Dust Control Strategies for Glass Processing

Material: Recycled Glass

Issue: *Processing any type of glass for recycling requires size reduction (crushing), an activity that creates fine particles of glass that can become airborne dust. All types of dust have come under increasing regulatory control in the U.S. because of the potential health hazards they pose toward workers (see* Analysis of Glass Dusts *Best Practice). Controlling dust in an industrial processing facility can be a costly proposition. Knowledge of effective dust control strategies for glass processing facilities is essential to create a safe working environment and to mitigate liability concerns.*

Best Practice: In designing a dust control system for a glass processing facility, it is important to consider the entire processing system layout. This includes everything from where material is received, to where finished product is loaded for shipment. One design strategy to minimize airborne dust generation involves enclosing equipment at any point where dust is likely to be created, particularly where the glass drops from one material handling device onto another, such as the discharge from the crushing mechanism, conveyors, and screens. Most material handling equipment is now available with enclosures from manufacturers. These products are a recent development by equipment manufacturers in response to growing health concerns related to airborne dusts. In designing enclosures on equipment such as conveyor belts, access to the processing lines should be considered, particularly at points where blockage of material flow may occur, or where maintenance may be required.

A complete dust control system must include negative pressure ducting to all processing system enclosures. The ducting would go first to a "drop-out" box, or place where the airflow slows enough to allow large particles and pieces of paper to settle. Then the airflow would go into a cyclone, where the coarser airborne particles would be removed, then to a baghouse for the finest dust. Finally, the dust-free air can be discharged through a fan.

Care should be taken to assure that airflow systems are designed to pull air, never push it. Ideally, the fan should be pulling from the baghouse exit. This is important for two reasons: (1) positive pressure ducting will leak air (and dust) through the seams, and (2) if the fan is in the glass dust-bearing air stream, fan blades will wear out quickly from abrasion.

Baghouses are a common type of final dust control used with airborne dust in industrial settings. Most baghouses are preceded by cyclones that remove coarser particles from the airflow prior to the baghouse, increasing the time between bag cleanings. The bags are typically supported by metal cages, where the dust enters from outside the bag, with clean air exiting from the inside through a plenum. The bags can be cleaned by a short burst or pulse of clean gas injected into the top of the bag, instantaneously reversing the flow of air through the bag, thereby removing fine particles trapped between the fibers. Recent technology developments in baghouses include the use of smaller bags and improved filter materials that allow greater airflow, facilitate cleaning, and require less horsepower to operate.

The configuration described above creates three potential products for a glass processing facility: a somewhat contaminated fine-grained aggregate, and two grades of clean glass dust. Markets can then be investigated for the dust. Water is perhaps the simplest and most intuitive tool that can be used in controlling dust. A fine mist of water applied to glass before processing reduces dust to undetectable levels. However, moisture creates a number of other issues in handling glass for recycling, including difficulties in screening, storing, and bagging. Also, moist dust can clog baghouses. Adding moisture can be an effective means of dust control for coarse crushing and screening systems, but water atomizers should only be used strategically before dryers in higher quality processing systems.

Implementation: During system design is the best time to consider integrating dust control into the processing system. There are many excellent manufacturers of dust control equipment listed in the *Thomas Register*. For small-scale, budget operations, a negative-pressure system can be built using several barrels for drop-out boxes, hoses for ducting, filter bags, and a fan.

Benefits: Effective dust control has the direct benefit to processors of mitigating environmental liabilities. This relates to both worker health issues and air emission compliance under regulations from air pollution control authorities. An additional benefit may be found by recovering fines from baghouse collection for industrial mineral applications.

Application Sites: Glass Processing Facilities, Material recovery facilities.

Contact: For more information about this Best Practice, contact CWC, (206) 443-7746, e-mail info@cwc.org.

References:

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