

PETROLEUM REFINING

Presentation By: Dr. U. K. Dutta and Mr. S.C Gupta

Who should attend:

This is an in-depth course on petroleum refining industry for those who want to get a total perspective of the industry and get familiarized with the technology, economics, global trends and HSE issues. The participants should have a sound engineering background. The course is meant for -

- Engineers and Consultants who want to learn about the refinery configurations, optimization and key design and operating parameters.
- Refinery production and planning personnel.



About the Course

Crude oil production and refining process provides the major source of energy particularly in the area of transportation. Over the years, the refineries have attained more complex configurations to meet the demand of product specifications and environment.

The course starts with production and transportation of crude oil and evolution of modern refinery configuration. The key performance parameters and factors affecting refinery economics are identified. Then each of the processing steps are described in fair detail identifying process schematics, operating conditions, key process parameters and technological features.

The program also covers the storage, product handling and utility facilities of a refinery, the design and operation of which has also impact on overall refinery performance. The course is concluded with a vision of future trends in refinery technology.

For better assimilation of the course by participants, the lectures with power point slides are interspersed with flash animations, video strips quizzes and exercise.

Course Content:

No.	Topic	Contents
1	Petroleum Product Markets	Crude Oil Market
		Major Producers, Sources, Suppliers
		Major Benchmark Types (E.G. WTI, Brent)
		Major Petroleum Products
		Product Supply And Demand Overview
		Petroleum Product Markets
		Supply Demand
2	Understanding Crude Oil	Fundamentals Of Petroleum Chemistry
		Description Of A Hydrocarbon Molecule
		Types Of Hydrocarbon Molecules
		Definition/Function Of A Catalyst
		Characteristics Of Crude Oil
		Composition And Important Physical Properties
		Description Of Crude Oil Fractions, Concept Of Boiling Range/Cuts
		Definition Of Physical And Chemical Processes
		Crude Oil Testing
		Crude Assays
		Crude Oil Types For Different Refinery Configurations
		Light Vs. Heavy
		Sweet Vs. Sour
		Paraffinic Vs. Naphthenic
		Crude Types Vs. Demand (E.G. WTI Composition Vs US Demand Gasoline 45%)
		Crude Oil Selection Considerations
		3
Three Parts Of Refinery		
Types Of Refinery (Topping, Hydroscheming, Cracking)		
Refinery Flow Scheme		
Major Units, Process		
Fundamentals Of Crude Oil Distillation		
Description Of The Distillation Process		
Cut Points Of The Various Fractions		
Gasoline Processing Options		
Isomerization		
Fluid Catalytic Cracking		
Alkylation		
Gasoline Production Processes		
Options for Heavy Oil Processing		
Delayed Coking		
Solvent De-asphalting		
Visbreaking		
Residual Oil Hydro-processing		
Lube Oil Processing		
Economics of Heavy Oil Production Processes		
Fundamentals of Hydro-processing		
Hydro-treating		
Hydro-cracking		
Economics of Hydro-processing Production Processes		
Auxiliary Refinery Processes		
Gas sweetening		
Sulfur Recovery		
Hydrogen Management		

4	Storage and Blending	Crude oil storage
		Intermediate storages
		Product storage
		Gasoline Properties and Blending
		Distillate Fuels: Heating Oil, Diesel, Jet Fuel
		Residual Materials: Bunker Fuel, etc.
		Lube and Specialty Products
		Product despatch and transportation
		Refinery Tank Farm Management
5	Refining Industry – Current Issues And Trends	Impact of Gasoline Reformulation on Refinery
		Use of Ethanol vs. MTBE
		Integration of refinery & Petrochemicals (economic driver)
		Impact Of Tightening Environment Specifications
6	Safety, Health and Environment	Safety Issues
		Implications
		OSHA
		Major Incidents (analysis - e.g. the BP Texas incident)
		Environment
		Pollutants
		Sources
		Industry standards (limits)
		Containment
		Monitoring & KPI
Standards		
7	Process Economics	Refinery Economics Fundamentals
		Crude Oil and Product Pricing
		Examples of Refinery Economic Calculations
		Product Blending Issues
		Capital and Operating Costs
		Losses & minimization
		Refinery Complexity
		Financial Terminology
		LP Applications and Optimization
		Examples of Refinery Economic Calculations
Operating Margin and Crack Spread		
8	Operations Management	Roles & Responsibilities
		Morning report
		Shift report
		Income statement / cost statement
		Major expenses items (energy x%, maintenance y%, etc.)
		Example from a refinery
		Operational challenges
		Maximizing Refining Margins
		Indexes / Solomon Index
		Relative Value of Crude Oil versus Products
Refining Process Capital Costs		

Methodology of presentation:

- Microsoft Power Point colorful slides and flash animation packed with information.
- Video clips on topics of interest.
- Highly interactive with total involvement of the participants.
- Interesting and Interactive Quiz Sessions, group tasks for better assimilation.

Course Materials:

- Soft copy of .pdf version (black and white) to be submitted.

Typical Course Benefits:

- Gives you a view of the total system and how your facility is linked upstream and downstream.
- Develops better understanding of the processes, technology and economics.
- Develops understanding of business opportunities and planning aspects.

Duration:

Five days.

Course Instructors:

Mr. S.C.Gupta

Graduate and Master's degree in Chemical Engineering from IIT, India, and trained in Institut Francais Du Petrole (IFP), he has over 35 years of experience in both upstream and downstream of oil and gas industry. He has worked with major companies like Indian Institute of Petroleum (Process Design), Indian Oil Corporation Ltd. (Technical Services and Project Management), Engineers India Ltd. (Process Design and Process Engineering). He has been responsible to develop FEED package for major oil and gas processing plant and refineries. His last assignment was with Stone & Webster, a major technology company in refinery and petrochemical area. He has conducted training programs with major companies in India and Singapore. Currently he is working as Training Specialist with Technomanage Consultants, New Delhi.

Dr. U.K. Dutta is a consultant in the Hydrocarbon Process Industry, focusing on Consultancy, and Training. Doctorate from Loughborough University of Technology (U.K), he has over 35 years of experience in Hydrocarbon Industry (upstream and downstream) in the areas of **process and technology, engineering consultancy, project development, marketing and organizational development**. He had work experience and association with major Indian and International companies like EIL, Union Carbide, CE Natco, Lummus Crest, Triune and Rotary Engineering. He has presented papers on Technology Development and Technology Transfer in major International Conferences such as ASCOPE and CHEMTECH. Presently he is running his own consultancy firm, 'Technomanage Consultants'. Earlier he was one of the promoters and Managing Director of Triune Projects Pvt. Ltd. He has conducted training for executives for major companies like Petronas (Malaysia), Petrosin (Singapore), The Yokogawa Group, Technip (India), Triune Projects (India), Indian Chamber of Commerce and others. **He regularly conducts open programs for executives in Singapore jointly with National University of Singapore, and international seminars in USA, Malaysia and Thailand.**