Refinery Safety

In 2008, thirteen people were killed and forty injured when the Imperial Sugar refinery at Port Wentworth, Georgia was destroyed by a sugar dust explosion. This wasn't, by any means, the first refinery to be destroyed in this way; there had been three fatal accidents in 2003 as a result of sugar dust explosions.

Yes, the Port Wentworth refinery was old and this, according to the U.S. Chemical Safety Board, contributed to the fire's severity. But as the CSB went on to state in its report which was published in September 2009, the incident had been "Entirely preventable".

There are many old refineries around the world, but thankfully not all are disasters waiting to happen. Explosion protection systems such as those designed and manufactured by StuvEX are widely used throughout Europe and other regions to ensure that a repeat of Port Wentworth simply can't happen.

Stephen Bell is the Managing Director of StuvEx UK and has spent many years helping to keep refineries and other industrial facilities explosion free and safe: "While explosion prevention has a lot to do with the way that a facility is maintained, making sure that the appropriate systems are in place is absolutely crucial. If an explosion does occur, the correct system will ensure that damage is kept to an absolute minimum. Without the correct system, a destroyed production facility is the least of a factory owners problems especially if there is injury or loss of life."

So what constitutes a correct system? StuvEx engineers have fitted and retrofitted explosion protection in many refineries throughout Europe and have designed products for protecting conveying systems, vessels and silos and filters. The company has a level of experience which is market-leading because installing explosion protection is not a job for the average maintenance engineer. An incorrectly sited or installed system simply will not stop an explosion from propagating. This is a job for a specialist installation company and StuvEx is there to help.

Stephen Bell continues: "We believe that we are one of very few companies who will design, manufacture, supply, install and maintain explosion protection systems for existing factories and installations. This is due to the complexity involved with existing equipment and plant. StuvEx has the resources and expertise that enables us to calculate the strength of existing equipment such as hoppers, silos, bucket elevators and filters to ensure that the correct protective system is installed which complies with current legislation. We often provide full turnkey installations and back this up with complete responsibility for the design."

So what should be installed and where?

Silos, vessels, elevators mechanical and pneumatic conveying

For silos, vessels, elevators and mechanical conveying where an explosion needs to be instantly supressed, StuvEX has the Flash system. A detector continuously monitors the process being protected. In the event of an increase in pressure the detector sends a signal to a control unit which instantly triggers the gas generators of the extinguishing agent bottles. It literally takes milliseconds to flood the problem area with enough food-grade Sodium Bicarbonate to suppress the explosion before it has had a chance to take hold. There is minimal damage to the process and as Sodium Bicarbonate is used as the suppressing agent, cleaning is easy. As soon as the cause of the problem has been resolved, production can continue as before. Unlike other types of explosion suppression there is no need for pressure vessels regulations as Flash is powered by gas generators (similar to those in your car airbag) with a life span of ten years.

Explosion panels in a silo

Mills

Even if a sugar mill has explosion venting or suppression installed, there is no guarantee that smoldering particles won't travel from the mill via the conveying system. For this, a spark detection system coupled with the facility to stop the process and clear the problem is the best option. As soon as the StuvEX Spark Detection system senses a rise in temperature, it switches off the process and sends an alarm signal to the master control unit (MCU). With the Spark Detection system placed a little way away from the mill, only significant, explosion causing sparks will activate the alarm and induce a process shutdown.

StuvEx's control unit against explosion

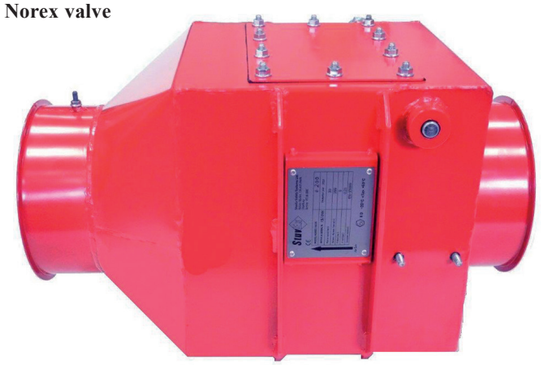
Explosion venting for vessels

With explosion venting, the easiest way is to guide the explosion away from the process in the refinery. Sometimes though, this is not possible as the distance from the process to a suitable outside wall is too great. StuvEx provides a range of indoor flameless venting systems such as the StuvEx DQS. The DQS provides a completely different type of explosion protection because with a DQS installed the explosive pressure can be safely vented even in areas where the workforce is close by. The DQS consists of a spring loaded diaphragm which, in the event of an explosion, opens and allows the gases to be cooled by a series of metal plates. This stops any flames from entering the work-place. Once the explosive pressure is reduced, the DQS closes to stop any air from re-entering the vessel and any chances of a secondary explosion. DQS is compact and practically maintenance free.

Air Filters

Air filters in a refinery are designed for one purpose; to remove fine, potentially explosive dust from mechanical and pneumatic conveying, mills and other machinery. A fire in process filters is a very real problem. StuvEX has designed two valves that can stop a fire or explosion in its tracks. Norex is a non-return valve for installation on the 'dirty' inlet side of a filter. It stays in an open position while air and dust is directed towards a filter but the moment that reverse pressure occurs due to an explosion or flame, the Norex valve closes automatically. While the Norex valve is designed to be fitted to the intake of a filter, the Ventex valve fits to the exhaust or clean air side of the filter. As soon as the Ventex valve senses the pressure wave preceding a flame jet, it automatically closes.

Norex valve



The products mentioned here are those routinely installed in refineries. Not all refineries are identical and other products or systems might be more suitable. StuvEX has a technical department which is able to provide advice on the best solution on any particular situation regarding explosion protection and prevention.

StuvEX Flash system on a bucket elevator

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