IRmadillo™

APN1041

CASE STUDY:

Preventing explosions: real time ethanol monitoring in beer bottoms

KEY WORDS

- Distillation
- Ethanol
- Safety
- Whole Stillage
- Explosion
- Beer Bottoms

The Risk

Ethanol vapor is highly flammable. Undetected ethanol in beer bottoms can vaporize downstream in dryers and thermal oxidizers - creating explosion hazards that flame scanners can't prevent.

The Problem

Flame scanners detect fires in real-time, but they don't tell you ethanol is building up in beer bottoms before it becomes a hazard. By the time vapor reaches downstream equipment, you're reacting to danger instead of preventing it.

The Solution

Continuous ethanol measurement at the source - in beer bottoms - so you catch high levels before they create explosive conditions.

Two Critical Hazards

1. Ethanol vapor traveling downstream

Beer bottoms with elevated ethanol flow to centrifuges, evaporators, dryers, and thermal oxidizers. High temperatures in this equipment can ignite ethanol vapor. Without upstream monitoring, you don't know dangerous levels are moving through your plant until it's too late.

2. Off-gassing from whole stillage

Whole stillage emits ethanol vapor. Without proper monitoring, vapor accumulates and creates explosive atmospheres - endangering personnel and equipment.

Recent incidents at ethanol plants demonstrate these aren't theoretical risks. They're real hazards that continuous monitoring prevents.

How real-time monitoring changes plant operations

Reroute before it's a hazard:
When beer bottoms ethanol exceeds your upper limit, automatically reroute back to the beerwell until concentration drops to safe levels. Prevent vapor from reaching downstream equipment.

Optimize column operation:
Real-time data lets you adjust the column profile as ethanol begins trending up - not after it's already high. Make proactive adjustments instead of emergency interventions.

Reduce unnecessary rerouting:
Current practice is to reroute beer bottoms more often than necessary because you can't measure ethanol in real-time. Operators play it safe. The IRmadillo provides the data to make informed decisions - improving both safety and operational efficiency.

Lower energy consumption:
Better column operation based on real-time data means less wasted energy cycling beer bottoms back through the system.

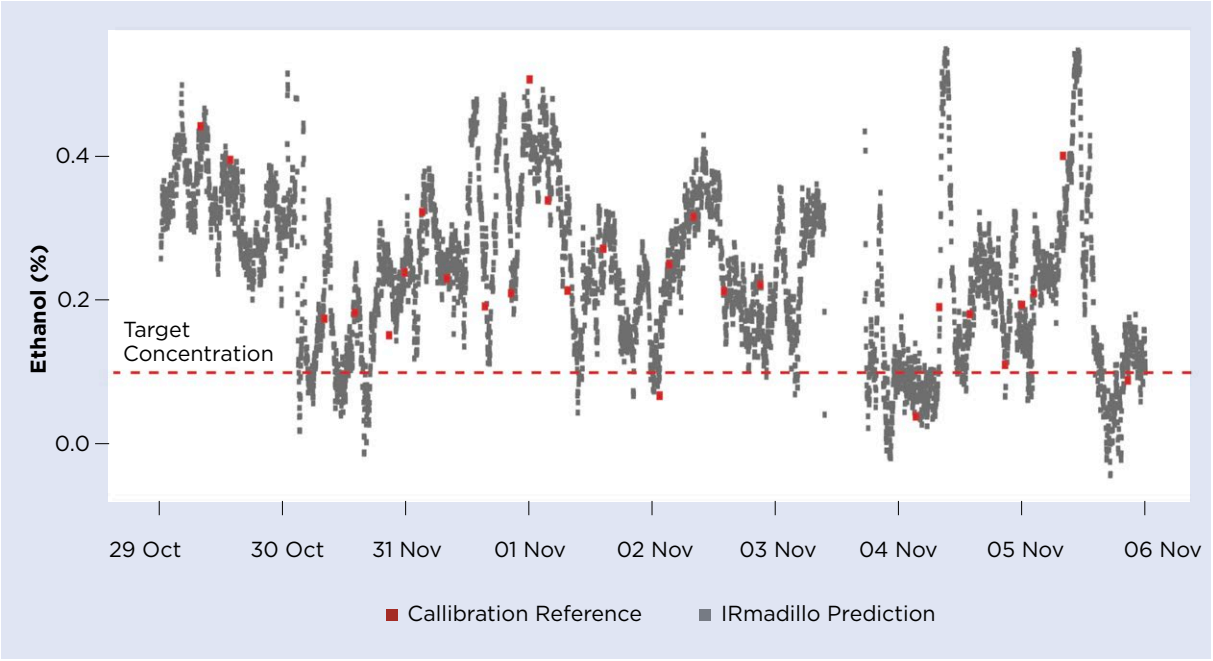

Figure 1: Real time measurment of ethanol in the beer bottoms overlaid with offline HPLC data

Installation & Compliance

- C1D2 and ATEX certified for hazardous environments
- Installs at beer bottoms to monitor liquid ethanol concentration continuously
- Integrates with plant control systems for automated alerts and rerouting
- No moving parts, no fragile components

Beyond Distillation

The IRmadillo measures multiple chemical species simultaneously across any liquid, slurry, or emulsion in your plant - fermentation, liquefaction, propagation, distillation. One instrument platform, plant-wide applications.

The Bottom Line

Flame scanners tell you there's already a fire. The IRmadillo tells you ethanol is building up before it creates an explosion risk.

Don't wait for an incident.

Ethanol production is inherently hazardous - continuous monitoring at the source is the difference between preventing problems and reacting to emergencies.

Protect your plant and your people.

Contact **Keit** to discuss safety monitoring for your distillation operations.

Real-time analysis for total process control

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