Whitepaper

InfinityQS®
Quality Re-imagined

Quality Craft Brews: 4 Problems with Pass/Fail Testing

Contents

Pass/Fail quality testing is the de facto standard for many craft brewers. But when you use only these basic tests, you miss out on some of the greatest opportunities for continuous improvement in your business. Pass/Fail testing can help prevent sub-par beer from leaving the brewery, but it does nothing to help you anticipate problems, improve processes, grow your business, or make strategic, data-based decisions about your operations or product. For this type of insight, you need deeper visibility into each step in your processes.

As a commercial craft brewer, you care about quality. But can you prove it to food and beverage regulators, investors, and—most important—customers? What does your quality assurance (QA) scheme achieve? What does it tell you? And is that information what you really need to know to optimize the quality of your beer?

For many brewers, quality management takes the form of pass/fail checks. These checks typically occur between operational stages in the brewing process. Although a simple pass/fail might be sufficient to catch product that is simply not up to snuff, this type of test lacks the level of insight that can make the difference between getting by and making headway in your brewery business.

The Right Questions

Even the simplest QA schemes include checks on raw ingredients and steady-state process automation for procedures such as mashing, boiling, fermentation, and conditioning temperatures. Based on the measurements from each stage, you'll need to adjust the length of other processes. For example, you might need to extend vorlauf based on wort clarity, or curtail fermentation based on gravity or temperature.

Between these stages, you probably run simple pass/fail checks:

- Is the liquid clear enough?
- Is it the correct color?
- Does it taste and smell right?
- Is the gravity good?
- Is the pH proper?
- Does the batch have the correct level of dissolved O_2 and CO_2?

These vital, real-time checks tell you whether the process is going wrong. If so, you can dump the batch before it disappoints your hard-won customers. But there's so much more to making great beer than throwing away bad beer.

Pass/fail data don't show you how close to specification limits your processes are—information that can help you anticipate and prevent problems before they ruin a batch (or more) of beer. Those limited data don't reveal trends that can indicate opportunities for improvements in output, procedures—and profits. And they don't indicate how likely you are to be able to brew a consistent quality product again in the future.

You gain these benefits only by recording actual values for lab, sensory, and other tests, across multiple batches, over time (see "Putting Quality to the Test," page 4). Only then can you gain the key insights that enable continuous process improvement.

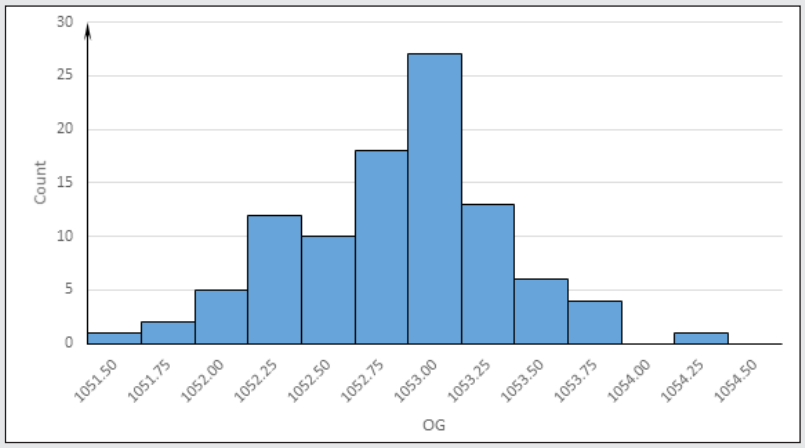
#1: Pass/Fail Doesn't Help You Anticipate

Many businesses that use data for continuous improvement, Lean, or Six Sigma efforts look for out-of-spec variations that indicate unacceptable quality—similar to the knowledge you gain from a Pass/Fail check. But the information within spec limits can transform your brewery business.

With a quality intelligence solution like InfinityQS Enact, you can turn test data into a histogram distribution of that data at each stage, as Figure 1 shows. This type of visualization can tell you how frequent each value is and where the majority of values lie.

This type of visual display helps you to spot outliers that indicate emerging issues (e.g., machine malfunction, shift differences). By catching these issues early, you can reduce costly waste and overfill as well as defective product. Depending on the size of your operation, overfill alone can eat into profits by hundreds of thousands of dollars per production line.

Figure 1. Using a histogram to display aggregated data enables comparative analysis.



Visualizing the meaning in quality data that's within spec limits can transform your brewery business.

Putting Quality to the Test

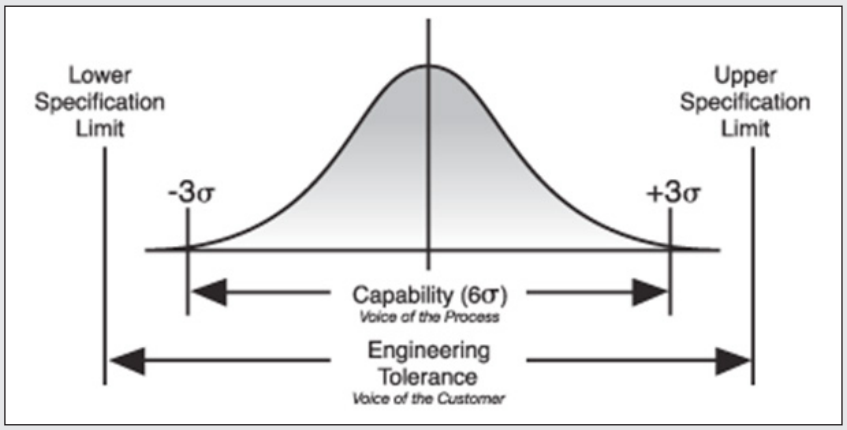
A full-fledged quality intelligence solution like InfinityQS Enact supports the collection, analysis, and visualization important measurements from the tests you already run:

- Lab tests
  - pH
  - turbidity
  - color
  - bitterness
  - dissolved CO_2
  - dissolved O_2
  - Gravity
  - ABV
- Sensory tests (through integration with third-party software)
  - Aroma
  - Mouthfeel
  - Taste
  - Legislative standards
  - Good Manufacturing Practices and (GMPs) and GMPs for Craft Brewers (GMPCBs) in the United States
  - SIBA Food Safety and Quality (FSQ) or Safe and Local Supplier Approval (SALSA) standard in the UK
  - Per-process hazard analysis and critical control points (HACCP) checks
- Raw materials
  - Water management
  - Yeast management
- Point-of-sale quality

#2: Pass/Fail Doesn't Help You Improve

When you collect the level of detail that enables detailed variation analysis, you can start to look at process capability at each check and each stage. A visual display like the one in Figure 2 allows you to answer what should be a key question for any brewer: "How capable is my production process of producing the right result?"

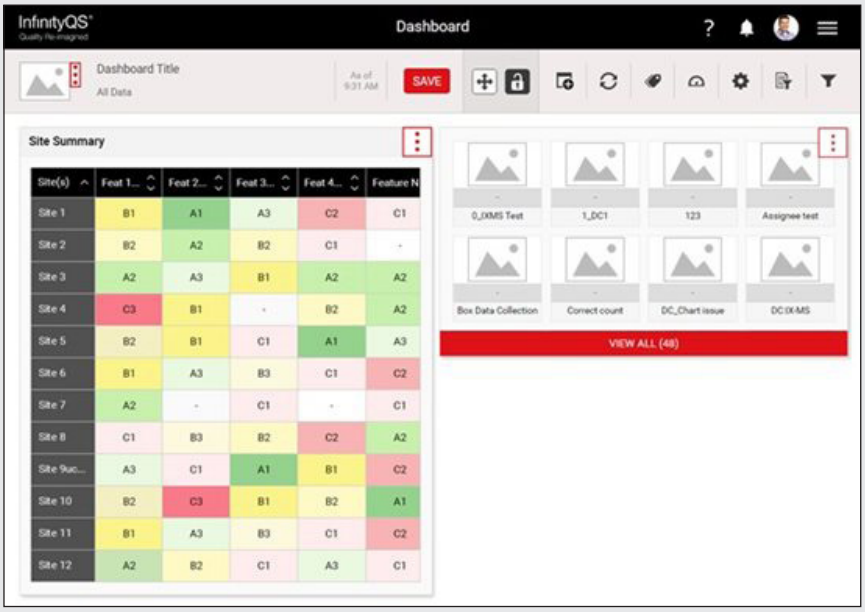
Figure 2. Measuring capability helps brewers set key targets for quality.



You can measure capability separately for each stage: brewhouse, fermentation, conditioning, and packaging. You can even assign a numeric score to capability. In essence, it's a score of how easily your histogram fits within your specification limits.

You can answer this question separately for each stage: brewhouse, fermentation, conditioning, and packaging. You can even assign a numeric score to capability—in essence, a score of how easily your histogram fits within your specification limits. Comparing scores in a visual chart like the one that Figure 3 shows enables you to quickly spot areas that need attention or that could provide quick and valuable quality wins.

Figure 3: A scoring system allows you to quickly see which products and processes need attention.



Through this process, you can pinpoint and prioritize improvements that will make your brewery more efficient, and your beer more consistently excellent.

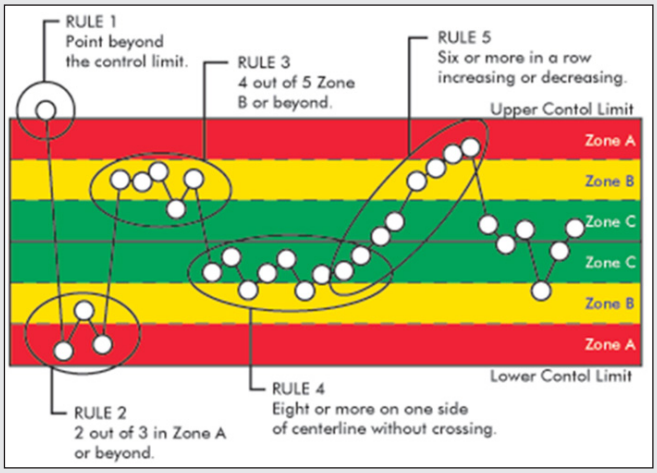
#3: Pass/Fail Doesn't Help You Grow

Can you look at statistically significant trends within your data? Not with Pass/Fail checks. But more granular analysis can highlight emerging problems, so you can intervene early. For example, if your dissolved O_2 is within acceptable limits but steadily rising over time, you might have a problem in the conditioning process. Check your OG values; if they're clustered near the lower or upper spec limit, it might be time to run your own lab check on the malt you're buying.

Likewise, you can run these sorts of analyses to spot successes. Which shift or batch or process is running right on the money? What is happening there that's different from less-outstanding areas? This type of evaluation can lead to brewery-wide improvements and better best practices—important steps when your business is booming.

Trend analysis enables early intervention.

Figure 4: Drilling into aggregated data can give a quick visual of trends that are occurring over time.

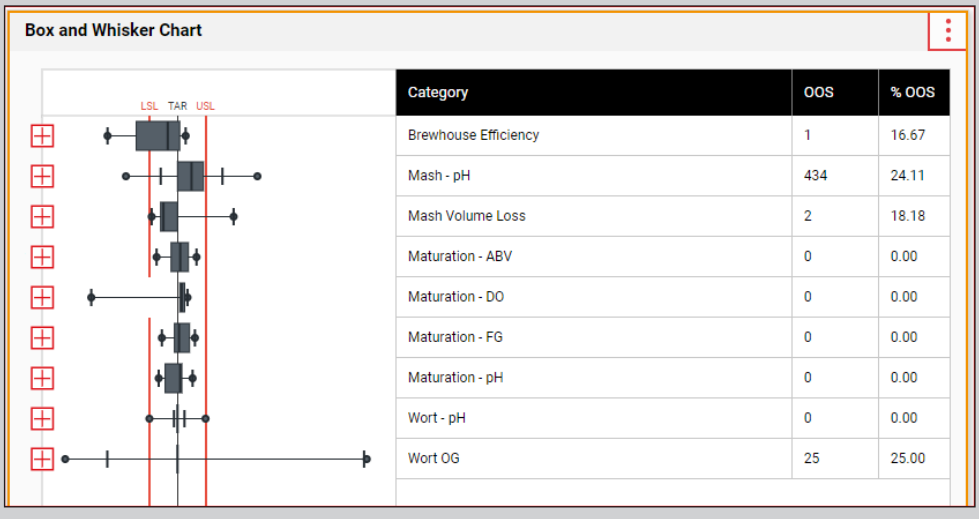


#4: Pass/Fail Doesn't Help You Strategize

Finally, a robust quality intelligence enables you to easily determine where the greatest variation in your process is, so you can improve product consistency – vital in brewing. It also should solution support comparison of quality parameters between different brews. Is the process capability for the ABV of your DIPA a problem, where it's fine for your Saison? If so—why?

Here, again, your quality data can lead you in the right direction for important product improvements, saving valuable time and resources.

Figure 5. Dashboard views enable you to quickly determine the source of your highest process variation.

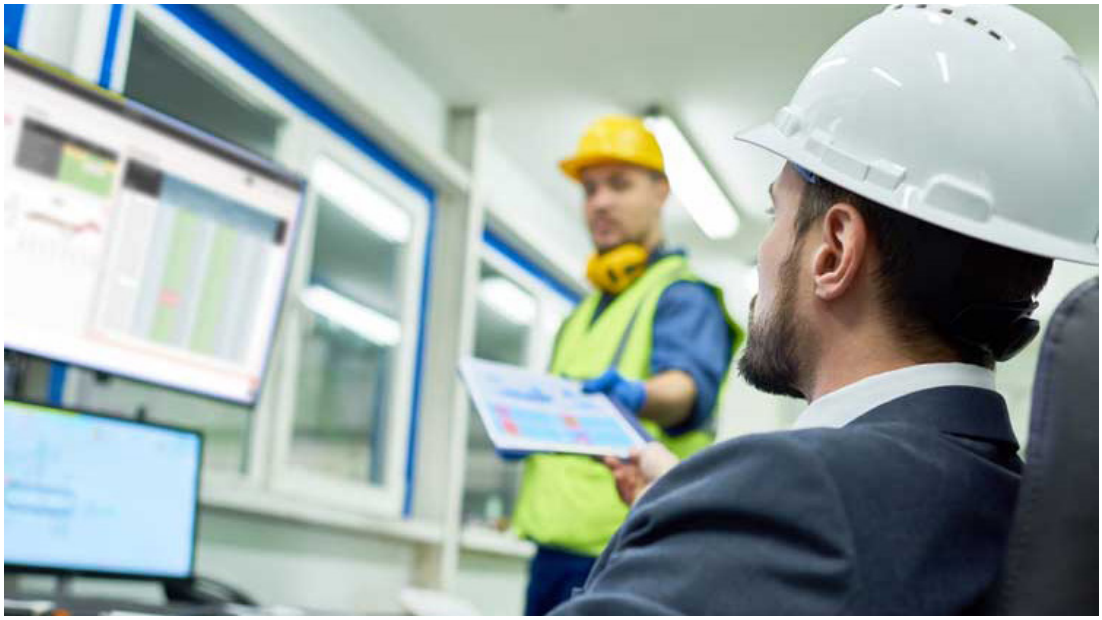


Category	OOS	% OOS
Brewhouse Efficiency	1	16.67
Mash - pH	434	24.11
Mash Volume Loss	2	18.18
Maturation - ABV	0	0.00
Maturation - DO	0	0.00
Maturation - FG	0	0.00
Maturation - pH	0	0.00
Wort - pH	0	0.00
Wort OG	25	25.00

A Better Option

Pass/Fail checks have their place when you're starting out in the craft brew business. But growing brewers need a more effective method for monitoring quality and delivering QA to customers and investors alike.

For nearly 30 years, InfinityQS has been a leader in providing quality management solutions to manufacturers, including some of the world's most successful food and beverage businesses. Now InfinityQS Enact brings the company's powerful quality intelligence capabilities to craft brewers, with an affordable, cloud-based subscription platform and true mobile accessibility. To see how Enact can help your continuous process improvement efforts, please contact us for a personalized demo.



About InfinityQS International, Inc.

InfinityQS International, Inc.® is the global authority on data-driven manufacturing quality. The company's Manufacturing and Quality Intelligence solutions deliver unparalleled visibility across the enterprise, from the shop floor to the boardroom, enabling manufacturers to Re-Imagine Quality and transform it from a problem into a competitive advantage. Powered by centralized statistical process control (SPC) analytics, InfinityQS solutions provide operational insight to enable global manufacturers to improve product quality; decrease costs and risk; maintain or improve compliance; and make strategic, data-driven business decisions. Headquartered near Washington, D.C., with offices in Seattle, London, and Beijing, InfinityQS was founded in 1989 and now services more than 2,500 of the world's leading manufacturers, including Ball Corporation, Boston Scientific, Graham Packaging, and Medtronic. For more information, visit www.infinityqs.com.

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