



White Paper

No Big-Bang in Wood Processing: Innovative Explosion Protection for Wood-processing Plants

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ince the re-discovery of regenerative energy sources wood processing has seen a considerable growth due to the demand of easy to handle fuel. In view of the ignitability and explosibility of the developing wood dust provisions must be taken to minimize/prevent the impacts of dust explosions.



An explosion in a wood processing plant may endanger human lives and the environment as well as the survival of the plant. (Pictures: © IEP Technologies)

Operational hazards caused by explosions constitute a great risk to human life and process plant machinery as well as to the environment. Therefore, explosion protection is often a necessity, especially in the wood-processing industry.

An adequate explosion protection solution is essential to ensure the uninterrupted production of the wood materials and to minimize risks. Unmitigated explosion events usually result in long downtimes for the production plant and all unplanned machine stoppages cause financial losses that have knock-on effects on the continued success of the business. Certain production steps in wood-processing plants will generate hazardous quantities of flammable wood dust which can, provided the right conditions, easily ignite and explode similar to gunpowder.



The dynamic detection system SmartDS.

Beside conventional solutions for the wood-processing industry, IEP Technologies' explosion protection experts focus on special applications to prevent/minimize any disturbance of and to avoid costly modifications to the production plant by implementing high-rate discharge (HRD) extinguisher containers together with Smart DS, an intelligent detection system comprised of two dynamic multi pressure sensors in one housing. The use of capacitive ceramic pressure sensors facilitate to measure the rate of pressure rise and report potential threats within milliseconds.

The detector will recognize the characteristic pressure increase caused by an explosion. Slow increases in pressure caused by process fluctuations will not trigger the suppression system. Data is monitored through three separate algorithms to provide the most reliable explosion detection, providing outstanding false alarm immunity. In addition, the Smart DS interface module's reliability is third party certified to SIL 2. This allows for post-event investigation and root cause analysis to identify the cause for the explosion/system activation.

To control the devastating effects of explosions, IEP Technologies calculates the quantity and positioning of the required HRD extinguisher containers such that the maximum reduced explosion pressure will not exceed the value specified for the process vessel strength.

With this protection solution, an incipient explosion will be detected rapidly and the explosion fireball will be suppressed and controlled with the injection of extinguisher powder. For wood-processing plants, IEP Technologies provides an explosion suppression solution designed to reduce the additional explosion pressure to an extent that is as low as possible. Usually, the equipment must be specified for Class 1, 2 and 3 dusts to resist additional pressures or shocks of 0.4 bar as caused by explosions.



Highest priority for explosion protection at wood-processing plants

Another important advantage of the explosion suppression is the fact that neither flames nor pressure or the product itself can be released outside the process vessels. Thus, no pollutants are released, which could harm humans and the environment – making this constructive explosion protection system an environmental sustainable as well as future-orientated measure.

Isolation between connected plants is very important. Design of explosion isolation systems – in particular the distance between the extinguishing barriers and the process vessel and detector types (pressure and/or optical) is of special interest. Due to existing or planned equipment, minimum or maximum distances are frequently not observed.

An explosion suppression system installed in conjunction with the explosion isolation system adapts to the existing equipment, which constitutes a cost-efficient constructive measure to provide protection against explosions. This safety solution does not only protect employees and the environment but also reduces economical losses to a minimum.

A risk analysis with an integral inspection of the production environment in wood-processing plants is an essential requirement in order to understand the risk of an explosion event. Individual measures rarely lead to the required level of safety. The application and continuous evaluation of the safety concept as well as regular maintenance allow for a safe operation and reduce the risk of an explosion. IEP Technologies provides these solutions to mitigate these risks, understanding the plant's processes and developing complete solutions from a single source - from the consultation, the planning and implementation to the maintenance service to protect plants and save lives.