

Plastics Packaging Design for Recycling

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Agenda

- ▶ Plastics Forming Enterprises LLC
- ▶ Recyclable Plastics Recovery Overview
- ▶ Plastics Recycling Challenges
 - ▶ Labels (Paper, Adhesives, Shrink Sleeves)
 - ▶ Mineral Fillers
 - ▶ Additives
- ▶ What Does Good Look Like?
 - ▶ Q&A

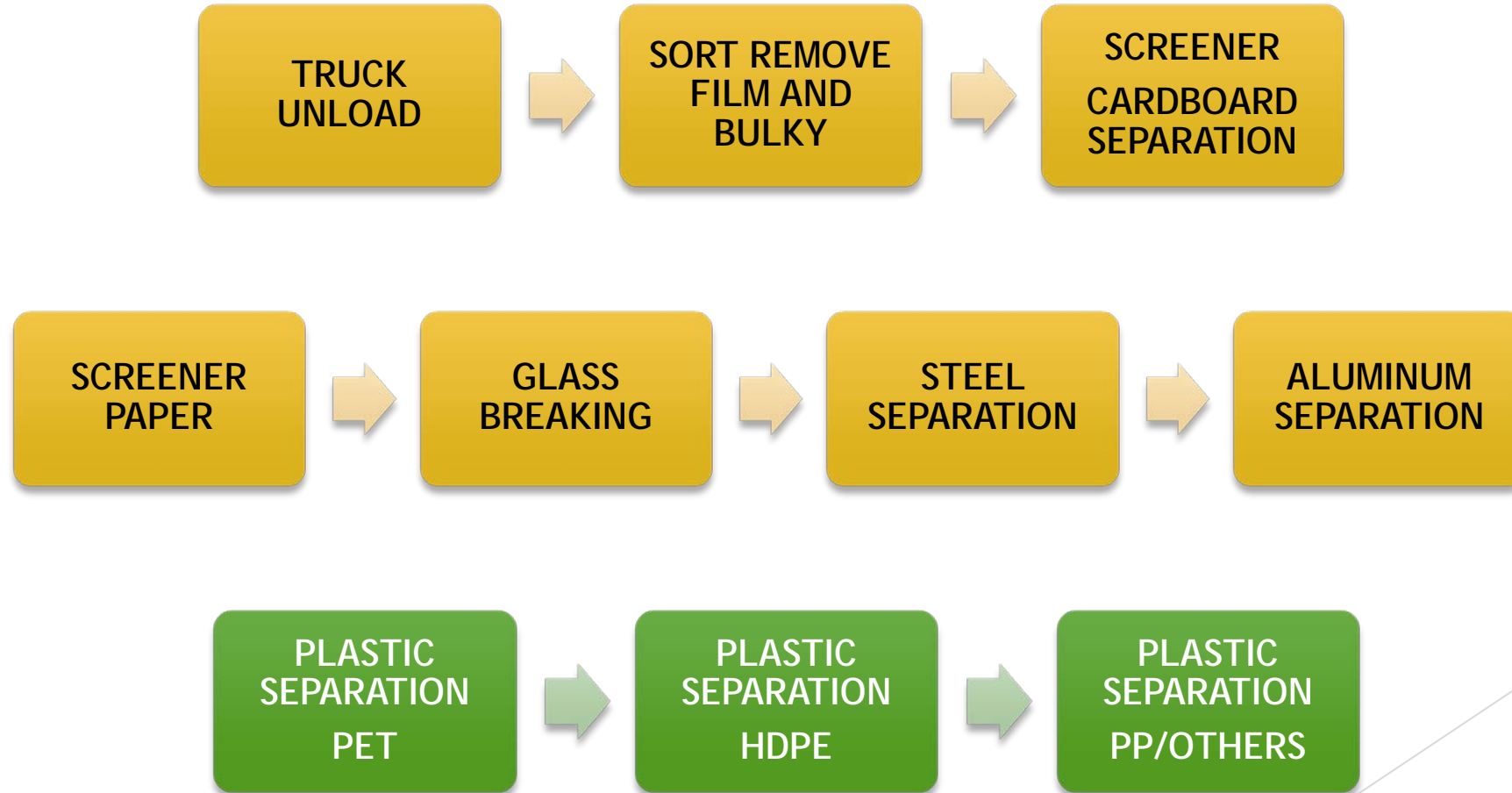


Who Is PFE?

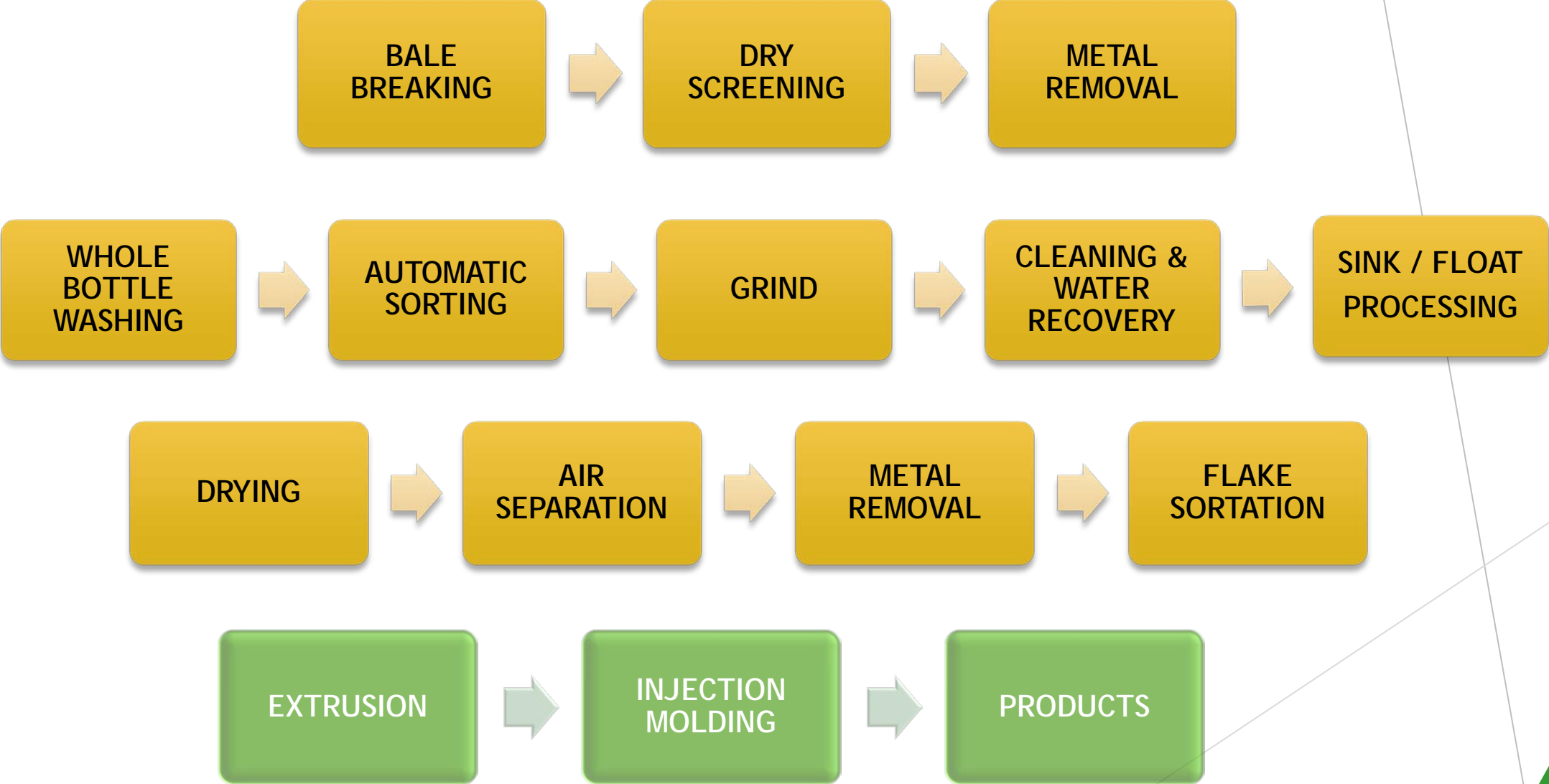
- ▶ Independent Test Laboratory
- ▶ Pilot Plant Simulation
- ▶ R & D of Plastics Recycling Systems
- ▶ Commercial Development Strategy



MRF (Materials Recovery Facility) Example Process Model



Plastics Recycling Process Model



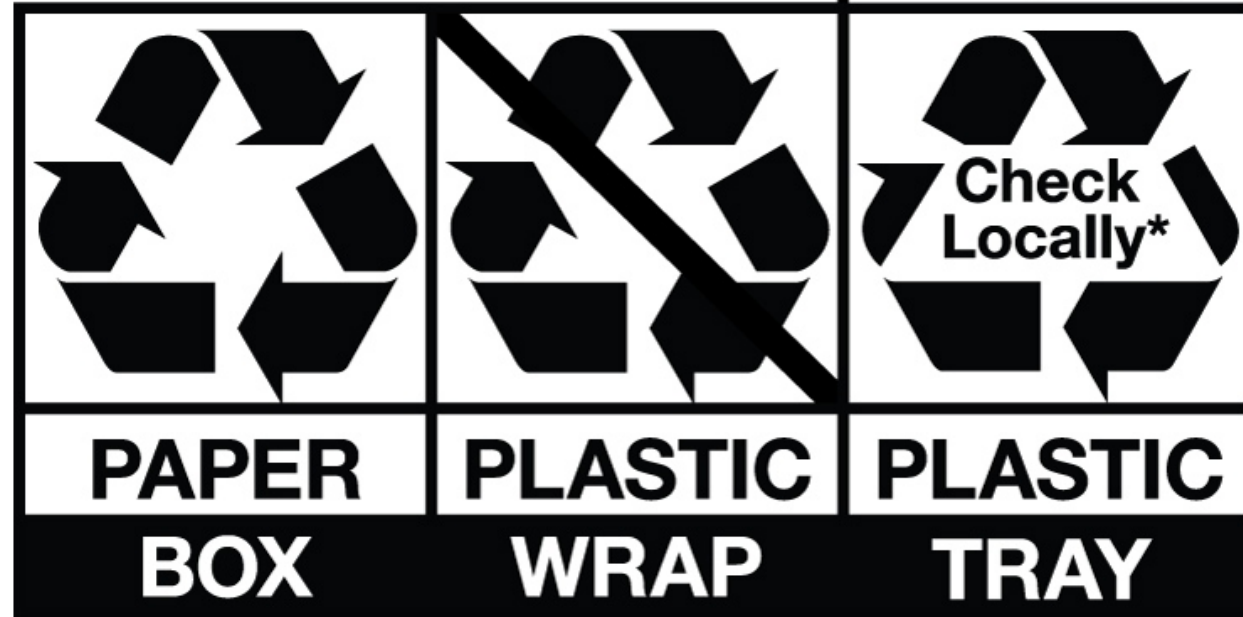
APR Design™ Guide Is a Great Tool !

Encourage package designers, engineers, brand managers, and decision makers to adopt these APR Guidelines



Best Possible How To Recycle Label

Clear. Consistent. Concise.



*Not recycled in all communities

how2recycle.info



Package Design Consideration for Recyclability

- ▶ The designer is in control of the package recyclability recommendations.
- ▶ Contamination will...
 - ▶ Increase Yield Loss
 - ▶ Reduce Value of the Plastics
 - ▶ Add to recovery cost
 - ▶ Reduce the quality



Design Focus for APR Programs

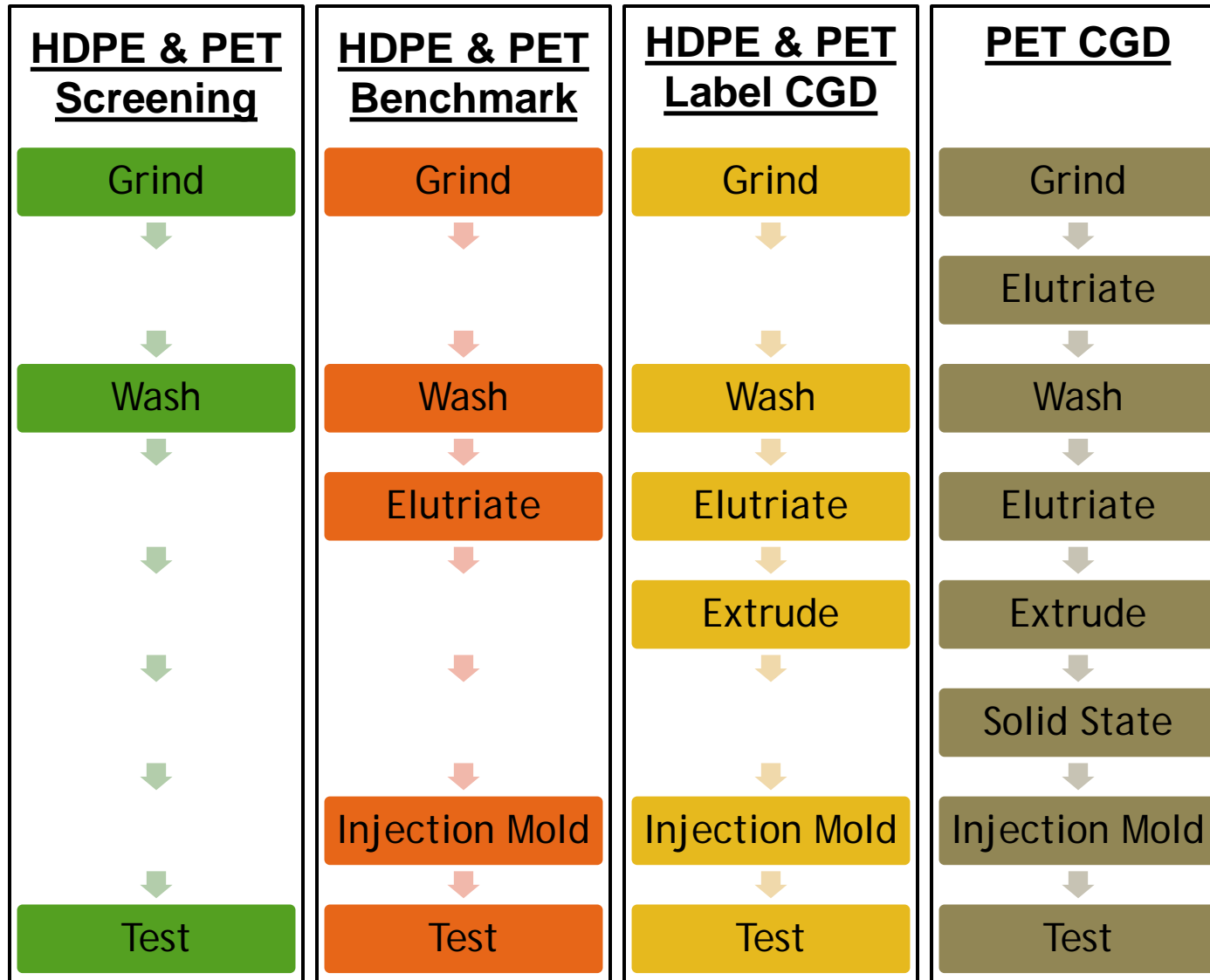
- ▶ APR Design™ Guide
- ▶ Test Methods & Protocols
 - ▶ Screening
 - ▶ Benchmark
 - ▶ Critical Guidance Document
 - ▶ Application Guidance Document



Levels of testing were created to step through improving the design for recyclability.



Compare The Levels Of Testing



PAPER LABELS

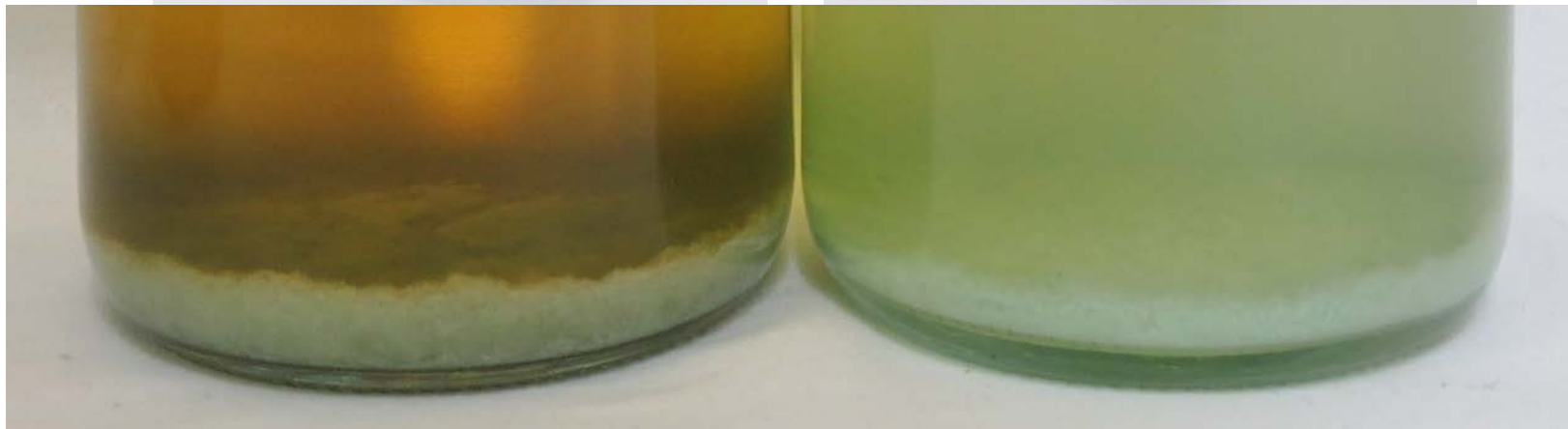
Paper - Problem Definition



▶ APR Provided



Paper - Investigation



Paper - Recyclability Validation

APR CONFORMING THERMOFORM LABELS



Inspired Brands.
Intelligent World.™



wausauPAPER®

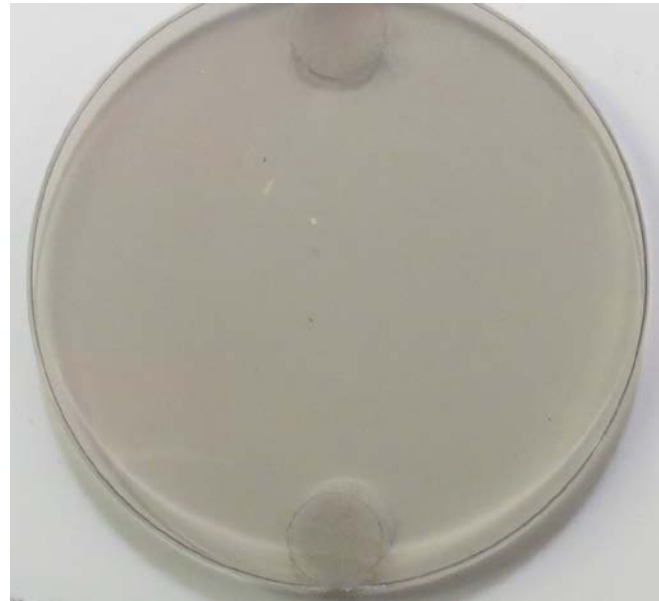


ADHESIVES

Adhesives - Problem Definition



Adhesives - Investigation

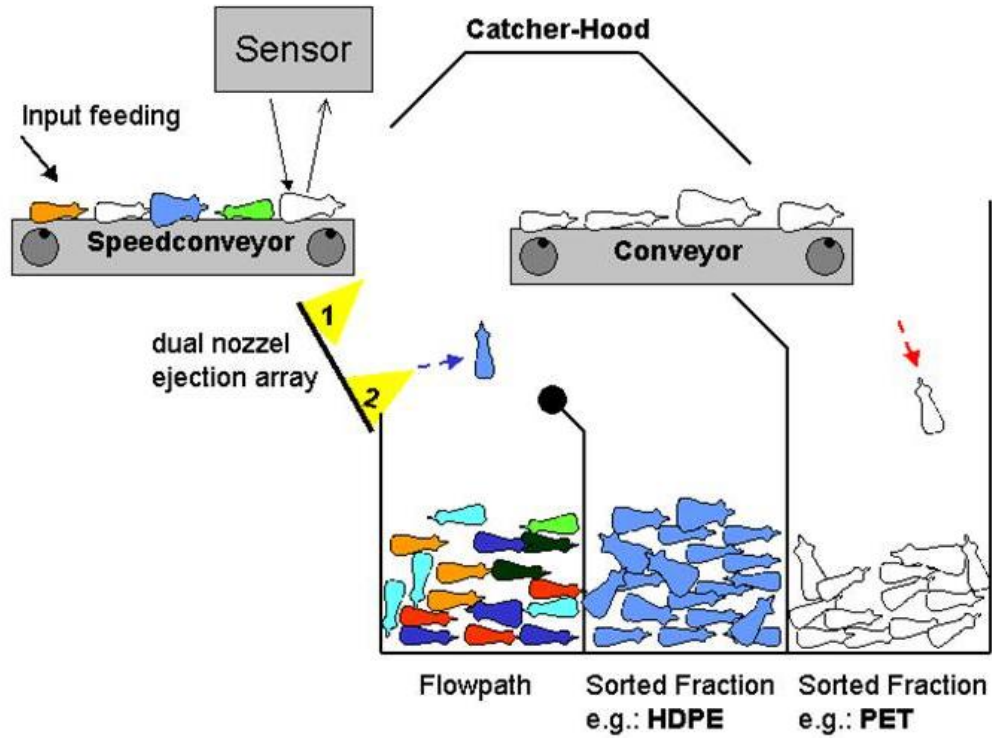


Adhesives - Recyclability Validation



SHRINK SLEEVE

Shrink Sleeves - Problem Definition



Shrink Sleeves - Recyclability Validation



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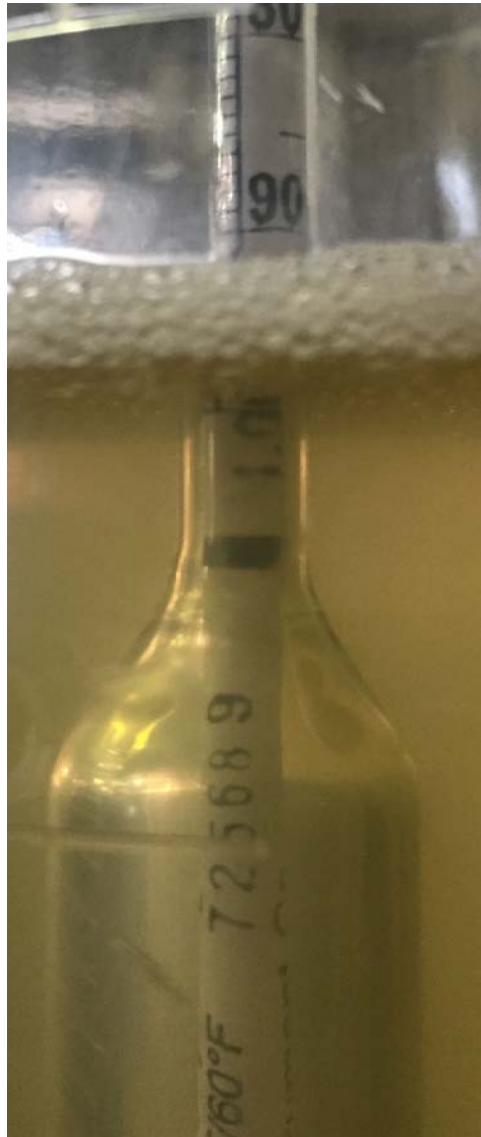


UPM



OLEFIN FILLERS

Olefin Fillers - Problem Definition



Fillers - Investigation



Fillers - Recyclability Validation



TALCO
PLASTICS, INC.

YOUR PARTNER IN THE
PLASTICS INDUSTRY

1000 W. Rincon St. Corona, CA 92880-9228
Tel: 951-531-2000 Fax: 951-531-2058

The advertisement banner has a background of blue and red plastic granules. The text is white and black, with "TALCO" in a large, bold, sans-serif font.

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The central text is positioned in the white space between these green elements.

PET AND OLEFIN ADDITIIVES

Additives - Problem Definition



- ▶ APR Provided



Additives- Investigation

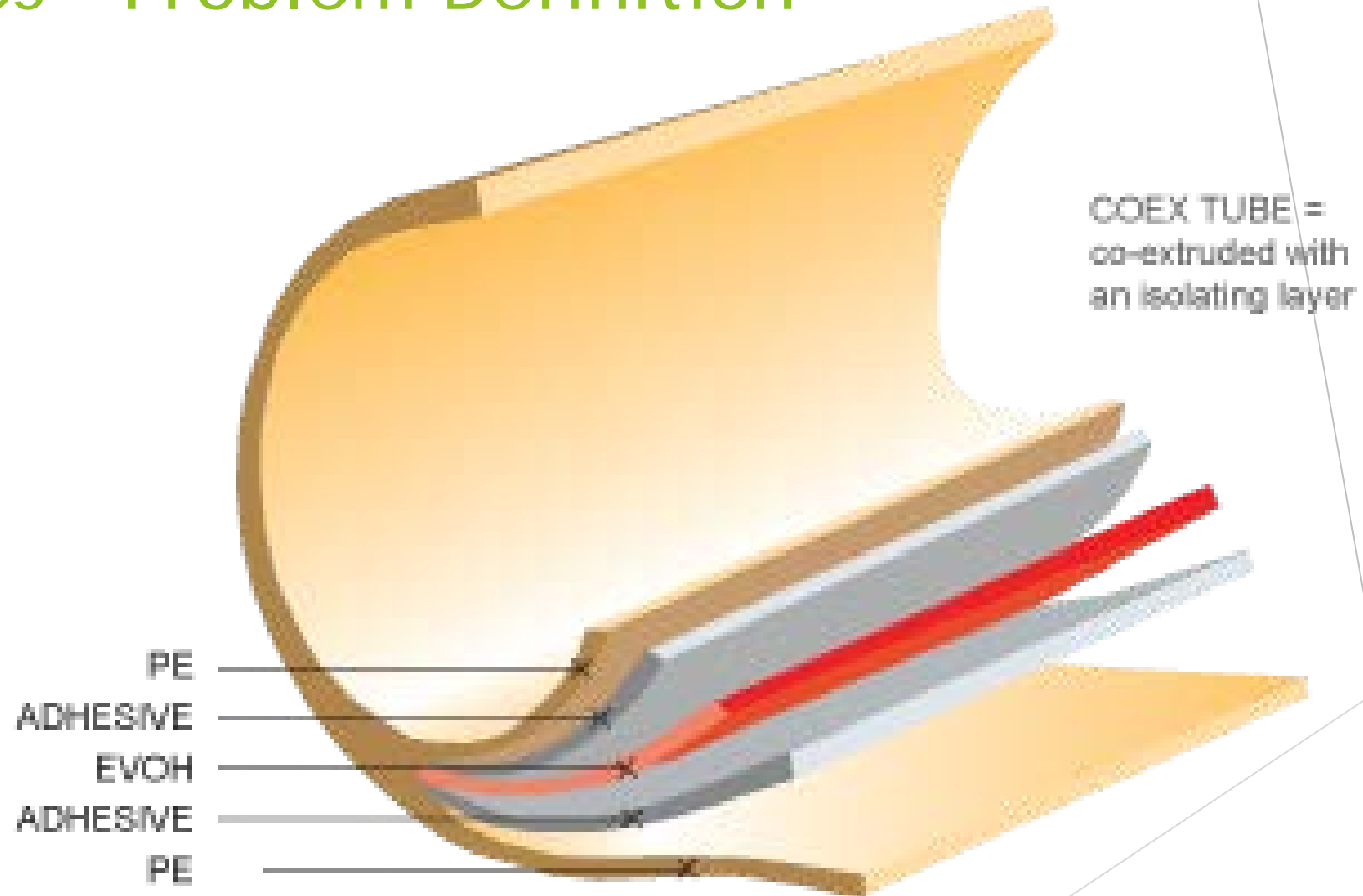
Virgin Resins



VPET vs. PCR



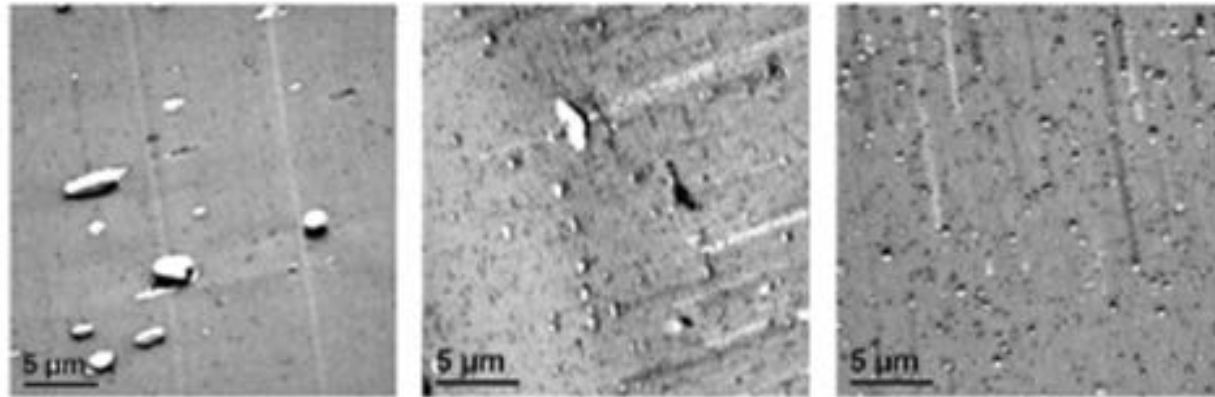
Additives - Problem Definition



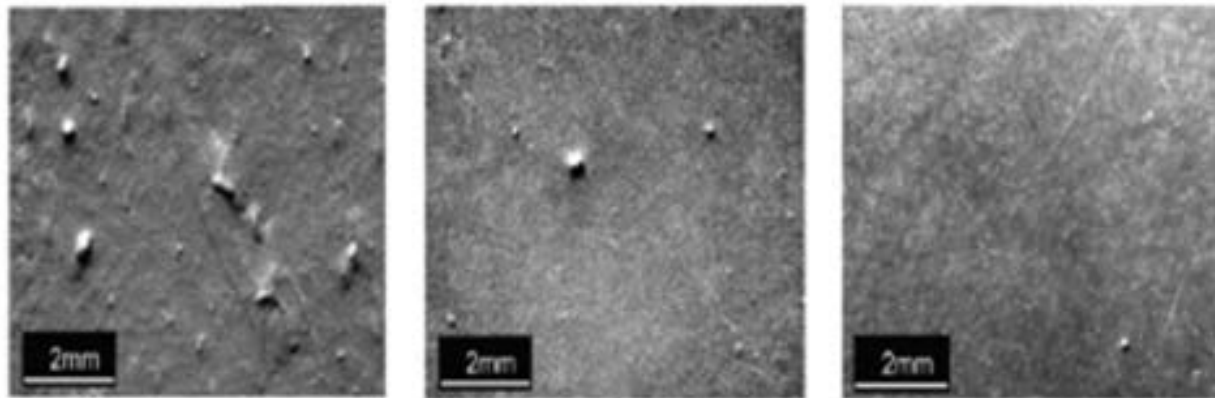
Additives Recyclability Validation



Transmission Electron Microscopy



Optical Microscopy



No compatibilizer
Large EVOH
domains

Conventional
compatibilizer
Bimodal EVOH
domains

RETAIN™ 3000
Small, uniform
EVOH domains



What Good Looks Like...



Inspired Brands.
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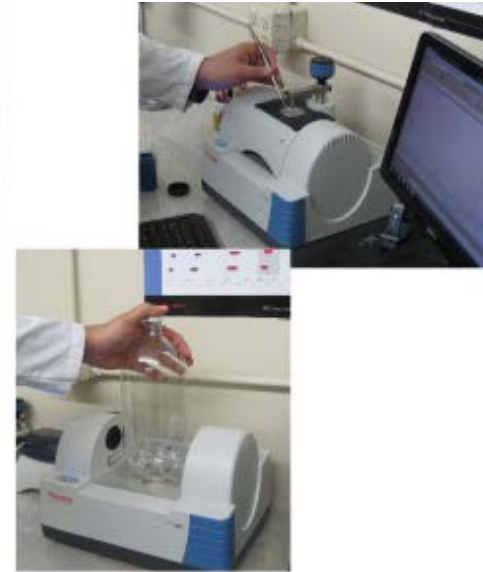
EASTMAN



Pilot Plant Simulation



Independent Test Laboratory



Questions

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