



Combustible Dust Hazards Course: Dust Explosion Prevention, DHA and Explosion Protection



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Introduction:

Combustible dust hazards, covering dust explosion prevention, DHA and explosion protection, is a 5-day course for process safety, HSE, operations and engineering staff in bulk solids plants that ends with a Dust Hazard Analysis report for a case processing line. Plants handling flour, sugar, wood, plastics, pharmaceuticals or metal powders suffer deflagrations and secondary explosions when explosibility data, accumulation limits and protection systems are missing or mismatched. Nominees already run, inspect or modify powder handling equipment and work through case studies on test reports, flow diagrams and plant layouts. CoreConcept Training Center delivers this combustible dust hazards course.

Course Objectives:

- Explain how the dust explosion pentagon and secondary explosions apply to the dusts handled on site and record deposits in a dust accumulation baseline survey
- Interpret Kst, Pmax, MEC, MIE and ignition temperature results from laboratory test reports and rank dusts by explosion severity
- Lead a dust hazard analysis with process nodes and a DHA worksheet using NFPA 652 and NFPA 660 concepts, identifying ignition sources and missing safeguards
- Set housekeeping frequencies, fugitive dust leak controls and dust collection checks that keep deposits below accumulation limits
- Select deflagration venting, flameless venting, suppression, isolation, containment or inerting for dust collectors, silos, mills, dryers and elevators
- Apply management of change and hot work permit controls to modifications and maintenance in combustible dust areas

Target Audience:

- Staff responsible for process safety studies and hazard analyses on powder and granule handling units
 - Staff responsible for HSE inspection, housekeeping standards and incident investigation in bulk solids plants
 - Staff responsible for running milling, drying, blending, bagging and storage operations on shift
 - Staff responsible for specifying and maintaining dust collectors, silos and explosion protection equipment
 - Staff responsible for approving plant modifications, hot work and maintenance in dusty areas
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Course Outline:

Day 1: Combustible Dust Fundamentals and Site Dust Baseline

- Dust Explosion Pentagon Elements and Primary Event Sequence
- Secondary Dust Explosion Mechanism From Lofted Settled Deposits
- Particle Size, Moisture and Surface Area Effects on Dispersibility
- Combustible Dust Material Inventory Across Food, Wood and Metals
- Site Dust Accumulation Survey Using Layer Depth Measurements

Day 2: Explosibility Parameters, Laboratory Testing and Standards

- Kst Deflagration Index and St Class Ranking Interpretation
- Pmax, MEC and MIE Values From Laboratory Test Reports
- Layer and Cloud Ignition Temperature Data for Hot Surfaces
- NFPA 652 and NFPA 660 Combustible Dust Requirements Structure
- ATEX Explosion Protection Document Elements and Dust Zone Concepts

Day 3: Dust Hazard Analysis Method and Prevention Controls

- Dust Hazard Analysis Scope, Process Nodes and Team Roles
- DHA Worksheet Recording Hazards, Safeguards and Recommendations
- Ignition Source Screening for Friction, Hot Bearings and Smouldering
- Housekeeping Frequency and Fugitive Dust Leak Control Plan
- Dust Collection Hood Capture Velocity and Duct Transport Checks

Day 4: Explosion Protection Systems and High-Risk Equipment

- NFPA 68 Deflagration Vent Sizing and Flameless Venting Options
- NFPA 69 Chemical Suppression, Isolation Valves and Inerting Systems
- Pressure Shock Resistant Containment Design for Mills and Vessels
- Dust Collector, Silo, Dryer and Bucket Elevator Protection Arrangements
- Management of Change and Hot Work Permits for Dust Areas

Day 5: Case Study Building a Dust Hazard Analysis for a Processing Line

- Case Processing Line Brief With Flow Diagram and Test Data
 - Node by Node Hazard Identification Using the DHA Worksheet
 - Secondary Explosion Incident Lessons Applied to the Case Building
 - Prevention and Protection Gap Ranking Against Explosibility Data
 - Dust Hazard Analysis Report Completion and Peer Challenge
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Skills You Will Gain:

- Explosibility Data Interpretation
- Dust Accumulation Assessment
- Dust Hazard Analysis Facilitation
- Ignition Source Screening
- Fugitive Dust Control
- Deflagration Vent Sizing
- Explosion Isolation Selection
- Dust Area Permit Control

Why Attend This Course:

- Deliver a Dust Hazard Analysis report for a case processing line to the plant manager and the process safety lead
- Decide whether a dust collector, silo or mill needs venting, suppression, isolation or containment from its Kst and Pmax values
- Avoid secondary explosions, unprotected equipment interconnections and uncontrolled hot work that turn a small deflagration into a building-wide event
- Share the DHA worksheet, dust accumulation survey and protection selection matrix with operations, maintenance and engineering colleagues

Conclusion:

Back at work, the participant presents the Dust Hazard Analysis report to the plant manager, the process safety lead and the maintenance planner. They use it to decide which equipment needs explosion protection, which housekeeping frequencies and leak repairs come first and which modifications must pass management of change. After the first housekeeping audit and the first protection upgrade, the unit should compare measured dust layer depths, open recommendations and permit records with the analysis, then update the worksheet, test data requests and action owners where conditions have changed.

Frequently Asked Questions FAQ:

What should participants know before a combustible dust hazards and dust explosion prevention course?

Participants should already work around powder or granule handling equipment, or review its safety. Familiarity with process flow diagrams and hazard studies helps. Bringing anonymised dust test reports, a plant layout or housekeeping records lets them test the methods on their own site.

How does a combustible dust hazards course differ from a static electricity or hazardous area equipment course?

It covers the whole dust explosion problem: explosibility data, dust hazard analysis, housekeeping, dust collection and explosion protection systems. Static electricity and hazardous area equipment courses go deep into one ignition source or into electrical equipment selection, which this course treats only briefly.

Why do secondary explosions dominate combustible dust hazards and dust explosion prevention?

A small primary deflagration inside equipment shakes and lofts dust settled on beams, ducts and floors, creating a much larger cloud that then ignites. Historically most dust explosion fatalities came from these secondary events, which is why housekeeping and leak control matter.

What do participants take back from combustible dust hazards and dust explosion prevention training?

Participants take back a Dust Hazard Analysis report for a case processing line, with a node worksheet, explosibility data summary, ignition source screening and ranked prevention and protection gaps, plus templates for dust accumulation surveys and protection selection.
