

Analyzing Data for a Delicate Finish: Six Sigma Ranch, Vineyards, and Winery



Kaj Ahlmann (right), owner of the Six Sigma Ranch, Vineyards, and Winery, and vineyard manager David Weiss create great wines by applying old-world techniques and the rigor of proven quality improvement.

KEY FACTS

ORGANIZATION

Six Sigma Ranch, Vineyards, and Winery

OVERVIEW

- Headquartered in Lower Lake, Ca.
- Founded in 1999
- 40 acres of vinelands in production
- Produces approximately 7,000 cases per year

QUALITY CHALLENGE

Combine the old-world art of winemaking with data-driven Six Sigma methods.

PRODUCTS USED

Minitab® Statistical Software

RESULTS

- Grape sorters trained for consistency
- Reduced variation in finished wines
- All processes capable of delivering within specification limits

Some people take it easy when they retire. But Kaj Ahlmann, retired chairman, president and CEO of General Electric's Employers Reinsurance division, is just getting started. In 1999, he united two of his passions—wine and statistics—in a new venture: the Six Sigma Ranch, Vineyards and Winery. This pairing may seem unlikely. "Winemaking" conjures images of pastoral fields of lush grapes, grown by experts who divine the ideal time to pick and ferment them. Six Sigma, on the other hand, is frequently associated with mass production, and massaging reams of data to wring maximum efficiency from the factory. When asked how the romantic art of winemaking can coexist with data-driven decision-making, Ahlmann suggests that his passions complement each other perfectly. Six Sigma theory posits that great products are informed by the voice of the customer, while great winemakers seek to ferment a wine that delights the drinker. Why *not* use Six Sigma to create great wines that answer the voice of the customer? "We aren't trying to take the romance out of winemaking—we're trying to improve the wine," he says. "Six Sigma helps us focus on factors that contribute to the wine's quality and what customers want." And when it comes to analyzing data to optimize those factors, Minitab Statistical Software plays a critical role.

The Challenge

Making great wine isn't easy. Vintners must carefully consider soils, grape varieties and ripeness, the vessel the wine is aged in, and many more factors. They must try to make the wine consistent within a batch or vintage year to satisfy the customer's desire to get the same flavor with every bottle. Even slight variation can result in an unacceptable product—and when something isn't

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right, a connoisseur's taste buds can detect it immediately.

Some vintners appear to be able to create great vintages by relying on intuition. As romantic as that approach might be, Ahlmann sees clear advantages in applying Six Sigma to the many variables involved in the process of turning grapes into something more: he and his team harness science, statistics, and their senses to create fine wine.

While the vineyard and winery offer a different environment than many Six Sigma practitioners would encounter on a daily basis, Ahlmann and his team gather data in ways any quality improvement professional would recognize. For example, they monitor critical-to-quality attributes within the wine fermentation vats, including temperature, alcohol level, acidity, and malolactic fermentation, among others.

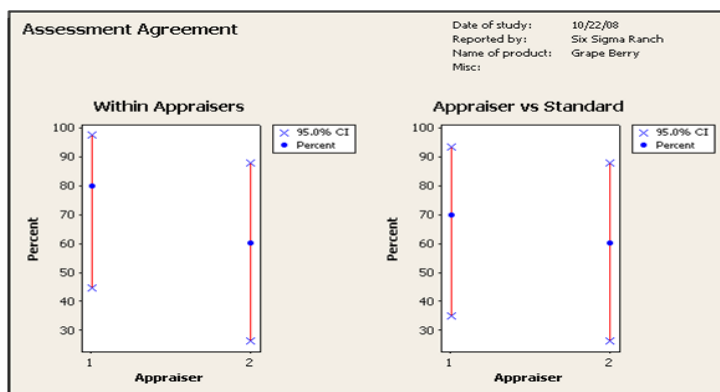
They also apply the DMAIC strategy to eliminate variability in the vinification process. "We decide where we want to be, then we make sure that our process ensures that our wines meet that level of quality," Ahlmann says. "We emphasize consistency, and eliminate variation where it would affect quality."

Grape sorting is just one of many places where Six Sigma tools—and Minitab—have made a difference in how the wine gets made. The winery's vineyards are typically harvested over a two-month period. Bad grapes must be removed before crushing and fermentation.

It takes 5 to 15 labor-intensive hours for employees to sort the grapes from each day's harvest. First, the grapes are placed in small bins, which makes it easier for sorters to spot and remove entire clusters that might be bad.



Clusters that pass this test move to the sorting table, where immature grapes are shaken out through a grid and discarded, leaving only mature grapes, which then face a final round of hand-sorting.



Consulting Black Belts Tanuj Pasricha and Akashdeep Khara used the Attribute Agreement Analysis in Minitab Statistical Software to assess how consistently the ranch's grape sorters evaluated berry quality. They were able to ensure that all sorters attained an acceptable level of agreement.

The Six Sigma Ranch wanted to be sure their sorters, who return for each year's harvest season, all knew the difference between good and bad grapes. Ahlmann and his winemakers began by defining specific standards for high-quality grapes. By randomly tasting grapes before harvest, they could identify characteristics that indicate flavor in the skin of the grape, whether the seeds have become nutty or

are still bitter, and other critical factors. "An expert winemaker's palette is his measuring tool—even if we don't usually think of it that way," Ahlmann notes. "Factors like these may not seem like hard data points on the surface, but you *can* get data around them."

How Minitab Helped

Once they clearly established criteria for sorting grapes, the winery had a solid foundation from which to make sure all sorters followed the same procedures to make sound pass/fail decisions at the sorting table. Tanuj Pasricha and Akashdeep Khara, two Six Sigma Black Belts working as consultants with the winery, used Minitab to conduct a measurement systems analysis of the sorting process.

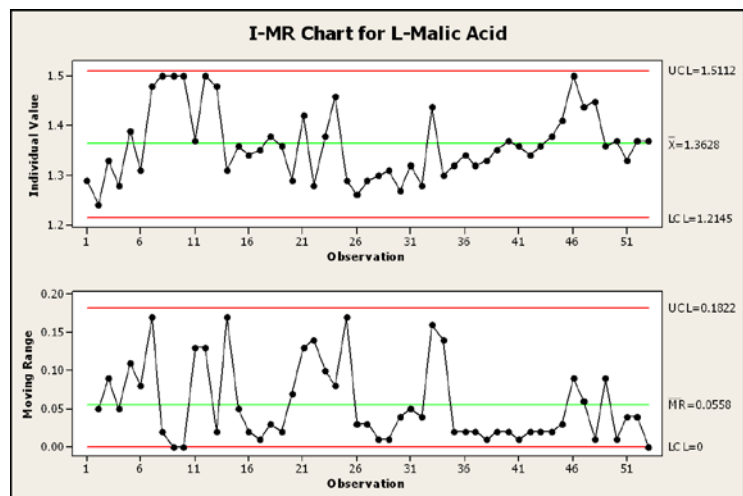
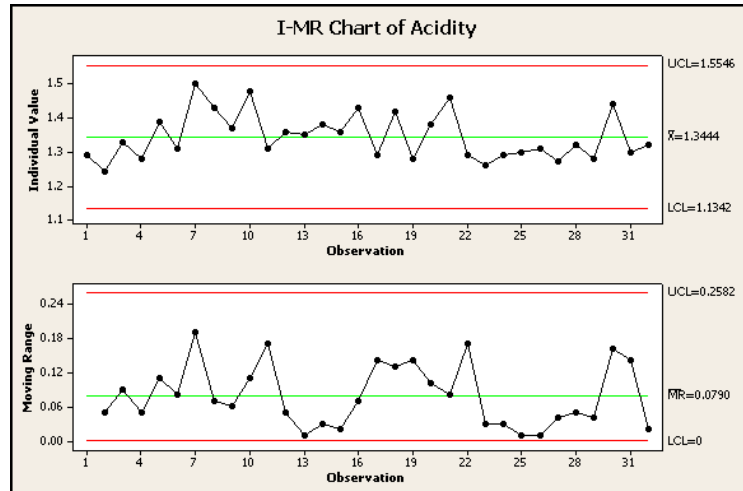
To measure the sorters' consistency in recognizing grape quality, they used Attribute Agreement Analysis to assess the consistency and correctness of sorters' ratings against the standards. By conducting their analysis and evaluating the results, they were able to effectively train all operators to ensure an acceptable level of agreement.

But sorting grapes is just one component of the winemaking process. Wherever they collect data, the winery turns to Minitab Statistical Software for tools like descriptive statistics, graphical analysis, control charts, and capability studies.

For example, Minitab's Individuals and Moving Range (I-MR) control charts have proven to be a particularly powerful tool in assessing whether the winery's processes are in control, and are used to monitor alcohol and acidity levels. All processes exhibit some natural variation, and control charts help you distinguish this natural variation from the non-random, "special cause" variation that can be detrimental. Minitab's I-MR charts help the winery identify problematic variation so they can provide customers with consistent wine taste and quality. The charts also help reveal patterns that may indicate quality improvement opportunities, such as shifts at the beginning or end of the winemaking process.

To ensure their processes are producing quality wine within acceptable limits, the winery turns to Minitab's capability analysis tools. These studies help the team ensure that fermentation and other processes under way at the winery are capable of producing results that meet the specifications they've set. "These charts easily show us the picture of how well we are doing," Pasricha says. "We also can use this data to make improvements in the next wine-making cycle."

Another aspect of Minitab Statistical Software that has been tremendously useful is the Help system, which features detailed explanations of statistical techniques, explains how to perform them, and even helps users interpret results. "I usually refer to Minitab's Help menu as the 'Google of Statistical Tools' because we use it so often," says Tanuj Pasricha.



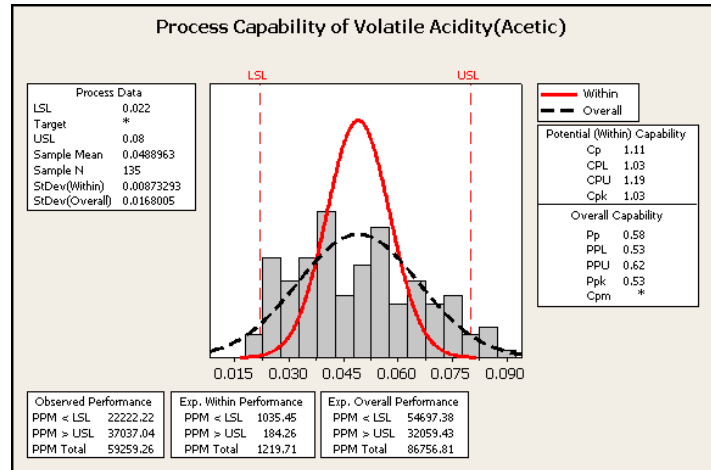
Minitab I-MR charts like these help the winery ensure that critical processes are stable and predictable. When a process becomes unstable, the winery team can act quickly to correct problems.

Results

Ahlmann and his colleagues now are looking at additional aspects of production, trying to define standards for all of the the critical-to-quality parameters that must be controlled at each step, then making sure their processes meet those standards.

In keeping with the commitment to quality implied in its name, all of the Six Sigma Ranch, Vineyard, and Winery's processes are in control and capable of delivering within specification limits. But that doesn't mean Ahlmann's quest to produce great wine is complete—far from it. Additional projects are under way, and the winery team continues to use Minitab to reveal the meaning of the data they collect. They're even using Minitab's DOE (Design of Experiments) functionality to efficiently assess promotional campaigns and to redesign the company Web site.

Through it all, Ahlmann's focus remains squarely on the most important person in the winemaking process: the person who drinks it. Six Sigma Ranch, Vineyards and Winery continues to learn about customers wants by soliciting feedback and conducting voice of the customer projects. "That's what Six Sigma is really about," Ahlmann says. "We want to understand what attracts a potential customer and adds the most value, and then deliver it."



The Six Sigma Winery uses Minitab's capability charts to ensure that their processes are able to produce results that meet specifications.



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