“An investment in knowledge always pays the best interest”

- Benjamin Franklin
Jerry Waggoner  
Commissioning Manager  
Foster Wheeler USA Corp  
585 North Dairy Ashford Road  
Houston, TX  77079  
p: (713) 929-5622  
Jerry_Waggoner@fwhou.fwc.com  
www.fwc.com

Brian Cormier  
Director of Oil & Gas Solutions  
Resource Development Co.  
13831 Northwest Frwy, Suite 520  
Houston, TX 77040  
p: (832) 704-0905  
bccormier@resourcedev.com  
www.resourcedev.com

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PILOT®

Programs in Learning Operating Techniques

- 50 years as the industry standard for operator training
- Certified by the American Petroleum Institute
- Over 40 million hours of training delivered around the world
- Over 600 hours of comprehensive learning content—proven to transfer knowledge.

Experience you can trust.
Delayed-Coking – Unique Challenges:

Complex process technology and innovation are far out pacing the capacity of traditional technical training. Coking is a unique process with unique challenges to manage:

- batch process
- extreme temperatures
- highly viscous feed
- coke-cutting and handling

Delayed-coking requires a unique program that can assimilate new innovation, tenured experience, fundamental process principles and create knowledge that will improve operator competency.
Protecting Your Investment

Working together to improve DCU operator competency in a new paradigm…
Industry Challenges Driven By:

- Skilled Workforce Attrition
- Institutionalizing Best Practices
- Compliance Mandates
- Training Resource Limitations
Traditional Training Isn’t Cutting It…

Most existing programs:

• Lack continuity from basic operator training to unit-specific

• Rely heavily on mentoring and can be subjective

• Do not define absolute knowledge requirements

• Do not address knowledge gaps on an individual level

• Do not provide a pathway to achieve 100% competency

• Are not sustainable for unit customization

RISK = Knowledge Gap

100% Competency

Safe & Best Operating Practices

Existing Knowledge
“Information is not knowledge”
- Albert Einstein
Learning is a complex activity involving:
- cognition
- memory
- association formation
- perception
- problem solving

Learning becomes useful in an organization when a learner is able to retrieve data and information stored in long-term memory and use that knowledge to improve production/reliability, increase safety, and prevent and solve problems...
Targeted Goals:

• Define absolute knowledge requirements
• Tactical approach to learner progression
• Pathway to reach 100% competency
• Sustainable platform for managing knowledge
• Site/unit-specific relevance – not generic
• Interactive problem solving – essential to learning
• Web-accessible 24 X 7
Defining knowledge requirements…

### Foster Wheeler SYDEC Delayed Coker

**MicroCourse Title:** 2.0 - SYDEC Delayed Coker Systems Overview

**Terminal Objective:** Describe how the process flows through the coker system.

#### Lesson ID/Title: 2.1 - Feed Streams

**Learning Objective:** Identify the feed flow into the coker system.

<table>
<thead>
<tr>
<th>ID</th>
<th>Learning Points</th>
<th>Graphic Asset Requirements</th>
<th>Evaluation Requirements</th>
<th>Source Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.1</td>
<td>Feed Streams (total feed rate is maintained at a constant rate. This is done by varying the tank (cold) feed rate when the hot feed rate changes)</td>
<td>Close view of feed streams</td>
<td>- Match the type of feed stream with its description</td>
<td>- FW Design Basis - PFT &amp; 6040_rev. Cpdf Section 1.0 - FW Delayed Coker Training Module.ppt - Dojr-310Training.ppt Slide 6.9</td>
</tr>
<tr>
<td>2.1.2</td>
<td>Feed Direct from Unit</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2.1.3</td>
<td>Feed Direct from Tank (tank feed will swing to maintain steady feed rate)</td>
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</table>

#### Lesson ID/Title: 2.2 - Feed Preheat System

**Learning Objective:** Describe the feed preheat system, including the pumparound.

<table>
<thead>
<tr>
<th>ID</th>
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<th>Graphic Asset Requirements</th>
<th>Evaluation Requirements</th>
<th>Source Material</th>
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<tbody>
<tr>
<td>2.2.1</td>
<td>Feed Preheat Equipment</td>
<td>Close up view of equipment</td>
<td>- Match the equipment with its function</td>
<td>- FW Delayed Coker Training Module.ppt - FW Design Basis - PFT &amp; 6040_rev.</td>
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</tbody>
</table>
DCU Knowledge Structure

Defined knowledge requirements, validated against operator roles.

Process Overview
  • Introduction to SYDEC Coking
  • SYDEC Delayed Coker Systems Overview
  • SYDEC Delayed Coker Chemistry

Primary Equipment
  • Fractionator System
  • Coker Heater System
  • Coke Drum System
  • Gas Plant Equipment

Auxiliary Equipment
  • Fractionator Auxiliary Systems
  • Cutting and Quench Water Systems
  • Coke Handling

Process Operations
  • Fractionator Operations and Key Process Variables
  • Coker Heater Operations
  • Coke Drum Operations
  • Operating Procedures
  • Gas Plant Operations

Consequences of Deviation
  • Preventing Abnormal Operations
  • Coker Process Hazards
Collaborative Strength is the Value

Foster Wheeler brings:
• Process technology expertise
• International best-practices

RDC brings:
• Knowledge-transfer environment
• Proven instructional design methods

Equipment Providers bring:
• Product knowledge
• Reliability support
Process Technology Expertise
Knowledge Transfer & Management Infrastructure

**SYDEC Coking Process**

*Delayed coking* is a cyclic process that upgrades *vacuum residues* to a wide range of lighter *hydrocarbons* and *distillates* through *thermal cracking*. The byproduct of delayed coking is *petroleum coke*, also known as coke.

During the process, gas oil feedstocks, distillates, *naphtha*, and *petroleum residuum* are extracted from the residue. The goal for most residue conversion operations is to operate the coker to maximize the yield of clean distillates and minimize the yield of coke.

To maximize liquid yields, the SYDEC coker unit is designed to operate under low pressure with minimal *recycle*.

*Heat residue to about 930°F (500°C) in coker furnace.*
*Transfer the hot residue to the coking drum before it has formed coke.*
*Switch the drum on a timed cycle (12 to 24 hours).*

*Desire the full drum using high pressure water jets.*
* Recover bottom coke, crush, and prepare for shipment.*
*Recycle water to eliminate waste.*
*Fractionate* cracked products into gas, coker naphtha, light coker gas oil (LCGO) and heavy coker gas oil (HCGO).*
*Further process fractionated products in downstream units.*

Refinery has developed a number of procedures that describe *normal and emergency situations*. You should be familiar with the location and contents of these procedures.

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*Knowledge Transfer & Management Infrastructure*

**Introduction to SYDEC Delayed Coking**

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<th>Course Title</th>
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<td>A4070</td>
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<td>1.0 Process Overview</td>
</tr>
<tr>
<td>A4071</td>
<td>1</td>
<td>1.0 Primary Equipment</td>
</tr>
<tr>
<td>A4074</td>
<td>1</td>
<td>1.0 Consequences</td>
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<td>DCU-EM-1.5</td>
<td>1</td>
<td>DCU - Emergency</td>
</tr>
<tr>
<td>DCU-Emer-JTA</td>
<td>1</td>
<td>DCU - Emergency</td>
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<tr>
<td>DCU-GunDrill</td>
<td>1</td>
<td>DCU - Gun Drill</td>
</tr>
<tr>
<td>DCU-NORM-Task</td>
<td>1</td>
<td>DCU - Normal Task</td>
</tr>
<tr>
<td>DCU-OP-1.4</td>
<td>1</td>
<td>DCU Startup Procedures</td>
</tr>
</tbody>
</table>

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- SYDEC Coking Process
- Process Flow
- Coke Products
- Gas Plant
- Types of Coke
- Review
- Post-Assessment
- SYDEC Delayed Coker System
Differential Learning

- Mastery Assessments
- Identify Knowledge Gaps
- Personal Learning Path
- Remediation to 100% Proficiency
OEM Contributions

- Reliability improvement
- Product knowledge
- Maintenance procedures
- Detailed schematics
- Best practices
Change behavior...

Improve performance.
Contacts for Follow-up:

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