Bechtel Energy Technologies & Solutions

ThruPlus® Delayed Coking Technology

Shell Island, St. Croix, USVI

Domed Coke Storage

ThruPlus® Delayed Coker

Bechtel ThruPlus® Delayed Coking Technology is your best choice.

Bechtel is the exclusive worldwide licensor of ThruPlus® Delayed Coking Technology, which was purchased from ConocoPhillips 2011. Prior to this purchase, Bechtel and Conoco Phillips collaborated on ThruPlus® Delayed Coking Technology for more than 15 years. Bechtel's ThruPlus® Delayed Coking Technology is the industry's leading choice for converting heavier oils into high-value products.

Bechtel offers comprehensive solutions that provide higher unit throughput and liquid product yields along with higher onstream factor and unit reliability.

Features

Major features of the ThruPlus® Delayed Coking Technology:

- Patented proprietary process that can achieve the lowest coke yields and the highest liquid yields in the industry
- Proprietary coker furnace design resulting in longer run lengths between off-line de-coking
- Proprietary coke handling system
- Maximum coking capacity with optimized economic value
- Proprietary coke drum design resulting in longer drum life
- Safer coke drum structure piping layout
- Unequaled operational stream factors and reliability
- Proprietary coker yield prediction model

The design of the ThruPlus® Delayed Coking Unit incorporates the latest operational best practices and technology improvements, including safety interlocks and egress, automated isolation and switch valves, coke drum auto-unheading/reheading, reliability, furnace design, coke drum design, optimized coke handling system, and environmental controls.

Technology Benefits

Bechtel Delayed Coking Technology offers four key overarching benefits:

Safe and Reliable

- Automatic and remote drum unheading and coke cutting removes workers from hazardous locations
- Automated coke drum valve interlock matrix prevents auto-ignition of combustible hydrocarbons
- Coke drums are field-proven to be bulge and crack resistant
- Longest coke drum life in the industry, which reduces need for premature drum repairs or replacement
- Most robust furnace design in the industry with tough furnace coils to stand up to erosion and inadvertent blocked-in conditions
- Coke drum dual entry feed noggler to best simulate true bottom center feed thereby avoiding temperature maldistribution
- Sloped wall structure directs cut coke to pit/pad, keeps the unit clean, stiffens the structure, and allows energy dissipation in the event of a bottom blowout
- Pit/pad/ crane system that provides better flexibility for operations and positive de-watering (not just decanting) of coke
- Plant layout for operator shielding and emergency egress, removing workers from harm's way
- Expert commissioning and startup support
- Shared learning and ThruPlus® Coking Symposium available to licensees

Clean

- Closed blowdown system eliminates hydrocarbon discharge to atmosphere
- Sloped wall structure does not leak, as steel box chutes often do, and better separates the coke handling from the process unit to avoid drift of mist and fines
- Improved bridge crane system and pit/pad dust control facilities have allowed our design to be installed in environmentally sensitive areas in California and Germany
- Pit/pad coke de-watering and water re-use minimizes fresh water make-up and reduces wastewater
- Sludge and slop oil processing addresses most stringent environmental requirements
- Flareless startups, a proactive approach to prevent heavy hydrocarbon emissions and loss of products

Proven

- ~60 years of delayed coking experience
- 19 ConocoPhillips (now Phillips 66) ThruPlus® operated cokers
- >70 licensed units
- Comprehensive understanding of feedstocks
- Demonstrated and effective shortest drum cycles in the industry which results in highest onstream factor
- Multiple applications of distillate recycle to maximize desired product yields
- Complete lifecycle support with experienced ThruPlus® engineers

Profitable

- Improved profitability via increased reliability
- Reduced coke yield, liquid product yield optimization
- Robust coke drums for extended service life
- Robust furnaces with on-line spalling for extended run length without off-line de-coking
- Robust and simple coke handling that is de-coupled from the rest of the coker
- Short drum cycles with high processing capacity
- Low maintenance costs
- Minimized downtime with maximized throughput capability
- Availability limited only by refinery/upgrader turnaround scheduling

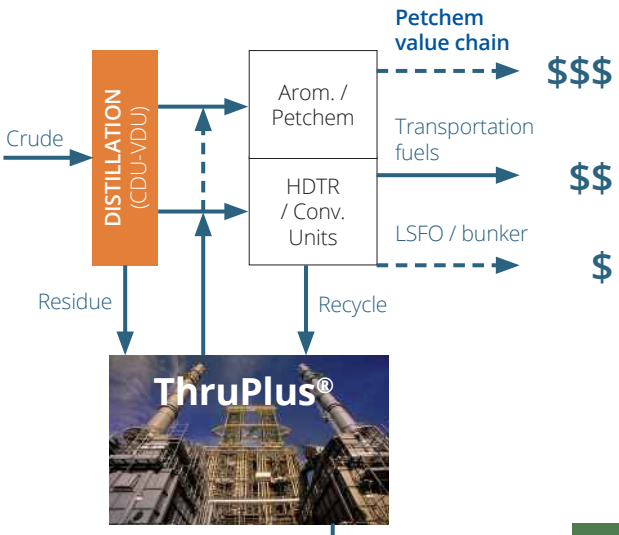
For all the reasons above, Bechtel ThruPlus® Delayed Coking Technology is your best choice for safe, clean, reliable, and profitable operation.

Benefits

Feedstock Flexibility	(L-H crude) differentials	$
Upgrade fuel oil to distillate	(Diesel-RFO) differentials	$$$
Coker naphtha to petchem	(Petchem-RFO) differentials	$$$

Proven technology with significant operating experience; lowers WACC and improves project NPV

Coking economics are particularly favorable for **high complexity** assets, and in regions with **feedstock advantage**



- Delayed coking remains the economical residue upgrading option
- Bechtel ThruPlus® delayed cokers allow refiners to take advantage of opportunity feedstocks, and **maximise naphtha yield for petchem integration**
- Modern Bechtel ThruPlus® design meets stringent standards in safety, environmental performance, and reliability

Fuel Grade Petcoke

Demand down **Less desirable**

- Power / Cement
- Potential carbon sequestration

Anode Coke

In Demand **Desirable**

- Upgrade fuel oil to distillate
- (Diesel-RFO) differentials

ThruPlus® Technology + Bechtel. Single source.

Significant savings.

Bechtel has capabilities in many other areas of heavy oil upgrading, which include the design of vacuum, sulfur recovery, tail-gas treating, and amine treating units. Bechtel can provide a single-source solution for a complete, integrated project.

When you need a proven technology solution to upgrade heavy crude fractions into high-value transportation fuels, choose Bechtel ThruPlus® Delayed Coking Technology.

Our Experience

Motiva Enterprises LLC
95,000 bpsd
Port Arthur, Texas
PDP, EPC

Motiva Enterprises LLC Motiva Crude Expansion

WRB Refining LLC
65,000 bpsd
Roxana, Illinois
PDP, EPC

WRB Refining LLC Wood River

ConocoPhillips
25,000 bpsd
Borger, Texas
PDP, EPCm

ConocoPhillips Borger

Merey Sweeny L.P.
67,000 bpsd
Sweeny, Texas
PDP, EPC

Merey Sweeny L.P.

Safety: separate operator egress tower; cutting deck layout; remote cutting controls in clean cabin; bridge crane cabin; no front loaders; safety interlocks, PLC and SIS, remote actuation for isolation and switching.

Reliable: well integrated, never missed process guarantees, highest On-Stream Factor.

Clean: environmentally low-emission features: furnace design; closed blowdown system; sloped wall instead of chutes; efficient pit/pad design; efficient water settling basin.

Proven: field proven with rich history in safe designs with demonstrated efficiency and higher product yields.

Profitable: continuously delivering short & long-term project economics.

>70
Licensed units

>3 million b/d
Licensed capacity

>50 Operating Units

>60 years
Experience
Patented technology

>98% Onstream factor
Cleaner, safer and more reliable

Delivering Net Zero with Bechtel

Helping customers accelerate their decarbonization goals

Our Bechtel Energy Technologies & Solutions (BETS) group provides technology and subject matter experts focused on delivering for our customers as they tackle the challenges of the Energy Transition. Bechtel delivers optimized solutions to help our customers realize lower capital costs, shorter times-to-market, and projects with lower carbon emissions.

Supported by world-renowned experts, our depth of technology experience and technology development capabilities, and a suite of in-house licensed technologies , we examine innovative solutions and identify the optimal solution for each customer's needs. We have the breadth and depth of expertise to evaluate and integrate proven technologies, emerging technologies, and innovative combinations of both to lower carbon emissions for our customers.

How we help

We apply technology, economic analysis and complex process systems analysis to the energy transition challenge including concept definition, emerging technology advice and selection services, feasibility studies, technology licensing, process design basis and pre-front-end engineering and design (pre-FEED) services in olefins, chemicals, water treatment, advanced fuels, sulfur, carbon capture and hydrogen.

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