CASE STUDY

# From Problem Child to Top Performer

## How a Midwest Ethanol Plant Sustained 0.26% Efficiency Improvement Through Human-Centric AI

**F6 was the problem child everyone knew about but couldn't fix.** Plant operators spent hours each week troubleshooting why Fermenter 6 underperformed - low yields, high contamination variability but by the time they identified root causes, batches were already lost. The team knew something was wrong; they just didn't have the quantitative evidence to prioritize where to act.

## The Cost of Inaction

Before intervention, the 6-fermenter plant was leaving performance on the table:

- **F6 chronic underperformance:** Consistently lowest ethanol yield and fermentation efficiency.
- **High batch-to-batch variability** signaling unstable contamination control.
- **180°F CIP temperatures** generating **8.8% higher** total acids (lactic + acetic) across all fermenters compared to higher-temperature cycles.
- At approximately **210,000 gallons daily production**, even small yield losses compound into significant operational impact.

The real cost wasn't just lost gallons - it was the operational friction, firefighting, and missed optimization opportunities.

## Working With Your Team, Not Around Them

In August 2025, Golgix partnered with this Midwest facility - not to rip out systems or demand infrastructure overhauls, but to enhance what was already there.

### The Deployment:

- **Behind-the-firewall AI platform:** No cloud dependency, full data sovereignty.
- **Live dashboards + early warning systems** tailored to operator workflows.
- **Weekly Pulse reports:** Rolling 4-week analytics delivered in plain language, not AI jargon.
- **Human-centric collaboration:** Weekly joint reviews with plant operators and lab managers.

When the Weekly Pulse flagged F6 for chronic underperformance and high variability, it wasn't a surprise to the operators - it was validation. The AI provided the quantitative evidence (including variability metrics) they needed to justify a root cause investigation.

What followed was a systematic, multi-layered diagnostic process. Golgix began by analyzing recent data for temperature and pH anomalies. Next, a deep dive on 3 months of data examined combined parameters specific to F6 - acetic acid, lactic acid, temperature, glycerol, and more. Then, a full retrospective analysis on 12 months of data was performed across all fermenters to identify behavioral patterns. The team also investigated external factors: F6's south-side location in the plant, outside air temperature correlations, and potential leakage during cleaning spray procedures.

After covering all angles, plant leadership was presented with multiple intervention options. They chose to investigate Clean-In-Place (CIP) procedures. Golgix then conducted a targeted deep-dive analysis on CIP temperature, uncovering not just a correlation between higher CIP temperatures and lower contamination - but validating the relationship through metabolic activity data and proving causation. Armed with this evidence, the team designed a structured multi-week trial:

> **Period 1 (Baseline):** 180°F CIP + 6 gal protease
> **Period 2 (Optimized):** 190°F CIP + 6 gal protease
> **Period 3 (Nutrient Test):** 190°F CIP + 5 gal protease (to test cost reduction)

### Fermenter 6 Transformation (The 'Problem Child' Becomes Top Performer):

Contamination reduction: **-15.1%** · Fermentation efficiency: **+0.28%** · Ethanol yield: **+0.58%**

## The Numbers That Matter

### For Plant Managers
### Yield & Efficiency

**+0.50%** overall ethanol yield improvement (13.91% → 13.98%)

**+0.21%** overall fermentation efficiency (92.92% → 93.12%)

### For CFOs
### Margin Impact & ROI

Sustained daily production increase: **+263 gallons/day**

Contamination control:**-9.18%** combined acids overall

### For Ops Directors
### Speed & Hours Saved

**12-month** retrospective analysis completed instantly

Multi-week structured trial replaced ongoing firefighting

### Table 1: Overall Plant Performance (Period 1 vs. Period 2)

| Performance Metric | Period 1 | Period 2 | Improvement |
|---|---|---|---|
| Fermentation Efficiency (%) | 92.92 | 93.12 | +0.21% |
| Ethanol Yield (%) | 13.91 | 13.98 | +0.50% |
| Residual Sugars | 0.9403 | 0.9050 | -3.75% |
| Average Daily Production (Gallons) | 210,718 | 210,981 | +263 Gallons |

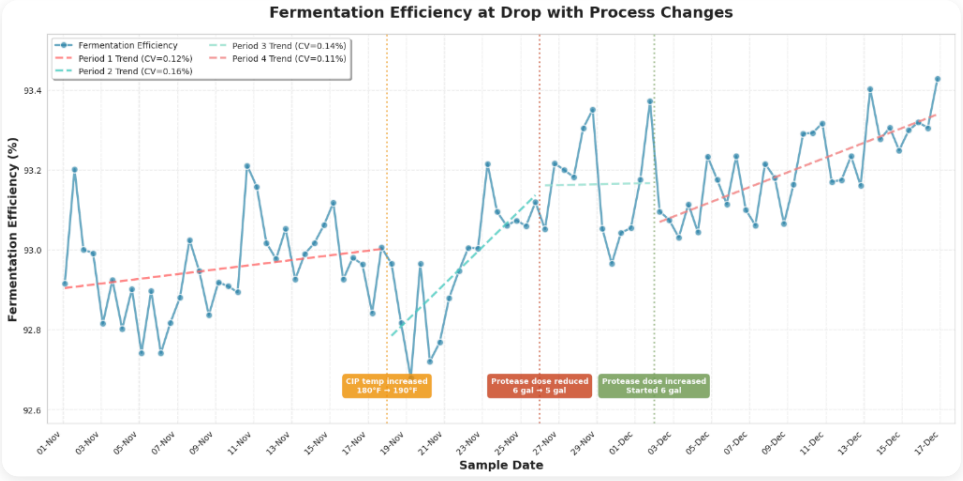


*Figure 1: Fermentation Efficiency trends showing sustained improvement following CIP optimization.*

### Table 2: Contamination Control Success (Period 1 vs. Period 2)

| Contamination Type | Period 1 | Period 2 | Reduction | % Improvement |
|---|---|---|---|---|
| Lactic Acid | 0.0364 | 0.0321 | -0.0043 | **-11.81%** |
| Acetic Acid | 0.0149 | 0.0144 | -0.0005 | **-3.36%** |
| Combined Contamination | 0.0512 | 0.0465 | -0.0047 | **-9.18%** |

## From the Floor

*"We always knew F6 was trouble, but we didn't have the data to prove it or prioritize fixing it. The Weekly Pulse gave us the evidence we needed to get leadership buy-in for the CIP trial. Now F6 is our best performer - and we caught the nutrient reduction issue before it cost us serious money. This isn't AI replacing us; it's AI making us faster and smarter."*

— Operations Manager, Midwest Ethanol Facility

**Ready to turn your 'problem child' into top performers? Let's talk about what human-centric AI can do for your plant. No new hardware. No external consultants. Just the team, empowered by real-time intelligence.**