

CEMENT KILN

FUNCTIONALITY

A cement kiln is the world's largest moving manufacturing machine. Cement kilns are cylindrical ovens, some as long as 1000 feet and as much as 24 feet in diameter. They rotate one to three times every minute. The kilns are mounted at a slight incline. The inside is lined with fire resistant brick. Powdered coal, oil, gas, liquid waste-derived fuel, and solid waste fuel are used to fuel the kiln. Raw material enters the kiln and is heated to over 2700°F. The material leaving the kiln is called clinker.

EXPLOSION HISTORY

- Loss history for the past twelve years in rotary kilns from FM Global Data Sheet 7-76:
 - 18.6% if 43 losses were due to explosions
 - 45% of 43 losses were in a cement industry

CAUSES OF EXPLOSION

- Poor combustion - flame temperatures low
- Combustion upset caused by product slide
- Firing increased too rapidly at startup
- Waste fuel gas accumulation
- Ignition sources continuously present



Figure 1: Typical Cross-Sectional View of a Cement Kiln

SOLUTION

Kilns are best protected by an explosion suppression system. Suppression containers should be used on the inlet and outlet to suppress the deflagration and to prevent flame propagation to other equipment.

DETECTION

1) When a deflagration begins, it is preceded by a pressure wave. Patented Fike pressure detectors sense these waves in one millisecond (.001 sec.), and instantly send a signal to the control panel.

SUPPRESSION

3) The suppressant container releases suppressant agent via a dispersion nozzle to suppress the explosion in a matter of milliseconds.

CONTROL

2) The control Panel receives the signal and issues a command to the suppressant container in less than one millisecond.

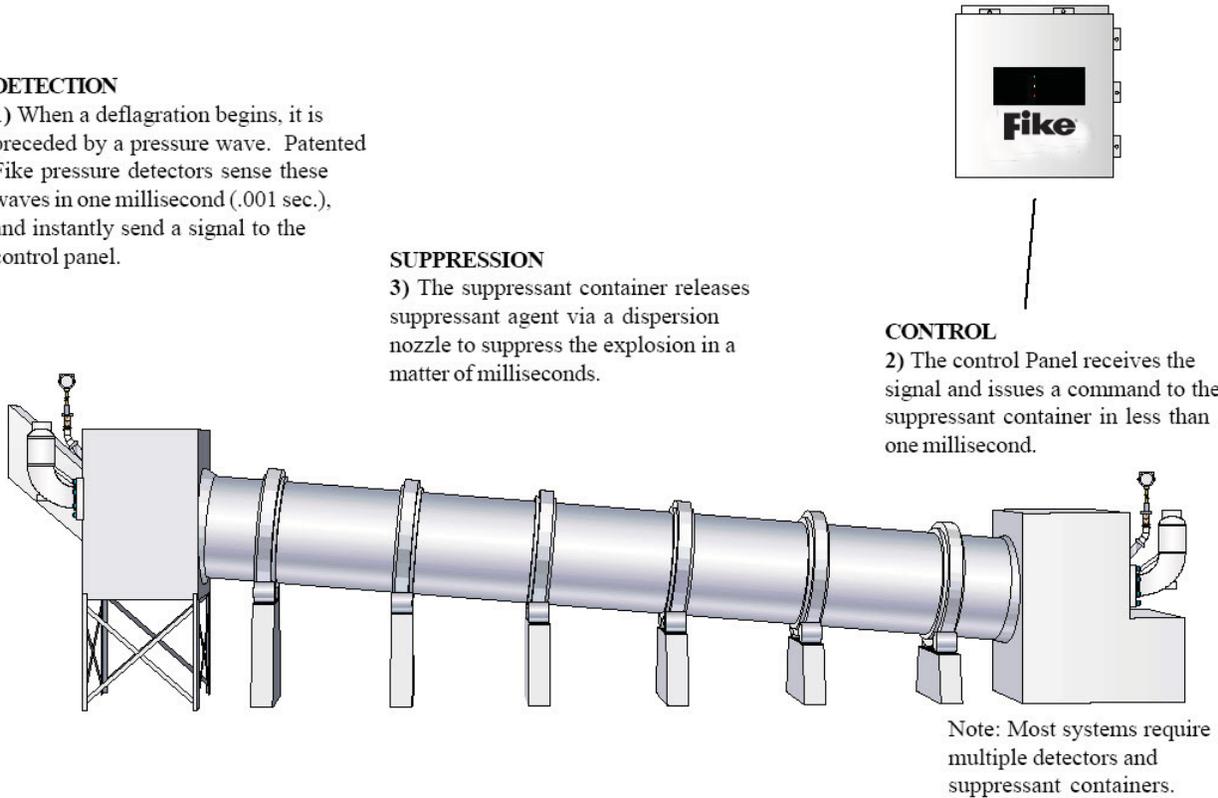


Figure 2: Kiln Protected by Explosion Suppression and Chemical Isolation

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