

## HYDROCRACKING AND HYDROTREATING PROCESS TECHNOLOGY

*“Master the Science and Operation of Hydroprocessing Units to Optimize Refinery Efficiency, Product Quality, and Environmental Compliance”*

### Schedule

Venue (InHouse)	Fees
At Your Organization Premises	Ask For The Quotation

### Introduction

In modern petroleum refining, hydrocracking and hydrotreating processes play an essential role in meeting the growing global demand for clean fuels, high-quality lubricants, and environmentally compliant products. These catalytic hydroprocessing technologies convert heavy fractions into lighter, more valuable products while removing impurities such as sulfur, nitrogen, oxygen, and metals.

The Hydrocracking and Hydrotreating Process Technology course provides a comprehensive understanding of the chemical principles, process configurations, catalyst technologies, and operating strategies used in hydroprocessing units. Participants will learn about process design, feedstock preparation, reaction mechanisms, reactor operation, and performance optimization.

This course is designed to bridge the gap between theory and industrial application, helping refinery professionals enhance operational reliability, improve product yields, and ensure compliance with stringent environmental regulations. Through detailed case studies, flow diagrams, and troubleshooting examples, participants will develop practical skills to optimize process parameters, extend catalyst life, and reduce operational bottlenecks.

### Objectives

By completing this course, participants will be able to:

- Understand the fundamental chemistry and mechanisms of hydrocracking and hydrotreating processes.
- Identify the role of hydrogen, catalysts, and reactor design in refining operations.
- Evaluate process flow schemes, unit configurations, and feedstock characteristics.
- Learn the kinetics of sulfur, nitrogen, and metal removal reactions.
- Optimize reactor operating conditions to improve conversion and selectivity.
- Recognize factors affecting catalyst deactivation and regeneration.
- Interpret process data to enhance unit performance and troubleshoot issues.
- Assess energy efficiency, hydrogen consumption, and environmental impacts.
- Apply best operational practices to maximize refinery profitability.

## Why Attend

As refineries face increasing pressure to produce cleaner fuels and maximize profitability, mastering hydroprocessing technologies has become a key competency for process engineers and operations staff. This course equips participants with the knowledge and tools required to understand, operate, and troubleshoot hydrotreating and hydrocracking units effectively.

By attending, you will gain insights into process optimization, catalyst management, and reactor performance that can significantly improve plant efficiency and reliability. Whether your focus is on operations, design, or technical support, this training will enhance your ability to make informed decisions that lead to cost savings, improved product yields, and reduced emissions.

## Target Audience

This course is designed for professionals involved in refining operations, process design, and optimization, including:

- Process Engineers and Technologists
- Refinery Operations and Production Engineers
- Catalytic Process Specialists
- Project and Design Engineers
- Plant Supervisors and Managers
- Maintenance and Reliability Engineers
- Research and Development Personnel
- Technical Service and Support Staff in Refining Industries

## Individual Benefits

- Gain a clear understanding of hydrocracking and hydrotreating fundamentals.
- Learn to interpret process data for performance evaluation and troubleshooting.
- Enhance operational decision-making through process optimization knowledge.
- Improve understanding of catalyst selection, deactivation, and regeneration.
- Strengthen technical competence in handling hydrogen-rich processes.
- Increase professional value and career prospects in refinery operations.

## Organizational Benefits

- Enhance refinery efficiency through process optimization and best practices.
- Reduce catalyst and hydrogen costs by improving operating strategies.
- Ensure compliance with international fuel quality and emission standards.
- Minimize unplanned shutdowns through proactive troubleshooting.
- Improve refinery profitability by maximizing conversion and product yields.
- Build internal technical capacity for continuous improvement and innovation.

## Instructional Methodology

The course combines technical theory with industrial best practices through an engaging and practical teaching approach. It includes:

- Instructor-led presentations with process flow diagrams and animations.
- Real-world case studies from refinery hydroprocessing units.
- Interactive discussions on operational challenges and solutions.
- Group problem-solving and simulation exercises.
- Practical troubleshooting and performance evaluation examples.
- Review of design principles and catalyst management strategies.
- Continuous Q&A sessions and technical guidance from the instructor.

## MAWA EVENTS

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## Course Outline

### Module 1: Introduction to Hydroprocessing Technologies

- Overview of hydrocracking and hydrotreating processes
- Role of hydrogen in refining operations
- Market and environmental drivers for hydroprocessing

### Module 2: Fundamentals of Hydrotreating

- Principles of hydrotreating and hydrogenation reactions
- Feedstock characteristics and contaminant removal
- Desulfurization, denitrogenation, and demetallization reactions
- Reactor configurations and process variables

### Module 3: Hydrocracking Process Principles

- Hydrocracking reaction mechanisms and kinetics
- Process configurations: single-stage vs. two-stage
- Feed preparation, catalyst functions, and process conditions
- Product yield optimization and selectivity control

### Module 4: Catalyst Technology and Performance

- Types of hydrotreating and hydrocracking catalysts
- Catalyst preparation, activation, and loading procedures
- Factors affecting catalyst life and activity
- Catalyst regeneration and replacement practices

### Module 5: Process Flow Diagrams and Unit Operations

- Overview of hydroprocessing unit components
- Reactor, separator, and recycle gas systems
- Heat integration and energy recovery strategies
- Hydrogen management and purification systems

### Module 6: Process Control and Optimization

- Key operating parameters affecting product quality
- Reactor temperature, pressure, and hydrogen partial pressure control
- Optimization of hydrogen consumption and product selectivity
- Advanced control systems for hydroprocessing units

### Module 7: Troubleshooting and Problem-Solving

- Common operational problems and their root causes
- Pressure drop, temperature maldistribution, and fouling issues
- Catalyst poisoning and premature deactivation
- Identifying mechanical and process-related failures

### Module 8: Environmental and Safety Considerations

- Handling hydrogen safely in high-pressure systems
- Managing sulfur and nitrogen by-products
- Emission control and waste management strategies
- Compliance with international environmental regulations

### Module 9: Integration with Refinery Operations

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Coordination of hydroprocessing with upstream and downstream units

- Product blending, quality control, and logistics
- Energy efficiency and operational cost reduction

Module 10: Case Studies and Practical Applications

- Case studies of hydroprocessing unit optimization
- Troubleshooting real refinery scenarios
- Best practices for process improvement and reliability

**Certification**

Upon successful completion of this course, participants will receive a Certificate in Hydrocracking and Hydrotreating Process Technology, demonstrating their knowledge and proficiency in hydroprocessing operations, catalyst management, and process optimization. This certification acknowledges their capability to enhance refinery performance, product quality, and environmental compliance through advanced hydroprocessing technologies.

**Why Choose MAWA Events**

- **Global Expertise:** More than 17 years of experience in professional training and consulting.
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