



Lithium-Ion Battery Manufacturing Course: Cell Production, Quality Control and Pack Assembly



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Introduction:

Lithium-ion battery manufacturing, covering cell production, quality control and pack assembly, is the subject of this 10-day course for process engineers, quality engineers and plant operations leads, ending with a Cell Plant Quality and Ramp-Up Plan. New cell and pack plants lose yield and schedule when slurry, coating, electrolyte filling and formation are not controlled as one chain and moisture or contamination goes unnoticed. Nominees already run, support or audit manufacturing lines, and teaching is by inspection walkthrough of process stages, line records and test reports. CoreConcept Training Center delivers this lithium-ion battery manufacturing course.

Course Objectives:

- Map the stages of a lithium-ion cell plant from powder receipt to shipment and locate where each defect type is created
- Set slurry mixing, coating, drying and calendering windows that hold electrode weight, thickness and porosity
- Control winding or stacking, tab welding, electrolyte filling and sealing against defined tolerances and leak criteria
- Specify dry room dew point, airlock and moisture monitoring rules and run formation, ageing and grading recipes
- Plan module and pack assembly, end-of-line tests and cell safety and transport testing against named international standards
- Build a Cell Plant Quality and Ramp-Up Plan with yield targets, controls, supplier checks and owners for a case plant

Target Audience:

- Process engineers responsible for mixing, coating, assembly and formation parameters on cell lines
 - Quality engineers who plan inspections, review test data and release cells, modules and packs
 - Plant operations leads accountable for yield, output and shift handover during a plant ramp-up
 - Supplier development and materials engineers who qualify powders, foils, separators and electrolyte
 - Technical project leads who prepare new battery plants for equipment installation and start-up
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Course Outline:

Day 1: Cell Anatomy, Formats and Plant Process Flow

- Cell Anatomy Map of Anode, Cathode, Separator and Electrolyte
- Cylindrical, Prismatic and Pouch Format Process Route Comparison
- LFP and NMC Cathode Families and Their Process Consequences
- Cell Plant Process Flow Map from Powder Receipt to Shipment
- Yield Loss Baseline Using First-Pass Yield and Scrap by Stage

Day 2: Electrode Mixing, Coating, Drying and Calendering

- Slurry Formulation Sheet for Active Material, Binder and Solvent
- Planetary and Twin-Screw Mixing Parameter Windows and Viscosity Checks
- Slot-Die Coating Weight Control with Online Thickness Gauging
- Drying Oven Profile Setting and Solvent Recovery Checks
- Calendering Density Targets and Porosity Measurement of Electrodes

Day 3: Cell Assembly, Electrolyte Filling and Sealing

- Electrode Slitting Burr Inspection and Edge Quality Criteria
- Winding and Stacking Alignment Tolerances with Vision Measurement
- Tab Welding Methods Compared with Peel and Pull Test Evidence
- Electrolyte Dosing Volume Control and Vacuum Wetting Cycles
- Sealing and Degassing Steps with Leak Check Criteria

Day 4: Dry Rooms, Formation, Ageing and Grading

- Dry Room Dew Point Targets and Airlock Discipline Audit
- Desiccant Dehumidification Unit Performance and Moisture Ingress Log
- Formation Cycling Recipe and Solid Electrolyte Interphase Growth
- Ageing Rooms and Open Circuit Voltage Screening Rules
- Cell Grading by Capacity, Internal Resistance and Self-Discharge

Day 5: Week-One Guided Case: Cell Line Yield Diagnosis

- Case Cell Line Data Pack with Stage Yield and Scrap Records
 - Case Pareto of Coating, Assembly and Formation Rejects
 - Case Moisture Excursion Review Against Dry Room Logs
 - Process Flow Gap Map Linking Defects to Upstream Stages
 - Week-One Findings Brief and Peer Challenge
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Day 6: Module Assembly and Pack Build

- Cell to Module Layout with Busbars and Compression Fixtures
- Laser and Ultrasonic Busbar Welding Process Windows
- Thermal Interface Materials and Cooling Plate Assembly
- Battery Management System Wiring Harness and Sensor Fitting
- End-of-Line Pack Testing for Insulation, Voltage and Communications

Day 7: Safety Testing, Standards and Quality Systems

- IEC 62133 and IEC 62619 Cell Safety Test Scope
- UN 38.3 Transport Test Sequence and Documentation
- Internal Short Circuit, Overcharge and Crush Test Planning
- Thermal Runaway Hazard Review and Plant Fire Protection Basics
- ISO 9001 and IATF 16949 Control Plan with Process FMEA

Day 8: Materials, Traceability and Localisation Readiness

- Raw Material Incoming Inspection and Supplier Qualification Scorecard
- Cathode Powder Metal Particle Contamination Control Checks
- Traceability Records Linking Cell, Module and Pack Serial Numbers
- Localisation Readiness Matrix for Equipment, Materials and Skills
- Operator Training Matrix and Handover Plan for Ramp-Up Shifts

Day 9: Measurement, KPIs and Continuous Improvement

- OEE and Rolled Throughput Yield KPI Tree for Cell Lines
- Statistical Process Control Charts for Coating Weight and Capacity
- Measurement System Analysis for Thickness, Resistance and Voltage Gauges
- Cost per kWh Model Covering Material, Scrap and Energy Losses
- Corrective Action Tracking with Eight Disciplines Problem Solving

Day 10: Inspection Walkthrough: Cell Plant Quality and Ramp-Up Plan

- Case Plant Walkthrough Against Dry Room and Coating Criteria
 - Case Defect Escape Review Using Fishbone and Five Whys
 - Ramp-Up Yield Curve and Quality Gate Schedule Build
 - Risk Register for Safety Tests, Suppliers and Staffing
 - Cell Plant Quality and Ramp-Up Plan Completion and Defence
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Skills You Will Gain:

- Cell Process Flow Mapping
- Electrode Coating Control
- Cell Assembly Tolerance Control
- Dry Room Moisture Control
- Formation and Grading Recipe Setting
- Module and Pack Build Planning
- Battery Safety Test Planning
- Yield and Scrap Analysis

Why Attend This Course:

- Deliver a Cell Plant Quality and Ramp-Up Plan to the plant manager, the quality lead and the project sponsor
- Decide whether a reject trend calls for a coating change, a dry room correction, a supplier action or a test change
- Avoid scrap, moisture damage and failed safety or transport tests that consume material, line hours and start-up schedule
- Coach colleagues and contractors on reading line records, formation data and test reports in a consistent way

Conclusion:

Back at work, the participant presents the Cell Plant Quality and Ramp-Up Plan to the plant manager, the quality lead and the project sponsor, who use it to set stage yield targets, inspection points, supplier checks and the order of quality gates during start-up. Line teams use its control windows and reaction rules to separate coating, assembly, moisture and formation causes of rejects. After the first full production month, the unit should compare yield, scrap and test failures against the plan and revise the controls that did not deliver.

Frequently Asked Questions FAQ:

What should participants know before a lithium-ion battery manufacturing course?

Participants should already run, support or audit a manufacturing line and read process records. No electrochemistry degree is needed. Bringing anonymised yield reports, line data or test results from a cell or pack plant makes the walkthroughs more useful.

How does a lithium-ion battery manufacturing course differ from a battery energy storage systems course?

It concentrates on making cells, modules and packs inside a factory: coating, assembly, formation and quality control. Storage system courses cover sizing, revenue and site design for installed plants, which appear here only as the customer context.

Why does lithium-ion battery manufacturing need a dry room?

Moisture reacts with the electrolyte and can reduce capacity and life, so cell assembly and electrolyte filling take place in air held at a very low dew point behind airlocks. Dry room records are therefore part of quality control.

What do participants take back from the lithium-ion battery manufacturing course?

Participants take back a Cell Plant Quality and Ramp-Up Plan, plus a process flow map, a yield Pareto, a dry room audit sheet, a safety test plan and a KPI tree adaptable to their own plant.