SYDEC℠ DELAYED COKING
Maximize profit from the bottom of the barrel
Delayed coking is a key technology for residue upgrading or zero fuel oil production.

Advantages
- Refiners can process heavier, cheaper crudes to increase their refinery margins
- Converts low-value residues to high-value fuels with moderate capital investment
- Easy integration into existing refinery
- Delayed coking is a safe, reliable and WELL-PROVEN technology, meeting all regulatory requirements

Valero’s $350 million investment in a 45,000 barrel per day coker (complex) at its Texas City refinery increased the plant’s ability to process heavy, sour Maya crude. As a result, the coker generated nearly $200 million in operating income in one year alone!

Typical yield from a barrel of coker feedstock

- Resid
- Coker Gas
- Naphtha
- LPG
- LCGO to Diesel
- HCGO to HDS, HC or FCC
- Coke
Delayed coking is a cyclic process that thermally cracks vacuum residue or other residue feedstocks into gas, light products and petroleum coke.

Key process steps:
- heat residue to about 930°F (500°C) in coker furnace
- transfer the hot residue to coke drum before it has formed coke
- fill the drum and allow the heavy tars to coke
- switch the drums on timed cycle (12 to 24 hours)
- decoke the full drum hydraulically
- recover the cut coke, crush and prepare for shipment
- recycle water to eliminate waste
- fractionate cracked products into gas, coker naphtha, light coker gasoil and heavy coker gasoil
- further process fractionated products in downstream units
BEST-IN-CLASS TECHNOLOGY
Foster Wheeler has designed and engineered more delayed cokers world-wide than any other technology provider or engineering contractor.

- Over 2.4 million bpsd installed using our technology
- Over 70 revamps designed in the last 10 years
- Almost 40 new units designed in the last 5 years
- Our mechanical design expertise and extensive EPC experience enables successful technology transfer
- Proprietary equipment design and supply – drum unheading systems and the all-important coker heater
- Proprietary specification of other critical equipment
- Maximum liquid yields while maximizing operating efficiency

RIGHT PEOPLE, RIGHT EXPERTISE
Our people have in-depth technical knowledge and expertise. We have the largest team of coking experts in the industry, many of them with over 30 years’ experience in all aspects of coker design and project execution.

SEAMLESS EPC EXECUTION
As a world-class EPC contractor with a long track record of executing successful major projects and revamps, our clients benefit from our experience of meeting aggressive cost and schedule targets.
WHEELER technology further
PROJECT

**VALERO**
Texas City Refinery, USA
EPC in less than 28 months, under budget, from process design to ‘oil in’. Coker process 45,000 bpsd in four drums.

**PETRONOR**
Somorrostro, Spain
Process design, FEED and EPC for 36,000 bpsd delayed coker, plus coke handling and storage facilities, and a gas concentration unit.

**PETROX**
Talcahuano, Chile
We designed, supplied and built a new 12,000 bpsd delayed coking plant at this innovative Petropower™ combined coker/cogeneration facility.

**SINCOR**
Jose, Venezuela
EPCm for debottlenecking and shutdown. One of four Orinoco upgraders; we provided delayed coking technology for three.

**MOL**
Százhalombatta, Hungary
We have worked with MOL for more than 20 years. Our recent revamp and expansion increased capacity by 27% to 26,400 bpsd.

**RELIANCE INDUSTRIES**
Jamnagar Export Refinery, India
Huge new eight-drum 160,000 bpsd delayed coking unit, one of the largest in the world, and four Terrace-Wall™ delayed coker heaters.
highlights

BP
Castellón, Spain
FEED and EPC for new 20,000 bpsd coker and design, engineering, procurement and supply of 43.5 MW double-fired Terrace-Wall™ heater.

ENERCON
ENAP’s Aconcagua Refinery, Chile
Feasibility study, basic design and EPC of a 20,000 bpsd coking facility, including amine regeneration unit, sour water stripping and coke handling facilities.

INDIAN OIL CORPORATION
Gujarat, India
License and basic engineering for new 3.7 mtpa delayed coker, part of IOCL’s residue upgrading program.

REPSOL YPF
Cartagena, Spain
Our relationship with Repsol started in 1966 and recently included the license, process design package and EPCs for a 53,000 bpsd delayed coker unit, gas concentration unit and 90,000 bpsd vacuum distillation unit.

BP
Whiting Refinery, US
License, process design package and EPCm for coker project to increase refinery’s ability to process Canadian heavy crude.

SAUDI ARAMCO/TOTAL
Jubail Export Refinery, Saudi Arabia
Process design package for a new delayed coker, part of the Jubail Export Refinery, a grassroots full-conversion refinery designed to process Arabian heavy crude.
The fired heater is the heart of the delayed coker, and we can offer:

- Terrace-Wall™ double-fired, sloped wall type
- single-fired cabin-or box-type with horizontal tubes and bridge wall

Foster Wheeler fired heaters are an integral part of our technology, and ensure economic operation with long on-stream factors.

Our in-house team provides full process, thermal and mechanical design to our stringent specifications and standards, leaving no critical details open to misinterpretation by a third-party designer.

The key advantages of Foster Wheeler’s Terrace-Wall™ delayed coker heaters:

- Sloped walls provide an extremely uniform heat flux from top to bottom of the radiant coil
- The burners firing up the sloped walls stabilize the coker off-gas fuel and spread the flame evenly along the length of the tube and up the wall
- Grade access permits 360-degree viewing access and easier burner maintenance
- Completely isolated cells allow individual pass firing controls for on-line spalling and turndown abilities, which result in cost savings from increased run length
of the process
The SYDEC<sup>SM</sup> difference

Although coking technology is ‘mature’, we are always looking for ways to make our SYDEC<sup>SM</sup> technology even safer and more reliable for our clients.

Key features of the SYDEC<sup>SM</sup> process are reliability and efficiency:
- Terrace-Wall™ double-fired furnace
- Advanced coke drum design
- Fractionator zone sprays and fines removal
- Low pressure, ultra-low recycle
- On-line spalling/pigging
- Can achieve successful run lengths of five years or more between turnarounds

Safety:
- Unheading system improvements
- Safety interlocks

Environmental advantages:
- SYDEC<sup>SM</sup> is an environmentally friendly process
- There is low-sulfur fuel gas production
- Enclosed blowdown recovery systems
- Unique clean coke handling systems

Due to the stringent environmental regulations at ENAP’s Aconcagua refinery in Chile, the petroleum coke produced is milled in a coke crusher and conveyed in belts installed in a closed gallery and driven into a hemispherical storage facility (‘domo’).
Did you know?

• Commercial coking first started in 1929
• Since 1994, all residue upgrading in the USA has been based on delayed coking
• Foster Wheeler cokers have the flexibility to produce fuel-grade coke or more valuable anode coke depending on feedstock
• We can integrate delayed coking with
  - solvent deasphalting (SDA) to increase residue conversion
  - circulating fluidized-bed (CFB) technology to produce electricity and/or steam
  - gasification to produce electricity, steam and hydrogen

Turning vision into reality
GLOBAL E&C OFFICE LOCATIONS