

Damage Limiting Construction – Part 4 Deflagration Conduits
(Dust Collectors)



Damage Limiting Construction- Part 4. HCI Systems, Inc.

If you are just starting with this article on Damaging Limiting Construction, please go to my LinkedIn page and also read Parts 1 and 2. This is a continuation of Part 3 topic that will discuss how deflagrations (i.e., fire ball) can be transmitted within a building or from building to building via dust collector conduits. Conduits, in this context, are not electrical conduits containing wires, but are pathways, like ductwork.

There are two technology camps when it comes to dust control. On one end of the spectrum you have the Suppressionists where the goal here is to suppress the dust before it becomes fugitive. That is, airborne. On the other end of the spectrum you have the Collectionists where the goal here is to collect and then manage the dust. And yes, there are plants that do both.

There have been many reported deflagration events that involved dust collectors. This article is not going to go into detail about active systems like fire suppression systems, fast acting fire valves, explosion protection systems and the like. We are going to discuss a passive device to minimize the risk of a fire ball propagating through the ductwork into other areas of the building. This device is called a Pressure Relief Elbow.

The above photographs show where a pressure relief elbow could be installed and what it looks like by itself. If you recall back in Articles 1 and 2, a deflagration produces a pressure wave that travels at about the speed of sound. Whereas the flame front is traveling much slower at its apparent flame speed. Using this differential in speed and



distance, a passive device such as the pressure relief elbow can be installed such that it "blows-off" before the fire ball gets there. And, since no turning elbow exists, the fire ball just exits the ductwork and does not make the change in direction.

The design of the pressure relief elbow is a function of dust collector strength, elbow release pressure, and the size and number of shear bolts attaching the two sections of the elbow. The elbow should be tethered so that it does not become an issue in flight. These devices can be pre-fabricated by your sheet metal shop and pressure tested in advance.

Damage Limiting Construction - Part 5 will discuss the deflagration event as it make its way to the main building.

Comments or questions? Please contact me at richgehse@hcisoftware.biz