Introduction to UOP

Jim McGehee
Development Specialist, Heavy Oils

Crude Oil Quality Group
Houston, 26 May 2006
UOP: An Introduction

- Who we are
- What we do
AND...
- Recent focus in heavy oils
World’s Largest Process Technology Licensing Organization

- 70 licensed processes
- 30,000+ patents, 90% licensable
- 70 catalysts
- Molecular sieves adsorbents
- 30 Engineered products
  - Packaged process units and systems
  - Proprietary equipment
  - Control systems and instrumentation
- Engineering, technical and training services
Who We Are

- Global company with manufacturing sites and offices in 20 countries
- Approximately 2,800 highly trained employees
- More than 90 years of innovative solutions for the hydrocarbon processing industry
- More than $1 billion in revenues annually from over 110 countries
UOP Sites Around the World

Headquarters: Des Plaines, IL USA

- Offices
- Manufacturing
UOP’s History

1914  ■  Founded in Chicago as Universal Oil Products Company
1933  ■  Sold to major oil companies
1944  ■  Placed in trust to American Chemical Society
1959  ■  Relaunched as public company
1975  ■  Acquired by Signal Corporation
1985  ■  Signal merges with Allied Corporation
1988  ■  Joint venture between Allied-Signal’s UOP and Union Carbide’s CAPS
1995  ■  Purchase of UnoCal Process Technologies Licensing
1998  ■  Purchase of Bayer’s zeolite and La Roche’s alumina business
2000  ■  Purchase of Sinco Engineering SSP Technology business
2005  ■  UOP becomes wholly owned subsidiary of Honeywell
UOP’s International Client Base

- Petroleum Refining
- Gas Processing
- Petrochemicals
  - Aromatics
  - Olefins
  - Detergents
- Major Manufacturing Industries
UOP Business Model

Complete Technology Package
- Process license
- Catalyst, adsorbent, chemicals
- Key mechanical equipment
- Engineering services
- Advanced process control
- Modular construction
- Training
- Start-up assistance and training
- Operating services and inspection
- Planning and consulting studies

Integrated Complex Designs
- Fuels refinery
- Aromatics complex
- Detergents complex
- C_3/C_4 Olefins complex
UOP Technology Transfer

- Primary mechanisms:
  - Schedule A design
  - Key equipment
  - Turnkey plants

- The Schedule A conveys engineering information and relevant UOP experience

- UOP has an ongoing process for capturing and incorporating experience from previous designs and field operations
Engineering & Equipment Products

- Engineering
  - Schedule A
  - Process Studies
  - Post Schedule A Services

- Equipment
  - Modular Process Units
  - Pressure Swing Adsorption Units
  - Gas Separation Units
  - Key Mechanical Equipment
  - Trays & Tubes
Services

- New Unit Commissioning
- Catalyst Regeneration
- Catalyst and Adsorbent reloading
- Troubleshooting
- Training
- Continuing Services
Technical Service Organization

- Field Operating Services
- Materials and Inspection
- Operating Technical Services
- Continuing Services
National Medal of Technology Citation

“over 85 years of sustained technical leadership and innovation for the worldwide petroleum refining and petrochemical industries, and for commercialization of absorbents, catalysts, process plants and process technology that have strengthened America’s global competitiveness and benefited quality of life throughout the world.”
Recent focus in heavy oil
UOP Technologies In Heavy Oil

- Jointly licensed with Foster-Wheeler USA:
  - Delayed Coking
  - Visbreaking
  - Solvent Deasphalting

- Hydroprocessing technologies:
  - Residue hydrotreating
  - Deasphalted Oil hydrocracking

- Fluid Catalytic Cracking technologies:
  - Resid FCC
  - Catalytic Crude Upgrading
Era of unattractive margins for heavy upgrading has passed...

Ramping up:

- Canadian Oil Sands
- Latin America (Venezuela, Colombia, others)
- Heavy-sour crudes in other areas of the world
Major Refining Technologies For Fuel Oil Elimination

- 1. Coking
- 2. Solvent Deasphalting + Deep hydroconversion + with Pitch Gasification
- 3. Direct Hydrocracking + gasification of unconverted residue
Major Refining Technologies For Fuel Oil Elimination

Coking: Dominant for many years. Major importance (especially in US) but no longer “the only game”

SDA+deep hydroconversion: emerging in importance; UOP involved in several recent projects of this kind

Direct hydroconversion: Ebbulated bed or slurry processes -- emerging interest with pitch gasification to hydrogen and power. “Zero residue refinery”
The Bottom of Barrel Varies Greatly
By Crude Source

- “Easy” (light sweet or medium crudes)
- Medium-Sour crudes (Middle Eastern)
- Heavy conventional crudes
- Bitumen/Superheavy
- Others
  -- Vary in amount of 535 C+
  -- Vary in total contaminants
  -- Vary in “depth” of contaminants
Assay key to understand conversion potential of vacuum residue

From UOP breakup of a vacuum bottoms from heavy-sour Middle Eastern crude
What lies ahead?—an opinion

- Persistent margins will encourage better direct solutions to 1050 F+ residue upgrading to transportation fuels.
- Increased understanding of residue—“molecular approach” may lead to better solutions than traditional thermal approach.
- The future of refining:
  - All clean fuels
  - Zero or near zero residue
  - Heavier feedstocks