Industrial Mixing and Agitation Systems Training Course

Professional Development Training Course Outline

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

Course Introduction

Industrial Mixing and Agitation Systems are critical unit operations widely used across chemical, pharmaceutical, food processing, wastewater treatment, petrochemical, and manufacturing industries. Industrial Mixing and Agitation Systems Training Course is designed to provide comprehensive knowledge of mixing dynamics, agitation principles, impeller design, fluid mechanics, scale-up techniques, and process optimization strategies. Participants will gain deep insight into how industrial mixers and agitators influence product quality, reaction efficiency, heat transfer, mass transfer, and overall process performance in modern industrial operations.

With increasing demand for process intensification, energy-efficient mixing systems, smart manufacturing, and Industry 4.0 integration, engineers and technicians must understand both theoretical and practical aspects of mixing technology. This course bridges the gap between theory and real-world industrial application by focusing on advanced agitation technologies, CFD-based mixing analysis, scale-up challenges, troubleshooting, and equipment selection criteria. It equips learners with practical skills to optimize mixing performance, reduce operational costs, and improve production consistency across diverse industrial sectors.

Programme Curriculum

Industrial Mixing and Agitation Systems Training Course

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of industrial mixing and agitation technology
2. Analyze fluid flow regimes in mixing vessels
3. Evaluate impeller design types and performance characteristics
4. Apply scale-up principles for industrial mixing systems
5. Optimize mass transfer and heat transfer in agitated systems
6. Identify mixing inefficiencies and troubleshooting techniques
7. Implement CFD simulation for mixing performance analysis
8. Design energy-efficient agitation systems for process industries
9. Improve blending, suspension, and dispersion operations
10. Understand rheology and non-Newtonian fluid behavior in mixing
11. Select appropriate industrial mixers and agitators for applications
12. Enhance process optimization and productivity in manufacturing systems
13. Integrate Industry 4.0 smart sensors in mixing operations

Target Audience

1. Process Engineers
2. Chemical Engineers
3. Mechanical Engineers
4. Production Supervisors
5. Plant Operators
6. Maintenance Engineers
7. R&D Scientists
8. Industrial Equipment Designers

Course Modules

Module 1: Fundamentals of Mixing & Agitation

- Basic principles of mixing operations
- Types of mixing processes
- Mixing terminology and performance parameters
- Flow patterns in stirred tanks
- Energy dissipation in mixing systems

- **Case Study:** Optimization of mixing in a detergent manufacturing plant

Module 2: Fluid Dynamics in Agitated Systems

- Laminar vs turbulent flow behavior
- Reynolds number in mixing applications
- Vortex formation and control
- Power consumption in agitators
- Flow visualization techniques
- **Case Study:** Reducing vortex formation in chemical reactor tanks

Module 3: Impeller Design & Selection

- Types of impellers
- Axial vs radial flow impellers
- Impeller sizing and geometry selection
- Speed and torque relationship
- Performance curves analysis
- **Case Study:** Impeller redesign in pharmaceutical blending tank

Module 4: Scale-Up Techniques in Mixing

- Laboratory to industrial scale-up principles
- Geometric similarity and dynamic similarity
- Scale-up challenges in large vessels
- Power number and mixing time correlation
- Validation of scale-up models
- **Case Study:** Scale-up of bioreactor mixing system for vaccine production

Module 5: Heat & Mass Transfer in Mixing Systems

- Heat transfer enhancement using agitation
- Mass transfer coefficient improvement
- Gas dispersion techniques
- Solid suspension mechanisms
- Reaction engineering in agitated vessels
- **Case Study:** Improved oxygen transfer in wastewater aeration tank

Module 6: CFD Modeling & Simulation

- Introduction to CFD in mixing applications
- Mesh generation and boundary conditions
- Velocity profile analysis
- Turbulence modeling in agitators
- Simulation validation techniques
- **Case Study:** CFD optimization of mixing efficiency in food processing tank

Module 7: Troubleshooting & Maintenance

- Common mixing system failures
- Cavitation and mechanical wear issues
- Shaft misalignment problems

- Vibration analysis in agitators
- Preventive maintenance strategies
- **Case Study:** Resolving uneven blending in petrochemical storage tank

Module 8: Advanced Smart Mixing Systems (Industry 4.0)

- IoT-enabled mixing systems
- Real-time monitoring sensors
- AI-based process optimization
- Predictive maintenance analytics
- Energy optimization strategies
- **Case Study:** Smart agitation system implementation in beverage industry

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

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
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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