

Technology Brief

APPLIED ENGINEERING TOOLS FOR RECYCLING: USING RECYCLED HIGH DENSITY POLYETHYLENE (HDPE) RESINS IN BLOWN FILM APPLICATIONS

This technology brief introduces an applied engineering tool for designing and conducting trials to evaluate the potential for converting to or increasing recycled HDPE content in blown film products.

The tool provides practical background and feasibility information related to the blown film extrusion process and using recycled HDPE resins in blown film extrusion. Additionally, a structured technique details how to design and conduct trials incorporating specific concentrations of recycled HDPE and evaluate the trial results to determine optimum processing blends and machine conditions.

The methodology can be adapted for feedstock conversion of other recycled plastics in blown film or other processes, however the case study supporting this tool is specific to using recycled HDPE in blown film.

Material and process parameters are both important considerations for converting to recycled content formulations. Material issues addressed include:

- Compounding compatibility of recycled resin with virgin resin(s) and additives.
- Recycled resin specifications such as form, color, grade, feedstock origin, polymer density, contaminant levels, melt index, pellet count and bulk density.
- End-product material properties such as tensile strength, elongation, dart



NIST MEP
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Key Words

Materials: Recycled HDPE.

Technologies: Blown Film Processing.

Applications: Blown film manufacturers with potential ability to incorporate recycled plastics into manufacturing processes and products.

Abstract: This applied tool provides a structured method for designing and conducting trials to evaluate the performance of recycled HDPE in film products.

drop impact strength, tear strength, haze, and gloss.

Equipment and processing issues addressed in the tool include:

- Extrusion equipment type, die size, gap width, screw length and length-to-diameter ratio.
- Strict process controls and monitoring, both during the trials and in full production.
- Equipment conditions for line start-up and processing, such as throughput, melt temperature, die/extruder pressure, air flow rate, pull speed, frostline height, and screen change interval.

Logsheets aid in evaluating the data and comments that were documented during the trials. Troubleshooting

recommendations are provided based on deficiencies in required properties of the end-product. The tool suggests evaluating the data and lessons from previous trial result(s) to redesign subsequent trials.

The findings of these documented and controlled trials should result in the optimum blend of recycled and virgin resins, and the optimum equipment conditions to produce a film product that meets performance criteria, aesthetic criteria, processing efficiency requirements, and also meets goals for recycled content levels.

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For More Information

For a copy of the report, *Using Recycled HDPE Resins in Blown Film Applications (PL-97-2)*, use the CWC Publication Order Form or call (206) 443-7746. For more information call CWC at (206) 443-7746, email info@cw.org, or visit the CWC Internet Website at www.cw.org.

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