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COURSE BROCHURE

Introduction to Manufacturing Processes Training Course

11 – 15 April 2027
Abu Dhabi

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Registered in the United Kingdom and Saudi Arabia

Introduction to Manufacturing Processes Training Course

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Introduction to Manufacturing Processes is a 1-week training course for new engineers, technicians and non-engineering staff seeing how raw material becomes a finished part, ending with a process selection guide for a chosen product. Shorter product cycles, rising material costs and the spread of additive methods now ask more people to judge how a component should be made. Jupiter Prime Training delivers this introduction to manufacturing processes.

Why Manufacturing Processes Matter Now

Three forces are reshaping how parts are made. Customers expect more variants in smaller batches, which favours flexible routes over long tooling runs. Material and energy costs push designers to cut scrap, machining allowance and rework. Additive and hybrid methods now sit beside casting and forging, widening the choice and the risk of choosing badly. A factory that matches each part to the right route gains lead time, yield and tolerance capability; one that does not pays for over-processing, late design changes and field failures. The course rests on design for manufacture and assembly DFMA and on process capability thinking.

Who Gains Most from Manufacturing Processes

- Graduate engineers moving into production, tooling or product development roles
- Technicians who set up, run or inspect machines and want to see the wider process chain
- Buyers and supplier quality staff who source castings, forgings, machined or fabricated parts
- Planners and cost estimators who build routings and quote manufacturing time
- Sales, project and support staff who discuss part feasibility with customers

Cross-functional groups from one plant mixing engineering, purchasing and planning newcomers gain most, leaving with one shared vocabulary.

Manufacturing Processes Capabilities

Participants move from material to shape to finished surface, judging each route by cost, tolerance and batch size.

- Compare sand, die and investment casting for a given geometry and volume — tooling investment decisions
- Specify forming routes such as forging, stamping and extrusion for strength and yield — part design reviews
- Estimate machining sequence, cycle time and tolerance capability — routing and quotation
- Select welding, brazing, fastening or adhesive bonding for a joint — fabrication and assembly engineers
- Weigh additive manufacturing against conventional routes for prototypes and low volumes — product development
- Build a selection guide linking material, process, finish and inspection — purchasing and quality colleagues

Key Manufacturing Processes Terms

- Casting — pouring molten metal into a mould cavity where it solidifies into the required shape.
- Forming — shaping solid metal by plastic deformation, as in forging, rolling, stamping or extrusion, without removing material.
- Machining — removing material with cutting tools, as in turning, milling and drilling, to reach final dimensions.
- Additive manufacturing — building a part layer by layer from powder, wire or resin directly from a digital model.
- Tolerance — the permitted variation in a dimension, which drives process choice, inspection effort and cost.
- Surface finish — the texture of a surface after processing, specified to control wear, sealing, fatigue or appearance.

Manufacturing Processes Day by Day

Day 1: Materials and the Process Landscape

- Process Families From Primary Shaping to Finishing — Route Mapping
- Metals, Polymers and Composites Properties — Material Choice for Function
- Heat Treatment Basics — Hardness Versus Machinability Trade-Offs
- Batch Size and Production Volume Curves — Tooling Versus Unit Cost
- Design for Manufacture and Assembly Principles — Early Design Choices

Day 2: Casting and Forming

- Sand, Die and Investment Casting — Geometry and Volume Fit
- Casting Defects Such as Porosity and Shrinkage — Inspection Planning
- Forging and Its Grain Flow Benefits — Strength-Critical Components
- Sheet Metal Stamping and Bending — Blank Layout and Scrap Rate
- Extrusion and Rolling of Profiles — Standard Sections Versus Custom Tooling

Day 3: Machining and Joining

- Turning, Milling and Drilling Operations — Machining Sequence and Fixturing
- CNC Programming Concepts and Cycle Time — Capacity and Quotation
- Arc, Resistance and Laser Welding — Joint Strength and Distortion
- Mechanical Fastening and Adhesive Bonding — Serviceability and Assembly Speed
- Weld Inspection and Non-Destructive Testing Overview — Acceptance Decisions

Day 4: Additive Methods, Finishing and Quality

- Powder Bed Fusion, Material Extrusion and Resin Printing — Prototype Routes
- Additive Versus Conventional Cost Comparison — Low-Volume Part Strategy
- Grinding, Coating, Plating and Painting — Wear and Corrosion Protection
- Tolerances, Fits and Surface Roughness on Drawings — Specification Clarity
- Process Capability and Statistical Control Charts — Holding Tolerance in Production

Day 5: Practising the Process Selection Guide

- Automotive Bracket Case Comparing Casting, Forging and Machining — Route Choice
- Pump Housing Case Combining Machining and Joining — Assembly Sequence
- Material and Finish Pairing for a Consumer Appliance Part — Durability Choice
- Cost and Lead Time Comparison Matrix — Make or Buy Discussion
- Process Selection Guide for a Product — Material, Route, Finish and Inspection

Applying Manufacturing Processes After the Course

- Walk one current part through its routing with production colleagues, marking where a different forming or joining method could cut scrap or cycle time.
- Review a drawing with the quality team to check whether its tolerances and surface finish match the capability of the chosen process.

Manufacturing Processes Questions FAQ

What is an introduction to manufacturing processes and why does it matter now?

It is a grounding in how parts are cast, formed, machined, joined, printed and finished. It matters now because smaller batches, costly materials and new additive options make process choice a daily business decision.

Which roles gain most from introduction to manufacturing processes training?

New engineers and technicians gain most, along with buyers, planners and estimators. Each needs to judge feasibility, cost and lead time without being a specialist in every process.

How does introduction to manufacturing processes training differ from production planning training?

It focuses on how parts are physically made rather than on scheduling. Production planning courses sequence orders and capacity, whereas this one explains the processes those plans rely on.

What do you bring back from introduction to manufacturing processes training?

You bring back a selection guide for a real product. It links material, shaping route, joining method, finish and inspection, showing colleagues why each choice was made.

Manufacturing Processes: The Way Forward

The process selection guide first informs the make-or-buy and tooling decision on the next new or redesigned part. Design engineers, buyers and planners use it to agree a route before quotes are requested. After its first use, revisit how additive and hybrid methods compare, because their cost and capability shift faster than those of casting or forming.