Advanced Casting & Forming in Manufacturing Training Course

Professional Development Training Course Outline

Category	Manufacturing	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Advanced Casting & Forming in Manufacturing Training Course is a designed to equip engineers, technicians, and production specialists with modern knowledge in metal casting, precision forming, additive integration, and smart manufacturing processes. This course focuses on next-generation technologies such as automated casting systems, simulation-driven mold design, defect reduction techniques, and Industry 4.0-enabled manufacturing workflows, ensuring participants stay aligned with global production standards and digital transformation trends in the manufacturing sector.

With increasing demand for high-performance materials, lightweight components, and zero-defect production systems, industries such as automotive, aerospace, oil & gas, and heavy engineering require highly skilled professionals. This training provides deep expertise in sand casting, die casting, investment casting, forging, extrusion, rolling, and hybrid forming technologies, while integrating modern tools like AI-based process optimization, CAD/CAM simulation, and digital twin manufacturing systems to improve efficiency, accuracy, and sustainability in production environments.

Programme Curriculum

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Course Objectives

1. Master advanced metal casting technologies and smart foundry systems
2. Understand Industry 4.0 integration in manufacturing processes
3. Apply CAE simulation tools for mold and die design optimization
4. Reduce casting defects using AI-driven predictive analytics
5. Develop expertise in precision forging and high-strength material forming
6. Implement additive manufacturing hybrid casting solutions
7. Optimize production efficiency using lean manufacturing principles
8. Analyze thermal behavior in casting and solidification processes
9. Improve surface finishing and dimensional accuracy in formed components
10. Gain skills in digital twin-based manufacturing simulation
11. Enhance knowledge of sustainable and green manufacturing practices
12. Manage automated production lines in modern foundries
13. Apply quality control techniques using smart inspection systems

Target Audience

1. Mechanical Engineers
2. Manufacturing Engineers
3. Production Supervisors
4. Quality Control Engineers
5. Foundry Technicians
6. Industrial Designers
7. Maintenance Engineers
8. Graduate Engineering Students

Course Modules

Module 1: Fundamentals of Casting Processes

- Types of casting methods overview
- Solidification principles
- Metal flow behavior
- Heat transfer in molds
- Casting process selection
- **Case Study:** Automotive engine block casting optimization

Module 2: Sand Casting Technology

- Green sand and dry sand processes

- Mold preparation techniques
- Pattern design fundamentals
- Core making methods
- Defect prevention in sand casting
- **Case Study:** Heavy machinery housing production

Module 3: Die Casting & High Pressure Casting

- Hot chamber vs cold chamber systems
- Injection pressure control
- Cycle time optimization
- Tooling design principles
- Alloy selection strategies
- **Case Study:** Aluminum automotive wheel manufacturing

Module 4: Investment Casting Techniques

- Wax pattern creation
- Ceramic shell building
- Precision metal pouring
- Surface finish enhancement
- Dimensional accuracy control
- **Case Study:** Aerospace turbine blade production

Module 5: Centrifugal Casting

- Rotational force mechanics
- Hollow component manufacturing
- Material distribution control
- Defect reduction techniques
- Equipment setup and calibration
- **Case Study:** Pipe manufacturing for oil & gas industry

Module 6: Forging Processes

- Open die forging operations
- Closed die forging methods
- Grain flow improvement
- Temperature control in forging
- Forging defect analysis
- **Case Study:** Aircraft landing gear forging

Module 7: Rolling Processes

- Hot rolling vs cold rolling
- Sheet metal thickness control
- Rolling mill operations
- Surface defect management
- Microstructure refinement
- **Case Study:** Steel sheet production for construction

Module 8: Extrusion Technology

- Direct and indirect extrusion
- Die design principles
- Material flow analysis
- Process optimization
- Defect troubleshooting
- **Case Study:** Aluminum profiles for construction industry

Module 9: Sheet Metal Forming

- Bending and stretching methods
- Press tool design
- Springback effect control
- Formability analysis
- CNC press integration
- **Case Study:** Automotive body panel manufacturing

Module 10: Casting Defects & Troubleshooting

- Porosity and shrinkage defects
- Cold shut and misrun issues
- Crack formation analysis
- Non-destructive testing methods
- Root cause analysis techniques
- **Case Study:** Defective turbine casing correction

Module 11: Simulation & CAE in Casting

- Mold flow simulation tools
- Thermal analysis modeling
- Stress distribution studies
- Virtual prototyping
- Process validation techniques
- **Case Study:** Simulation of aerospace casting mold

Module 12: Advanced Materials in Casting & Forming

- Aluminum, titanium, and superalloys
- Composite materials usage
- Material selection criteria
- Heat treatment effects
- Microstructure engineering
- **Case Study:** Titanium aerospace component development

Module 13: Smart Manufacturing & Industry 4.0

- IoT-enabled foundry systems
- Digital twin integration
- Real-time monitoring systems
- AI-driven process control
- Predictive maintenance
- **Case Study:** Smart foundry automation system

Module 14: Quality Assurance in Casting & Forming

- ISO manufacturing standards
- Statistical process control (SPC)
- Inspection techniques
- Metrology tools usage
- Quality documentation systems
- **Case Study:** Zero-defect automotive part production

Module 15: Sustainable Manufacturing Practices

- Energy-efficient casting methods
- Waste reduction strategies
- Recycling of metals
- Green foundry technologies
- Carbon footprint reduction
- **Case Study:** Eco-friendly steel manufacturing plant

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	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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

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