

Crude Distillation Unit

What is a Crude Distillation Unit (CDU)?

The OmegaLand Educator is a comprehensive training system composed of three main modules:

- Principle Module, which focuses on learning the fundamentals and operational principles,
- Basic Unit Module, designed to master unit operations, and
- Industry Module, which allows users to learn industry-specific processes.

The Industry Module features a Crude Distillation Unit (CDU) model that operates within a dynamic simulation environment. It is designed to provide practical, hands-on training for plant operators.

The package includes (1) Realistic CDU process model for dynamic simulation and (2) detailed training manual covering key topics such as: Process Overview, Process Flow, Operation and Control, Steady-State Operation, Non-Steady-State Operation, Abnormal Situation Handling. The CDU model used in this product is based on a standard atmospheric crude distillation unit and has been simplified for training purposes. It includes all major stages - from crude oil feed from the storage tank to product draw-off - allowing trainees to gain a comprehensive understanding of CDU operations. While simplified, the model retains essential complexity to ensure effective training in realistic operational scenarios. This product is ideal for operator training programs in the refining industry, offering both foundational knowledge and situational practice in a safe, simulated environment.

Process Overview & Process Flow

■ Feedstock Options

The CDU can handle two types of crude oil:

- Heavy Crude – API Gravity: 31°
- Light Crude – API Gravity: 40°

■ Production Capacity

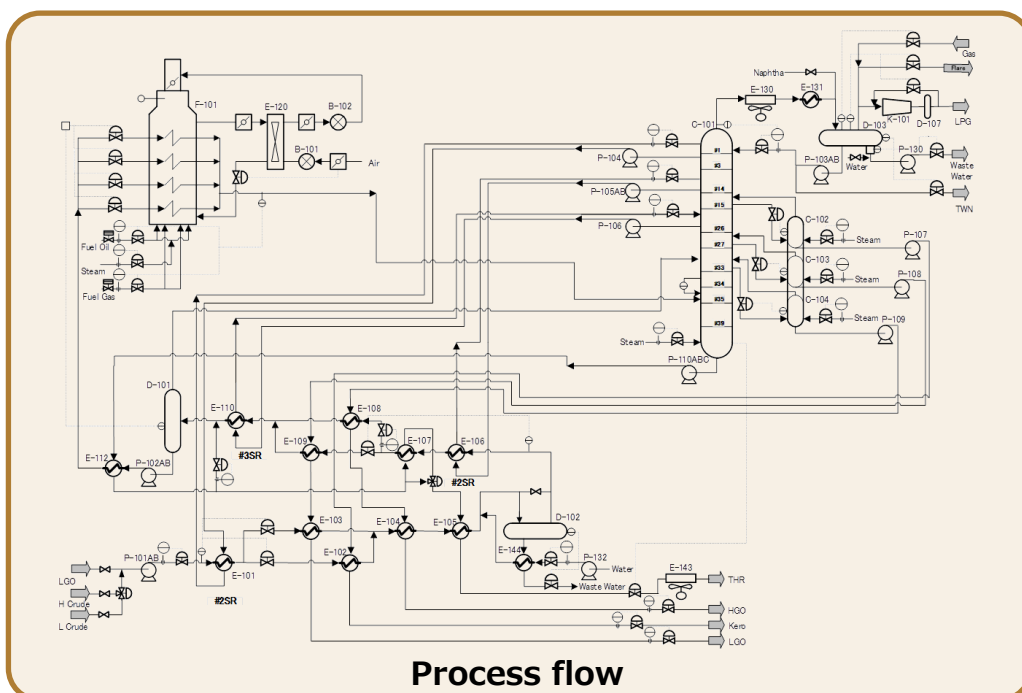
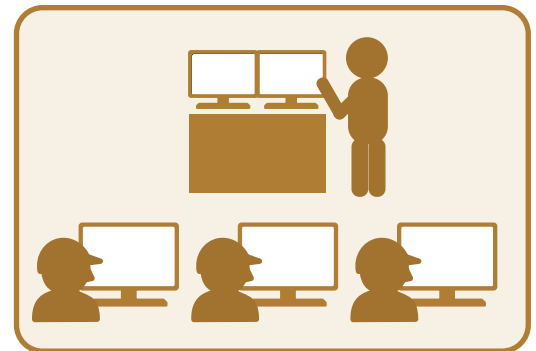
- Light Crude: 650 kl/h (98,000 BPSD)
- Heavy Crude: 700 kl/h (105,000 BPSD)

The capacity is designed to simulate realistic processing conditions suitable for a wide range of training scenarios.

■ Main Products

The CDU produces a full range of atmospheric distillation products, including:

LPG (Liquefied Petroleum Gas) / Straight-Run Naphtha (TWN) End Point (EP) : 145°C / Kerosene (KERO) IBP : 137°C ASTM 95% : 244°C / Light Gas Oil (LGO) ASTM 95% : 337°C / Heavy Gas Oil (HGO) ASTM 90% : 420°C / Atmospheric Residue (THR)



Process flow

What Can Be Done

In this product, participants can learn three main operational tasks: 'steady-state operation', 'non-steady-state operation' and 'abnormal response operation'.

Class	Title	Summary
Steady-state operation	Crude oil grade switching	The switching of crude oil involves light crude oil $\leftrightarrow$ heavy crude oil, but by adjusting the opening of the three-way valve, participants can perform switching training with an intermediate crude oil composition.
	Production rate change (change in crude oil processing rate)	Since there are many opportunities to change the crude oil processing rate according to the production plan, participants will learn smooth adjustment methods.
	Product oil grade property change	Participants will learn how to adjust the properties of each oil grade to target values in order to produce products according to the required production plan. The adjustments are carried out after switching crude oil and when changing the extraction targets. Here, participants will learn the operational items and quantities necessary for changing the product properties.
	Fuel switching for the heating furnace	In the refinery, due to the balance of the generated off-gas volume, the gas firing may reach its maximum, and cheaper heavy oil may be consumed. During the switching operation, the transition is made without causing fluctuations in the heating furnace. Specifically, participants will learn methods to switch without causing incomplete combustion.
	Verification of energy-saving operations and others	Participants will learn that reducing O ₂ in the heating furnace leads to a reduction in fuel consumption, bypassing the air preheater increases fuel consumption, and raising the tower pressure, similar to lowering the heating furnace outlet temperature, results in energy waste.
Non-steady-state operation	Startup	Compared to desulfurization units with catalysts, the heating rate is higher, requiring reflexive responses rather than thoughtful operations. Therefore, the training aims to enable quick and efficient operations.
	Shutdown	In shutdown operations, excessive temperature changes in equipment such as heat exchangers can lead to leakage. Therefore, through simulator training, participants will learn the shutdown methods of actual equipment by comparing them.
Abnormal response operation	Crude oil charge pump failure	Participants can learn how to handle abnormal conditions.
	Booster pump failure	
	Bottom pump failure	
	Naphtha pump failure	
	Side reflux pump failure	
	Overhead condenser fan failure	
	Charge heater fuel gas supply shutdown	
	Light crude oil supply shutdown	
	Heavy crude oil supply shutdown	
	Heat transfer reduction due to fouling in the #1 side reflux heat exchanger	
	Atmospheric distillation column steam supply shutdown	
	KERO distillation column steam supply shutdown	

Contact Information

For inquiries regarding the OmegaLand Educator Industry Edition and CDU, please contact the following.

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