L&T Technology Services

FEED to Field: inside 24 months

High Purity IPA engineered end-to-end

CASE STUDY



EXECUTIVE SUMMARY

A global specialty chemicals and Oil & Gas major needed to launch an ultra-high-purity Isopropyl Alcohol (IPA) product for the electronics intermediates market in the US- inside an operating brownfield site, on a fixed window, with a business case that would set the benchmark for future expansions.

LTTS engineered the program end-to-end - Pre-FEED, FEED, detail design, and procurement - delivering **~$10 Mn in CAPEX** savings through value engineering and India sourcing, in just **24-months.**

CLIENT CHALLENGE

The client was chasing a fast-closing market window: ultra-high-purity IPA is a critical intermediate for the electronics industry, and demand was rising faster than qualified capacity. Missing the window didn't just mean lost revenue - it meant ceding a competitive position in a segment where qualification cycles with downstream electronics customers can take years to re-open. The obvious fix - a clean greenfield build on a new plot - was off the table: it would have added land, permits, and utility-tie-in time that the business case could not absorb, and it would have stranded the client's existing brownfield infrastructure and workforce. What they actually needed was a greenfield-grade facility built inside a live, congested brownfield, with a repeatable execution template that could be cloned for the next expansion if the economics held.

ENGINEERING COMPLEXITY

The complexity here wasn't in any single problem - it was in **four compounding challenges** that had to be solved at the same time, on the same plot, against the same clock.

01

Greenfield inside a live brownfield.
The plot sat inside an operating "dirty" facility. That meant underground unknowns (legacy piping, foundations, cables), constrained heavy-lift paths for two 220+ ft columns and three pipe-rack/staging modules, and hot-tap/turndown tie-ins that had to be engineered without shutting the host plant.

02

Pilot-to-commercial jump.
The engineering had to move directly from pilot-plant data to full commercial scale, without an intermediate field-proven baseline to anchor the design against.

03

Long-lead procurement on a fixed window.
30+ pieces of long-lead, heavy equipment had to be sourced, shipped, dressed-up on site, installed, and commissioned inside a 24-month envelope - one slipped forging pushes the whole critical path.

04

Thermosyphon reboiler at column height.
At ~220+ ft columns, thermosyphon hydraulics leave no margin -driving force, vapour disengagement, and turndown all must balance at once, or the column stalls off-design.

OUR SOLUTION



Modular construction strategy :
for the greenfield-in-brownfield challenge.

Pipe-racks and staging were shifted from site build to shop-fabricated modules - cutting on-site man-hours, decongesting the live plot, and shrinking the window of exposure to the host plant.



3D-model-led design reviews :
for de-risking execution inside the live facility.

An immersive digital twin became the single source of truth for constructability, operability, and safety - so clashes and rework were resolved in the model, not in the field.



Early pre-FEED engagement :
for the pilot-to-commercial jump.

By entering at scope-definition rather than at FEED, LTTS locked the basis of design on defended assumptions - before detailed engineering, and before the cost curve steepened.



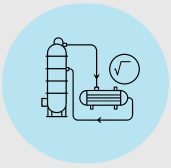
Value engineering at FEED stage :
for de-risking the investment case.

Structured VE and risk workshops delivered ~$4 Mn of engineered savings before design freeze - captured in the sanctioned estimate, not chased as post-hoc under-runs.



India-sourced procurement + Asian-market supply chain :
for the long-lead procurement window

The two costliest long-lead items - the column and reboiler - were sourced from qualified Indian fabricators, holding both the quality bar and the 24-month delivery slot.



First-principles engineering for the tall-column reboiler :
for the thermosyphon-at-height risk.

The reboiler-column loop was engineered to perform across the full operating envelope -not just at the design point - protecting throughput, uptime, and product purity from day one.

BUSINESS OUTCOMES

~$10 Mn saved on a ~$140 Mn program (~7%). Delivered through value engineering and India-anchored sourcing of the two costliest equipment items - the column and the reboiler.

Faster, safer construction inside a live plant. Shifting pipe-racks and staging to shop-built modules cut on-site work in the congested brownfield - reducing schedule risk and exposure to the host plant.

Rework avoided before it reached the field. Model-based reviews caught constructability and operability issues in the digital twin - where fixes cost hours, not weeks.

A repeatable template for the next expansion. The client set this project up as a benchmark - if the numbers and construction model held, it would be cloned for future capacity additions. They did.

The EI Edge

A software vendor could have modelled this plant. A construction contractor could have built it. Neither, alone, could have engineered a greenfield inside a live brownfield - with a fixed market window. That is the **Engineering Intelligence** edge: pre-FEED foresight, module-first constructability, model-led reviews, and a globally qualified sourcing network - working as one layer across the lifecycle.

The client didn't just get a facility. They got an **execution pattern** - one they can point at the next expansion; the moment the market asks for it.



This collateral includes AI-enhanced imagery

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ENGINEERING THE CHANGE

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