# Optimum - The Deep Learning AI/ML Platform for Industrial Process Optimization

**Domains:**

Plant Optimization

Refinery Unit Optimization

**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”
- **Able to implement large problems** which are easier to scale and standardize, no MV/DV limits
- **Includes a tool set** for APC engineers to de develop their own applications

## The Optimization Challenge

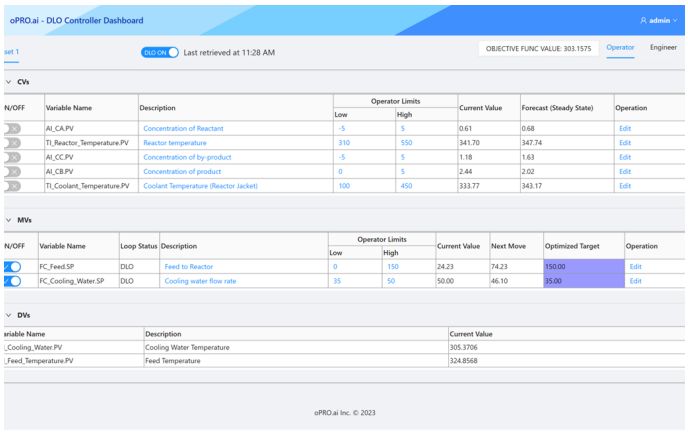
The refining industry has the important task of manufacturing transportation and other fuels, and it currently faces multiple challenges such as demand disturbances, excess capacity, and environmental regulations. Refining is a business of margins which requires an efficient and best performance of the refinery. To enable this, we must drive to obtain optimal control of individual units and the synergistic coordination of the refinery as a whole. In a highly competitive market where companies can see decreasing margins, optimum operations can be a differentiated capability to satisfy demand at the lowest cost while still satisfying any business constraints.

Historically, refining companies have invested in control systems, advanced process control and real time optimization applications to optimize their process and operations. To enhance the efficiency already achieved with the current automation platforms, artificial intelligence (AI) and cloud computing offer opportunities to operate at the higher yields and margins by operating closer to product specification and diminishing product giveaway.

## 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 plant units and processes*

**oPRO.ai Platform features:**

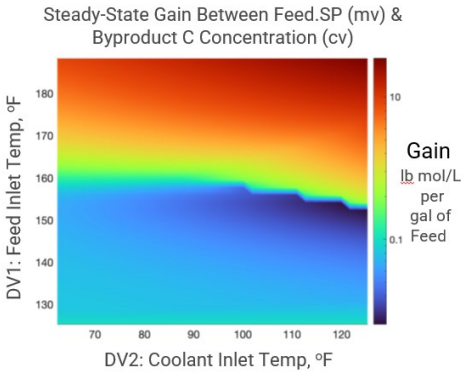
- **Data validation:** The platform performs automatic detection of invalid data ranges. Outlier removal and data smoothing are available for noisy data.
- **Deep Learning prediction capabilities:** LSTM and GRU deep neural networks are trained with time-series data from the process data historian.
- **Inferentials:** For properties not measured frequently, a number of inferential algorithms are available for prediction.
- **Optimization:** oPRO.ai's proprietary genetic algorithm (GA) computes the optimal moves for manipulated variables using the prediction models.
- **Integration with DCS:** The deep learning optimization application can be used in open loop for advisory applications and closed-loop for control applications. Seamless connectivity software is provided with the necessary handshaking for the safe operation of the application.

**Current oPRO.ai APC* and RTO** applications in oil and gas refineries:**

- APC of LNG Fractionation
- RTO of Naphtha Hydrotreating
- APC of Diesel Desulfurization
- APC of Alkylation Unit
- APC of Fluid Catalytic Cracking Unit
- RTO for Coke Drum Foam Over Avoidance

* Advanced Process Control
** Real Time Optimization


oPRO.ai
Email sales@opro.ai
Website www.opro.ai
Address 2923 Jackson Street,
Houston, Texas 77004
+1 713 829 2363 (Phone)

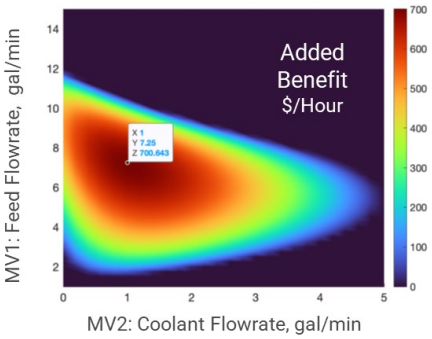



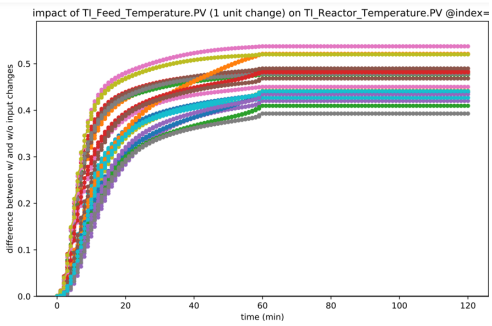

Optimum can capture the behavior of the process across all unit regimes due to variation of:

Unit processing capacity
Product specification
Environmental conditions
Operation mode
Process disturbances

oPRO.ai optimizer searches a global optimum of the configured optimization function:

Control Objective Function,
Economic Objective Function, or
Muti-objective function




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 leaning: Steady state gain range, time to steady state variation, and process delay.

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

Current, maximum, minimum, forecast, and optimized values


oPRO.ai