

Starting Out? Five Questions to Ask at the Outset

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Vino and *Veritas*

Winery pairs tradition
and Six Sigma

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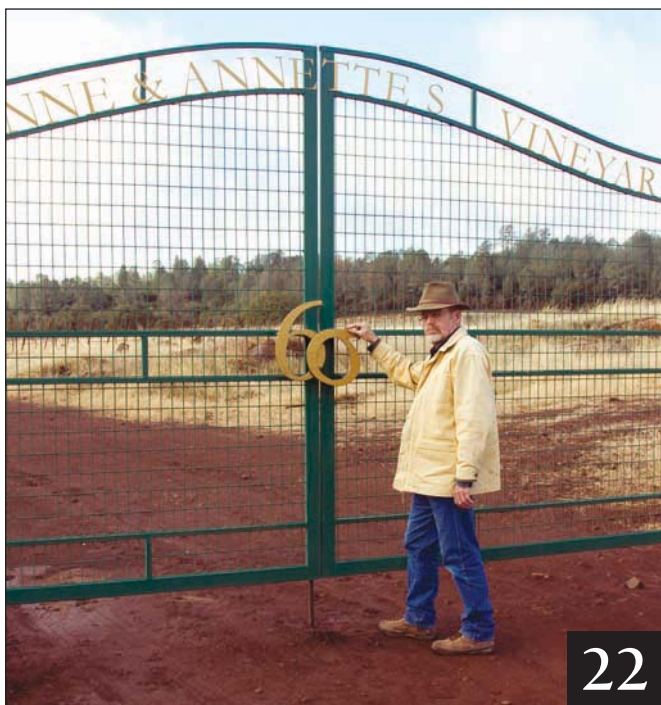
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BY JAMIE FRIDDLE

When Kaj Ahlmann retired from an executive position with GE, he carried the principles of Six Sigma to his new endeavor – Six Sigma Ranch, Vineyards and Winery in California, USA. Ahlmann and his team have proven that pairing Six Sigma and winemaking is a good match. Every stage of wine production is treated as an elongated SIPOC (suppliers, inputs, process, outputs, customers) so production personnel can best define and understand the various processes.

CORPORATE LEADERSHIP

On the cover:
Kaj Ahlmann, owner, Six Sigma
Ranch, Vineyards and Winery

Cover photo by Amy Nash

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BY MICHAEL MARX

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To be more competitive, many organizations at some point take on the difficult task of changing their corporate culture. The key to success lies in understanding how culture is shaped.

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Six years into the Six Sigma deployment at TRW Automotive, a team performed a DMAIC project to determine how the process improvement program itself could benefit from continuous process improvement. The project resulted in a monitoring method to report on how each business unit was performing on the critical factors found in the Analyze phase.

THE FINAL TOLLGATE

45 | **A True Story: The Black Belt and the Magic of Communication**

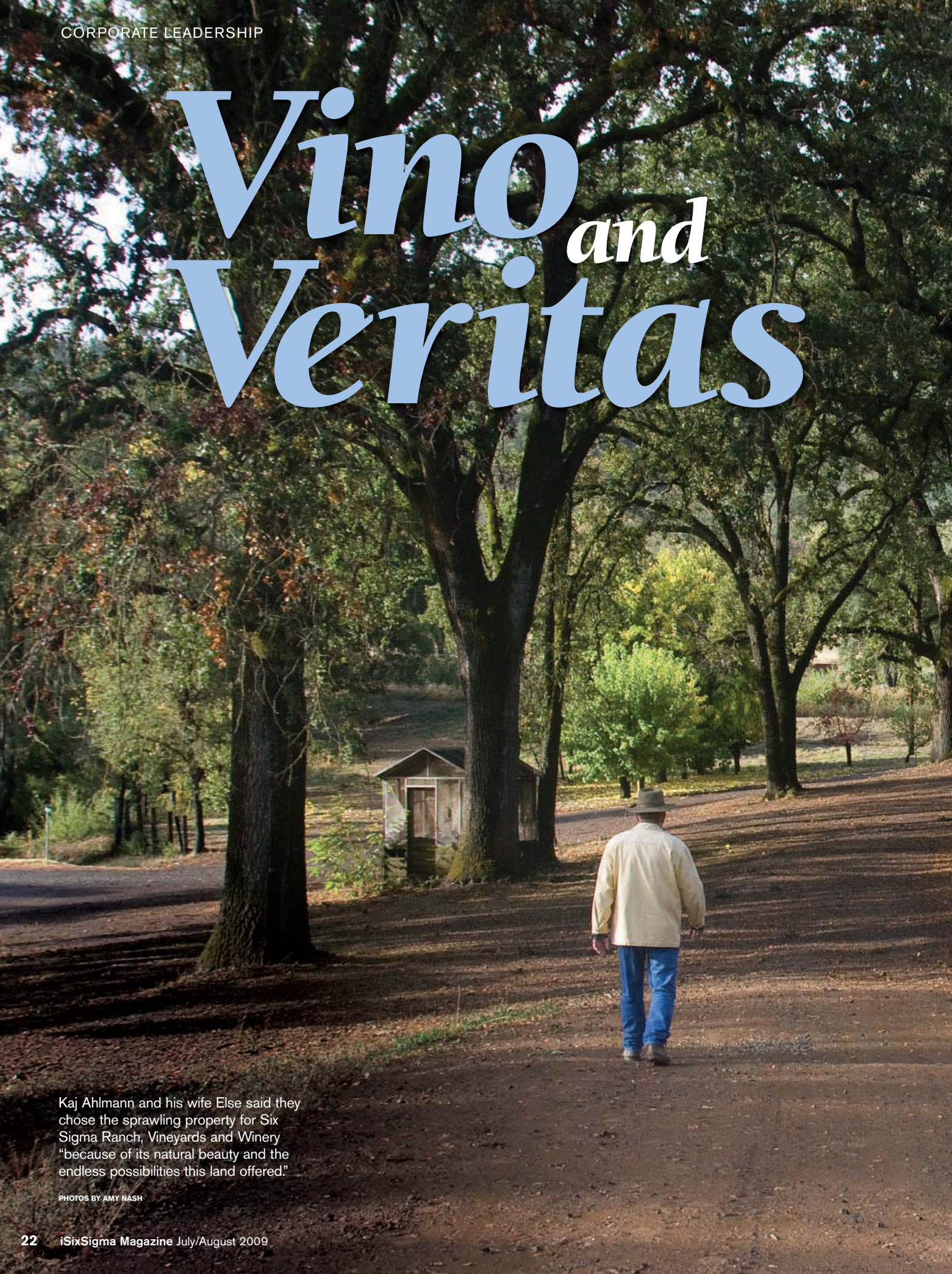
BY SCOTT GOLMEN, CAROL KEERS AND JOHN UNDERWOOD

Learning to communicate with clarity, confidence and passion helped this Black Belt improve his performance and invigorate a Six Sigma program.

METHODOLOGY

➤ This article is related to the theme of *The Starting Block*.

Vino and Veritas



Kaj Ahlmann and his wife Else said they chose the sprawling property for Six Sigma Ranch, Vineyards and Winery "because of its natural beauty and the endless possibilities this land offered."

PHOTOS BY AMY NASH



California vintner pairs tradition and Six Sigma

BY JAMIE FRIDDLE

Pairing an entrée with a wine is a familiar convention.

But pairing the rich tradition of winemaking with Six Sigma? That match is not as obvious.

After all, an appreciation of wine is ultimately subjective, and an image of sun-drenched vineyards and casks of wine aging in dark cellars is romantic. Six Sigma, on the other hand, is purely objective, its application scientific. Which is exactly why when Kaj Ahlmann made a lifestyle change to start his own winery, he relied on the statistical principles he knew and believed in.

“I looked at the entire process, from doing the research before you plant the vineyard to producing the wine,” said the GE executive-turned-vintner. “It’s a very well-defined process, and in every step of the way, you can actually apply Six Sigma.”

Kismet and Serendipity

Ahlmann had been smitten by the Spanish Tempranillo grape as a young man in his native Denmark, and after visiting Northern California's wine country in the 1970s, he began nurturing a dream of owning his own vineyard. The dream took root in the soil of Lake County when Ahlmann and his wife bought a ranch there in 1999 – the same year he retired as chairman, president and CEO of Employers Reinsurance Corp., at that time a unit of GE. Lake County is wedged north and east of the celebrated counties whose names roll rhythmically off the tongue – Napa, Sonoma, Mendocino, the big three of California winemaking.

Off and on since the 1870s Lake County had been home to a number of iconoclastic and pioneering grape growers. In 1999 the area was just beginning to pull out of a slump in its bulk grape market, a market that had fed such well-known players as Robert Mondavi and Kendall-Jackson. Land prices were still significantly lower than in the big three counties, and Ahlmann seized the opportunity to purchase 4,300 acres of ranch land near a town called Lower Lake.

Before planting a single rootstock, Ahlmann named his enterprise Six Sigma Ranch, Vineyards and Winery. "I wanted to produce a quality product," Ahlmann said. "And I started from the top: 'Why don't we call this thing Six Sigma Ranch to indicate that it's going to be a slightly different operation?'"

On a bright autumn day in 2005, the first rivulets of ruby liquid were gently crushed from 6.4 tons of Ahlmann's very own Tempranillo grapes – the variety that had caught his fancy all those years before, and one not common in the United States. The inaugural Tempranillo was the first Six Sigma Ranch wine produced on-site. Released in 2007, it was praised in *Wine Enthusiast Magazine*, and received a rating of 91 out of 100 and "Editors' Choice" designation.

SIPOC, VOC and DMAIC

Applying the methodology he had practiced in his days with GE means that Ahlmann and his team don't depend on their senses and providence to produce good wine. Although the winery does not have a Six Sigma deployment in the sense of large-scale efforts (there are no full-time Black Belts or Green Belts on staff), the principles and many of the tools are rigorously used. Every stage of wine production is treated as an elongated SIPOC (suppliers, inputs, process, outputs, customers) so production personnel can best define and understand the various processes.

Every process detail is connected back to the voice of the customer (VOC), which is gathered at tasting events in the ranch's converted bungalow and through a newly formed advisory board comprising winemakers, a sommelier and distributor representatives.

Do people want "fresh and crispy"? "We can give them something fermented in steel," Ahlmann said. More of a "mouth feel and softer"? "Then we give them something fermented in oak barrels." When a correction is needed in a process, Ahlmann and his team apply the standard Six Sigma roadmap, DMAIC.

"We are more focused on high and consistent quality



The label definitely says "Six Sigma." Part of the winery's marketing plan includes gift packs for industry professionals.

Company Profile

Company name: Six Sigma Ranch, Vineyards and Winery

Headquarters: Lower Lake, Calif., USA

Founded: 1999

Number of employees: 12 full-time; 35 at harvest

2008 revenue: \$3 million

2008 net income: Low "due to investments in new vineyards, new facilities and ranch infrastructure"

Primary business activities: Winemaking, grass-fed beef, agritourism, event hosting

Website: sixsigmaranch.com

than we are on costs," said Ahlmann. "Having said that, given the fact that the entire company has been designed as one long process...we are by nature a pretty lean organization. We obtain consistency by using data to make decisions in every process step."

Ahlmann is enthusiastic, but not the least bit didactic. He speaks from years of experience as a mathematician who studied for his master's degree in mathematical statistics under the noted Anders Hald at the University of Copenhagen. Later he



Six Sigma Ranch now has 12 stainless steel tanks for wine fermentation, double the number the fledgling business began production with in 2005. From any laptop computer, the winemaking team can monitor and manipulate critical-to-quality attributes within the tanks.

engaged in a full career in the reinsurance industry (companies that insure insurers), which culminated with his position at GE. Now, in addition to helping run the ranch, Ahlmann consults and serves on numerous boards.

Winemakers' Seal of Approval

At first Ahlmann thought that the winemakers he would need to operate his winery would be turned off by Six Sigma. "I was afraid they would be more romantic about it," Ahlmann said. "That by doing this, you're taking the romance out of the wine business. But it was quite the contrary."

Romance is written all over the career of Denis Malbec, Six Sigma Ranch's chief winemaker of its releases since 2006, who literally grew up in the cellars and vineyards of the French winery Château Latour, and later worked there. But, according to Ahlmann, Malbec loves the Six Sigma approach.

The ranch's new consulting winemaker, Wayne Donaldson, hails from Domaine Chandon in Australia and California, and was E. & J. Gallo Winery's senior director of coastal winemaking, overseeing its portfolio of premium brands. He learned Lean Six Sigma principles while at Gallo.

"Let's say you have four [Cabernet Sauvignons] in front of you," Donaldson said. "You find that Glass 3 is far superior than 1, 2 or 4. Kaj will challenge the group to name what makes the wine [in Glass 3] stand out. Was it the harvest

date? Was it the temperature [the grapes were] harvested at? Were the grapes crushed with the feet of 10,000 virgins?"

The team researches the data, rigorously collected for every stage, to discover why Glass 3 is the best. "If you apply a Six Sigma approach to it and go back and look at the process of making that wine, then you might tap into that and replicate it going forward," he said.

Donaldson recently helped the winery hire its first full-time winemaker.

Public Reaction

Ahlmann's decision to name his enterprise Six Sigma Ranch, Vineyard and Winery and even to trademark the Six Sigma name for his wine label (he was amazed no one had already claimed it) has had pros and cons. While the name clearly states the intent to produce quality wine, and while Ahlmann believes some of the traffic on his website can be chalked up to the name, it also has been misunderstood.

Some people, of course, simply have never heard of Six Sigma. Then there was the customer surveyed about the Six Sigma Ranch brand who said he "didn't realize GE was in the wine business" – a sarcasm leveled at Six Sigma's predominately industrial image, which Ahlmann hopes his wines will undo.

In fact, Ahlmann loves to turn criticism into explanation. At a recent conference where he presented the story of the winery to a group of process improvement professionals, one man

Figure 1: SIPOC of Vineyard Site Selection

Suppliers	Inputs	Process	Outputs	Customers
<ul style="list-style-type: none"> • Temperature recorder • Soil scientist • Cartographer 	<ul style="list-style-type: none"> • Attributes of soil hospitality, such as acidity; mineral composition, such as calcium and potassium; the potential for root impairment at various depths; hydraulic capacity; and texture 	<ul style="list-style-type: none"> • Decide where to locate vineyards based on soil attributes • Decide rootstocks 	<ul style="list-style-type: none"> • Plan for vineyard preparation and planting 	<ul style="list-style-type: none"> • Vineyard preparation and construction crews

stood up during the question-and-answer period to say he didn't think he'd be serving a bottle of Six Sigma wine to a friend who was recently laid off because of Six Sigma streamlining.

"Well I completely understand your point," Ahlmann said. "But you have to understand we are using Six Sigma in the old-fashioned way of the world before everything was Lean Six Sigma. We're using it to produce top-notch quality."

Ahlmann likes to contrast his small, 7,000-case-a-year operation to Gallo's 64-million-case-a-year operation, where efficiency in the bottling line can make or break margins. "I know very well," Ahlmann said, "that if your quality is awakened in your process you automatically take the work out of every single thing you do. You also become more efficient, but that's not our goal."

In the end, Ahlmann knows that the quality of his wine must speak for itself, regardless of whether Six Sigma is in the process and on the label. All wine production follows roughly the same three stages: grape growing, winemaking, and marketing and distribution. At Six Sigma Ranch, the quality differential and variation reduction are realized in the vigor with which data is collected and measured during every step of each stage; the application of SIPOC to map out every process step in each stage; and the use of DMAIC to reduce variation, bolster efficiency and keep quality high if a process is out of control.

Selecting the Sites

Vineyard site selection is one of the steps in the grape-growing stage of production; as with all the process steps, Ahlmann and his team use a SIPOC to analyze it (Figure 1). Ahlmann took a year between 2000 and 2001 to study soil conditions and weather patterns before grafting Cabernet Sauvignon, Cabernet Franc, Sauvignon Blanc, Tempranillo and Pinot Noir vines onto rootstocks that were handpicked by him and his team.

"You want to make sure you have consistency in your soils, and you can do a number of things to that end," Ahlmann said. "Once you have the data about the soils, physical and chemical, you can do adjustments like adding lime or gypsum to adjust the acidity. You can also adjust the different rootstocks." Planting the right rootstocks in the right soil is key so that harvesting of the vines can occur at relatively the same time (late September/early October); otherwise, grapes must be harvested at different times, which can introduce error and variation and also can increase costs.



Christian Ahlmann is the company's viticulturist, the scientist who cultivates the vines. One of the vineyards is named for him.

The site for each vineyard is chosen to match specific soils to specific varieties. All of the vineyards now in production at Six Sigma Ranch are named after family members – Ahlmann's wife, Else, and their four children, Christian, Michael, Marianne and Annette. Christian, the eldest sibling, is the ranch's viticulturist, the scientist who cultivates the vines.

After finishing a horticultural degree at Kansas State University, Christian spent some time in the fatherland of Denmark where he worked for a garden center.

"Ironically I didn't become interested in wine until I came to a country like Denmark where you can't grow [grapes]" he said. A holiday visit to the California ranch led to a job at a local vine grower, and from there his career in wine took root.

Nurturing the Vines

Not schooled, per se, in the principles of Six Sigma, Christian uses an approach to keeping Six Sigma Ranch's vines healthy that is no less scientific. As he studiously walks the rows of vines, his head is typically full of numbers and guidelines: Are the vine shoots pruned properly? Is the ratio of plant mass to shoot length correct? Do 12 to 14 leaves adorn each shoot? (This is the number that produces a solid one to two clusters of fruit at the shoot bottom.) Do 10 to 14

shoots grow from each of two vine branches that come off the trunk? Are any pests in sight? If the shoots are longer than 3 feet, why is that so?

"If I have shoots that are too long, I go back and check what it might be," Christian said. "Of course, there is a reason for it. If I did my homework right, it's not that the trunks are too close or not in the right soil." It might be, for example, too much water, too much fertilizer or too little competition. Christian sends samples to labs to test the nutrient values in the plant matter, and he uses a "pressure bomb," a field tool that measures the amount of water pressure in a single leaf, which tells him how much the vine must work to pull water from the ground.

"Viticulture is a very romantic concept," Christian said, "but you can get really quite academic about it."

Deciding When to Harvest

Harvesting is the last part of the grape-growing stage. According to Donaldson, the single most important decision a winemaker will make is when to harvest. "When do you pick the grape? What is the ultimate point where the chemistry is in place, the flavors [are] in place, and the winemaker says to the vineyard guys, 'Pick the fruit now?'"

To make this decision, Donaldson and team look at the data: acidity levels and sugar levels based on a Brix scale. A Brix of 24 or 25 is necessary to convert sugar to 12 percent alcohol in fermentation. And Donaldson liberally employs the most esoteric tool in the winemaker's toolkit: his palate. If the skin has no flavor, the wine will have no flavor. And if the seeds are not brown and nutty, but bitter, the wine will be bitter.

"These guys [winemakers] can express in fairly exact terms [the grape's] quality," said Ahlmann. "I guarantee you, when you've done this a couple of times there's no doubt in your mind that these guys know what they are talking about."

Once during a barrel tasting, Ahlmann and his winemaker noticed an overwhelming aroma of vanilla in the aging wine. At \$1,000 an oak barrel, it is important to get the composition right. So Ahlmann and the barrel maker applied DMAIC to work out the right combination of staves in the barrel to reduce the vanilla aroma without sacrificing other characteristics of the flavor.

Sorting the Grapes

Six Sigma tools are used to govern the five to 15 hours of sorting grapes after each harvest. It takes 12 to 18 days to harvest all the vineyards over a one- to two-month period. To keep wine quality high, it is essential that bad clusters and grapes be removed before they move into crushing and fermentation. Many bad clusters are clipped the evening before and morning of the harvest. All clusters are picked and put in small 40-pound bins to keep sample sizes manageable and to more readily expose bad clusters.

Once the grapes arrive on the sorting table, they are destemmed and shaken on a grid through which immature grapes are discarded; the mature grapes are then hand-sorted according to criteria established by Ahlmann and his winemakers. The sorters were trained to use this criteria during



Ahlmann and his barrel maker applied DMAIC to work out the right combination of barrel staves to correct an aroma problem.



Data on acidity and sugar levels is factored into when to harvest the grapes – the most important decision a winemaker makes.

Six Sigma Snapshot

Deployed: 1999

Number of Belts: 2

2009 Six Sigma goals: To match vine nutritional values with established criteria by adjusting soil programs



The Ranch Experience

Kaj Ahlmann is selling more than just wine. He is selling an experience.

"I think that's where this big ole cattle ranch does a very good job," he said. "Because one thing is a fancy tasting room, but another thing is to sit beneath a couple of big oak trees, sniff the wine, taste a little bit, maybe have a sandwich or cold cuts or something like that."

Often, Ahlmann will invite visitors to help prune the vines as a way of being more than just consumers of the Six Sigma Ranch brand.

The vintner is fond of saying that owning 4,300 acres of land in Lake County is "like having your own national park." Encompassing mountains, rolling hills and picturesque valleys, the area is habitat for deer, bobcat and other wildlife. To preserve the natural look and allow wildlife corridors, the vineyards are integrated with native vegetation. Only about 40 acres have been planted to vines thus far, but there are plans to plant more than a hundred more acres in the near future.

Ahlmann also has other plans to utilize the land commercially, yet at the same time he is interested in giving back. Soon after buying their property, the Ahlmanns donated a conservation easement to the Golden State Land Conservancy. Typically, such easements restrict certain development rights and protect conservation values of the land.

Today Ahlmann is chairman of the board of Acorn Soupe, a nonprofit dedicated to educating children about the environment. Every year students from nearby schools visit Six Sigma Ranch to harvest acorns, which a local nursery sprouts for planting on the ranch the following year. While Ahlmann does not lecture the kids on Six Sigma, the program is part of a larger plan of eliminating waste and instilling quality in the land.

Another part of that plan is to raise grass-fed beef. Christian Ahlmann sees nothing but "sequestered sunlight" in the acres of grass. "If we put that energy to good use by raising beef," he said, "we're providing a humanely raised alternative to conventional beef operations."

Christian is overseeing 20 head of Black Angus in the first year of operation. He said experts at the University of California, Davis believe the ranch land can support up to 50 head and 50 calves annually.

Filet mignon with your Cabernet?

the 2008 harvest by graduate student interns Tanuj Pasricha (Duke University) and Akashdeep Khera (North Carolina State University). Pasricha and Khera conducted a measurement systems analysis to look at attribute (pass/fail) reproducibility and repeatability (Gage R&R), and later trained sorters to be consistent in their judgment of good and bad fruit. The sorters, who come back each year, will use the criteria during the sorting process for the 2009 harvest.

Pasricha and Khera, both graduated now, have been hired as Black Belt consultants by the winery. "Now we are planning to drill down further in detail in each and every level [of grape growing, winemaking and marketing]," Khera said. "For example, in line production (winemaking), what are the critical-to-quality parameters at each step? What do we need to control?"

Fermenting the Wine

According to Donaldson, the most challenging stage to control in wine production is grape growing because of the unpredictable inputs of weather and natural conditions, which are not easily or quickly adjusted for in the field. But control is a little more in reach once the grapes have been pressed and the wine is in one of the ranch's 12 stainless steel tanks to ferment before being bottled or aged in French oak barrels.

Ahlmann said the winemaking team can monitor and manipulate critical-to-quality attributes within the tanks from any laptop computer, using a web-based temperature control and fermentation management solution. The team constantly measures temperature, Brix level, acidity, malolactic fermentation (key to adding softness and complexity to red wines), among other attributes, and stores related data in a database for reference. Individuals and moving range charts can be created to analyze data streams. Process capability charts keep fermentation processes on track before barreling, bottling and, finally, going to market – to distributors, wholesalers, restaurants and individuals from the label's wine club, tasting room and website.

"Six Sigma is extremely unique in terms of the rigor deployed in the total winemaking process," Donaldson said. "Very few people do it in this business. Probably the best thing for me is that by understanding and controlling variables, [I] make better artistic decisions as a winemaker."

A Toast to Fine Winemaking

At Six Sigma Ranch, Ahlmann's statistical approach to winemaking does not compete with Donaldson's ancient art. On the contrary, Ahlmann and his team are proving that old traditions can be enhanced by new ones.

"Our competitive advantage in the wine business is that we use the Six Sigma techniques in all our process steps from planting to marketing," Ahlmann said. "Our competitors use Six Sigma-like thinking in some of their processes, but not from soil to bottle all the way."

The result can be tasted in each and every glass. Skool! ♦

Jamie Friddle is a freelance writer and editor, and a frequent contributor to iSixSigma Magazine.