We are Stonehouse process safety

Dear Vahid,

September 2023

Process Safety Dispatch

In this Issue

Combustible Dust Explosion Testing: Why do it now?

At Stonehouse, as we continue to invest in laboratory staff and more combustible dust explosion testing equipment, it's clear to us that more and more companies are seeing the benefit in evaluating the fire and explosion properties of the powders they handle and process; this as part of their normal process safety practices. In this piece we examine why the demand for testing is increasing and what companies are doing with the test results they get.

So why do processing companies invest in obtaining dust fire and explosion test data? Here are 3 answers to start out...

1. NFPA652 requires it!
2. Data allows you to identify previously unidentified hazards with your materials
3. Data allows you to save money by cost effective spending on explosion prevention and protection equipment

Let's take a look in a little more detail at these answers...

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Combustible Dust: Sampling for Dust Combustibility Testing

Our 'Go To' guide for selecting/collecting your powder samples for combustibility testing.

Photo by Joel Henry on Unsplash

OK, so you have understood from NFPA 652 that you are responsible for determining if your materials are combustible or explosible, and if so, for characterizing their properties as required to support your Dust Hazards Analysis (DHA) [Ref 1]. Maybe you have selected the tests you think you need, and perhaps even sent an order to a test house somewhere. All you need to do now is collect the samples and ship them, right?

Stop right there.

Let's take a step back and consider how you arrived at your decision to select those powder/dust samples and then review how you might go about collecting and shipping samples so as to ensure you get test results that can actually be used in your DHA.

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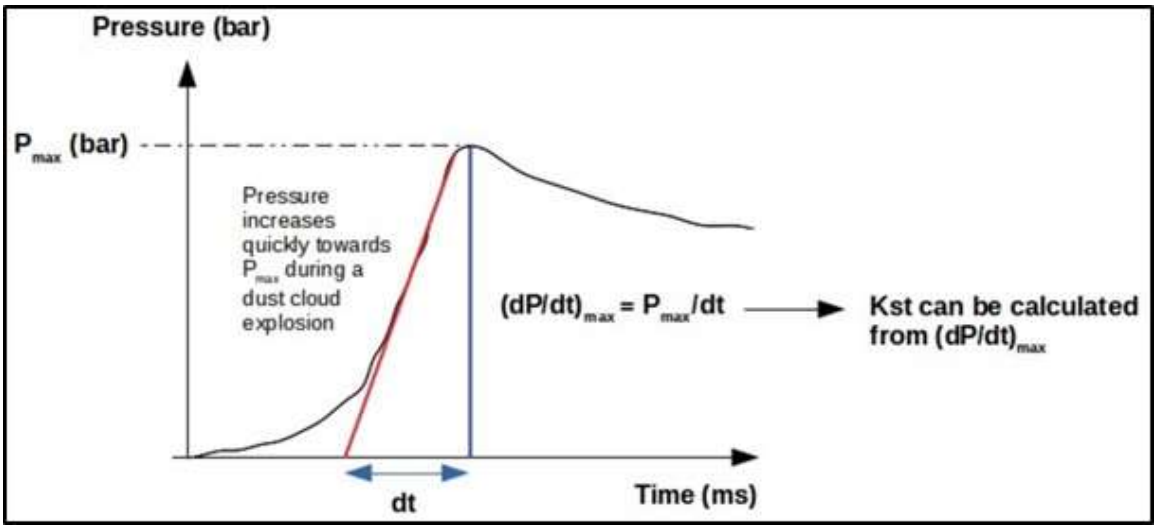
Explainers: What is Kst, Pmax...?

If you have any interest in dust explosions, you will have heard of the mystery term 'Kst' value. It's an often-quoted physical property of a combustible dust/powder. It has some rather strange units too – bar.m/s [yes, that's bar-meters per second]. You will also have encountered the terms 'Pmax' [bar] and 'maximum rate of pressure rise' [bar/s]. So, what do all these mean and how are they used in dust explosion safety. Let's tempt you with some feel-right science...



Pmax

Dust explosions involve the combustion of individual powder particles in the dust cloud that transfer their heat on to adjacent particles and a chain reaction begins. Once an explosion starts, heat is produced which leads to increase in pressure (hot gases expand). If the explosion is inside

a closed, strong vessel, the burning will continue until there is insufficient powder (fuel) or air left to burn anymore; it's been largely used up. So perhaps you can see that an explosion inside a strong, closed vessel will have a pressure profile beginning at atmospheric pressure then rising up to some maximum value – as shown on the diagram. If test conditions are optimized and standardized for concentration, turbulence and more, then this maximum pressure value we term 'Pmax'. So that's one of our 3 powder properties defined already!

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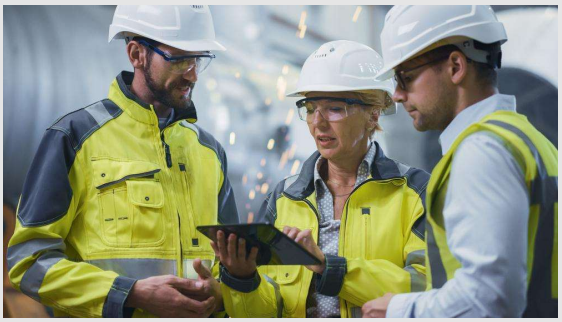
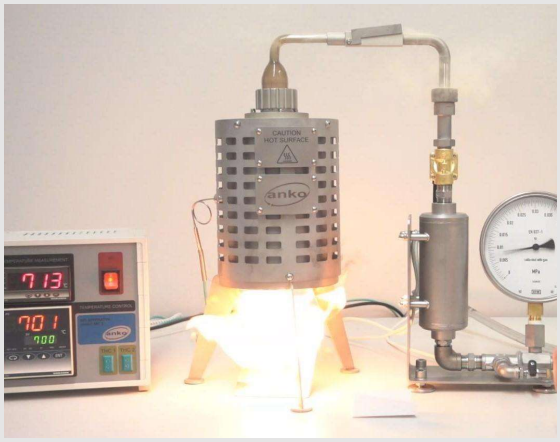


Expert Consulting

- Dust Explosion Prevention & Mitigation
- Control of Static Electricity
- Hazardous (Electrical) Area Classification
- Process Hazard Analysis
- Process Safety Management
- Fire and Explosion Hazard Assessment
- Incident Investigation
- Organizational Process Safety Competency Assessment

Specialist Laboratory Testing

- Combustible Dust Testing
- Electrostatic Testing
- Self-Heating / Thermal Instability Testing
- Flammability Testing of Gases & Vapors



Dust Clouds, Liquids & Gases, Static Electricity, Electrical Sparks, Mechanical Sparks

Explosions - Learn all about them!

Fall Training Courses in Process Safety from Stonehouse.**Virtual, broadcast live and direct to your PC in two 3-hour segments.**

At Stonehouse, we've been helping hundreds of businesses with their process safety consulting and testing needs. We've built decades of cumulative knowledge, and experience - and (we believe) a unique insight into industry's process safety problems and solutions. Everything from dust explosions and static electricity through to hazardous area classification and process safety management. Now it's time to let you benefit directly from this, through a suite of live virtual training courses, complete with video footage, solution methodologies, and case studies.

We hope you can join us on-line starting in September for all our virtual and live, bite-sized training events!

The Courses:

Explosions - Oct 24 & 25, 2023, 1:00pm-4:00pm EDT

Gases, vapors, aerosols, fibers, dusts and more. We all know they can (and do) explode uncontrollably in industry threating life, community, and business integrity. Yet, explosions and flash fires can be prevented and controlled…. if you have the knowledge, experience and sometimes ingenuity. Our 'Explosions' course is your key to a safer plant – and peace of mind.

Our bitesize course takes you from understanding to hazards analysis, to explosion prevention and protection techniques and through to compliance with standards and guidelines. And we do this with copious doses of video and case study material built up from years of practical experiences. For more information and to register, **click here**.

Static Electricity - Nov 14 & 15, 2023, 1:00pm-4:00pm EST

Static electricity is a devious subject. Fear not. We have it covered in this neat course designed for those who want to understand how static sparks arise in industry – and what to do to control this most elusive of ignition sources. We walk you through from the basics

of the subject to help you understand where it all starts, we enthral you with new video clips of the subject, filmed in our own labs and we lay out practical options available to control static electricity on your plant. For more information and to register, **click here**.

Hazardous Area Classification - Dec 5 & 6, 2023, 1:00pm-4:00pm EST

You've got flammable atmospheres at your facility. You've got electrical equipment at your facility. Better make sure the two never meet – or else make sure that if they do, the electrics cannot cause a fire or explosion. Knowing where your flammable atmospheres are (classifying hazardous areas) is a fundamental requirement of good process safety – important enough to have its own NFPA standards.

In our bitesize hazardous area classification course, we aim to have you understanding the requirements of the standards, explain good industrial practice and point you in the right direction to ensure your plant is same from the fire and explosion hazards presented by electrical equipment. For more information and to register, .

For more info & Registration

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