BLACKBIRD FOR TRAINING

Manufacturing Technologies: Production Study and Preparation Course



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Introduction:

Manufacturing technologies: production study and preparation is the engineering work that takes a product whose design is complete and defines how it will be made, checked and approved in repeatable volume. This one-week course is for manufacturing, industrial, process, quality and test engineers, technology engineering teams, production planners and supervisors, and each team leaves with a production preparation file for a sample product. It is taught at practitioner level through case study work, using design for manufacture and assembly DFM/DFA, a method of reviewing a design for ease of production, and process failure mode and effects analysis PFMEA.

Course Objectives:

- Define the manufacturing requirements of a released design and distinguish design for manufacture DFM from design for assembly DFA findings
- Apply process planning, routing and lean simplification methods to build a manufacturing process for a new product
- Select production line layout, tooling, fixtures and capacity, and interpret takt time vs cycle time when balancing a line
- Distinguish work instructions from standard operating procedures and apply both to document a production process clearly
- Apply PFMEA, control plans, in-process and final inspection, and IQ/OQ/PQ to validate a process before production approval
- Justify the introduction of a new manufacturing technology using readiness levels and a business case

Target Audience:

- Manufacturing, industrial and process engineers who define how a new product is made, deciding which processes, routings and equipment it needs
- Technology engineering and new product introduction teams that move designs into production, judging when a product is ready for release to the line
- Quality and test engineers who set inspection and validation evidence, deciding which characteristics to check, how often and with which method
- Production planners responsible for capacity and line loading, judging whether a line can meet the required takt time
- Production supervisors and managers who run the line after handover, deciding whether procedures, tooling and controls are fit for daily use
- Engineers assessing automation and additive manufacturing, judging whether a new technology is mature enough to adopt



Course Outline:

Day 1: Determining Manufacturing Requirements From a Completed Product Design

- DFM vs DFA: Manufacture Review Compared With Assembly Review of a Design
- Manufacturing Requirements Matrix: Materials, Tolerances, Volumes and Special Characteristics Captured
- Key Characteristic Identification: Product Features That Drive Process and Inspection Choices
- Make vs Buy Analysis: Deciding Which Parts and Processes Stay In-House
- Product Study Report: Current-State Assessment of Design Readiness for Production

Day 2: Process Planning, Simplification and Production Line Preparation

- Process Flow Chart vs Routing Sheet: Sequence View Compared With Operation Detail
- Lean Process Simplification: Removing Waste, Combining Operations and Reducing Handling Steps
- Takt Time vs Cycle Time: Customer Demand Rate Compared With Operation Duration
- Line Balancing and Capacity Calculation: Allocating Work Elements Across Workstations
- Layout, Tooling and Fixture Planning: Cell, Line and Workstation Arrangements Specified

Day 3: Writing Production Procedures and Defining Testing and Inspection

- Work Instruction vs Standard Operating Procedure: Task Detail Compared With Process Rules
- Visual Work Instruction Design: Photos, Key Points and Safety Notes per Operation
- In-Process vs Final Inspection: Where Each Check Catches Defects in the Flow
- Test Specification and Sampling Plan: Methods, Frequencies and Acceptance Criteria Defined
- Measurement System Analysis: Gauge Repeatability and Reproducibility Before Trusting Test Results

Day 4: Process Validation, Risk Control and Production Approval

- AIAG-VDA PFMEA: Structure, Function and Failure Analysis of Manufacturing Process Steps
- Control Plan Development: Linking PFMEA Risks to Process Controls and Reaction Plans
- IQ vs OQ vs PQ: Installation, Operational and Performance Qualification Stages
- AS9102 First Article Inspection: Verifying the First Production Part Against Design Records
- PPAP-Style Approval Package: Evidence Submitted Before Releasing a Process to Production

Day 5: Case Study: New Technology Evaluation and the Production Preparation File

- TRL vs MRL: Technology Maturity Compared With Manufacturing Readiness for New Processes
- Automation, Additive Manufacturing and Industry 4.0: Business Case for Introducing a Technology
- Case Process Plan Review: Applying Routing, Line Balance and Layout to a Sample Product
- Case Validation Pack: Applying PFMEA, Control Plan and Inspection Plan to the Sample
- Production Preparation File: Completing Requirements, Procedures, Tests and Validation for Handover



Skills You Will Gain:

- Design for Manufacture and Assembly Review
- Process Routing and Flow Charting
- Line Balancing and Capacity Planning
- Work Instruction Writing
- Inspection and Sampling Plan Design
- Process Failure Mode and Effects Analysis
- Control Plan Development
- Manufacturing Readiness Assessment

Why Attend This Course:

- From receiving a finished design with unclear production needs to listing its manufacturing requirements and key characteristics
- From lines set up by trial and error to layouts, tooling and staffing sized from takt time and balanced workloads
- From approving processes on a few good parts to validating them with PFMEA, control plans, IQ/OQ/PQ and first article evidence
- From scattered notes to a production preparation file for a sample product that the team can reuse on the next product launch

Conclusion:

Production study and preparation is the disciplined bridge between a finished design and a manufacturing process that delivers good parts at the required rate. The course makes clear how DFM differs from DFA, how takt time differs from cycle time, and how process validation differs from first article inspection, and it adds a structured way to judge new manufacturing technologies by readiness level. It suits engineers, planners and supervisors who already work in production and now need a repeatable, documented approach to manufacturing technologies and product launch.

Frequently Asked Questions FAQ:

What should participants know before a manufacturing technologies production study and preparation course?

Participants should understand basic manufacturing processes and be able to read engineering drawings and bills of materials. Experience in production, quality or engineering helps, but no software skills are needed; every method is introduced and then applied in case study work.



How does manufacturing technologies production study and preparation differ from a lean manufacturing course?

It covers the whole path from a completed design to an approved production process, including requirements, line preparation, procedures, testing and validation. A lean course focuses mainly on improving processes already running, while this course prepares new ones and uses lean only for simplification.

When is process validation needed in manufacturing technologies production study and preparation?

Process validation is needed whenever a product's output cannot be fully verified by inspection alone, or when a new line, tool or technology is introduced. IQ, OQ and PQ prove that equipment is installed correctly, operates within limits and performs consistently.

What do teams take back from manufacturing technologies production study and preparation training?

Each team takes back a production preparation file for a sample product, covering manufacturing requirements, process plan, line layout, procedures, inspection and test plan, PFMEA, control plan and a technology assessment, ready to adapt to a real product launch.

