vduX360

Predictive decision support for the Vacuum distillation unit

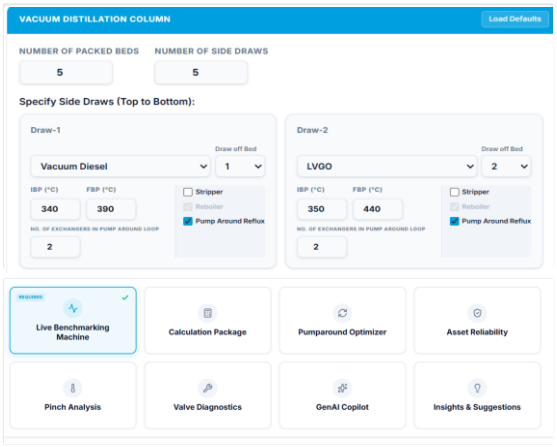
MODULE OF THE INGENEROX360 AI SUITE

PRODUCT OVERVIEW

VDUX360 is an AI-powered decision support application for vacuum distillation units. Domain and machine-learning agents benchmark column, heater and ejector performance, turning historian and DCS data into ranked, quantified recommendations — from heater and pump-around to cut points and valve health. Each deployment is configured and commissioned by Ingenero process engineers to match the unit's feedstock and envelope.

01 Unit Configuration

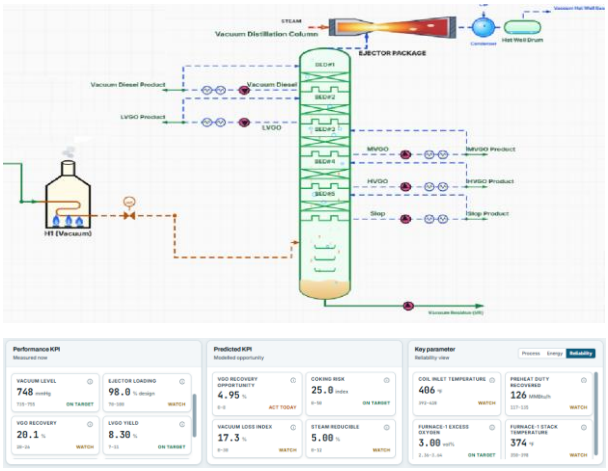
Shown: column configuration, then model selection against the assets.



Asset hierarchy	*preheat train, vacuum heater, column, ejector system, pumparounds*
Column internals	*tray count, side draws and feed tray location*
Side draws	*product cut, draw-off tray, IBP and FBP per draw*
Operating modes	*normal, turndown and crude switch; KPIs per asset*

02 Plant Data and Model Execution

Shown: the configured unit as a process flow, with live KPIs and trends.



Inputs	*crude API, feed rate, COT, draw rates, pumparound/ejector duty*
Processing	*tag validation, steady state framing and mode segmentation*
Outputs	*predicted KPIs, ranked actionables with cause, trends, alerts*

03 AI-Powered Model Agent Suite

A site enables only the models its assets and available data can support.

Live Benchmarking	*Benchmarks column performance against historical optimum.*
Vacuum Heater Optimizer	*Minimizes excess O2 and Stack losses improving fuel consumption.*
Pumparound Optimizer	*Improves heat recovery and minimizes fuels consumption in heater*
Asset Reliability	*Outlier detection flags anomalies and failure risk.*
Cut Point Optimizer	*Improves distillate yield while maintaining product specification*
Ejector Performance Monitor	*Tracks ejector loading and motive steam*
Pinch Analysis	*Targets preheat train heat recovery against the pinch.*
Valve Diagnostics	*Tracks control valve health and ranks tuning gaps.*
GenAI Copilot	*Answers plant questions inside the operating workflow.*
Insights & Suggestions	*Quantified actions reported against operating envelope deviations.*
Column Performance	*Detects flooding, loss of vacuum and increase in ΔP.*
Product Quality Soft Sensors	*Provides visibility on quality parameters to minimize giveaways.*

04 Opportunity and Operator Actions



BUSINESS KPI	CAUSE MESSAGE	ACTUAL	OPTIMUM	SUGGESTION
LOW VGO YIELD	LOW VDU HEATER OUTLET TEMPERATURE	743 °F	748 °F	INCREASE VDU HEATER OUTLET TEMPERATURE TO INCREASE VGO RECOVERY.
	HIGH VDU COLUMN PRESSURE	45 MMHG	40 MMHG	REDUCE VDU COLUMN PRESSURE BY OPTIMIZING EJECTOR OPERATION TO IMPROVE VACUUM AND VGO YIELD
HIGH FUEL GAS CONSUMPTION	HIGH HEATER EXCESS O_2	3.8 %	2%	REDUCE EXCESS O_2 TO REDUCE FUEL GAS CONSUMPTION WHILE MAINTAINING SAFE COMBUSTION.
LOW HEATER THERMAL EFFICIENCY	HIGH DRAFT PRESSURE	-0.35 INWC	-0.15 INWC	REDUCE HEATER DRAFT. THIS WILL HELP IN IMPROVING HEATER THERMAL EFFICIENCY

VGO recovery: +0.5–2 wt %
Cut-point optimization

Vacuum heater energy saving : 2–5 %
Excess O_2 and stack losses reduction

Vacuum-system steam saving: 2–5%
Ejector performance optimization

Column throughput: +1–3%
Pump around and column optimization

05 Platform

Historian connectivity
connects directly with leading plant historians

Simulation integration
third-party simulators integrate without custom engineering

Daily reporting
downloadable daily reports with interactive trends

GenAI Copilot
answers plant questions in the operating workflow

Build your own dashboard
engineers assemble the views each unit needs

DELIVERY
Configured, validated and commissioned by Ingenero process engineers.

FLEXIBILITY
Any crude slate; selectable KPI set; selectable virtual analyzers.

SCALE
Repeat sites reuse the configuration, with no/minimal rework per plant.

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