



Recycling of Fiber-Based Materials with Transfer Metallic Decoration

A Study Commissioned by the Foil & Specialty Effects Association and Conducted by the Van Dyk Technology Center

A Message from the Foil & Specialty Effects Association

Executive Director Jeff Peterson

The Foil & Specialty Effects Association (FSEA) acknowledges the existence of misconceptions on sustainability issues as they pertain to the recyclability of metallic decorated paper and board. The association has been proactive in working to provide clear supported evidence that transfer metallic decoration (hot foil, cold foil and digital foil transfer processes, as well as transfer metalization of board or paper) is recyclable.

In 2020, as sustainability issues came to the forefront of the print decorating industry, FSEA commissioned a study to be undertaken by the Georgia Tech Renewable Bioproducts Institute. The comprehensive testing demonstrates that transfer metallic decorated paper and board do not create problems in the recyclability/repulpability of paper and/or board in a common repulping process.

The following study has taken a further step to test transfer metallic decorated fiber-based materials and demonstrate that it is actually being recycled by Materials Recovery Facilities (MRFs) throughout the U.S. and North America. Through extensive testing at the Van Dyk Technology Center, the following study will demonstrate that fiber-based transfer metallic decorated materials are recyclable and are currently being sorted by Materials Recovery Facilities (MRFs) to be included in the recycling stream.

STUDY SCOPE

The Foil & Specialty Effects Association (FSEA) contracted with the Van Dyk Technology Center in Norwalk, Connecticut, to test transfer metallic decorated printed materials to determine how they are handled in recycling streams. These tests were intended to provide broad direction and point consumers, Consumer Products Group (CPG), Material Recovery Facilities (MRFs), and marketers toward resource-efficient recycling data for fiber-based packaging and printed materials. This study demonstrated how transfer metallic decorated materials can be collected, separated, and recovered from the waste stream and be efficiently recycled. Various products and packaging formats with metallic decoration have been questioned in the past.. The Van Dyk study proves reprocessing and repurposing transfer metallic decorated materials don't fall into the misinformation trap.

DETAILS OF STUDY

The Van Dyk Technology Center was commissioned to test fiber-based folding cartons and greeting cards with transfer metallic finishes. The goal was to mimic various functions found in Materials Recovery Facilities (MRFs) sorting plants in a laboratory setting. Van Dyk Recycling Solutions is one of North America's leading providers of comprehensive recycling and sorting systems for MRFs. They design, supply, install, and service recovery equipment to meet the ever-increasing environmental regulations. The Van Dyk testing center is designed to provide a setting for those involved in the recycling and solid waste industry to implement tests that mimics real sorting challenges.



Figure 1: Model of TOMRA Autosort 5

The equipment used for the testing was a TOMRA Autosort 5. The TOMRA Autosort is a multifunctional optical sorting system that recovers various materials from different waste streams that yield more accurate sorting results. The ultra-high NIR (Near Infrared) sensors combined with SHARP EYE lenses provide for clear identification, allowing the Autosort to determine the difference between paper and aluminum/ferrous metals. The TOMRA also has a highly sensitive metal sensor capable of identifying hard to detect objects. The high-resolution sensors on the TOMRA clearly identify the material and color of the samples being tested and determine the difference between fiber grades. The testing recovered the cellulose fibers and separated what is recyclable and what needs to go to landfill.

Van Dyk tested 20 samples each of eight different folding carton and greeting card styles with varying degrees of transfer metallic coverage. Van Dyk then assigned a variable number from V1 – V8, photographed each submitted piece and estimated the metallic coverages. Each sample sorted varied between 25% and 75% transfer metallic coverage. The test results indicated, “The metal detector detected none of the variables and were correctly ejected with fiber.”

Figure 2 captures the total image of one of the most densely covered test pieces, the Champagne folding carton, V2. It is an example of one of the eight products tested and had an estimated 75% metallic decoration coverage. The test results proved it to be 100% sortable.



The summary of test results for each of the eight fiber-based transfer metallic decorated samples demonstrated that 100% of the samples were sorted to be included in the recycling stream. All of the metallic decorated samples were properly sorted and correctly ejected with fiber. None were destined for landfills.

Variable	Description	Estimated Foil Coverage	Sorted as Fiber*	Percent of Total
V1	Champagne carton low coverage	25%	20	100%
V2	Champagne carton high coverage	75%	20	100%
V3	Alien carton low coverage	25%	20	100%
V4	Alien carton high coverage	50%	20	100%
V5	Chanel pink carton	50%	20	100%
V6	Sympathy greeting card	25%	20	100%
V7	Birthday greeting card	25%	20	100%
V8	Metallic birthday greeting card	50%	20	100%

Figure 3: Summary of all 8 tested products

CONCLUSION

- The eight folding cartons and greeting card samples were tested at the Van Dyk Testing Center to mimic various functions found in Materials Recovery Facilities (MRFs) sorting plants in a laboratory setting.
- All eight samples of folding cartons and greeting cards included an estimated 25% up to 75% coverage of transfer metallic decoration.
- The summary of the test results for each of the eight fiber-based transfer metallic decorated samples demonstrated that **100%** of all samples were sorted to be included in the recycling stream. None of the metallic decorated samples were sorted and destined for landfill.
- Brand owners, Print Service Providers (PSPs), and designers have testing conclusions that transfer metallic decoration is most likely being recycled by Materials Recovery Facilities (MRFs).
- The test results of the Van Dyk sorting study with the conclusions from the FSEA Repulping of Foil Decorated Paper study indicates that fiber-based transfer metallic decorated materials are recyclable and are currently most likely being sorted by Materials Recovery Facilities (MRFs) to be included in the recycling stream.