converting an existing grape-receiving hopper into a bi-directional receiving hopper was chosen. The bi-directionality allows processing of red grapes on one end of the hopper and receiving and transfer of white grapes on the other end of the hopper.

In order for the existing hopper to undergo the drastic modifications, it was removed and sent back to P&L for modification. A new bi-directional 18-inch diameter variable pitch screw was fabricated and installed along with complete redesign and fabrication of the mechanical drive system.

The new crush pad includes the reuse of an existing cleated, incline belt berry-separator/feed-conveyor supplied years earlier on the "red" end of the receiving hopper, and addition of a new 30-inch-wide cleated incline belt conveyor on the opposite end to feed a new Bucher tank press.

A new 20-inch stainless-steel in-

Crush pad with receiving hopper, berry separator/sorter and tank press to use as a basket press.

Two high elevation Cabernet Sauvignon vineyards ready for harvest.

ground press discharge and incline pomace-removal system was installed to complete the crush pad. This crush pad is a compact and efficient use of space that provides the versatility to process both red and white grapes in the same location with one receiving hopper.

New berry separator/sorter

"The Pellenc Selectiv' Process Berry Separator/Sorter utilizes linear high-frequency vibration to achieve gentle separation of berries from the stems," says Lance Vandehoef of Pellenc America Inc. "This new technology works well to keep berries and stalks intact at the Rodney Strong Vineyards.

"A unique feature is that the Selectiv' Process unit allows loose berries to pass through a grid belt directly to an integrated and adjustable roller-sorting table prior to the linear berry separators. The first stage of the roller-sorting table separates any juice present and removes independent seeds and immature berries and raisins. The second stage removes jacks, petioles and other green material before discharge of the berries into a mobile transfer bin for delivery to a fermentation tank."

Rodney Strong Vineyards operated the separator/sorter at 12 tons per hour to achieve desired quality. Its maximum speed is 20-tons per hour.

New program to operate tank press as a "basket-style" press

The Bucher press programs available on the new 250hl tank press at the Rodney Strong Vineyards are part of the new model Bucher Xpert ICS (Intuitive Communication System). One specific program that allows the press to function similarly to a basket press is called "sequential pressing," explains Mea Leeman, sales director at Bucher Vaslin North America.

Sequential pressing is based on a series of inflations to pressure levels and holding times attained sequentially without performing any deflations of the membrane or rotations of the press. The value of the successive pressure levels range from 0 to 2 bars.

When the tank press is filled with fermented material, the tank rotates 40 degrees to position the membrane at the top of the drum and the patented Bucher drain channels to be in the lower half of the drum, allowing gravity and pressure to release wine from the fermented grape skins.

The winery can program in advance or modify, in real time, up to 10 different "sequential programs" that contain up to 20 different pressing "steps." The pressing can be graphically displayed on a user-friendly Windows screen.

Sequential press programming is a standard press program installed on all Bucher Xpert presses. The specific "sequential pressing" exists on previous versions of the Xpert Series (Versions 1 and 2). However, deflation of the membrane without any rotation of the tank is made possible exclusively through the new Bucher ICS system.

When the tank press is loaded with fermented grapes after free run drain-separation of 24 hours from a 20-ton fermentor, the pomace is discharged from the press after a 90-minute press cycle.

New red fermentation cellar

To make the highest quality wine possible, Seidenfeld and his team designed a brand new fermentation cellar exclusively for this new brand in an existing 11,520-square-foot building. The remodel included re-sloping of the floor and insulating the walls and roof before installing 57 new La Garde stainless steel square fermentation tanks that maximized the space in the building.

Four inches of foam insulation were sprayed on the roof to achieve R30 value and insulation panels (total of 6 inches thick) were installed inside the walls to achieve an R40 value.

La Garde, a division of SML Stainless Steel Group in Canada, built the custom-designed wine tanks from 304 stainless-steel Grade 11. "La Garde square shape fermentors are designed to maximize the contact ratio of must to juice through a thinner cap to optimize fermentation," says Jostran Lamontagne of La Garde, "wherein lies the creation of flavor and complexity of the wine.

"With La Garde square tanks, the contact surface could be increased by up to 50% when compared to a cylinder with the same floor width. By increasing that contact surface for the same volume, you increase the efficiency of the fermentation process. You achieve more color, tannin and more flavors from the grapes with a cap of must that is thinner, much easier to facilitate pump overs and the cooling process. The square tanks can produce 30% more volume of wine than a round tank for the same wall width that you want to occupy.

"A big advantage of La Garde tanks is the simplicity to clean them, due to the hand-polish finish. The exterior wall is a number-four polished finish with polished welds. The interior wall is a 2B-polished finish with polished welds

A pump trial was conducted in the 2014 harvest with three fermentation tanks containing grapes harvested on one day from the same vineyard block to determine the optimum pump for pump over during primary fermentation. Pumps included: 1.5 hp RV65 with a helicoidal impeller, and a 5 hp RV80 with a helicoidal impeller. RV series pumps are widely used for pump over where high capacity and minimum destruction of solid parts (seeds, skins etc.) is required. The design of a pump contributes to a better extraction of tannin, reducing formation of lees to achieve higher quality wine. The third pump, a 2-inch air pump that handled 140 gallons per minute at 100 psi, was chosen for pump overs in the future with an air pump to be installed with every fermentation tank.

A forklift delivers a 1,500-pound capacity transfer hopper to the fermentation cellar to drop sorted grapes through a 12-inch diameter butterfly valve into a 12-inch screw sump that keeps the pump suction flooded of a 4-inch diameter Waukesha variable speed (0-220 gpm) positive displacement pump that transfers grapes into the fermentation tank.

that are seamless. Although the tanks have a rectangular shape, the inside is rounded with no sharp corners."

La Garde fabrication has been preceded by seismic design objectives to resist an earthquake of level 6 on the Richter scale. The Rodney Strong 6,000-gallon tanks were designed following a finite element analysis. Two structural braces were welded around the tank and reinforced corners support the base of the tank. La Garde supplied special circular metal collars that limit the movement of the tank's six feet (see photo on page 13).

Dimensions of the 6,000-gallon (20-ton grape capacity) tank are 115 inches (side walls), 112 inches (front and back walls), 127 inches tall from the 2% slope floor that is 34 inches above ground. There are six breakdown tanks: two 1,250 gallons, two 1,000 gallons, and two 750 gallons.

Cooling/heating capability on new tanks

"The 6,000-gallon fermentation tanks have two sets of tank wall channels for recirculation of chilled or warm glycol to give winemaker Justin Seidenfeld close and constant temperature control," explains Bob Heasell, senior engineer at Applied Process Cooling Corp. (APCCO).

A "toad" irrigator was installed inside the truncated manway at the top of the tank to perform a 20-minute pump over supplied by a 2-inch air pump three times per day.

Depending on the temperature of the fruit being received, the two tank wall-channel system allows for either cooling or warming of the fruit.

In the 2014 harvest, grapes typically arrived at the winery at 70° F and were chilled for three days in tanks with chilled glycol in tank wall channels to lower the fruit temperature to 50° F. On the third day, the fruit was allowed to begin to warm up naturally to assist the initiation of primary fermentation, and the system continued to precisely manage the tank temperature.

During the cooling mode, both the upper and lower jackets provide cooling based on a TankNet controller activat-

Glycol piping on tank back wall.

ing chilled glycol supply and return solenoid valves.

In this system's design, a special upper jacket solenoid valve was incorporated to allow flow to the upper cooling jacket only in the cooling mode to cool the cap during fermentation. This is a concept that has been incorporated on many new tank additions at Rodney Strong Vineyards that have a warming feature.

During the warming mode, the TankNet controller activates warm glycol supply and return solenoid valves but with the upper jacket cooling solenoid valve remaining closed, supplying warm glycol to the lower jacket only.

"Three additional special features were included in this installation to guard against line breaks and loss of glycol," adds Heasell:

• Flex connectors were installed in the glycol piping at the tank jackets to compensate for pipe and equipment movement caused by catwalk movement, tank wall movement or even mild earthquakes. During the August 2014 earthquake near Napa, Calif., numerous wineries experienced cracked piping and loss of propylene glycol solution. Installation of flex connectors in the glycol piping should help in this regard.

• A glycol line pressure transducer was installed. Upon a loss of glycol pressure, a PLC is specially programmed to deactivate the glycol pumps and make an automatic notification.

• The piping and valve assemblies were arranged to take advantage of the work space. Facilities manager Larry Solomon, along with APCCO and other contractors, designed the piping layout between the backs of the tanks by holding the assemblies close to the tank wall (see photo on page 12). In addition to providing valuable hose and pump storage space, this allows for cellar and maintenance personnel to easily and quickly approach and isolate the valves manually in an emergency. It also provides the working space needed by service crews to replace/repair valves and fittings as quickly and efficiently as possible.

Anchor-collars surround tank feet to minimize seismic movement in an earthquake.

Cap management in primary fermentation

"For grapes fermented in the new cellar, our cap-management program allows for changes based on many different factors with some basic guidelines," says winemaker Justin Seidenfeld.

Upon arrival at the winery of the hand-harvested grapes from the vineyard in the early afternoon, grapes are destemmed and receive an SO_2 addition with a target of 30 to 40 ppm total SO_2 in tank.

On day two, a sample is taken for juice analysis. On day three, initial nutrients are added and either the fermentation is allowed to start without inoculation or U43 yeast is added, based on winemaker discretion.

When fermentation has started, until about 10° Brix, there are three pump overs per day. Each pump over should turn over the tank volume once. From 10° Brix onward, there will be two pump overs per day (to turn over the tank volume one time). When the wine has fermented to dryness, there is one pump over per day to wet the cap, turning over between one-quarter and one-half of the volume during the pump over.

There are a few different parameters for temperature, but the goal is to allow the temperature to increase gradually. "We want to avoid spikes in the fermentation curve," adds Seidenfeld, "and use tank-wall refrigeration to guide the fermentation to a nice curve, with peak temperature between 75° and 85° F.

"When the wine reaches 0° Brix, we will use warm glycol in the tank wall to assist thermal maceration for additional extraction. We will warm the tank over several days from 84° to 88° F.

"Our goal is to have a minimum of 21 days of skin contact. We will make all pressing decisions based on taste and start daily tastings as soon as the wine in the tank is dry."

The free-run wine is drained from the fermentor to another tank for 24 hours of settling, and racked to another tank for inoculation with malolactic bacteria. The next day the inoculated wine goes to barrel with a Guth tank mixer stirring the lees during barrel-down.

Floor coating of new fermentation cellar

"Seidenfeld invested much attention on a state-of-the-art tank room expansion and found he had to solve durability and aesthetic issues with the existing floor of a cellar to be remodeled," says David Genova, Lennova VP of Operations.

Seidenfeld searched for a new flooring company that could solve technical drainage and durability issues. He learned about Lennova from colleagues at other wineries. "Seidenfeld asked to see if Lennova's approach of creating custom solutions and attention to detail could really meet Rodney Strong's needs," adds Genova.

"Rodney Strong and other wineries have found that natural compounds in wine such as sugar and acidity can seep through and both degrade and destabilize concrete floors. This creates a challenge as forklifts with a four-barrel pallet negotiate tank rooms with eroded, uneven and rutted floors. The damaged floors sometimes led to incidents impacting productivity, product loss and health code violations."

Seidenfeld reviewed a solution for eroded concrete floors at another winery's tank room. "Although he was pleased with the workmanship and performance of the flooring installed, he wanted to make sure that the solution would be a seamless flooring system that met the Rodney Strong Vineyards' unique needs and aesthetic values."

One big challenge for the new tank room was drainage. Lennova had to deal with existing elevations, newly installed trench drains and flat concrete with existing door openings to the building.

"Using a simple but effective method of long, straight boards, shims and levels we determined the appropriate deflection (drainage slope of 4 inches over 16 feet) for proper drainage. We used a material unaffected by fluctuating moisture and acidity that would also stand up to forklift traffic to build the needed deflection."

A resinous material was chosen with an anti-microbial additive to prevent bacterial growth rather than cement because most cement-based products lose tensile strength and impact resistance as it tapers to less than ¼-inch thick to accommodate the slope. The sloping material was mixed in manageable quantities and troweled in place over the existing concrete with the use of screed bars and forms (see photo on page 14).

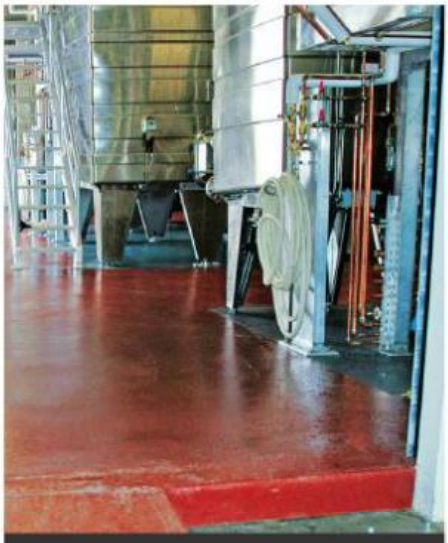
A red and brown blend of decorative colored quartz was chosen for high traffic areas and charcoal gray for underneath the tanks.

"The fluid-applied, seamless flooring material has the viscosity/consistency of a pancake batter, and once the flooring is troweled in place and is leveled out over the sloping material, we broadcast the first layer of colored quartz," explains Genova. After curing and sweeping off the spent quartz, a clear build coat was applied, and the second layer of colored quartz was broadcast to ensure color uniformity and consistency.

Once cured, a clear seal coat was applied to lock in the colored quartz and begin the process of traction control. After the clear seal coat was cured, the entire flooring surface was protected with a clear, chemical-resistant and high-traffic sealer. Since this is a seamless floor application, the color separation actually doubled the time required for installation, as one color has to be completely dry prior to installing the other color.

The correct size of coarse aggregate was blended in and applied in the finish coats at a particular thickness to achieve the perfect balance between floor traction and ease of surface cleaning. The entire process from start to finish took approximately 28 working days completing approximately 11,520 square feet and 404 linear feet of integral cove base on the walls (12 inches high).

Installation of sloped floor.



Tank floor has a 4-inch slope from the wall to the floor drain between two rows of tanks.

By drawing on lessons learned from 15 years of customer experience, Lennova provided a unique solution for Rodney Strong Vineyards.

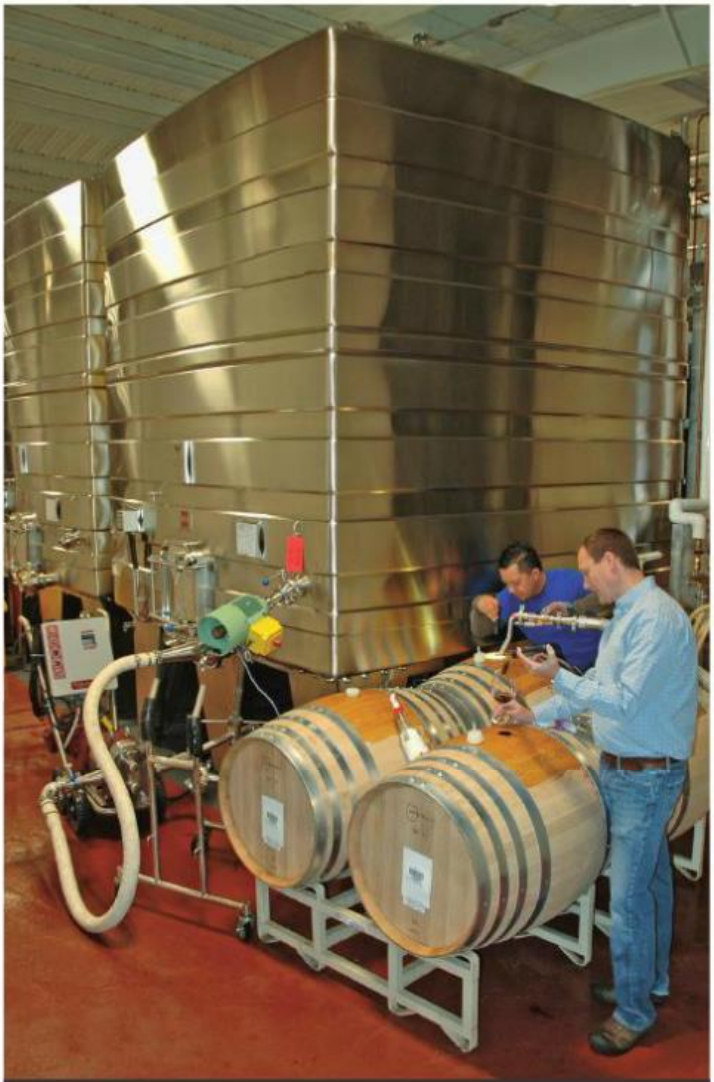
Barrel selections for new red wine blend

Seidenfeld has identified Cooperages 1912, Gamba and Vicard Generation 7 as the three primary cooperages for the new red wine blend.

Botti Generazioni, an extension of the Gamba Cooperage in the Piedmonte province of northern Italy, supplied barrels with a blend of 28-month naturally seasoned staves from the center of France that utilized a proprietary, slow Toast Check process.

Cooperages 1912 supplied three French oak barrels, each contributing a unique influence: World Cooperage Profile 8 for added spice, World Cooperage Profile 14 to enhance structure and the T.W. Boswell Legacy barrel for beautiful balance.

Vicard Generation 7 French oak barrels are coopered from staves with low, high and mixed tannin potential levels, and then "cooked" for 90 minutes with a patented bending and toasting process.



Luis Flores, barrel foreman, racks wine from tank into barrels while Justin Seidenfeld (right) samples barreled wine. Wine from the tank flows through a 3-inch diameter Waukesha variable speed 0 to 130 gpm positive displacement pump with a winged rotor. Four-barrel pallets are used at Rodney Strong Vineyard for best stability in an earthquake.

Water conservation/sanitation in tank cellar

"A winery that has good sanitation standards produces wines that reflect that," says cellarmaster Manuel Villanueva. "A high-quality wine is difficult to achieve if you have poor sanitation practices. Rodney Strong Vineyards has been ensuring sanitation is a top priority for many years, but we need to find ways to continually improve.

"We have a four-step sanitation cycle that consists of: 1) warm water (85° to 100° F) rinse to remove debris and some organic stains, 2) caustic circulation to completely remove all organic stains and film residues, 3) cold water rinse to remove dirty caustic water, and 4) peracetic acid (PAA) circulation to kill any microorganisms remaining that the caustic solution missed.

"Approximately 50 gallons are used in each step. Depending on how dirty a tank is, we circulate the caustic solution for about 20 minutes and about 10 minutes circulation for PAA. We use a 10 hp centrifugal pump and a Lechler M20 sprayer on a cart on the tank floor.

"The pH level of the wash solutions are monitored to ensure the caustic wash is maintained above 10 to 11 pH and PAA wash is maintained around 120 to 140 ppm. When we dissolve the caustic solution in warm (85° to 100° F) water, we make sure the pH of that solution is above 10 pH using test strips or a digital pH pen. The PAA is tested with a test kit that uses a series of solutions (50% sulfuric acid, potassium iodide, starch indicator and sodium thiosulfate 0.1N/ peracetic DT) measured in drops to determine ppm.

A previous seven-step cycle took approximately 80 minutes and required approximately 1,000 to 1,200 gallons of water per tank sanitation. The four-step cycle has reduced the wash-time to approximately 30 to 45 minutes, and approximately 150 to 200 gallons of water are used.

"This change, along with reducing the water supply hose from 1-inch to ¾-inch diameter, has helped conserve about 1,000 gallons water per tank wash," adds Villanueva.

"To further conserve water, we will take the added step to collect and re-use the caustic and PAA wash water after cleaning a tank if the concentrations are at required levels and the water is not too visibly dirty. The PAA circulation in the tank is not rinsed so that the PAA can conserve the sanitized tank status longer. As long as we ensure the ppm are within tolerances and allow the tank to drain out all the water that settles inside the tank, direct wine contact to the tank is safe and has no harmful effect on the wine.

"We have swab-tested both methods of sanitation and found that although both consistently passed, the four-step method had passed in almost all areas that we swabbed (valves, gaskets, welds and inside tank top). We are experimenting with the new square tanks to see if we can achieve the same results without using caustic cleaner. Since the tanks have a special polished surface inside that reduces the pore size of the metal, they are more resistant to staining than non-polished tanks." PWV