

Winery Design: Image and Sustainability

Part One of a Three-Part Series

Story by Dr. Bruce Zoecklein

“A wine cellar must have a low ceiling at the entrance, so that wine writers bow down to you upon entering.”

BRUCE ZOECKLEIN is head of the Enology—
Grape Chemistry Group at Virginia Tech University.

The quote above is winery design advice given to me by Alphonse Mellot, Domaine de la Mousiere, Sancerre, France. The following column is adapted from *Winery Planning and Design*, Zoecklein (2007), available in CD format at www.vtwines.info.

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Pictured from top: Saracina Vineyards, Palmaz Vineyards.

Issues in Winery Layout and Design

Coordinated by Dr. Bruce Zoecklein, Head, Enology-Grape Chemistry Group, Virginia Tech. This day-long program will cover practical topics of interest to those starting a new winery, or expanding an existing facility. Industry and winery architects will discuss and review issues under these topics:

- *Winery Design & Examples*
- *Integration of Winery Process Equipment, Layout and Design*
- *Green Design Considerations*

Fri. March 7th, 2008 at Wineries Unlimited

Register online at: www.wineriesunlimited.com

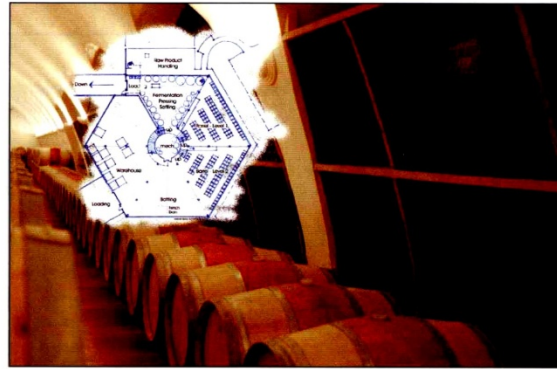
WINERY DESIGN

At a Glance

- ▶ Each winery, regardless of size, is a specialized operation, and design should consider the particular needs of the winery.
- ▶ As tourist and customer destinations, wineries today should be designed for aesthetic merit as well as for optimal processing.
- ▶ A compelling winery design can be a powerful part of branding; sustainable or green designs can be very important in establishing an image and brand identification.
- ▶ Green construction has become a trend; there is no dichotomy between sound environmental practices and economic enrichment.
- ▶ Green construction involves site planning, design and construction, including the sustainability of the site, water usage, energy usage, environmental quality, and materials.

the 21st century, it should be acknowledged that the fundamentals of wine-making have not changed over the centuries, however both technologies utilized and functional winery designs

aesthetic architectural merit if tourism is involved. Additionally, today's wineries must be efficient in terms of energy and resources, must be environmentally responsible, and must support



The front cover of Dr. Zoecklein's Winery Planning and Design CD.

have changed dramatically. Today, most wineries are more than processing facilities and certainly should have

the brand image desired. Objectives of winery design and expansions usually include the following:

- Establish a positive image
- Have a desirable location
- Produce wines of high and uniform quality
- Efficiently use raw materials, manpower, and energy
- Create a functional and expandable design
- Have low construction costs



Photographed on location at the Grgich Hills Estate, Rutherford, Ca.

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- Optimize a desirable working environment
- Achieve acceptable environmental impact

ESTABLISHING A POSITIVE IMAGE

The link between winemaking and the buildings in which it occurs goes back to the late 18th century, when winemak-

ers in Bordeaux began using the word "chateau" on wine labels. Today, the representation of the winery through label design has progressed beyond merely using "chateau," to using the image of the winery.

As suggested by Stanwick and Fowlow (2006), the ability of consumers to select a particular wine is confounded by the number of choices available

in the ever-expanding marketplace. As such, many attempt to increase brand identity. Wine producers are increasingly looking to architecture and the image created by their winery design as a method of identity and branding.

When given the choice, customers frequently choose products they perceive most closely match their own values and ideals. It is obvious that institutions and corporations are utilizing building designs to help create an identity, the ultimate in branding, the building as a signature of identity. For the wine industry, this trend is also architecture as a tourism conduit, referred to by Stanwick and Fowlow (2006) and others as the "Bilbao effect," after the tremendous success of the Frank Gehry-designed Guggenheim Museum in Bilbao, Spain.

Don Triggs, former president and CEO of Vincer International, notes in Stanwick and Fowlow (2006) that the hospitality element of the wine business is inextricably linked with brand and product image. He suggests a parallel relationship between consumers' view of a wine brand, what it means to them, and the experiences that they have with the winery. Creating a great wine, and an appealing environment to produce and house that wine, can both be considered art forms. To a certain extent, consumers relate to a brand in terms of its perceived image and lifestyle. As such, winery design and expansions should consider this interrelationship in the very early planning stages.

THE 'GREEN' IMAGE AND SUSTAINABLE DESIGN CONSIDERATIONS

Building and construction in the USA uses 65% of the electricity consumed, produces 30% of the greenhouse gas emissions, uses 30% of the raw materials, and consumes 12% of the potable water. Until the rise of the petrochemical industries a few decades ago, all agricultural chemicals were organic, and almost all construction was with local material. As sustainable viticultural practices have spread, so has the interest in sustainable winery construction. Sustainability is the concept of blending economic prosperity, social responsibility, and environmental quality based on the belief that the confluence of these enhances the



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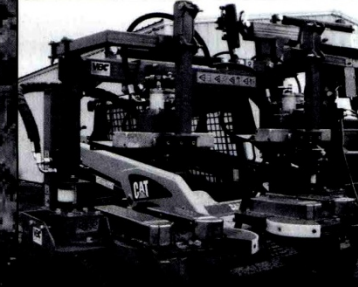
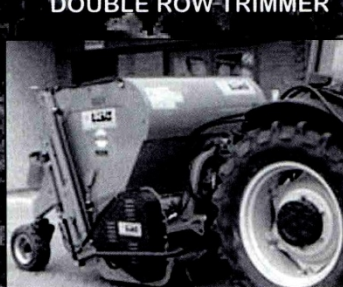
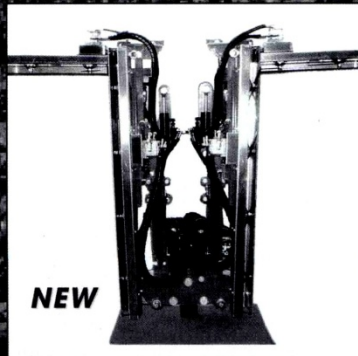
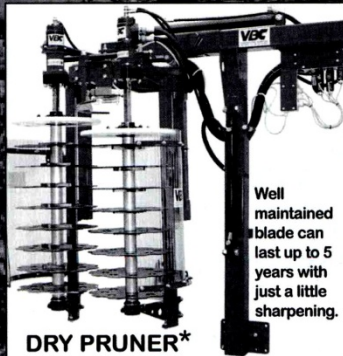
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quality of life for present and future generations. While the wine industry has traditionally considered itself as environmentally friendly, a California study conducted several years ago reported the industry was the largest energy user in the food industry sector. This realization, coupled with the desire to sustain success, has promoted changes.

A unique feature of the wine industry is that each winery, regardless of size, is a specialized operation. A particular winery may place more or less importance on fresh whites vs. aged reds, on general tourism and aesthetics, versus food and wine pairing, etc. Many believe that an optimal site and facility combine traditional winemaking philosophies, such as minimal fruit and wine handling, with modern engineering and aesthetics.

"Green" construction has become a trend, as it is obvious that Mother Nature's resources have been stretched beyond the limits of sustainability, and that there is no a dichotomy between sound environmental practices and economic enrichment; they are supplemental. It is now obvious that it will be cheaper to preserve fossil fuels than to continue to buy them. The long-term operational savings from sustainable designs and expansion may help to offset some of the initial costs. Additionally, sustainable or green designs can be very important in establishing an image and brand identification.

In the very initial planning stages, an elaborated business plan should be created that includes a detailed review of the business philosophy and a review of potential Environmental Performance Indicators (Lyster, 2003):

- Energy
- Water
- Materials
- Waste
- Emissions and discharges into air, land and water
- Biodiversity
- Ozone-depleting substances
- Suppliers
- Products and services

"Green" or sustainable construction involves site planning, design, and construction, including the sustainability of the site, water usage, energy usage, environmental quality,

WINERY DESIGN

and materials. Some practical steps to consider, adapted, in part, from Chauncey (2006) are listed below.

Use cool-build materials:

- If metal roofs are utilized, use materials developed or painted with infrared-reflecting pigments to lower the amount of heat absorbed from sunlight.
- Cool roofs can reduce heat absorption and cooling costs by as much as 13%.

Use regional materials and local fabricators:

- This helps to reduce transportation impacts and stimulates the local economy.

Use building and construction materials with a high percentage of recycled content:

- Straw construction buildings are becoming more popular. Straw is the inedible stock of grains such as wheat, rice, and rye.

Use optimum building insulation:

- Have portions of buildings underground, or partially underground, to take advantage of the earth's constant temperature.
- Have barrel storage areas where walls are in contact with the earth, which can eliminate the need for cooling. Air movement, from fan coil units cooling an above-ground barrel room, dries out the barrels and increases evaporation. To help control this problem, winemakers humidify this space, adding cost and some additional potential problems.

- Barrel rooms that do not need cooling will promote less evaporation.

Consider geothermal heating and cooling:

- Water circulates in a sealed loop that extends well into the earth.
- In the winter, the water absorbs heat from the earth and carries it to a compressor, which raises the temperature.
- In the summer, the water takes heat away from the building and transfers it to the earth.
- Orient and insulate buildings to optimize energy.

Optimize the use of shading:

- Blocking sunlight that would fall on building surfaces can dramatically reduce cooling loads.
- Plant trees along the south and west faces of the buildings.
- Install wall trellises; grow vines or shrubs to shade walls.
- Design sunscreens that shade and ventilate heat away from the wall surfaces.

Consider low emissive insulation on windows:

- Metal oxide glazing can allow the sun's heat and light to pass through glass while blocking the heat from leaving the building, thus reducing heat loss.

Increase daylight levels and outside views in winery design:

- Add skylights or upper windows (clerestories), while avoiding direct sunlight on barrels or tanks.
- Design additional windows and skylights in subterranean spaces to expand views to the outdoors from as many occupied spaces as possible.

Design natural ventilation:

- Design windows or louvers at or near the floor level of the winery to bring in cool night air that blankets the

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ground. By also opening a louver in the upper part of the winery, a passive ventilation system is created. Hot air that has been accumulated during the day can be exhausted through a louver in the clerestory area. The hot air leaving the winery pulls cool night air in the lower louver. Such purging can be done without mechanical equipment.

Water usage:

- During harvest, a 30,000-case winery can use as much as 3,000 gallons of water per day.
- Reduce water use by collecting wash-down water, settling/filtering, adjusting the pH, and using for irrigation of winery grounds.
- Consider rainwater collection systems for landscape irrigation, etc.
- Use evapotranspiration irrigation systems that irrigate based on current weather conditions.

Sustainable site planning:

- Use native and adaptive plants and landscaping that will require minimum irrigation and help to promote biodiversity.

Use minimal exterior lighting and computerized cut-off fixtures, motion sensors, and/or timers for both interior and exterior lighting:

- Use environmentally sound lighting.

Construct buildings with mass:

- A thin-wall building with a metal skin and batt insulation allows heat (and cold) to penetrate more quickly than a thick-wall building.
- Build with concrete, masonry, or stone, and sandwiched insulation.
- Thick-wall buildings absorb heat all day long, and release it at night

with little impact on the interior temperature.

Consider the use of biodiesel and wind energy.

Consider solar:

• Panels transform light into direct current, which is converted to alternating current that can go directly to power winery needs.

• About 30 California wineries have installed photovoltaic panels to provide some or all of their electrical needs.

• Conduct a site audit. Evaluate shade, building orientation, degree of pitch, and daily light interception to create a solar orientation factor used to evaluate efficiency.

• Review the California Solar Initiative, or other state and federal agencies for a review of initiative programs.

• Solar can pay for itself within 3-5 years, with panels lasting up to 30 years.

Gravity flow design:

• True gravity flow can reduce the use of pumps and motors.

Establish a recycling program:

• Create a zero-waste philosophy, if possible.

LEED (Leadership in Energy and Environmental Design) is a point system used to quantify the use of "green" materials, designs, and products. The rating system contains several sections and subsections in which points are allocated towards LEED certification of a building. Information is available at www.thermomass.com. Additionally, the Sustainable Winegrowing Alliance has created an assessment workbook that helps to

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evaluate energy usage and methods for establishing integrated energy and water use plans. For information, see www.sustainablewinegrowing.org.

In the very initial stages of winery planning, an elaborated business plan should be created that includes a detailed review of the business philosophy, and a review of 'green' or sustainable practices such as those listed above. Microsoft Project can be used as a simple software tool for compiling the varied and complex activities of winery planning, including a review of sustainability options. It allows for the integration of the following:

- The overall goal
- Specifics regarding the project management
 - Individual tasks to be performed
 - Timelines for those tasks to be completed
- Timing the relationships between those tasks
 - Resources needed
 - Budget components


Information on sustainability and green design will be part of Dr. Zoecklein's seminar on "Issues in Winery Layout and Design," on Friday, March 7 at Wineries Unlimited (see ad on page 68. 

REFERENCES

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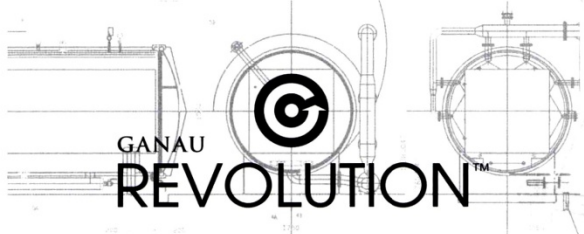
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