



# Technical Talk

By Mark Chisnall

## ATEX - Reducing the

As an automation company we centre a lot of our development time in the application of safety. Obviously automation can bring significant cost and production advantages but the more mechanical we make the operation the more we have to consider replacing human intervention with fail safe production methods.

One of the risks we encounter in the preparation of food for human or animal consumption is a milling process that creates fine explosive dust. Common processes generating this form of hazard includes flour and animal feed milling, sugar grinding, spray drying of milk and instant coffee, conveyance and storage of whole grains and most finely divided materials.

### Reasons for Explosion

There are basically only two reasons for explosion of dust. Firstly when a concentration of dust in the air falls within an explosive limit and secondly a source of ignition is present within the hazard zone.

To prevent an explosion depends upon the exclusion of one or preferably both of the above conditions. Other precautionary measures include prevention of secondary explosions, explosion relief, explosion suppression, explosion containment and building design.

### The ATEX Directive

Many process industries generate potentially explosive atmospheres using substances

from solvents to flour. The ATEX directive was designed to harmonise European Standards and in the UK to replace the previous Health and Safety at Work Act. The ATEX Directive is still administered by the Health and Safety executive in the UK.

In July 2003 ATEX became mandatory for all sites with potentially explosive atmospheres. This meant that all sites had to provide documented analysis and risk assessment towards the potential of explosive atmospheres to ensure the site, personnel and any proposed new equipment were compliant with the ATEX Directive.

Existing sites already in use before 30 June 2003 had a further 3 years to 30 June 2006 to fully comply with the hazardous area aspects of the directive.

### Main requirements of ATEX

ATEX has led us to focus on the main principles of prevention and the protection of workers much of which was previously covered by the Health and Safety at Work Act.

The first priority is the prevention of the formation of an explosive atmosphere and secondly if that is impossible due to the nature of the activity then the avoidance of ignition needs to be applied. If neither of these elimination measures is possible then the mitigation of the damaging effects of an explosion needs to be applied to ensure the

health and safety of workers. Finally all the above measures need to be reviewed regularly and always when significant change occurs within the production facility.

### The Risk Assessment

Everyone in the milling and food manufacturing industry is aware of the risk associated with dust explosions therefore continuous vigilance needs to be applied. Risk assessments will cover most eventualities and they should at least cover the following:

- How much likelihood is there that explosive atmospheres will occur and their persistence?
- How much of a likelihood is there that ignition sources are evident including electrostatic discharges and how likely are they to become active and effective?
- Assessment of the installation, substances used, processes and their possible interaction.
- The scale of the anticipated effects of explosion.
- The places which are or can be connected via openings to areas in which explosive atmospheres may occur.

### Zoning the Hazard

There are three zones relevant to the ATEX dust regulations, a brief description is shown below:

- Zone 20: This applies to a continuous presence of combustible dust. A high level of protection is required for both electrical and non electrical elements. Two separate

## risk of Explosion

safety systems need to be applied for each risk. Type testing and certification is required by a notified body.

- Zone 21: Defined as an occasional presence of combustible dust during normal operation. Plant considered to be at risk must have one level of protection. Full risk assessment and technical details to be logged in a technical file and stored with a notified body.

- Zone 22: The presence of combustible dust is unlikely, and if so for very short periods. Plant considered at risk must have one level of protection. Full risk assessment should be documented and technical details to be included in a file and stored with the manufacturer.

### Dust explosion precautions

The following precautions are some of those commonly applied to plant for storage and handling of both whole grains, for example maize, barley wheat, oats, rye soya beans, milo and explosible meals and flours.

- 1) Locate plant in the open air or in a lightweight building so that the roof and wall cladding panels can act as explosion relief. On older brick / stone built premises, provide the maximum area of explosion relief which is reasonably possible.
- 2) Enclose plant and equipment to prevent escape and accumulation of dust in the building.
- 3) Ensure all electrical equipment, switches and plant is certified to CE standards for

hazardous areas. New or modified installations have had to comply since 01 June 2003 but the next critical date is 01 June 2006 when older facilities will have to meet the ATEX directive.

- 4) Maintain scrupulous cleanliness including, normally, a centralized piped vacuum cleaning system.
- 5) Maintain slight negative pressure on storage vessels such as bins and silos. Equip dust collecting silos with explosion relief and a rotary valve at the base to act as an explosion choke.
- 6) Totally enclose dust collecting filter units and fit with explosive relief.
- 7) Equip bucket elevators with explosion relief at the head of the elevator. Preferably fit bucket elevators with underspeed switches and alignment monitors.
- 8) Exclude obvious ignition sources and ensure electrical equipment is dust protected to CE standards. Surface temperatures should be controlled and prohibit use of inspection lamps with flexible cables. To check inside bins use explosion proof battery hand lamps secured against accidental dropping or fixed lamps placed over inspection hatches.
- 9) Equip all explosion reliefs with index switches to close down the plant in the event of an explosion relief being activated. This will prevent the onward transmission of burning material.
- 10) Finally use an effective permit-to-work system to control hot work, welding etc and put clear signing around the plant and hazardous areas.

### ATEX compliance - questions you should ask yourself:

- Are your hazardous materials labeled, identified and classified?
- Have you conducted a fire and explosion risk assessment?
- Are your Zones identified and documented?
- Are all personnel who have access to the zoned areas trained to the appropriate level?
- Do you carry out regular inspections?
- Have you mitigated against the effects of an explosion?
- Do you have documented systems and procedures that comply with ATEX?

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Please contact Mark if you have any questions on plant Automation or if you require a specific subject to be considered for future publication.

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