Hydrotreating Reactor Design Training Course

Professional Development Training Course Outline

Category	Business	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Hydrotreating reactor design plays a critical role in the refining industry by removing impurities such as sulfur, nitrogen, and metals from feedstocks to produce cleaner fuels that meet stringent environmental regulations. With the increasing global demand for ultra-low sulfur diesel (ULSD) and sustainable fuel production, professionals in the oil and gas sector need advanced expertise in reactor engineering, catalyst performance optimization, and process simulation. This specialized training delivers cutting-edge knowledge on hydrotreating processes, integrating industry best practices, computational modeling, and case-based learning to ensure high-efficiency reactor operation.

Hydrotreating Reactor Design Training Course is engineered for engineers, process specialists, and technical managers seeking to enhance their expertise in refining technologies. It combines real-world industry case studies, hands-on design calculations, and interactive process modeling to equip participants with the skills to optimize reactor configurations, extend catalyst life, reduce hydrogen consumption, and comply with evolving fuel quality standards. By the end of the program, participants will master the end-to-end process of designing, operating, and troubleshooting hydrotreating reactors for maximum performance and profitability.

Programme Curriculum

Hydrotreating Reactor Design Training Course

Introduction

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Course Objectives

1. Understand fundamentals of hydrotreating processes and reaction chemistry.
2. Design efficient hydrotreating reactors to meet environmental regulations.
3. Optimize catalyst performance for longer life cycles and better product yields.
4. Apply process simulation tools for accurate reactor modeling.
5. Evaluate hydrogen consumption and optimize hydrogen management strategies.
6. Identify and troubleshoot operational bottlenecks in hydrotreating units.
7. Analyze feedstock characteristics and their impact on reactor performance.
8. Integrate safety and environmental compliance into reactor design.
9. Implement heat integration techniques for energy efficiency.
10. Compare fixed-bed vs. moving-bed reactor designs for different feedstocks.
11. Conduct economic evaluations of hydrotreating unit investments.
12. Interpret industry case studies for practical application.
13. Stay updated with emerging trends in hydrotreating technology.

Target Audience

1. Process Engineers
2. Refinery Operations Managers
3. Catalysis Specialists
4. Chemical Engineers
5. Maintenance and Reliability Engineers
6. Project Engineers in Refining Projects
7. Environmental Compliance Officers
8. Technical Consultants in Oil & Gas

Course Duration: 5 days

Course Modules

Module 1: Fundamentals of Hydrotreating Processes

- Principles of hydrotreating chemistry and reactions
- Feedstock classification and properties
- Removal of sulfur, nitrogen, and metals
- Hydrogen management fundamentals
- Process flow diagram interpretation
- **Case Study:** ULSD production in a Middle Eastern refinery

Module 2: Reactor Design Principles

- Fixed-bed versus moving-bed reactor configurations
- Reactor sizing and scale-up considerations
- Temperature control and heat balance
- Pressure drop and flow distribution
- Reactor material selection for corrosion resistance

- **Case Study:** Designing a new hydrotreating reactor for heavy feedstock

Module 3: Catalyst Selection and Performance Optimization

- Types of hydrotreating catalysts
- Catalyst loading and activation procedures
- Activity, selectivity, and stability parameters
- Catalyst deactivation mechanisms
- Regeneration and replacement planning
- **Case Study:** Extending catalyst life in a diesel hydrotreating unit

Module 4: Process Simulation and Modeling

- Introduction to simulation tools (Aspen HYSYS, Petro-SIM)
- Building hydrotreating process models
- Sensitivity analysis for process variables
- Integration with plant data for model validation
- Scenario-based design optimization
- **Case Study:** Process simulation for reactor optimization in Asia-Pacific refinery

Module 5: Hydrogen Management and Optimization

- Hydrogen purity and supply considerations
- Hydrogen partial pressure control
- Hydrogen recovery systems
- Minimizing hydrogen consumption
- Impact of hydrogen on product quality
- **Case Study:** Reducing hydrogen costs in a European hydrotreating unit

Module 6: Troubleshooting and Performance Monitoring

- Common operational issues in hydrotreating
- Diagnosing catalyst deactivation causes
- Identifying reactor temperature imbalances
- Addressing feedstock variability challenges
- Advanced monitoring techniques (AI and predictive analytics)
- **Case Study:** Solving reactor fouling issues in a North American refinery

Module 7: Energy Efficiency and Environmental Compliance

- Heat integration and energy recovery techniques
- Minimizing Carbon emissions in hydrotreating
- Environmental regulations and standards
- Wastewater treatment considerations
- Sustainable hydrotreating technologies
- **Case Study:** Meeting IMO 2020 standards in a marine fuel refinery

Module 8: Economic Evaluation and Future Trends

- CAPEX and OPEX analysis for hydrotreating projects
- Lifecycle cost analysis of reactors
- Impact of market trends on hydrotreating economics
- Adapting designs for renewable feedstocks
- AI-driven optimization in reactor operations
- **Case Study:** Cost-benefit analysis of retrofitting an existing hydrotreating unit

Training Methodology

- Instructor-led technical presentations with visual aids
- Hands-on exercises using process simulation software
- Interactive Q and A and group discussions
- Real-world case study analysis and problem-solving
- Pre- and post-training assessments to measure learning outcomes

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
21 Sep 2026	25 Sep 2026	Online	$1,000
21 Sep 2026	25 Sep 2026	Physical	$1,500
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0

Start Date	End Date	Location	Price
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0

Ready to enroll or request a customized program? Book online or contact us:

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Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com