

CASE STUDY: How continuous monitoring in distillation can save you thousands



KEY WORDS

- Ethanol
- Distillation
- Whole stillage
- Beer bottoms
- Distillation overheads
- Continuous monitoring



The Problem

In distillation, small problems quietly become expensive ones: fouling that forces shutdown, ethanol slipping into stillage, safety risks from vapor buildup. By the time lab samples confirm the issue, you're already losing yield and burning money.

What if you could see problems developing in real-time - early enough to prevent them?

The problems costing you money

Fouling and unplanned shutdowns

Sugars in beer bottoms increase viscosity, clog trays, and accelerate fouling in heat exchangers. Every cleaning cycle costs time, labor, and lost production. If you could spot sugar trends before fouling starts, you'd schedule maintenance on your terms - not when equipment forces your hand.

Over-driving the column

Chasing purity by pushing the column harder is a gamble. Drive it too hard and you risk flooding, wasted energy, and ethanol losses. Without real-time visibility into what's actually happening in beer bottoms, you're making decisions blind.

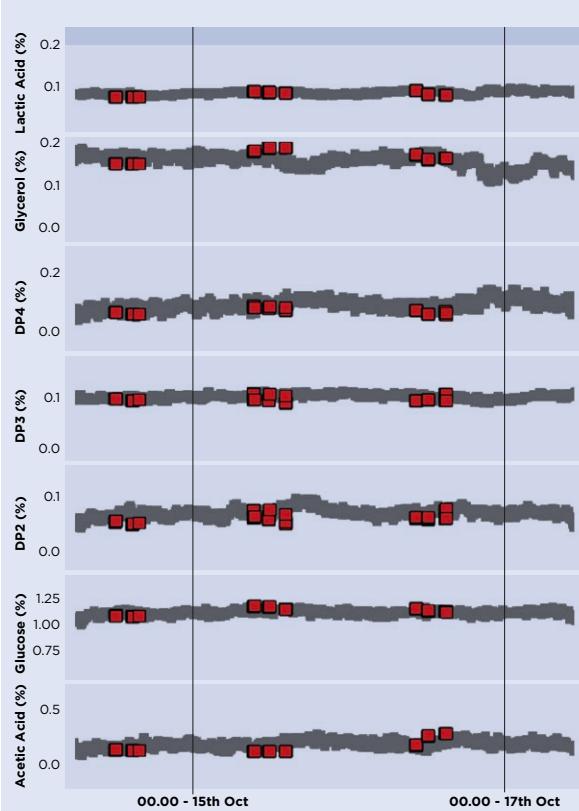
Ethanol losses and safety risks

Excess ethanol in beer bottoms migrates downstream to centrifuges, evaporators, and dryers. Vapors create flammable conditions - an invisible risk until it's too late. You're losing yield and creating hazards.

The fundamental problem: By the time lab samples reveal issues, you're in damage control mode. You need to see what's coming, not what already happened.

Real-time visibility changes everything

The IRmadillo measures eight components in beer bottoms simultaneously and continuously



Chemical	Range (%)	Accuracy (%)
Ethanol	0.01 - 0.43	±0.058
DP4	0.7 - 1.1	±0.059
DP3	0.06 - 0.16	±0.012
DP2	0.05 - 0.4	±0.059
DP1 (Dextrose)	0 - 0.2	±0.025
Glycerol	0.9 - 1.4	± 0.060
Lactic Acid	0.08 - 0.6	±0.114
Acetic Acid	0.04 - 0.16	±0.014

Figure 1 (Left): Measurements of species of interest at the bottom of the distillation column. Grey points are the output of the IRmadillo spectrometer. The red points are the measured samples from offline HPLC

Table 1 (Above): Measurement accuracy for species of interest in distillation

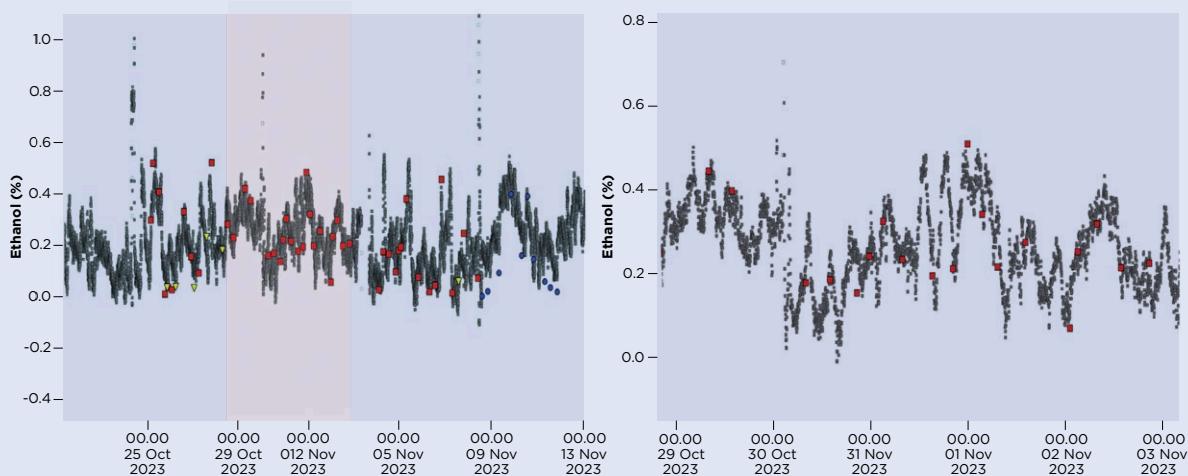


Figure 2: Tracking ethanol concentrations in the beer bottoms can be used to optimize steam or direct the process liquid back to the beer column for reprocessing, maximizing ethanol yields.

What you can do with this data:

Prevent fouling:

Spot sugar trends before they clog trays or foul heat exchangers. Schedule maintenance proactively instead of responding to equipment failure.

Optimize column operation:

See when purity gains aren't worth the energy cost. Stop over-driving when real-time data shows diminishing returns.

Protect yield and safety:

Catch ethanol losses before they reach dryers or oxidizers. Reroute beer bottoms back to the beer column when ethanol exceeds safe levels - automatically, based on real-time measurements.

Connect fermentation to distillation:

Catch fermentation problems (bacterial contamination, enzyme issues) as they show up in beer bottoms chemistry - before they cascade into distillation headaches.



Beyond distillation

The same IRmadillo that monitors beer bottoms can measure across your entire plant:

Fermentation:

FAN, PAN, fusels, sugars, acids

Propagation & liquefaction:

Real-time process control

Multiple installation points:

Connect the dots across your operation
The more you measure, the more you understand. The more you understand, the more you can prevent.

From reaction to anticipation

This isn't about replacing your control system. It's about eliminating blind spots where problems hide until they're expensive.

With continuous measurement, you're not asking "what went wrong?" You're asking "what's trending up?" and intervening before it costs you.

Take action now

Every hour you wait is another hour of risk - another chance for fouling, ethanol loss, or a safety incident to eat into your margins.

Ask yourself:

- Where do fouling and ethanol losses cost us most?
- How could real-time trends help us intervene earlier?
- What would it mean to reduce both downtime and safety risk?



*The answers might change
how you run your plant.*

Ready to stop reacting and start preventing?

Contact **Keit** to discuss where real-time monitoring creates the most value in your operation.



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**Real-time analysis for
total process control**