

LOOP PERFORMANCE MONITORING

Fouling Cools Your Exchanger While Heating Up Your Costs

\$31,500

COST PER FOULING EPISODE

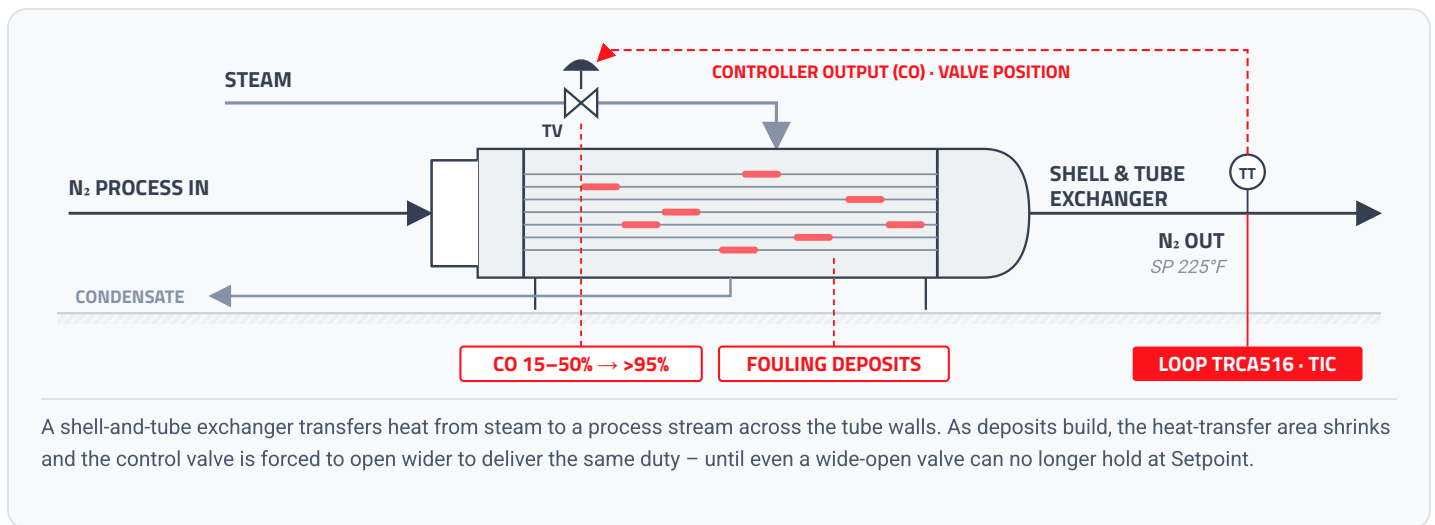
A nitrogen process heat exchanger fouled gradually over 99 days. The temperature loop never left Setpoint, but its Overall Controller Effectiveness collapsed from 97.4% to 8.0%, exposing the problem weeks before it would otherwise have been caught using traditional metrics. The fouling episode cost an estimated **\$31,500**.

THE CHALLENGE

Fouling Builds Quietly, But Costs Loudly

Heat exchangers transfer thermal energy between two fluids, typically using steam or another utility to heat a process stream to a target temperature. A control loop maintains that temperature by modulating the heating medium through a valve. When control is poor, the consequences reach well beyond the trend chart: excess utility consumption, off-spec product, reduced throughput, and unplanned maintenance all carry direct costs. Because these losses accumulate gradually, they often go unnoticed until they appear as a significant line item.

Here, a steam-heated exchanger controlled a gas stream carrying contaminants that gradually adhered to the exchanger walls. As fouling reduced heat transfer, the steam valve opened steadily wider, eventually running near saturation for extended periods. Traditional metrics missed it entirely as the outlet temperature held Setpoint until the valve ran out of room. OCE, which scores PID loops in terms of Availability, Quality, and Performance, provided the necessary warning and prevented the fouling episode from worsening beyond its ~\$31,500 cost.



Steam use

Fouled operation drew ~2,455 lb/hr of steam versus ~415 lb/hr when clean – about \$318/day at \$6.50 per 1,000 lb.

Valve headroom

CO rose from ~16.9% to ~99.9%. A saturated valve cannot reject disturbances, so OCE falls even while PV still tracks Setpoint.

Detection lag

Catching the fouling 60 days late cost \$19,100 or 60.6% of the episode's \$31,500 cumulative cost.

Maintenance timing

A sustained OCE drop puts a documented cost behind each cleaning decision, so maintenance is scheduled on evidence.

Measurable, Loop by Loop

The connection between PID performance and heat exchanger economics is not theoretical. **PlantESP™** is the leading control loop performance monitoring (CLPM) solution. PlantESP actively monitors PID performance on a plant-wide basis, and it has been successfully deployed across all variety of unit operations involving heat transfer

Among its metrics, PlantESP scores every loop using Overall Controller Effectiveness (OCE). Like OEE, OCE is a composite KPI that assesses three operating attributes — Availability, Performance, Quality — and facilitates the benchmarking of individual PID loops, unit operations, and entire facilities.

≥ 95% **AVAILABILITY**
Time in Normal — auto/cascade

≥ 90% **PERFORMANCE**
Time Not Saturated — off limits

≥ 85% **QUALITY**
% Good Error within tolerance

OCE = Time in Normal × Time Not Saturated × % Good Error

A loop meeting all three thresholds scores at **72.7%** — the upper boundary of world-class control. In contrast, because the terms multiply a loop running 80/80/80 falls to **51.2%**. OCE punishes weakness in any one dimension - which is why it gauges control quality and financial exposure alike.

**FRAMING POOR
PERFORMANCE AS
LOST PROFIT**

97.4% → 8.0%
Average OCE clean vs. fouled

\$318/day
Excess steam cost while fouled

\$19,100
Cost of the 60-day detection lag

DIGITAL LIFECYCLE SOLUTIONS

A project-based, control-strategy-improvement offering purpose-built for interactive, multi-loop unit operations like a steam-heated heat exchanger — engage to find and fix the losses, then sustain the gains.

ENGAGE
01 — 04

01 KICK-OFF

Prioritize by Strategy

Rank loops, units, and areas against the plant's own goals — temperature, energy, uptime.

02 MONTHLY

Identify Bad Actors

Control Station engineers pinpoint that scope's top 10 bad-actor loops every month.

03 MONTHLY

Tune the Loops

Four hours per month of direct, hands-on tuning support to resolve those loops.

04 AS NEEDED

Strategy Change

When tuning cannot close the gap, escalate to a more strategic assessment and action plan.

SUSTAIN
ONGOING

QUARTERLY

Assess the Value

Financial impact of the 10–20% typical PGE gain from resolved bad-actor tuning.

MONTHLY

Track OCE Live

Unit Operation Performance Indicators in PlantESP keep the OCE trend visible.

QUARTERLY

Report to Stakeholders

Benchmark against industry peers for sponsors and non-technical stakeholders.

ANNUAL

Plan the Roadmap

Update a one-to-three year plan for closing whatever performance gap remains.

DECADES OF DOMAIN EXPERTISE

Control Station is the process industry's leading provider of controller performance monitoring and analytics. PlantESP™ supports hundreds of facilities worldwide, backed by an engineering team focused solely on process control.

Next Step: Is a Fouled Exchanger Quietly Draining Your Maintenance Budget?

Start with a performance assessment of your heat exchangers and other unit operations. Contact us for a no-obligation loop performance assessment and a site-specific estimate of the opportunity hidden in your regulatory controls.

[REQUEST AN ASSESSMENT](#)