Optimum - The Deep Learning AI/ML Platform for Fractionation Optimization

Domains:

NGL fractionation

Crude distillation

Vacuum distillation

FCC main fractionator

Hydrocracker fractionator

Coker fractionator

Hydrotreater fractionator

Overview:

Optimum enables complex manufacturing operations to achieve optimum results – creating millions of incremental operational dollars by driving higher yields, lower energy use, and reducing carbon emissions

Patented IP Platform allows scalability from single units to multiple unit process optimization and plant optimization (RTO)

Unit and product templates enable faster implementation

Leverages standard industrial communication protocols (e.g., OPC) and meets the rigorous security requirements to operate on the PCN

Benefits over existing APC and RTO technologies:

- **Improved model accuracy** by capturing process dynamics accurately using deep learning technology
- **Improve productivity** by operating units to the unit capacity while respecting safety, quality and energy constraints
- **Stable in all plant regimes** with the ability to operate efficiently under different unit regimes
- **True objective function** optimized using a genetic algorithms without any linearization
- **Flexible optimization function** that can be modified "on the fly"

The Fractionation Optimization Challenge

The midstream industry relies on fractionation processes to separate natural gas liquids (NGL) into their components. With the increase in natural gas production and related NGL, the industry is boosting its fractionation capacity. Operating companies are expanding their assets to process more NGL. To address capacity limitations, optimization solutions can be employed to increase capacity while reducing energy consumption and product giveaway.

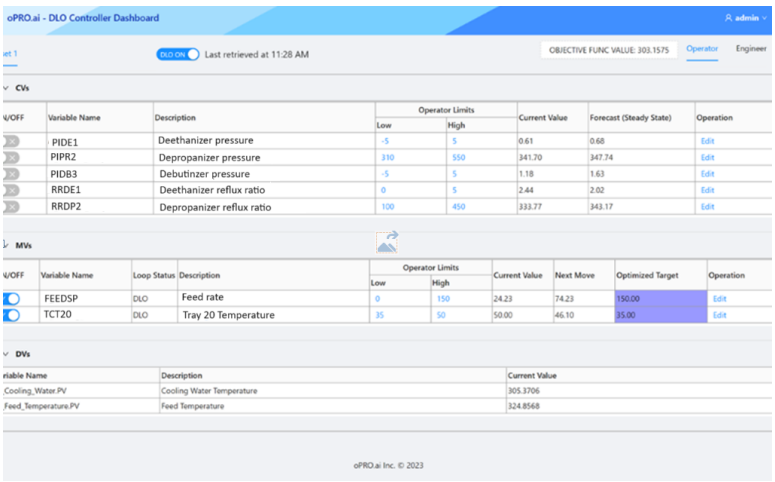
NGL processing has long been a crucial part of the midstream industry, supplying fuels for both industrial and residential use. Recently, however, new industries such as renewables have emerged, requiring advanced polymers. The essential feedstocks for these polymers are produced through fractionation processes.

In addition to NGL fractionation, there are multiple fractionation and distillation processes within the oil and gas industry that require optimization. Enhancing these processes can increase the overall plant capacity and promote better efficiency for adjacent operations.

Optimum Overview

oPRO.ai's patented Optimum software platform enables complex manufacturing operations to achieve higher optima than traditional linear APC technologies including higher yields, lower energy use, and reduced emissions.

Delivered on-premise and deployed at the edge on the PCN, Optimum integrates seamlessly within current operator dashboards for ease of use and adoption.

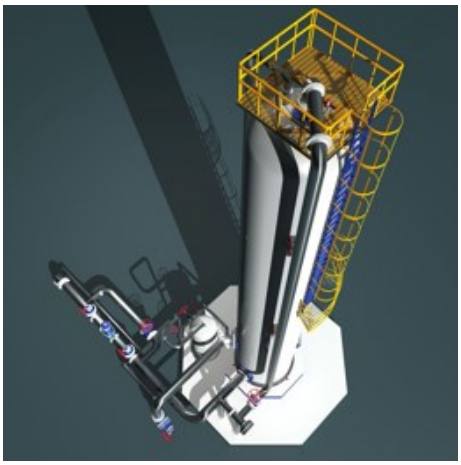


Optimum HMI for Operators and Engineers

oPRO.ai Deep Learning AI/ML Platform accelerates the optimization of Fractionation Processes

Optimum for Fractionation Optimization includes:

- **Multivariable deep learning optimizer:** More than 10 manipulated variables and 25 controlled variables.
- **Sub-model architecture:** Deep learning models are used to predict properties and state variables. These predictors are trained as sub-models and assembled into a overall model, enabling easier and faster model maintenance.
- **Templatized approach:** oPRO.ai's proprietary platform allows the templatization of models so that they can be reused by similar assets, reducing implementation time.
- **HMI and dashboards:** Operators and engineers are provided with the tools required to operate and tune the optimizer.
- **Engineering Services:** APC and machine learning engineers provide the necessary services for the development and implementation of the application: data validation, correlation analysis, model training, software deployment, and commissioning.



Our optimization applications can be applied to any fractionation process, enhancing the value of these assets.

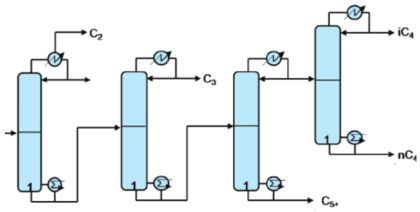
Variable	Units	Traditional APC	oPRO.ai
Capacity	Barrels per day	100,000	104,000
Margin	$ per Mscf	1.38	1.38
Margin increase	$ per year	--	~$5 Million

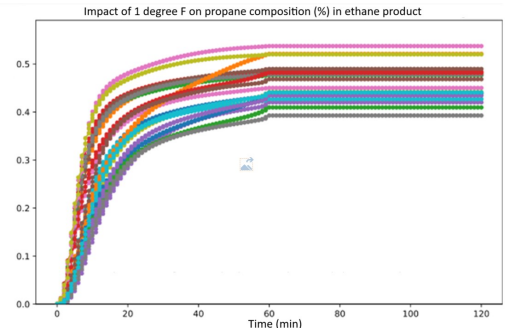
Annual economic value generated by a deep learning optimization application

The oPRO.ai application finds the optimal values for the manipulated variables in order to comply with control and objectives:

Maximizing feed rate to unit capacity limits

Optimizing and controlling product impurity (or other quality) measurements to specification or operator targets/ranges

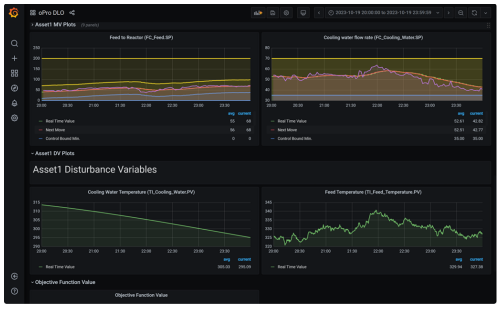




Explainable AI features assist APC engineers to validate models and sub-models based on engineering and process knowledge. The simulated behavior shows key characteristics of model learning: Steady state gain range, time to steady state

The optimizer includes dashboards to monitor the process and performance of the Deep Learning Optimization application including:

Process values, optimized targets and operational limits.



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