RecyClass

RecyClass Unwrapped

RecyClass Unwrapped

Plastic packaging decorations

Moderated by
Paolo Tecchio | Packaging Sustainability Specialist | Ferrero

RecyClass

Plastic packaging decorations

26/05/2021
Fabrizio Di Gregorio – PRE Technical Director
fabrizio.digregorio@plasticsrecyclers.eu


Persil
LOSK
REX
Tide
ARIEL
%

Different colors, different streams

Different recyclate quality for different applications

Decorations can cause discoularation and increase the gels and specks.

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Sorting: ensure NIR detection

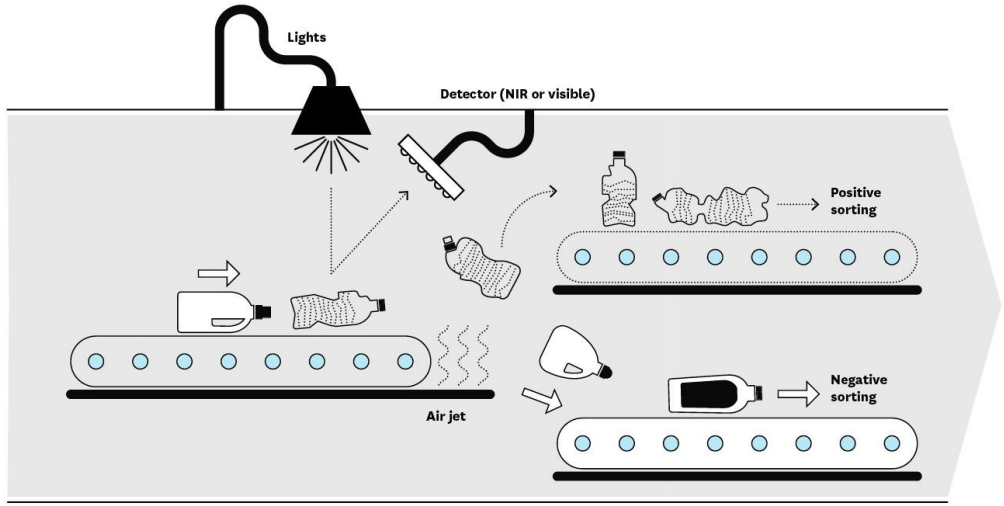
LABELS/SLEEVES (preferred)

- Reduce the coverage
- Prefer PE and PP for LDPE/HDPE and for PP packaging, respectively.
- !!! Prefer floatable for PET bottles
- Prefer light to dark colours (minimize the amount of inks)
- Reduce the thickness lower than 40-50 microns in case of labels of different materials
- Avoid heavily inked labels/sleeves
- Avoid metallized labels

DIRECT PRINTING (limit)

- Reduce the printing as much as possible (for example to production and expiry date and/or basic product info)
- Prefer light to dark colours

Example of sorting process



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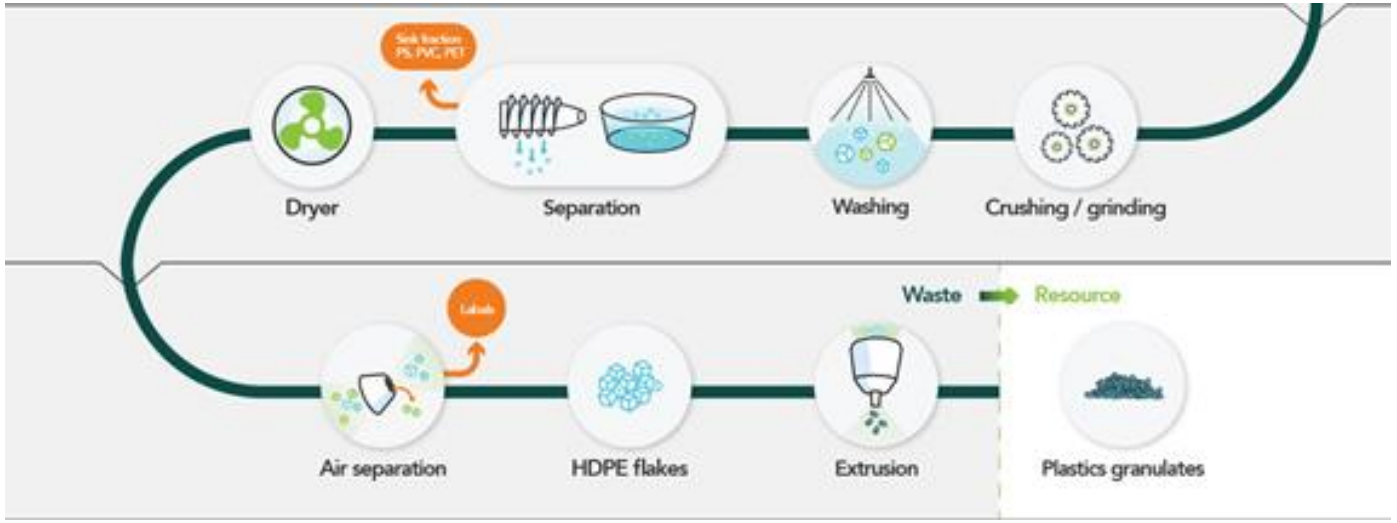
Washing/Floatation

PREFER SEPARABLE DECORATIONS

- Labels/Sleeves provided with washable or releasable adhesives (check the washing water conditions in the DfR guidelines)
- Prefer floatable labels for both polyolfinic and PET packaging
- Avoid non wet strenght paper labels

LIMIT THE USE OF NON-SEPARABLE DECORATIONS

- Direct printing, as well as labels/sleeves with non washable/releasable adhesives



Main steps of the recycling process

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The “Washing Quick Test Procedure for Film Labels applied on HDPE & PP Containers” describes the methodology to apply at laboratory scale in order to **determine if adhesive and label combinations are compatible with the post-consumer HDPE or PP recycling stream.**

Labels/Sleeves non detaching from the packaging body cannot be separated by the recycling process and the recyclate will be contaminated by:

- The adhesive
- The label/sleeve material
- The inks printed on the label/sleeve

Procedure published on https://recyclass.eu/recyclability-evaluation-protocols/

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HDPE NATURAL CONTAINERS AND TUBES

	YES – FULL COMPATIBILITY	CONDITIONAL – LIMITED COMPATIBILITY	NO – LOW COMPATIBILITY
CLASS RANKING*	**A-B**	**B-C**	**D-E-F**
DESCRIPTION (Test Protocol)	Materials that passed the testing protocols with no negative impact OR materials that have not been tested (yet), but are known to be acceptable in PE recycling	Materials that passed the testing protocols if certain conditions are met OR materials that have not been tested (yet), but pose a low risk of interfering with PE recycling	Materials that failed the testing protocols OR materials that have not been tested (yet), but pose a high risk of interfering with PE recycling
LABELS	Labels in HDPE, LDPE, LLDPE, MDPE (all with density < 1 g/cm³)* ** with a print and/or barrier that does not hinder the recognition of the underlaying PE-polymer*	Labels in PP (with density < 1 g/cm³)*; Labels in PET, PETG, PLA, PS (all with density > 1 g/cm³)*; Labels in Paper without fibreloss*; PO-foamed labels* ** with a size, a print and/or barrier that does not hinder the recognition of the underlaying PE-polymer:* *- Indication label size on containers > 500 ml: < 70% coverage* *- Indication label size on containers ≤ 500 ml: < 50% coverage*	Labels that hinder the recognition of the PE; Labels in non PO-materials with density < 1 g/cm³; Paper labels with fibreloss during recycling process; Aluminium; Metallised labels; PVC
SLEEVES	Sleeves in HDPE, LDPE, LLDPE, MDPE (all with density < 1 g/cm³)* ** with a print and/or barrier that does not hinder the recognition of the underlaying PE-polymer*	Sleeves in PP (with density < 1 g/cm³)*; Sleeves in PET, PETG, PLA, PS (all with density >1 g/cm³)* ** with a size, a print and/or barrier that does not hinder the recognition of the underlaying PE-polymer:* *- Indication sleeve size on containers > 500 ml: < 70% coverage* *- Indication sleeve size on containers ≤ 500 ml: < 50% coverage*	Sleeves that hinder the recognition of the PE; Sleeves in non PO-materials with density < 1 g/cm³; Aluminium; Metallised sleeves; Heavily inked sleeves; PVC
ADHESIVES FOR LABELS	Water soluble or water releasable adhesive (@ less than 40°C)	Pressure sensitive labels	Non water soluble or non water releasable adhesives
INKS	Non toxic following the EuPIA Guidlines		Inks that bleed; Toxic or hazardous inks
DIRECT PRINTING	Laser marked; Production or best-before date		Any other direct printing

Current Design for Recycling guideline for HDPE natural containers and tubes
(version: February 2021)

All guidelines available at https://recyclass.eu/recyclass/design-for-recycling-guidelines/

Decorative technologies applied on HDPE and PP rigid packaging: mapping

Direct printing (include lacquers, varnish, metallized inks)	Metallization	Cold transfer	Hot stamping	Adhesive applied labels: water-based adhesive (cut & stack)
Adhesive applied labels: hotmelt adhesive (wrap-around)	Pressure sensitive labels	Heat Shrink Sleeve labels	Stretch Sleeve labels	In-Mould-Labels
	Heat transfer labels	Cardboard based decoration	Digital technologies (RFID)	

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Conclusions

Separable decorations are preferred but ensure the separation (washable/releasable adhesives -> Washing QT protocol)

Polyolefinic labels/sleeves are preferred (PE for LDPE/HDPE, PP for PP, PE or PP for PET); Follow the **coverage recommendation**

Light colours are preferred (dark tones could hamper the sorting)

Reduce the amount of inks/lacquers and follow EUPIA guidelines

Minimize direct printing (limit to production/expiring date or product info)

Stay posted on new RecyClass lab findings (further test ongoing to provide guidance on decoration)

If you like to join our new Decoration Taskforces and contribute to develop deeper decoration guidelines, please contact us !

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Let's join the RecyClass Community!

Thank you

RecyClass

www.recyclass.eu

info@recyclass.eu

MULTI-COLOR
PREMIUM LABEL SOLUTIONS

Sustainable Label & Decoration Solutions

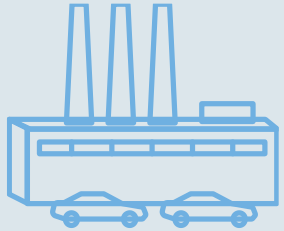
RecyClass – May 26, 2021

#2

Globally

#1

In North America



74

Production Facilities in 27 Countries

$2.1B

Headquartered in Cincinnati, Ohio

7 Label Solutions

100+ Years in Labels

Pressure Sensitive

Cut & Stack

Roll Fed

Aluminum

Shrink Sleeve

Heat Transfer

In-Mold

5 Print Technologies

100+ Years in Label

Flexography

Gravure

Lithography

Digital

Rotary Screen

MCC's Self-coating Capability

US and EU asset base

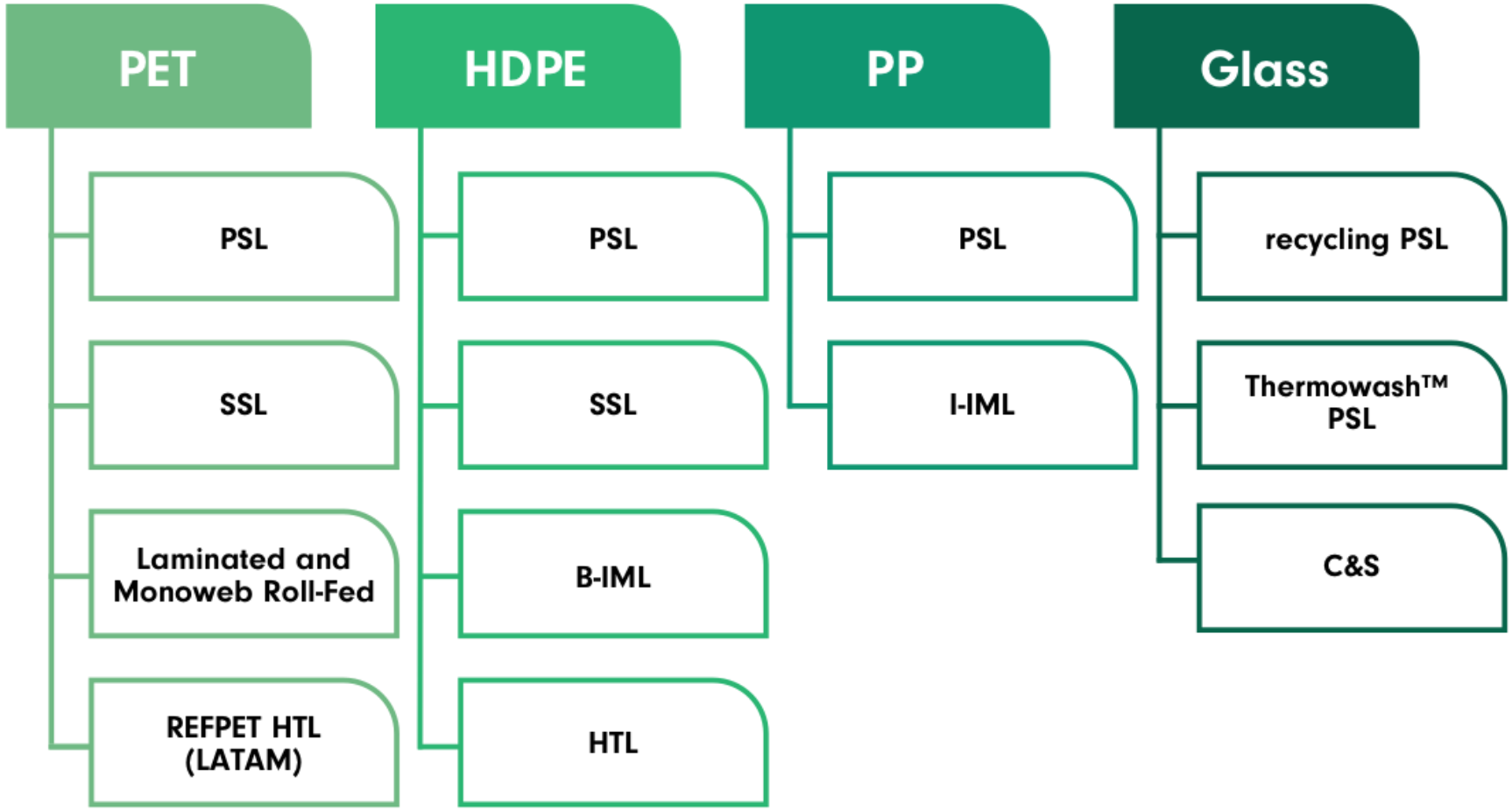
Self-coating capability

- Locations:
  - MCC Elkton, Kentucky, USA
  - MCC Heiligenstadt, Germany
- Commercial since 2010

Benefits

- Better control of material costs
- Develop new products & technologies

Our Sustainable Label Offering



Label should not hinder recycling

Regional differences

Sustainable Label & Decoration Solutions

HDPE

Recycle Guidelines for HDPE Containers

APR Requirements

General truths

- Paper is detrimental
- Film labels are preferred
- Label construction requires testing to determine impact of recycling properties

HDPE classification

- Non-food, colored container
    - The film label should stay ON
    - Wash temperature of 20°C
- Food, natural colored container
    - The film label should be designed to separate cleanly from the container
    - Wash temperature of 75°C

Label Solutions for HDPE

APR recognition for pigmented (colored, non-food) HDPE containers

MCC label constructions for HDPE containers, validated and approved by APR Critial Guidance

Assessment:

- Heat Transfer Label
- In Mold Label
- Pressure Sensitive Label
- Shrink Sleeve Label

The Association of Plastic Recyclers

Recycle Guidelines for HDPE Containers

RecyClass Requirements

HDPE classification

- Colored & Natural colored container
    - The film label should be designed to separate cleanly from the container
        - HDPE, LDPE, LLDPE, MDPE (all with density < 1 g/cm^3)
        - Print/barrier that does not hinder recognition of PE-polymer.
    - Water soluble or water releasable adhesive (Wash temperature of 40°C)

- Testing is required for pressure sensitive labels
    - Significant market share & investment made by brand owners.
    - Provide data to show what options are available.

Sustainable Label & Decoration Solutions

PP

Recycle Guidelines for PP Containers

RecyClass Requirements

PP classification

- Colored & Natural colored container
    - The film label should be designed to separate cleanly from the container
        - PP (all with density < 1 g/cm^3)
        - Print/barrier that does not hinder recognition of PE-polymer.
    - Water soluble or water releasable adhesive (Wash temperature of 40°C)
- Testing is required for in-mold labels
    - Significant market share & investment made by brand owners.
    - Provide data to show what options are available.

Technology testing for IML decoration

Collaboration between Berry Superfos & MCC Verstraete

- Injection moulded PP packaging
- In the 3 segments: Natural, white and coloured packaging
- Making sure the samples reflect the real market situation and penetration
  - Max label coverage
  - Above average ink coverage
  - Most common used label substrates and inks
  - Different printing techniques
  - Different inks and lacquers
  - Real market samples

Sample overview

Polymer	Color	Label substrate	Inks	Lacquer	Printing technique	IML supplier	Project
PP	natural	Solid transp BOPP - 55µ	UV white + Conventional	water based dispersion lacquuer	offset	MCC Verstraete	Coop Soup
PP	white	Voided white BOPP - 60µ	Conventional	water based dispersion lacquuer	offset	MCC Verstraete	Arla Cream Cheese
PP	Colored	Voided white BOPP - 60µ	Conventional	water based dispersion lacquuer	offset	MCC Verstraete	Mars Celebrations
PP	White	Voided white BOPP - 60µ	Solvent based	Solvent based	Flexo	Berry Printing	Arla Cream Cheese

Please note that this selection is prepared in cooperation between MCC Verstraete and Berry both market leaders in IML labels and packaging representing the vast majority of the market.

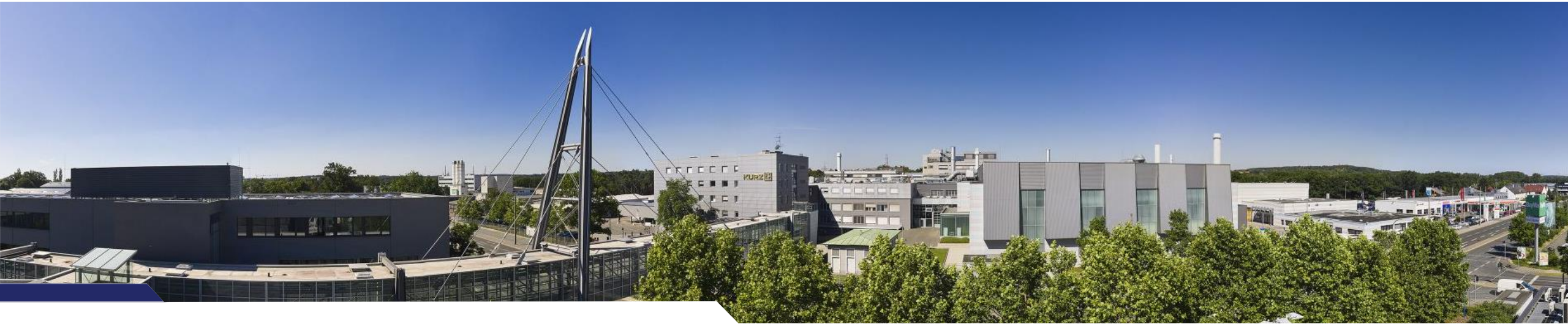
1. Get up to speed
with the latest trends in labeling solutions for your packaging.

2. Work together
with experts to upgrade your current label solutions..

3. Have a clear insight
in our upcoming label innovations that will help your products stand out on the shelf.

Stijn Billiet
Global Sustainability Director
Stijn.billiet@mcclabel.com

Our core values in business: integrity, passion, creativity, perseverance, achievement



KURZ – making every product unique

Sustainable embellishment: Focus on hot stamping and cold transfer decoration

Dr. Markus von Beyer – Head of EHS & S

the KURZ Group

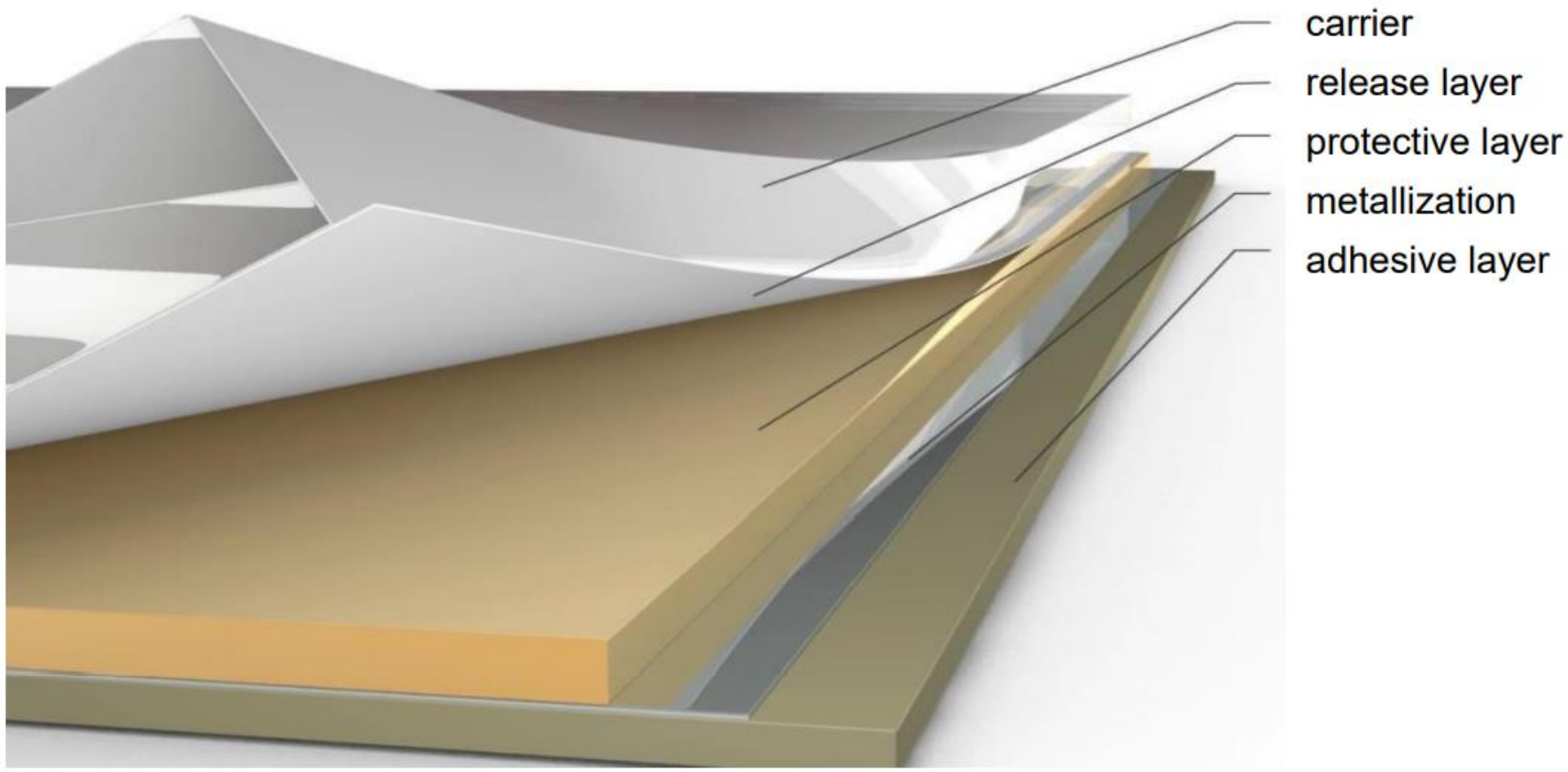
- family run business since 1899
  (5th generation)
- global leader in thin-film technology
- supplies products for surface finishing, decoration, labelling and counterfeit protection
- over 5,500 employees
- global presence in more than 30 locations
- manufactures in Europe, Asia and the USA
- Introduced the first real **PET-carrier-recycling program** in 2020: **KURZ RECOSYS®**

Agenda

- Introduction Leonhard KURZ
- Technology for decoration of polymer substrates:
  hot stamping and cold transfer
- Applications: Sleeves / tubes / label
- Sorting and recyclability
- Conclusion and outlook

Transfer Decoration

Layers



→ Total thickness of all layers 1.5 to 3 g/m² ≈ 1.5 to 3 µm

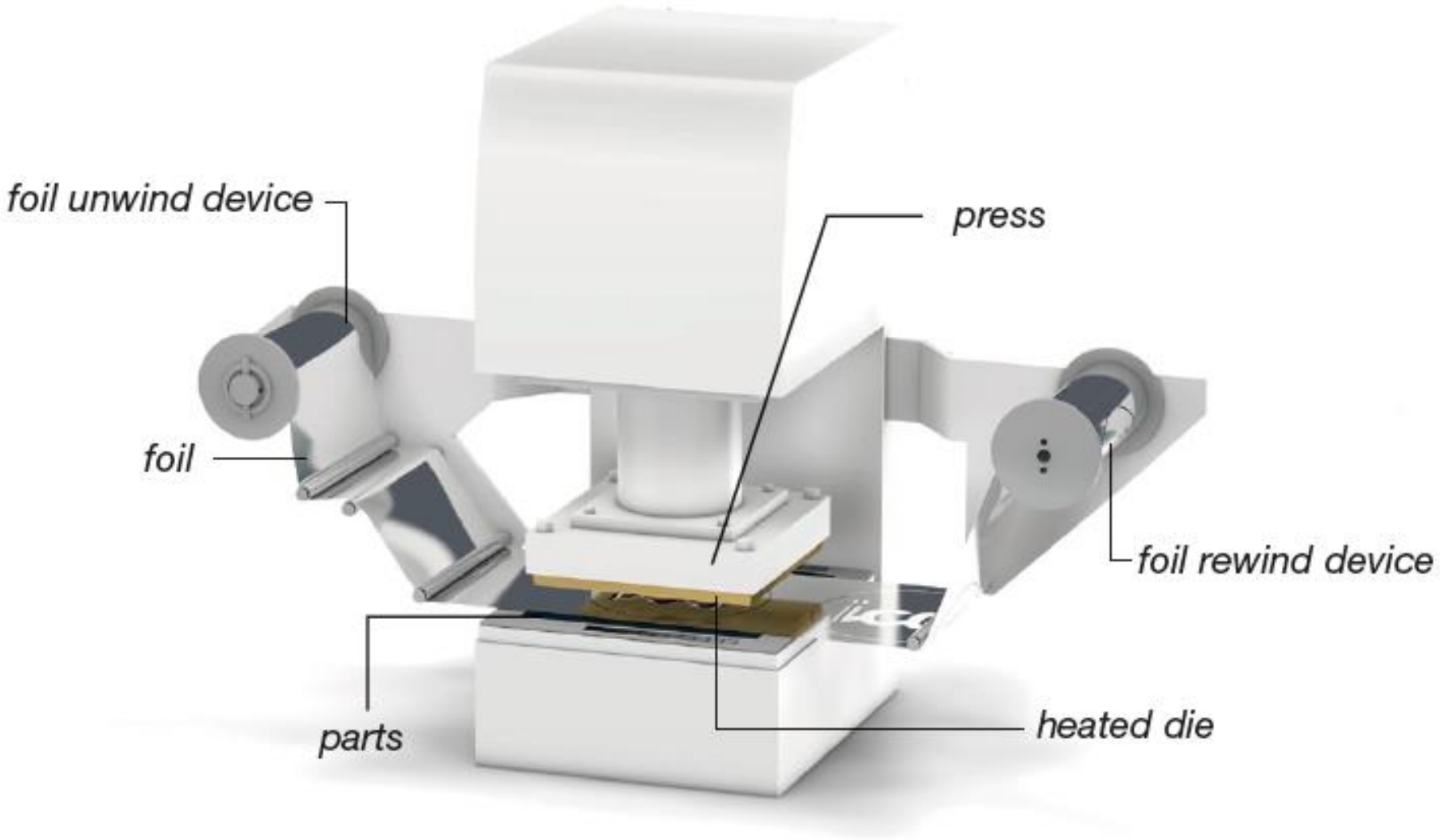
Transfer Decoration for Plastic Substrates

	Labels	Sleeves	Tubes
• **Hot Stamping**	X	-	X
• **Cold Transfer**	X	X	X
• **Digital Embellishment**	X	(x)	X
• **InlineFoiling**	-	-	X

X = yes
\- = no
(x) = rarely

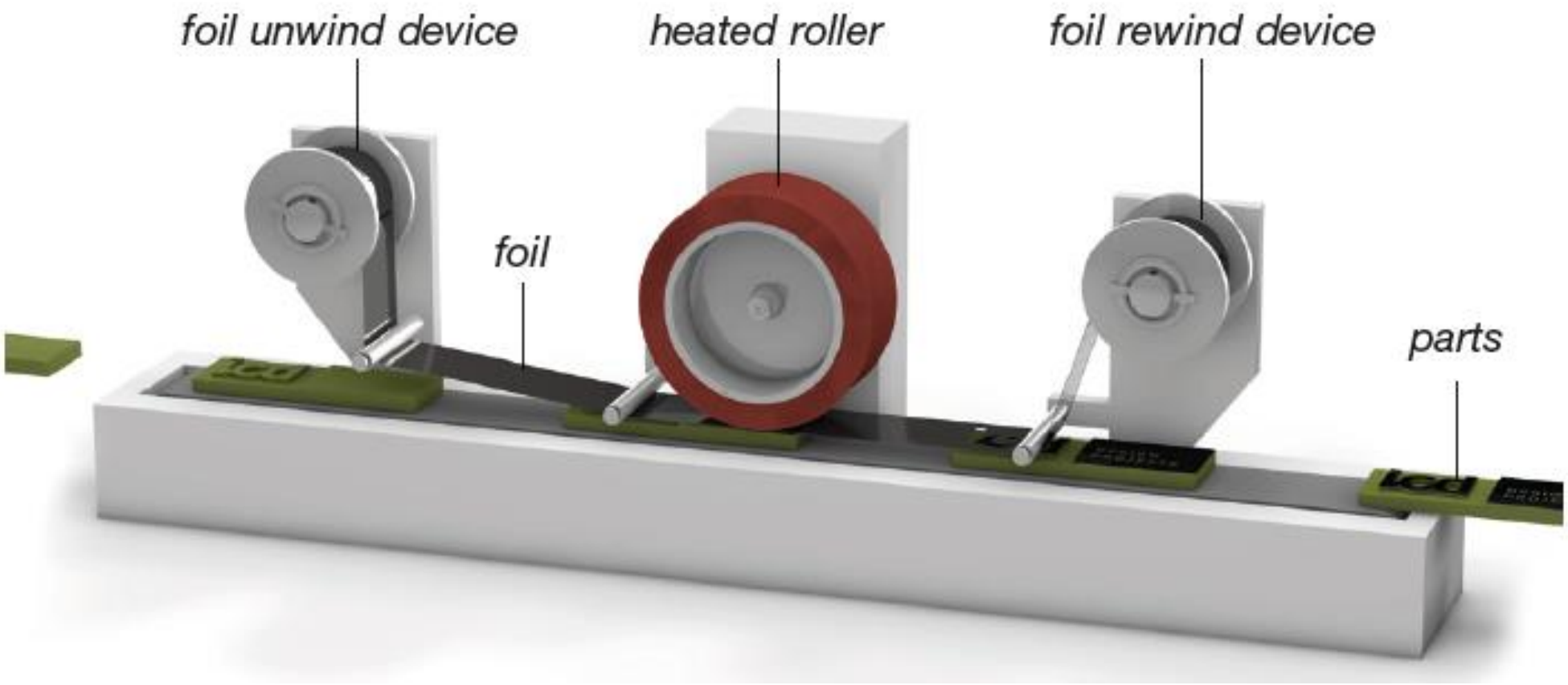
Hot Stamping

Application Processes: Vertical Stamping



Hot Stamping

Application Processes: Roll-on



Hot Stamping

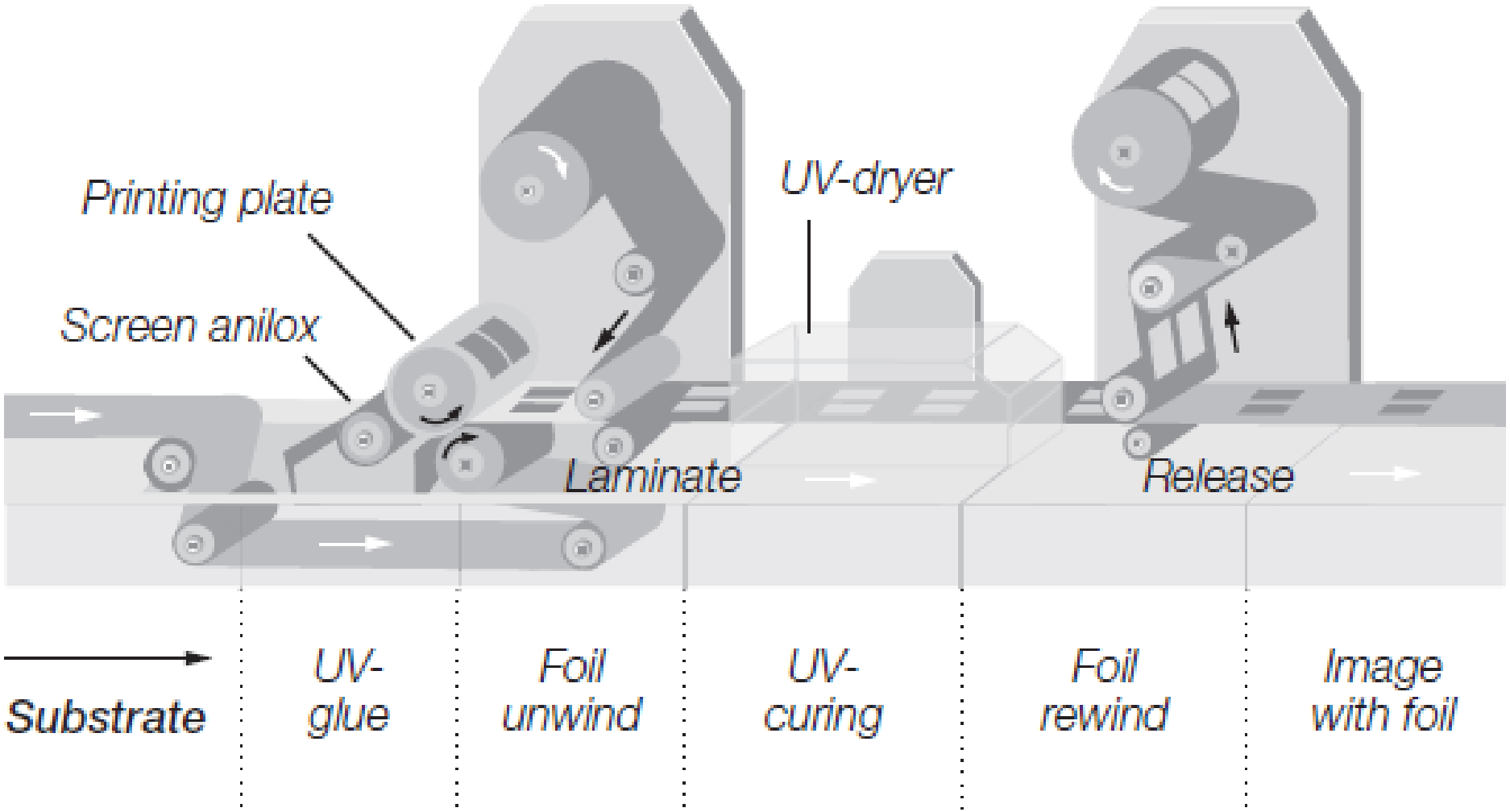
Label Samples

Hot Stamping

Tube Samples

Cold Transfer

Application Process



Cold Transfer

Label samples

Cold Transfer

Sleeve Samples (Second Surface applied via Cold Transfer)

Cold Transfer

Tube Samples

Tube Samples: Tube laminate is processed like common label material

Tube Samples: extruded cylindrical tube is decorated, filled and then welded

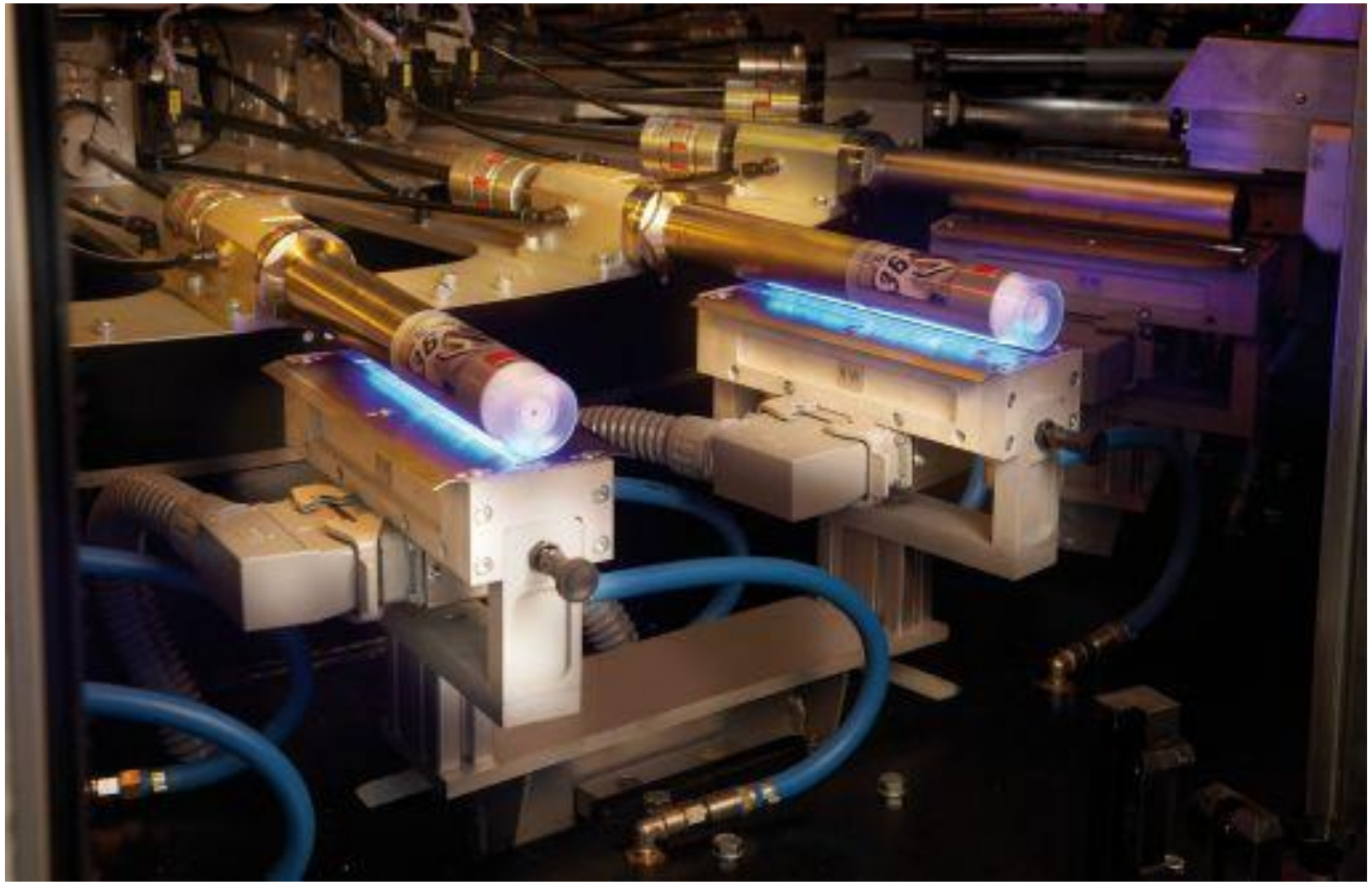
Digital Embellishment

Process: metallization is applied to the unprinted substrate with a UV-curing adhesive, the PET carrier is removed, and the substrate can be overprinted within the printing machine.

Label Samples

Inline Foiling

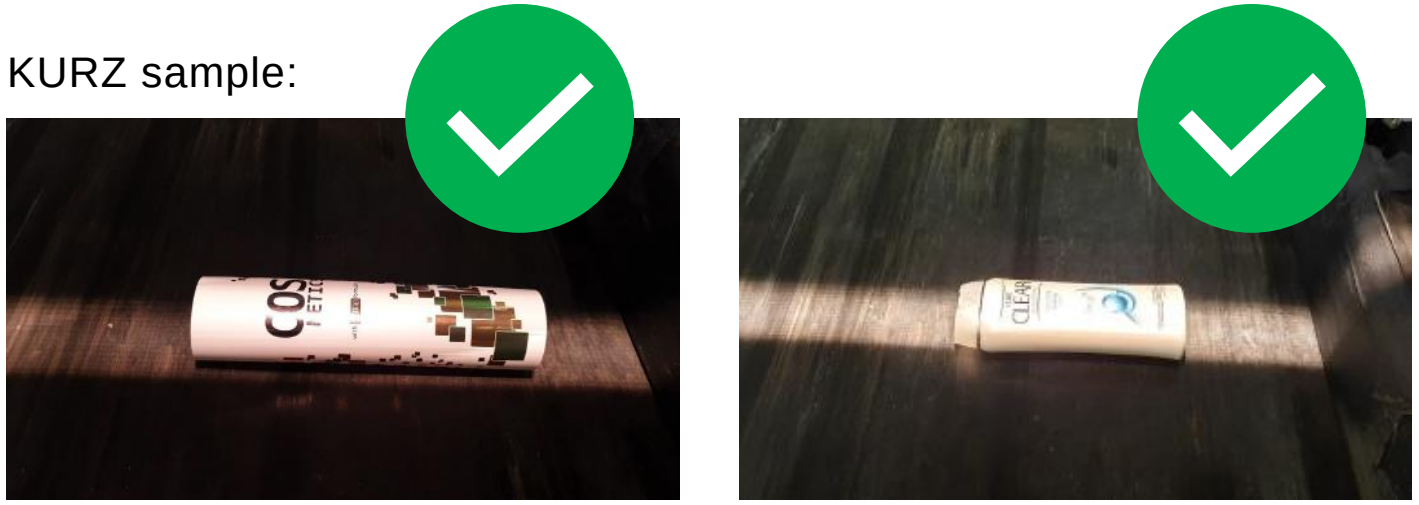
Process & Tube Samples



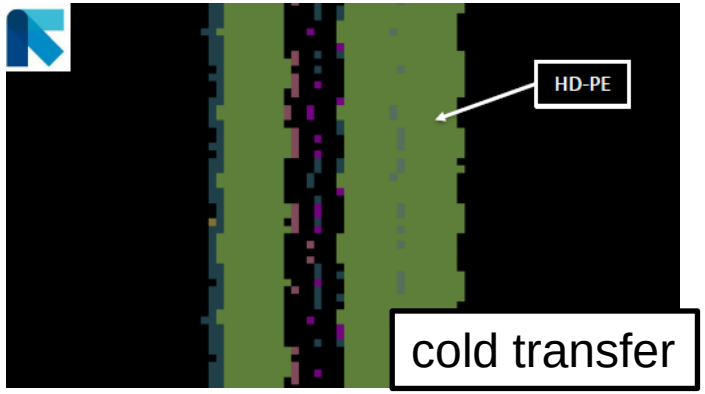
Sorting Tests @ TOMRA

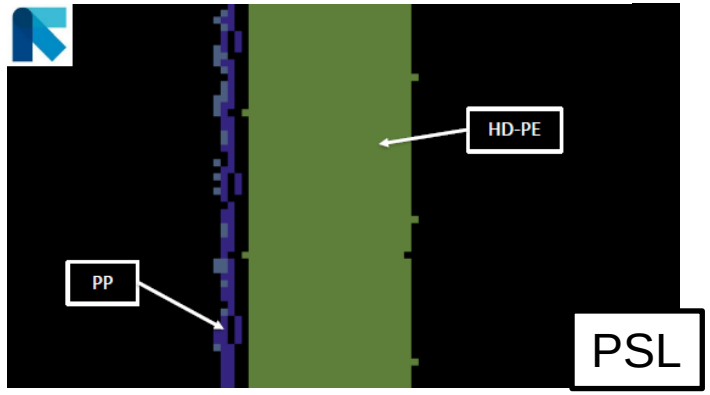
KURZ

KURZ sample:



NIR classified picture:



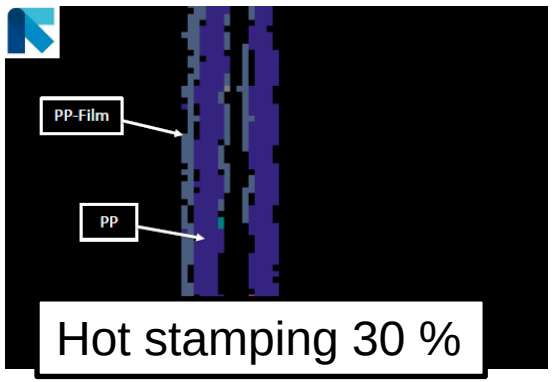


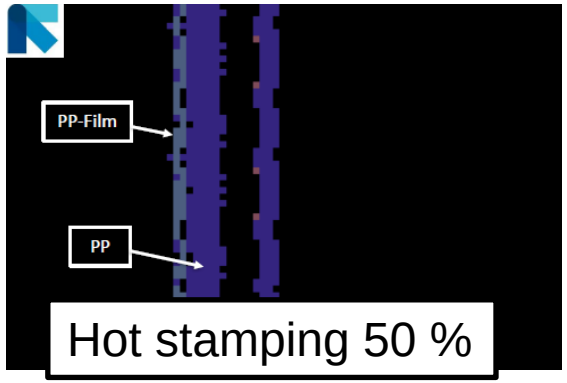
Sorting Tests @ TOMRA

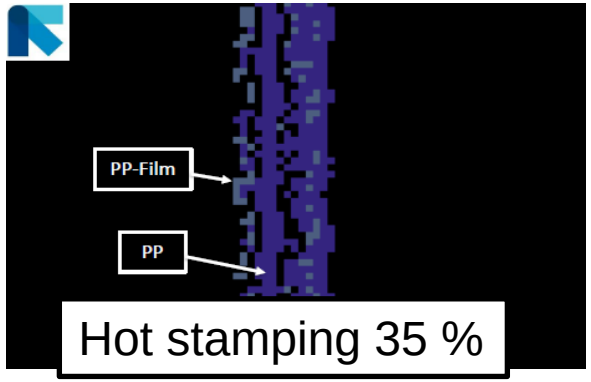
KURZ

KURZ sample:

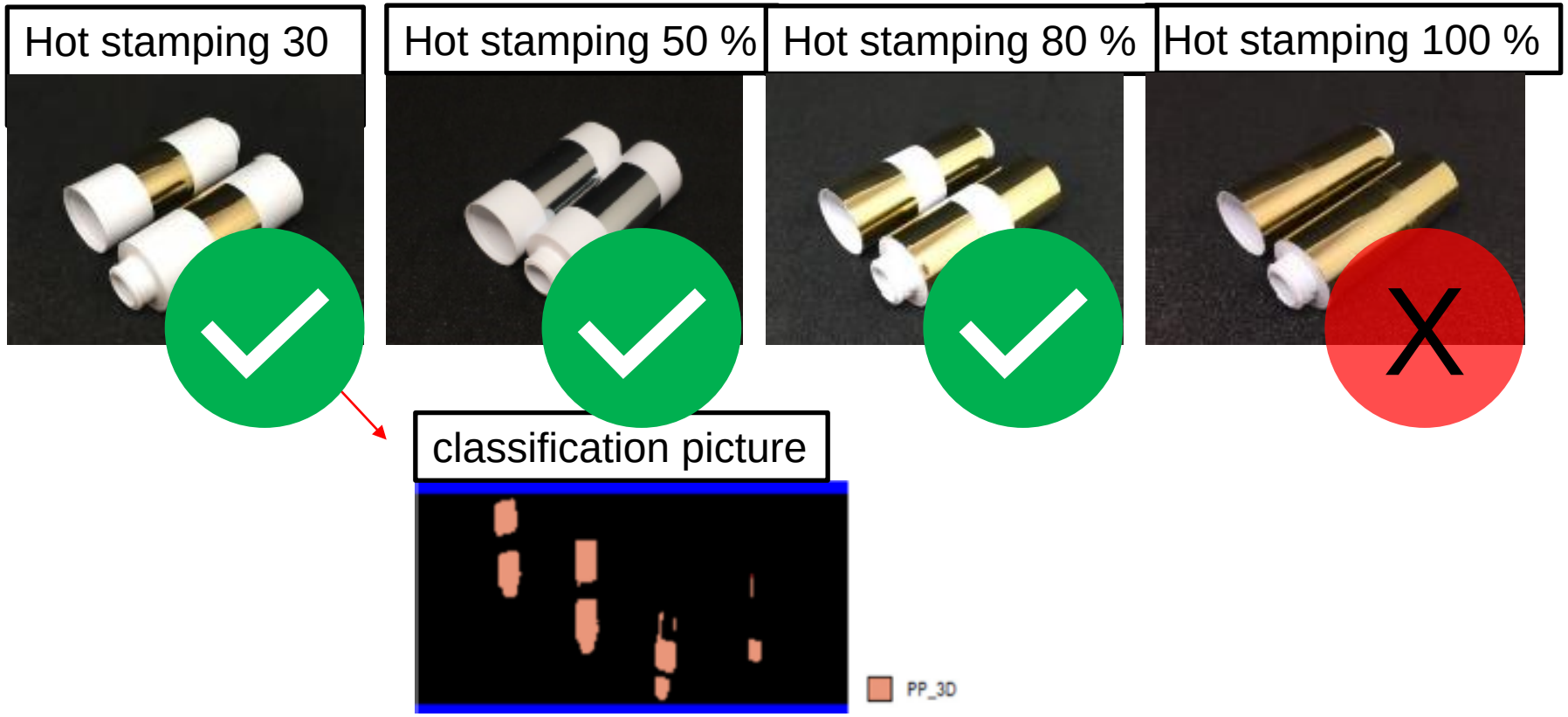
NIR classified picture:







Sorting Tests @ HTP cyclos



In the area of the applied hot stamping / cold transfer the surface is not detected by NIR. The same conditions apply for labels. The total surface coverage with decoration can be: 65 % better 50 % for bottles/tubes < 500 ml and 70 % for bottles/tubes > 500 ml.

Sorting Tests @ SUEZ.circpack

This sorting facility started to run in May 2019. With a capacity of around 100.000 to/a household packaging waste, in total 14 fractions are sorted. The LWP (**L**ight **W**eight **P**ackaging) sorting facility in Ölbronn (Germany) consists of following unit steps in the mentioned order:

LVP-Sortieranlage in Ölbronn

Quelle: SUEZ Deutschland GmbH

1. Inspection & Acceptance
2. Input with crane
3. Bunker
4. Feed conveyer
5. Bag opener
6. Sieving drum
7. Wind sifter: film
8a. NIR: flexibles (LDPE)
8b. NIR flexibles (MPO)
9. Magnet: Ferro metals
10. NIR: beverage cardboards
11. Eddy Current: Non-Ferro metals
12. NIR: PP, PE, PS, PET
13. Ballistic separation
14. Quality control
15. Weighing of output
16. Bale Press
17. Bales, ready for shipment to Reprocessor

Sorting Tests @ SUEZ.circpack

1.Standard tube (reference)

2.Tube with Inline foiling Technology (front & back) – coverage 70%

As the tested samples are rigid packaging, the expected route is that the material will first follow step 1 to 6 in the sorting installation. After this, it will not be separated by the wind sifter (step 7) and continue the process at step 9. They continue towards several NIR and ballistic separation in order to sort the packaging into valuable plastic streams.

The packaging are tested in each relevant step accordingly. The ballistic separation and the several NIR's for:

- PE (due to the main material)
- Mixed plastics (due to higher diffusion of light at the NIR)

Sorting Tests @ SUEZ.circpack

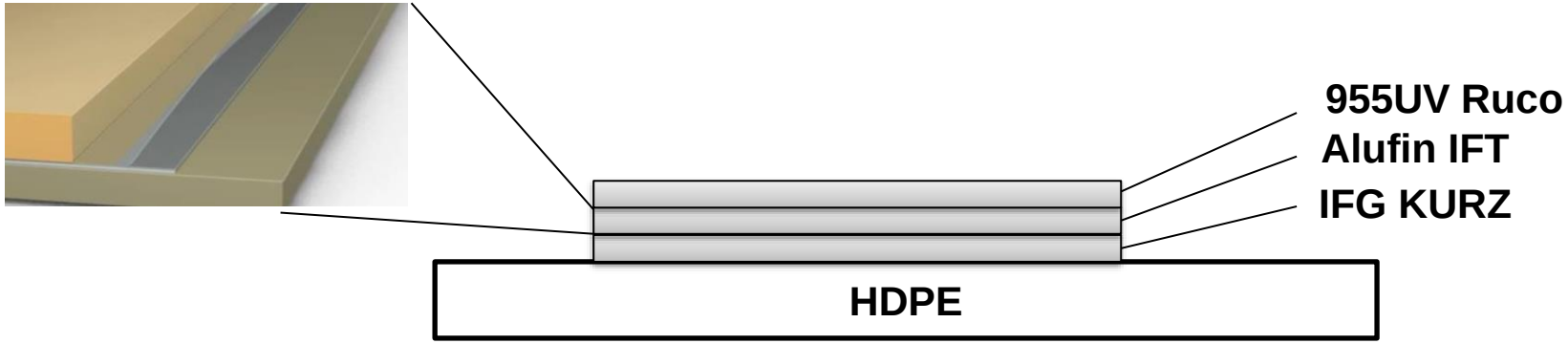
With this initial tests, 4 x 25 samples each condition were tested to get 100 samples according to the sorting protocol. Integrating them in the process right after the sieving drum, they walked through the complete facility and were removed at the manual sorting cabin from the conveyer belt:

Material	Tested samples	NIR PE,PP,PS	NIR PP	NIR PE	NIR MIXED PLASTICS	Residue
Standard tube (reference)	100 (4 x 25)	92	0	88	10	2
Tube with Inline foiling Technology	100 (4 x 25)	91	0	87	12	1

	FINAL RESULT
1. Standard tube (reference)	88% rigid PE 10% mixed plastic 2% residue
2. Tube with Inline foiling technology covering approx. 70%	87% rigid PE 12% mixed plastics 1% residue

Recyclability evaluation @ RecyClass

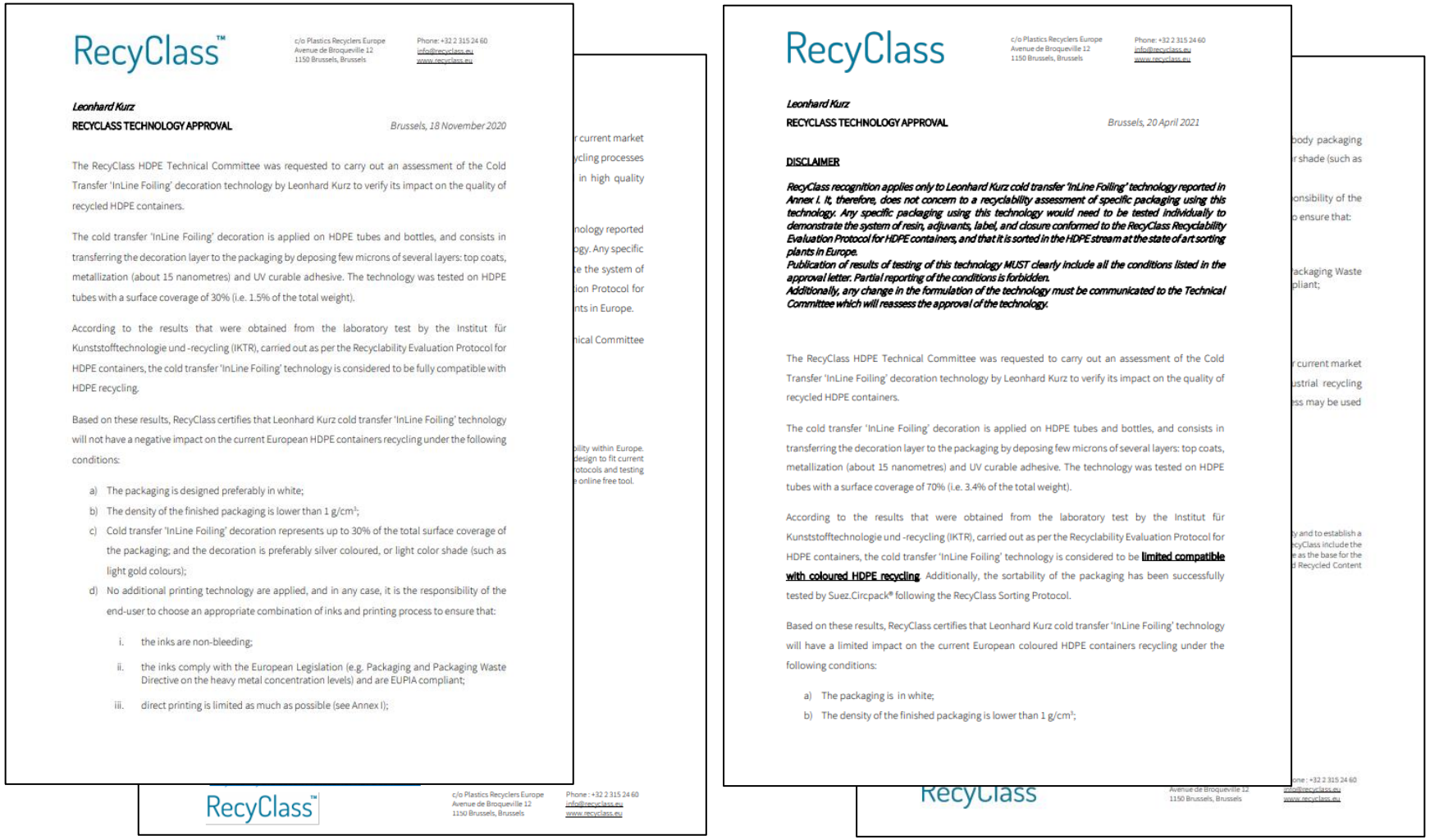
Cold transfer (digital InLine Foiling) with different surface coverage on HDPE HDPE/LDPE/LLDPE + white MB tubes coextruded tubes



30 % coverage

70 % coverage

Recyclability evaluation @ RecyClass



RecyClass™

c/o Plastics Recyclers Europe
Avenue de Broqueville 12
1150 Brussels, Brussels

Phone: +32 2 315 24 60
info@recyclass.eu
www.recyclass.eu

Leonhard Kurz

RECYCLASS TECHNOLOGY APPROVAL

Brussels, 18 November 2020

The RecyClass HDPE Technical Committee was requested to carry out an assessment of the Cold Transfer 'InLine Foiling' decoration technology by Leonhard Kurz to verify its impact on the quality of recycled HDPE containers.

The cold transfer 'InLine Foiling' decoration is applied on HDPE tubes and bottles, and consists in transferring the decoration layer to the packaging by deposing few microns of several layers: top coats, metallization (about 15 nanometres) and UV curable adhesive. The technology was tested on HDPE tubes with a surface coverage of 30% (i.e. 1.5% of the total weight).

According to the results that were obtained from the laboratory test by the Institut für Kunststofftechnologie und -recycling (IKTR), carried out as per the Recyclability Evaluation Protocol for HDPE containers, the cold transfer 'InLine Foiling' technology is considered to be fully compatible with HDPE recycling.

Based on these results, RecyClass certifies that Leonhard Kurz cold transfer 'InLine Foiling' technology will not have a negative impact on the current European HDPE containers recycling under the following conditions:

a) The packaging is designed preferably in white;
b) The density of the finished packaging is lower than 1 g/cm^3;
c) Cold transfer 'InLine Foiling' decoration represents up to 30% of the total surface coverage of the packaging; and the decoration is preferably silver coloured, or light color shade (such as light gold colours);
d) No additional printing technology are applied, and in any case, it is the responsibility of the end-user to choose an appropriate combination of inks and printing process to ensure that:
   i. the inks are non-bleeding;
   ii. the inks comply with the European Legislation (e.g. Packaging and Packaging Waste Directive on the heavy metal concentration levels) and are EUPIA compliant;
   iii. direct printing is limited as much as possible (see Annex I);

RecyClass

c/o Plastics Recyclers Europe
Avenue de Broqueville 12
1150 Brussels, Brussels

Phone: +32 2 315 24 60
info@recyclass.eu
www.recyclass.eu

Leonhard Kurz

RECYCLASS TECHNOLOGY APPROVAL

Brussels, 20 April 2021

DISCLAIMER

RecyClass recognition applies only to Leonhard Kurz cold transfer 'InLine Foiling' technology reported in Annex I. It, therefore, does not concern to a recyclability assessment of specific packaging using this technology. Any specific packaging using this technology would need to be tested individually to demonstrate the system of resin, adjuvants, label, and closure conformed to the RecyClass Recyclability Evaluation Protocol for HDPE containers, and that it is sorted in the HDPE stream at the state of art sorting plants in Europe.
Publication of results of testing of this technology MUST clearly include all the conditions listed in the approval letter. Partial reporting of the conditions is forbidden.
Additionally, any change in the formulation of the technology must be communicated to the Technical Committee which will reassess the approval of the technology.

The RecyClass HDPE Technical Committee was requested to carry out an assessment of the Cold Transfer 'InLine Foiling' decoration technology by Leonhard Kurz to verify its impact on the quality of recycled HDPE containers.

The cold transfer 'InLine Foiling' decoration is applied on HDPE tubes and bottles, and consists in transferring the decoration layer to the packaging by deposing few microns of several layers: top coats, metallization (about 15 nanometres) and UV curable adhesive. The technology was tested on HDPE tubes with a surface coverage of 70% (i.e. 3.4% of the total weight).

According to the results that were obtained from the laboratory test by the Institut für Kunststofftechnologie und -recycling (IKTR), carried out as per the Recyclability Evaluation Protocol for HDPE containers, the cold transfer 'InLine Foiling' technology is considered to be **limited compatible with coloured HDPE recycling**. Additionally, the sortability of the packaging has been successfully tested by Suez.Circpack® following the RecyClass Sorting Protocol.

Based on these results, RecyClass certifies that Leonhard Kurz cold transfer 'InLine Foiling' technology will have a limited impact on the current European coloured HDPE containers recycling under the following conditions:

a) The packaging is in white;
b) The density of the finished packaging is lower than 1 g/cm^3;

Conclusion / outlook

- Cold transfer and hot stamping are sustainable decoration processes for labels, sleeves, tubes and bottles
- Thin metallic decoration is **not** influencing the sorting process (max. surface coverage: 50 % < 500 ml; 70 % > 500 ml)
- Decoration is **not** hindering recyclability
- KURZ technology enables high quality recyclates
- Further recyclabiltiy and sorting test are ongoing
- KURZ is commited to collaboration between the value chain

RecyClass

RecyClass Unwrapped

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Questions & Answers session

Use the Q&A box in the top-right corner of your screen

RecyClass

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Thank you for participating!

Next webinar:
23 June 2021: Recyclability of personal care packaging

We kindly ask you to fill in the webinar evaluation form.