Reducing Glass Breakage in Material Recovery Facilities

Material: Recycled Glass

Issue: *Achieving efficient recovery of post-consumer glass depends greatly on maintaining glass quality all the way from collection through processing. The primary market for post-consumer recycled glass in most parts of the country is the manufacture of new containers. Specifications for glass container manufacturing require that glass be beneficiated, a process of size reduction and contaminant removal from color sorted cullet (see* Cullet Specifications for Container Manufacturing *Best Practice). Breakage during handling at material recovery facilities (MRFs) decreases the ability to effectively identify and remove contaminants. Breakage also reduces the ability to sort for color, which works most effectively with glass greater than 2 inches square. Sorting and removing contaminants are also important to other applications besides container manufacturing, such as fiberglass insulation or niche product applications.*

Best Practice: To reduce breakage and increase the value of collected glass, it is important to note that breakage occurs at several points in the collection and processing of post-consumer glass containers, and varies depending on whether glass has been color sorted prior to arriving at the MRF. For information on controlling breakage in collection, see *Controlling Breakage in the Collection of Recycled Glass* Best Practice. This best practice addresses strategies for reducing breakage within material recovery facilities. Major points of breakage after collection include "tipping" activity, where glass containers are unloaded at the MRF, at feeding and conveying points within processing lines, and whenever containers are handled with heavy equipment.

Studies have shown that modifications in glass handling at recovery facilities can reduce breakage rates, lowering production of mixed residuals. The modifications include changes in design such as lowered tipping heights, the addition of deflection ramps, and the installation of rubber baffles at impact points. Procedural changes that may be implemented include tipping and handling speeds, compaction strategies, and loader operation. Minimization of total handling steps may be the most important strategy for achieving efficient recovery of glass containers. It is important to note that many programs use transfer stations distinct from MRFs, meaning additional loading and transportation steps for recovered containers. The practices discussed here apply to such transfer stations as well.

With a large percentage of glass being broken at the unloading stage, and as the material moves through the line dropping from one level to another, simple and inexpensive means of reducing impact forces are critical. Equipment additions or modifications including deflection ramps, drop chutes, and rubber baffles are all designed to reduce impact forces. Deflection ramps placed below tipping points effectively reduce drop distances and can be faced with abrasive-resistant, shock-absorbent plastic to further reduce impact. Drop chutes also reduce drop distances and encourage containers to "roll" rather than break on each other, and can be implemented at infeed hoppers or conveyor ends. Ramps and chutes should be angled between 30 and 45 degrees to achieve impact reduction with enough slope to prevent hang-ups.

Rubber or synthetic baffles represent one of the most effective and least expensive methods of reducing glass breakage. Baffles reduce impact speed and deflect drop angles, and can be installed at nearly any impact point within a processing line. Such points include between the in-feed conveyor and trommel or bar screens, and any other conveyor interface. Baffles should be made of durable abrasive resistant material. Success has also been achieved with bumper guards installed on steel shaker tables and conveyors to soften the impact of containers on the steel edges.

Procedural changes include using greater care in handling, including slow dumping and gentle in-feed loading by both manual handlers and heavy equipment such as end-loaders. The recommendations for loaders focus on operating speeds, encouraging operators to slow loading or "scooping" and avoiding running over the piles. While seemingly contrary to throughput objectives, studies suggest that a small reduction in speed can yield a net increase in recovered material throughput, by reducing breakage. Additionally, some transfer station programs intentionally compact material for volume reduction. Given the weight of glass containers, transportation efficiencies from volume reduction are limited and not likely to offset material loss. Procedural modifications require worker education regarding the need to reduce breakage and their role in improving efficiency.

Implementation: Materials recovery facilities sometimes get so consumed with increasing production rates that they give little attention to quality. An analysis of handling procedures to minimize breakage should be part of a total quality management program, ideally including statistical process control, to optimize facility revenue from recovered materials.

Benefits: Modification of glass handling practices in material recovery facilities can significantly increase marketable recovery rates for collected glass containers. Reduction in breakage means lower production of unsortable mixed color glass. Material that cannot be sorted is called residual and must be removed in processing and handled for disposal, or channeled to lower value applications. Inexpensive design and procedure modifications can boost program revenues from the sale of cullet to manufacturers. A study by SWANA (1) showed that programs have been able to reduce breakage by as much as 33%.

Application Sites: Material recovery facilities, glass processors, transfer stations.

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

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