

Understanding and minimizing the safety hazards of the deinking process

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Flammable chemicals can pose new risks to recycling mills

Many pulp and paper companies have become heavily involved in deinking. The benefits of deinking are apparent: it prevents the need to extensively bleach the final product, which can damage the fibers. It also prevents ink buildup from damaging fourdrinier wires or other types of process equipment. The deinking process is used as well, to remove nonpaper "contaminants" such as plastic windows on envelopes. These plastics can "gum up" the recycling process.

However, mills may often be unaware of hazards associated with the process. One of the safety issues inherent in the process is the increased use of flammable solvents—especially low flash point solvents such as some naphtha grades, acetone, and toluene—that may start being used in areas of a mill that previously had minimal risks of combustion.

An example is the repulping area at the wet end of a paper machine. This area has historically been free of ordinary combustibles and may even lack sprinklers for fire protection. Further, electrical equipment may be unsuitable for the new exposure. Introducing flammable liquids in such an area could adversely change the mill area environment and potentially expose high-value production equipment to a severe fire and extended downtime.

Another concern is the practice of some mills to actually spray naphtha, a low flash point solvent, on the moving machine wires to deink during machine operation. Others are removing "contaminant" plastics by continuously spraying naphtha onto the moving wires to dissolve the small plastic pieces. In both cases, naphtha solvent-laden air (SLA) is removed in a ventilation system and recovered by carbon bed absorption.

Spraying low flash point solvents such as naphtha directly onto moving machine wires is unduly hazardous and should be discouraged. As an alternative, it may be possible to dissolve contaminant plastics in a pulp mixing tank that presents a lower risk than spraying within the machine. If this cannot be done, then the best engineering judgment, such as providing special protection systems or interlocks to minimize liquid flow, will be needed.

The use of low flash point solvents, especially if they are heated, can lead to increased fire and explosion hazards. Vapors or spilled liquids could enter drainage systems not designed for solvents and find their way to an ignition source.

There are several ways to manage the introduction of these new processes. The first step is to be aware that these hazardous chemicals are being used and that the increased risk to production and equipment may warrant a re-evaluation of property protection systems.

The correct approach is systematic, such as a hazard and operability study (HAZOP) which uses a team concept to analyzing risk and developing a method for sound preventive measures.

Beyond that, the best way to reduce the risk is to provide dedicated solvent deinking plants or rooms that are properly protected and isolated so that important production machines are not unduly exposed. One company, for example, is moving its deinking process to a separate building, then returning the deinked pulp to the main paper machine.

If solvent processes need to be located near the paper machine, the mill should install cutoff rooms for tanks and pumps, proper piping systems, and automatic shutoff valves. Automatic fire protection may be needed where flammable liquid processes exist. Larger bulk storage tanks should be located outdoors if possible. SLA systems frequently have vapor explosion hazards and demand special attention.

Codes and guidelines

Companies using large quantities—over 10,000 pounds of chemicals—in a system must comply with OSHA's Process Safety Management of Highly Hazardous Chemicals, regulation 29CFR, part 1910.119. The law covers 13 major provisions and is detailed and concise in its safety provisions.

Additional safety and prevention guidelines and design recommendations are available in Factory Mutual Engineering and Research (FME&R) data sheets, the National Fire Protection Association (NFPA), and various government agencies.

The recycling process in pulp and paper mills can be safe, as long as companies educate themselves on the risks associated with it. By altering loss protection systems accordingly, mills can enhance production and minimize the danger involved in the deinking process. 

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