



Combustible Dust Hazard Recognition – an Insurer’s View

A presentation for the Fire Protection Research Foundation Seminar on Dust Hazards

Presented by Henry L. Febo, Jr. PE
Senior Engineering Technical Specialist
FM Global
Engineering Standards Department

May 13 – 14, 2009

This presentation it meant to give an overview of an industrial property insurer’s approach to identifying combustible dust hazards and applying good engineering practices to reduce the hazard and minimize the consequences.

FM Global, as an organization believes every loss is preventable. Toward that end, we have a field staff of approximately 1400 engineers world-wide who visit our insured locations to audit their operations for the purpose of identifying conditions which could result in a fire, explosion, natural hazard or equipment loss and provide solutions to remove the hazard or reduce the consequences.

Our engineers are guided mainly by FM Global’s approximately 300 property loss prevention standards. In some areas, these standards supplement national codes or standards such as the ASME Boiler & Pressure Vessel codes. These FM Global standards are written by a small cadre of engineers supported by scientists conducting research using the latest technology to investigate fundamental and practical phenomena and develop solutions related to property loss prevention.

Since it is not possible to have every engineer apply every standard at all locations during our annual audits, we target these visits to identify issues that we know are most likely to result in a property loss. This targeting is accomplished by evaluating past incident history mainly from FM Global clients but with an awareness of the broader industry experience. We do this for all the various industries and occupancies we insure. The following two tables show examples data developed for the hazard of combustible dust.

Table 1 Losses by Industry		
Industry	Number	Gross Loss – %
Chip & particleboard mfg	21	72
Furniture mfg	16	7
Saw & planing mills	12	4
Wood product mfg	5	5
Prefab building mfg	3	4
Plywood mfg	3	5
Wood, cane, cork mfg	2	1.5
Flake & hardboard mfg	2	1.5
Total	64	100

Table 2 Losses by Equipment Type		
Equipment Type	Number	Gross Loss - %
Dust Collector	67	12
Impact Equipment	22	11
Boiler	11	18
Storage Silo	8	4
Processing Equipment	7	2
Conveyor	5	3
Oven/Dryer	8	40
Grain Elevator	4	2
Spray Dryer	4	1
Various	30	7
Total	166	100

Once the presence of dust is recognized by our field engineers, they need to answer 10 questions that can help them focus on the real hazards and provide direction on solutions. The questions are:

1. Is there a combustible dust in user or created?
 - a. What is a combustible dust?
2. Are there any processes that could create a dust?
3. Where are the dusts handled or processed?
4. Is there combustible dust handling equipment without explosion protection?
5. Is there combustible dust handling equipment with explosion protection?
6. Is there a management of change process to prevent a change of conditions (increase or decrease the hazard)?
7. Are there areas containing fugitive dusts?
8. Is there a fugitive dust control (inspection) program?
9. Is there an adequate ignition source control policy?
10. Is there a suitable preventive maintenance program?

These are important questions to answer so that our engineering staff can properly understand our customer's dust exposures. If there is a hazard identified or a protection feature lacking, what can be done to reduce the hazard or limit the consequence? For FM Global field engineers, the main answers for dust are:

Loss Prevention Data Sheet 7-76, Prevention and Mitigation of Combustible Dust Explosions and Fires

Loss Prevention Data Sheet 7-73, Dust Collectors and Collection Systems

Data Sheet 7-76 contains FM Global's fundamental requirements for dust hazard control and prevention as well as mitigation features while 7-73 addresses some additional details regarding dust collection systems. There are also a few other data sheets that address specific occupancies with dust hazards like grain handling and wood working.

As part of the mitigation tool kit, FM Global field staff have a simple computer tool (DustCalc[®]) to design explosion venting for buildings and equipment. The tool has been available since 1997 and makes use of the research conducted by FM Global scientists to implement the latest and most sophisticated modeling methods to size vents for many scenarios. The program has been frequently updated as new information is developed. The 2002 edition of NFPA 68 adopted much of the basic FM Global methodology for vent sizing. The 2007 edition continues with the fundamental methodology.

The DustCalc[®] software gives our field engineers the ability to easily and consistently develop vent size and has an extensive proprietary data base of dust properties important to hazard understanding and mitigation. In addition, the software has the ability to calculate what NFPA 68 would get for the same problem. Similar capability is also available for the latest codes from VDI (Germany) and the European Union.