



discovering solutions

## Types of Combustible Dusts

- ▶ Bio-solids
- ▶ Candy, sugar, spice, flour, grain
- ▶ Certain textile materials
- ▶ Coal and other carbon dusts.
- ▶ Fertilizer
- ▶ Metal dust such as aluminum and magnesium
- ▶ Organic dust such as sugar, paper, soap, & dried blood
- ▶ Plastic dust
- ▶ Rubber
- ▶ Wood dust

## Industries Most Susceptible to Dust Explosion Hazards

- ▶ Agriculture
- ▶ Chemical
- ▶ Textile
- ▶ Forest and furniture products
- ▶ Metal Processing
- ▶ Paper products
- ▶ Pharmaceutical
- ▶ Recycling operations (metal, paper, & plastic recycling)
- ▶ Food

## Key Services Available

- ▶ Incident Investigations
- ▶ NFPA 654 Compliance Audits
- ▶ NEP Preparation
- ▶ Training Employees about Handling Combustible Dust Hazards
- ▶ Engineering Design Reviews
- ▶ Process Hazard Analysis
- ▶ Develop Company Design Standards
- ▶ Software Solutions for PHAs, Management of Change, and Data Management



*“The Chemical Safety Board identified 281 combustible dust incidents between 1980 and 2005 that killed 119 workers, injured 718, and extensively damaged industrial facilities. The incidents occurred in 44 states, in many different industries, and involved a variety of different materials.”*

**ioMosaic**  
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# ioMosaic

NOW OFFERING...

COMPREHENSIVE  
CONSULTATION AND TESTING  
SERVICES  
DUST HAZARD ANALYSIS



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## CONSULTING SERVICES DUST HAZARD ANALYSIS

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### Overview

Recent tragedies in many industry sectors, followed by the regulatory attention given to dust handling operations, provide evidence that a new approach and higher emphasis for managing dust explosion hazards is needed.

ioMosaic has the experience and expertise to assist with management of your combustible dust hazards. Our Services begin with a review and assessment of potential dust hazards and are supported by testing, analysis, and Code and OSHA compliance reviews for facilities and/or unit operations.

ioMosaic has provided assistance with development of dust characterization plans, testing, hazard analysis, and explosion relief sizing; as well as on-site facility auditing for clients to ensure they are incorporating current-day best practices for addressing dust handling hazards.

ioMosaic has software solutions including the popular HAZOPTimizer™ PHA software tool, which includes pre-populated checklists for review of unit operations; as well as documentation of the required Process Hazard Analysis prior to start up of a new or significantly modified operation. A second software solution, ioXpress™ can help clients manage all dust data as well as to provide an electronic workflow solution for Management of Change and centralized Action Item Management System.

An article was recently written by the ioMosaic Partners titled, "Conducting Process Hazard Analysis for Dust-Handling Operations." This article headlined the February 2009 edition of "Chemical Engineering Progress," the monthly publication of AIChE.®

Please contact us for an individualized plan to address your facility's needs.

## TESTING SERVICES DUST HAZARD ANALYSIS

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### Services

#### Explosion Severity Test

The testing will be performed per ASTM E 1226-00e1, "Standard Test Method for Pressure and Rate of Pressure Rise for Combustible Dust." The parameters measured are the maximum pressure output and the maximum rate of pressure rise, Pmax and dP/dtmax. Kst is then calculated. These values are applicable to the design of protective measures, such as deflagration venting per NFPA 68, VDI Method 3673 or ISO Method 6184.

#### Minimum Ignition Energy (MIE)

The testing will be performed per ASTM E 2019, "Standard Test Method for Minimum Ignition Energy of a Dust Cloud in Air." (This standard is very similar to British Standard 5958, 1991 and European Standard: IEC 1241-2-3, 1994).

#### Minimum Auto ignition Temperature (MAIT) of Dust Cloud in Air

Testing will be performed per ASTM E 1491, "Standard Test Method for Minimum Auto-ignition Temperature of Dust Clouds." Approximately 70g of material is required.

#### Minimum Explosible Concentration (MEC) of Dust in Air

Testing will be performed per ASTM E 1515, "Standard Test Method for Minimum Explosible Concentration of Combustible Dusts."

#### Limiting Oxygen Concentration (LOC) Test

Testing will be performed per ASTM proposed standard. The tests will determine how much inert (nitrogen atmosphere) is needed to prevent an explosion from occurring when the dust concentration is in the explosive range. Approximately 200g of sample below 200 mesh is required.

## TESTING SERVICES DUST HAZARD ANALYSIS

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### Services cont'd

#### Hot-Surface Ignition Temperature of Dust Layer

*An additional cost per sample will be incurred if no DSC is available.*

Testing will be performed per ASTM E 2021, "Standard Test Method for Hot-Surface Ignition Temperature of Dust Layers." Test will determine the hot-surface ignition temperature needed to ignite the material in the dust layer form.

#### Volume and Surface Resistivity of a Dust Layer

Testing will be performed per ASTM D257-99, "Standard Test Method for DC Resistance or Conductance of Insulating Materials" (Modified). The testing will determine the volume and surface resistivity of the material, and breakdown voltage.

#### Electrostatic Charging (Chargeability) Test

Testing will evaluate the tendency of the material to generate an electrostatic charge and to hold that charge.

#### Chemical Reactivity / Calorimetry Testing

Testing will evaluate the chemical reactivity of pure components or mixtures of chemicals:

ARC	VSP2	ARSST
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