

# Delayed Coking



Chevron Lummus Global

## Overview

Chevron Lummus Global's (CLG) proprietary delayed coking technology is one of the most cost effective routes for converting/upgrading heavy residual stocks to more valuable lighter distillate products and coke.

The current design is based on several decades of continual refinement and accumulated data from over 60 unit designs and commercial installations. CLG's delayed coking technology embodies high reliability and flexibility while meeting today's more rigorous environmental and safety requirements

The delayed coking unit design features online computer control, fully enclosed automatic unheading, single or double fired heaters, state-

of-the-art coke drum mechanical design, vertical plate coke drum technology, helical baffle exchanger in fouling services, and an innovative water management/coke recovery system. The process can handle a variety of feedstocks, such as petroleum derived resids, cracked materials (pyrolysis tar and cycle oils), and liquid feedstocks derived from coal.

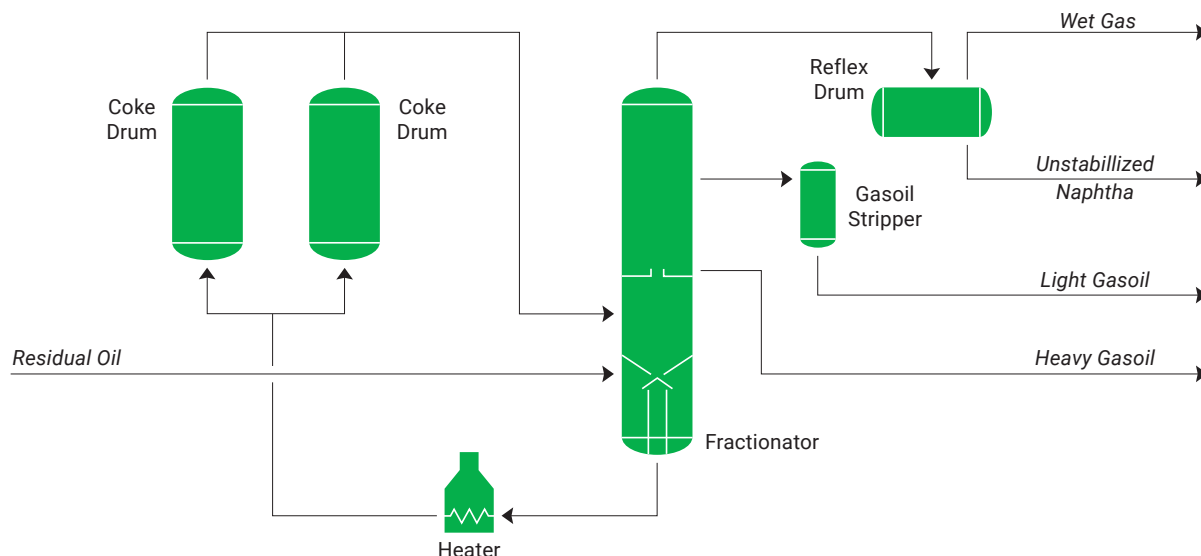
The CLG design maximizes distillate yield while achieving the specification requirements of the downstream hydroprocessing units.

CLG is a joint venture between Chevron U.S.A. Inc. and Lummus Technology.

## Technical Advantages

| Process Features  | Process Benefits                                 |
|---|--|
| Extensive commercial and pilot plant database; predictive tools | Optimizes operating conditions and product slate |
| Special coking heater design                                    | Maximizes run length • High efficiency           |
| Online heater decoking  | Higher on-stream factor                          |
| Fully enclosed automated flange unheading system                | Enhanced operational safety • Shorter cycle time |
| Vertical Plate Coke Drum (VPCD)                                 | Maximizes drum life for all drum sizes           |
| Low pressure • Ultra low recycle design                         | Maximizes distillate production                  |
| Helical baffle exchangers                                       | Improved unit on-stream time                     |
| Environmentally advanced design                                 | Reduces fugitive emissions and waste effluents   |
| Advanced process control system                                 | Operating cost savings                           |
| Proprietary coke pit/pad and coke drum structure design         | Reduced investment and maintenance costs         |
| API sludge disposal process                                     | Provides sludge disposal capability              |

## Process Flow Diagram



## Process Description

Delayed coking is a semi-continuous process using alternating drums that are switched off-line after filling. Support facilities include closed blowdown, coke cutting and handling, and a water recovery system.

Hot residual oil is fed to the bottom of the fractionator where it mixes with condensed recycle. The combined stream is heated in the furnace to initiate coke formation in the coke drums. Coke drum overhead vapor flows to the fractionator

where it is separated into wet gas, and coker liquid product such as unstabilized naphtha, light gasoil, and heavy gasoil.

During the coke drum steam out and cooling period, all steam and hydrocarbon vapors are directed to the blowdown system where they are recovered and recycled back. After the coke drum cooling cycle is complete, the coke is hydraulically cut from the drum and dropped into a pit or pad, where water is separated from coke and recycled.

## Predictive Tools

From extensive pilot plant and operating experience, Lummus Technology has developed a correlation package and computer software to predict delayed coking yields and operating conditions for a wide variety of feedstocks and product requirements. For unusual feedstocks, Lummus Technology's pilot plant can be used to obtain design yields.

Lummus Technology provides operator training simulators (OTS) that exactly mimic the actual unit control room. OTS uses in-house developed dynamic simulation of the delaying coking unit using confidential kinetic model of CLG's proprietary delayed coking technology.

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