



PVC and Vinyls Chain Plant Operations

Course: EDC, VCM and Suspension Polymerisation



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Introduction:

PVC and vinyls chain plant operations, covering EDC, VCM and suspension polymerisation, is a 10-day course for operating, shift supervisory and process engineering staff on vinyls units, ending with a Vinyls Chain Operating Improvement Plan for a case plant. Sites lose ethylene, chlorine and prime resin when oxychlorination hot spots, cracking furnace coking, HCl imbalance and off-target K-value batches are caught late, and residual VCM puts crews at risk. Nominees already run or support chlorination, cracking or polymerisation sections and learn through inspection walkthroughs of case unit data. CoreConcept Training Center delivers this PVC and vinyls chain plant operations course.

Course Objectives:

- Operate direct chlorination and oxychlorination reactors to hold EDC selectivity, catalyst condition and oxygen margins within the unit operating window
- Run EDC purification columns, pyrolysis furnaces and VCM and HCl distillation so that conversion, run length and monomer purity stay on target
- Control suspension PVC batches through suspending agent choice, initiator dosing and reaction temperature to deliver the specified K-value and grain porosity
- Manage slurry stripping, centrifuging, drying and VCM recovery so that resin leaves the plant with low residual monomer and vent emissions stay controlled
- Apply VCM exposure monitoring, reactor opening permits and runaway shortstop arrangements to protect shift and contractor crews
- Build a Vinyls Chain Operating Improvement Plan that ranks consumption, yield, safety and emission actions for a case plant

Target Audience:

- Control room operating staff responsible for chlorination reactors, cracking furnaces and polymerisation batches on each shift
 - Field operating staff responsible for columns, strippers, centrifuges, dryers and VCM recovery equipment
 - Shift supervisory staff responsible for grade changes, permits, upset response and handover across vinyls sections
 - Process engineering staff responsible for unit operating windows, consumption figures and run-length targets
 - Technical service and laboratory staff responsible for EDC and VCM purity, K-value and resin release results
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Course Outline:

Day 1: Vinyls Chain Process Routes, Chemistry and Unit Baseline

- Balanced Vinyls Chain Mass Balance From Ethylene to PVC
- Chlorine, Ethylene and HCl Flows Between EDC and VCM Units
- EDC, VCM and PVC Physical Properties for Operators
- Suspension, Emulsion and Bulk PVC Route Comparison
- Vinyls Unit Baseline Sheet for Yield, Losses and Downtime

Day 2: Direct Chlorination and Oxychlorination to EDC

- Iron Chloride Catalysed Direct Chlorination Reactor Temperature Control
- Boiling Versus Subcooled Direct Chlorination Heat Removal Options
- Copper Chloride Oxychlorination Fixed and Fluidised Bed Reactors
- Oxygen to Ethylene Ratio and Flammability Envelope Management
- Oxychlorination Vent Gas, Reaction Water and Caustic Wash Handling

Day 3: EDC Purification and Pyrolysis Furnace Cracking to VCM

- Light Ends and Heavy Ends EDC Distillation Column Operation
- EDC Pyrolysis Furnace Firing, Conversion and Coil Outlet Temperature
- Cracked Gas Quench With Cold EDC and Coke Removal
- HCl Column and VCM Column Refrigerated Distillation Control
- Unconverted EDC Recycle and Furnace Decoking Cycle Planning

Day 4: Process Data, Analysers and Laboratory Control of the Chain

- DCS Trend Reading for Chlorination, Cracking and Polymerisation Units
- Online Gas Chromatograph Checks on EDC Purity and VCM Impurities
- Iron and Moisture Analysis of Furnace EDC Feed
- HCl Balance Reconciliation Between Cracking and Oxychlorination Units
- Shift Log and Off-Spec Deviation Recording Templates

Day 5: Inspection Walkthrough of the EDC and VCM Sections

- Case Direct Chlorination Reactor Walkthrough Against Operating Window
 - Case Oxychlorination Hot Spot and Catalyst Fluidisation Review
 - Case Cracking Furnace Coil Inspection and Run Length Data
 - Case VCM Column Upset Traced to HCl Carry-Over
 - Week One Findings Register for the Monomer Sections
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Day 6: Suspension PVC Polymerisation and K-Value Control

- Batch Reactor Charging Sequence of Water, VCM and Suspending Agents
- Polyvinyl Alcohol Protective Colloid Selection for Grain Porosity
- Monomer-Soluble Peroxide Initiator Dosing and Reaction Rate Profile
- Polymerisation Temperature Setpoint for Target K-Value Grades
- Jacket Cooling, Reflux Condenser and Water Injection During Shrinkage

Day 7: Residual VCM Stripping, Drying, Emissions and Resin Quality

- Slurry Column Steam Stripping of Residual VCM
- Decanter Centrifuge Dewatering and Wet Cake Moisture Control
- Fluid Bed and Cyclone Dryer Operation for Resin Powder
- VCM Recovery Compressor, Gasholder and Vent Absorption Systems
- Resin Porosity, Bulk Density, Fish-Eyes and Thermal Stability Testing

Day 8: VCM Exposure, Process Safety and Cross-Unit Communication

- VCM Carcinogen Hazard Briefings for Shift and Contractor Crews
- Personal and Area VCM Monitoring Against Occupational Exposure Limits
- Reactor Opening Degassing and Confined Space Entry Permits
- Runaway Polymerisation Shortstop Injection and Emergency Venting
- Grade Change Communication Between Production, Laboratory and Sales

Day 9: Vinyls Chain KPIs, Benchmarking and Improvement

- Ethylene and Chlorine Specific Consumption per Tonne of PVC
- Furnace Run Length and Decoking Frequency Benchmarking
- Batch Cycle Time and Reactor Fouling Build-Up Tracking
- Prime Resin Yield and Off-Grade Rate Pareto Analysis
- Fugitive VCM Emission Inventory and Leak Detection Trends

Day 10: Inspection Walkthrough Capstone and the Vinyls Chain Operating Improvement Plan

- Case Polymerisation Reactor Walkthrough Against K-Value and Cycle Data
 - Case Stripper and Dryer Review Against Residual VCM Results
 - Case Chain Loss Ranking From Ethylene to Bagged Resin
 - Improvement Actions Prioritised by Yield, Safety and Emission Gains
 - Vinyls Chain Operating Improvement Plan Completion and Peer Challenge
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Skills You Will Gain:

- Oxychlorination Reactor Control
- EDC Cracking Furnace Operation
- VCM Distillation and HCl Recovery
- Suspension Polymerisation Batch Control
- K-Value and Grain Porosity Management
- Residual Monomer Stripping
- VCM Exposure Monitoring
- Specific Consumption Benchmarking

Why Attend This Course:

- Deliver a Vinyls Chain Operating Improvement Plan for a case plant to the production manager and the unit process engineers
- Decide when to cut furnace firing, schedule a decoke, adjust initiator dosing or trigger a shortstop as unit trends move
- Avoid lost prime resin, shortened furnace runs, residual monomer complaints and VCM releases that stop units and expose crews
- Coach board and field operators on cracking, batch and stripping checks using the course trend sheets and walkthrough checklists

Conclusion:

Back at the plant, the participant hands the Vinyls Chain Operating Improvement Plan to the production manager and the process engineers for the chlorination, cracking and polymerisation units. They use it to agree which consumption losses, furnace run-length gaps, off-grade batches and VCM emission points to tackle first, and which operating windows and permits to tighten. After the first quarter under the plan, the site should compare specific consumption, furnace run length, prime resin yield and residual VCM results with the baseline and reset its priorities where results differ.

Frequently Asked Questions FAQ:

What should participants know before the PVC and vinyls chain plant operations course?

Participants should already work on an EDC, VCM or PVC unit and read DCS trends and laboratory results. No polymer chemistry degree is needed. Anonymised furnace run data, batch records or residual VCM results help them apply the walkthroughs to their own plant.

How does PVC and vinyls chain plant operations training differ from a chlor-alkali or polyolefin plant course?

It follows chlorine after it leaves the cell room: chlorination and oxychlorination to EDC, cracking to VCM and free-radical suspension polymerisation to PVC resin. Chlor-alkali courses cover brine and electrolyzers, and polyolefin courses cover catalyst-driven polyethylene and polypropylene reactors.

Why does K-value control matter in PVC and vinyls chain plant operations?

K-value expresses the molecular weight of the resin and decides which converters can use a grade, from rigid pipe to flexible film. It is set mainly by polymerisation temperature, so small setpoint drift produces batches outside the grade window.

What do participants take back from the PVC and vinyls chain plant operations course?

Participants take back a Vinyls Chain Operating Improvement Plan for a case plant, with a loss ranking from ethylene to bagged resin, furnace and batch checklists, a findings register and VCM exposure monitoring notes ready to adapt to their own units.
