The Use of Nitrogen in the Winery

By: Dana Hinders

Although the quality of your grapes is obviously a vital part of making wine, managing exposure to oxygen via the use of nitrogen can play a key role in creating a product your customers will love.

Using Nitrogen to Enhance the Quality of Your Wine

Exposure to oxygen can have a negative effect on your wine's stability, quality, and longevity. Over time, oxygen causes oxidation that will turn your carefully prepared wine into a vinegar-like substance. Browning, loss of freshness, and sherry-like aromas can also result.

Nitrogen gas is used throughout the winemaking industry to eliminate exposure to oxygen during bottling and storage. It can be used alone or with argon and carbon dioxide.

Drew Horton, an Enology Specialist with the University of Minnesota's Grape Breeding & Enology Project, has extensive experience using all three gases in the winemaking process. "I worked at a winery where we used carbon dioxide when working with young white whites," he said. "We used argon when storing and bottling aged dry red wines. We used nitrogen for almost everything else."

According to Horton, a winery's need for nitrogen only increases as the facility expands, "The bigger a winery is, the more nitrogen they'll typically use," he said. "The most common use is to sparge a tank to displace the air before filling it to minimize oxidation of the wine. The next biggest use is for bottling."

Reasons to Invest in an On-Site Nitrogen Generator

When you purchase an on-site nitrogen genera-

tor, you'll be free to focus on the task of making the best possible wine. Generators save time and money, two resources that are in high demand for any winemaker.

On Site Gas Systems has been manufacturing nitrogen and oxygen generators for over 30 years. A leader in nitrogen and oxygen generation, they are an ISO 9001 and ISO 13485 certified company as well as being an approved FDA manufacturing facility. President Robert Wolff says having an on-site nitrogen generator will allow your winery to generate your own nitrogen as you need it right at your facility with no unnecessary downtime. "With an on-site nitrogen generator, you eliminate the need to have nitrogen delivered in either cylinders or dewars," he said. "This also eliminates the need to be constantly moving or changing cylinders as they are emptied."

Wolff also feels that eliminating waste and production delays benefits the winery. "Another issue with cylinders is that you usually only use about 70% of the nitrogen in the cylinder, yet you pay for 100%," he said. "You also eliminate the potential of running out of nitrogen and either slowing or halting production."

Compressed Gas Technologies Inc. has been a supplier of nitrogen generators since 2001. "Our nitrogen generation specialists are very well versed in sizing systems and determining which type of nitrogen generator is best suited for an application," Sales Manager Pat McCloskey said. "We look at the system as a whole, from the compressed air system feeding the nitrogen generator, to the nitrogen generation system itself."

When asked why an on-site nitrogen generator would be a smart investment for a winery, McCloskey echoed many of Wolff's key points while appealing to the desire to remain eco-friendly. "For a winery, purchasing an on-site nitrogen generator offers a number of benefits," he said. "You'll have an unlimited supply of nitrogen and handling of high pressure nitrogen cylinders is eliminated. However, on-site generators are also good for the environment. They eliminate regular truck deliveries and reduce the winery's carbon footprint."

A Winemaker's Perspective

Jason Centanni is the winemaker at Llano Estacado Winery, the largest premium winery in Texas. He

says economic factors were the main reason the winery decided to invest in an on-site nitrogen generator. "Although the cost of purchasing nitrogen isn't very expensive, the cost of rentals and delivery does add up over time," he said. "Nitrogen is a gas we use almost daily at our winery, so having the means of producing our own nitrogen was long overdue. We already had most of the required equipment—air compressors, gas regulators, tubing, gas fittings—to facilitate an install of a generator, so that helped. After calculating what our daily nitrogen needs were, sizing the generator was all that was left."

If you're contemplating investing in an on-site generator, Centanni urges you to factor in the reduced waste involved in handling your nitrogen needs on-site. "We considered using bulk containers with a monthly delivery, but found that the cost and availability were prohibitive," Centanni said. "The only type of bulk containers we could get were rented dewars of liquid nitrogen, which were used for our bottling runs. We encountered problems during the summer months, because our bottling area is not climate controlled. The liquid nitrogen tended to boil out of the pressure relief valve on the tank, causing it to stick open and emptying the tank in hours if not fixed. Having total control of our nitrogen production has eliminated this waste."

The Llano Estacado Winery team calculated an 18-month ROI on the unit they purchased. They're currently using their nitrogen generator for inline sparging, purging empty bottles, purging the filler bowl, and during the shutdown process. However, this is just the tip of the iceberg for how they plan to make the winemaking process more convenient. "We are currently installing flex-lines throughout the cellar so we can expand our use to emptying barrels, wine sparging, and tank headspace purging," Centanni said. "Installed in place regulators with quick connect adapters has proven to be less burdensome, tidier, and safer than using tanks on dollies."

Purchasing Considerations

When you're purchasing your nitrogen generator, one of the first decisions you'll need to make is whether you're interested in membrane or PSA technology. "Both membrane and PSA nitrogen generators are well suited for a winery," McCloskey

said. "Both will give an endless supply of nitrogen for many years as long as the compressed air quality feeding the nitrogen generator meets the manufacturer's specifications. Ultimately it will depend on the customer's nitrogen requirement in terms of flow rate, purity, and pressure. Most nitrogen generator companies will be able to work closely with the winery to determine what system best suits the customer's needs."

If you're on an extremely tight budget, purchasing a refurbished generator might be an option to consider. "A refurbished unit may be a great option if you . . . find one that meets or exceeds the size of the nitrogen generator needed," Wolff said. "On Site Gas Systems offers refurbished units when they are available. Our refurbished units are usually available due to the end of a rental contract. Each unit comes back to our factory and is completely inspected and put back into as new of condition as possible. Every one of our refurbished units is offered with a specification certificate and factory warranty."

For those with more to spend, a custom engineered nitrogen generator system could be a smart investment. Having a system built to your specific needs offers maximum flexibility. "If there are any special factors or unique circumstances such as space limitations or harsh ambient conditions, then an engineered system from On Site Gas Systems would be an option," Wolff said.

Looking Beyond Price

Although cost is obviously a factor when you're investing in equipment for your winery, Wolff points out that payback for the purchase of a nitrogen generator occurs fairly quickly. "The most important factor will be the reduction in expense to generate nitrogen versus buying nitrogen," he said. "Most wineries would require a small unit, so the capital expense will be minimal. A payback on the equipment usually occurs in less than 18 months."

McCloskey urges winery owners not to get so hung up on price that they neglect to purchase equipment that fits their needs. "With a nitrogen generator, you are looking at payback versus your current nitrogen supply of cylinders and dewars," he said. "If the payback is there, and the nitrogen generator you are most interested in is more money than the competitors, buy the unit you are happy with. Don't get caught up in saving a few dollars on a product you are not 100% happy with."

Reliability and Customer Service Count

A nitrogen generator is an investment in the long-term success of your winery, which means you want to purchase from a company you can count on. "A winery should perform due diligence before any purchase of a nitrogen generator and make sure they are purchasing from a company that has a solid referral list, is ISO 9001 certified, and has been in business for many years," Wolff said.

McCloskey points out that customer service will prove key if you experience any issues with your generator in the future. "Most wineries do not have a large maintenance staff. Therefore, they want to find a nitrogen generator that has a minimum amount of maintenance required," he said. "Over the last few years, there have been many companies entering the nitrogen generation market. The equipment they have been selling does not have a proven track record. Make sure you deal with a company that has been around for some time and is going to be there in the future."