

Revolutionizing Sorting By Intelligent Packaging



Gian De Belder

P&G, Packaging R&D – Rigid Sustainability

Plastic Recyclers Europe - Recyclclass Platform

Petcore ODR Opaque and Difficult to Recycle PET containers (chair & board)

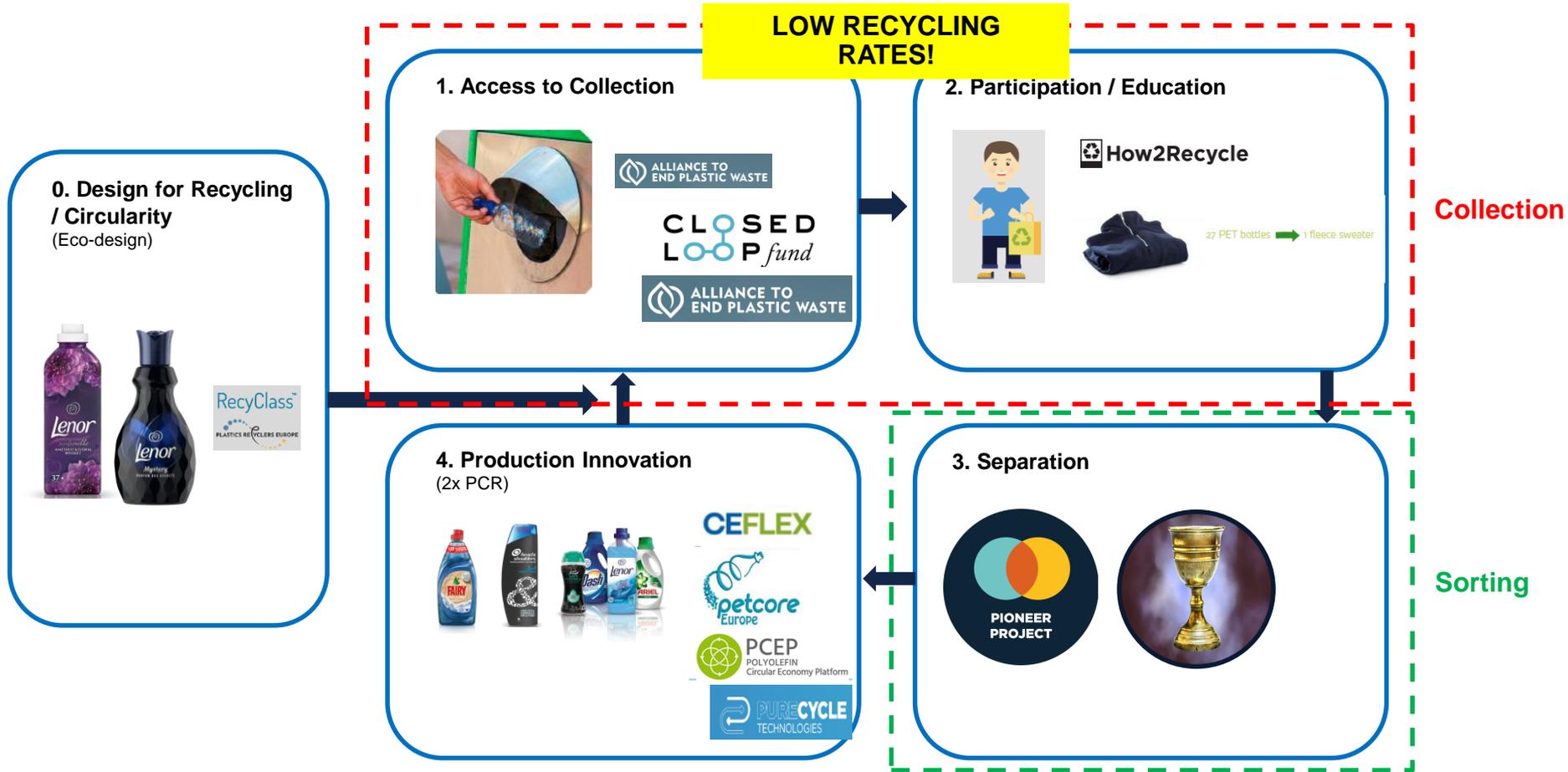
Ceflex member

Consumer Goods Forum – Optimising Design

Project leader HolyGrail 2.0



Plastic Strategy CE – Need To Fix ALL Weaknesses...



Pioneer Project HolyGrail

3-year initiative and collaborative project led by P&G

Find a *harmonized* approach to improve detection and sorting of plastic

- Digital watermarking vs. chemical tracers

Top 5 identification priorities:

- Food vs. non-food grade plastics
- Recyclable vs compostable packaging
- Shrink-sleeved plastic identification
- New materials introductions
- Mono vs multi material thermoform and film

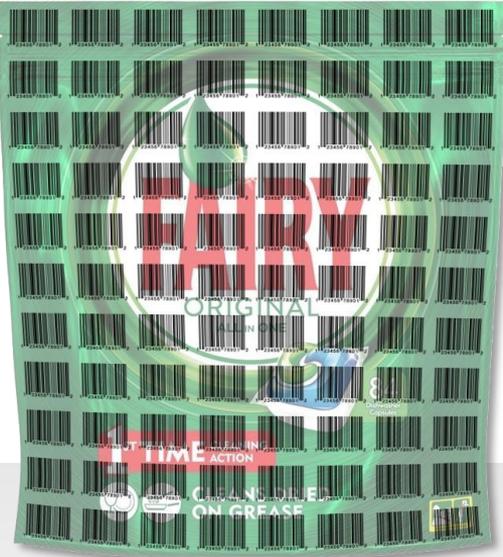


Intelligent packaging through Digimarc Barcode



Looks Like This

The same information contained in the UPC code is difficult for human's to see and is replicated hundreds of times across a package.



Performs Like This

This illustration shows an idea of the replicated code performance, but there would be minimal to no visible impact to an average consumer.

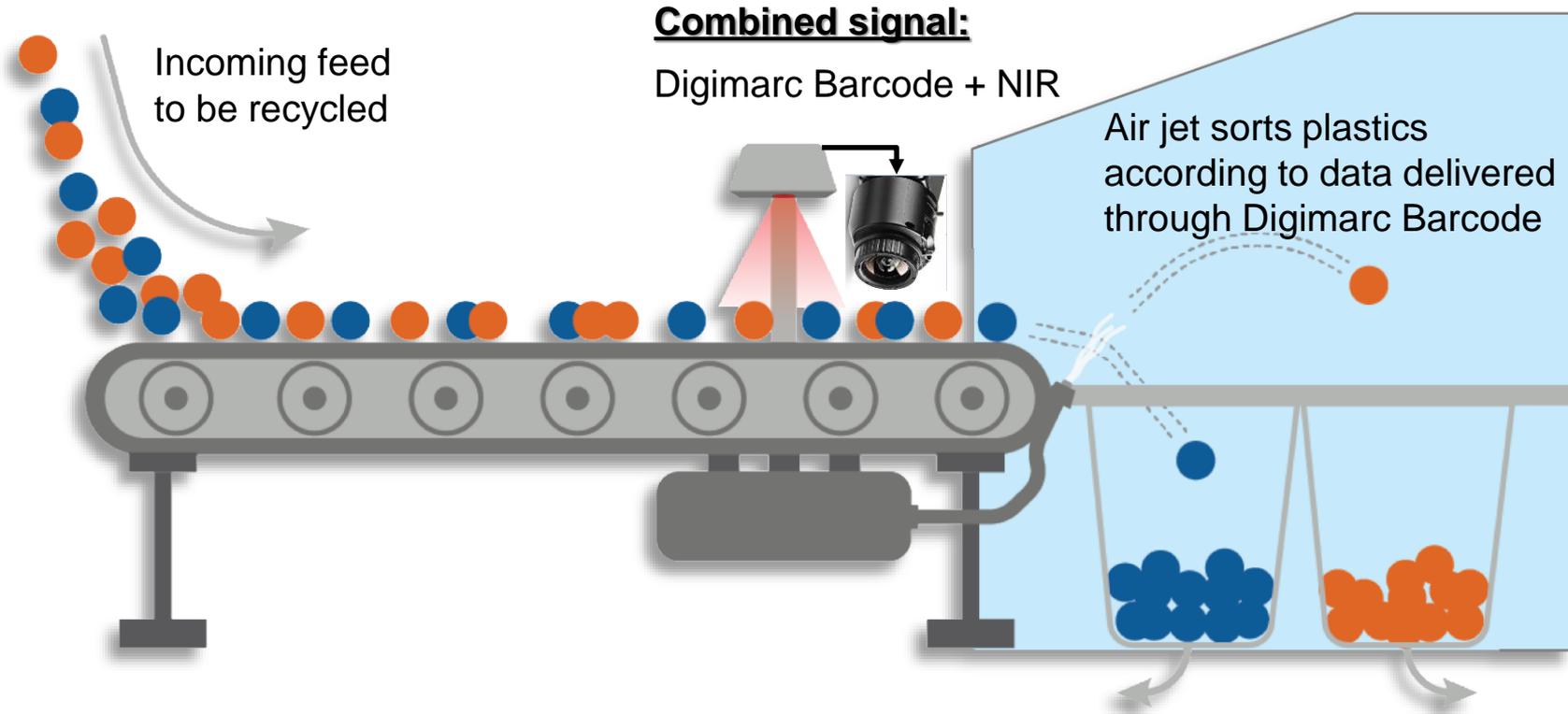
3D



For illustration purposes only

Image courtesy of P&G / Digimarc

Detection in sorting/recycling centers: **add-on module**





codenamed holy Grail and more than

BBC NEWS

20

BUSINESS BRIEFING

• BREAKING

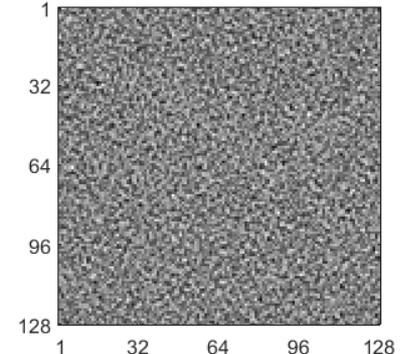
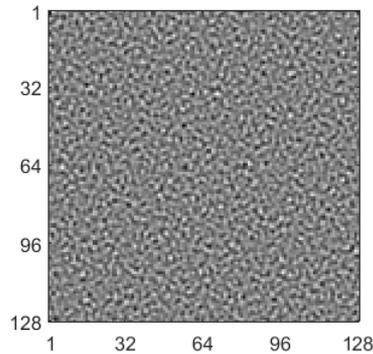
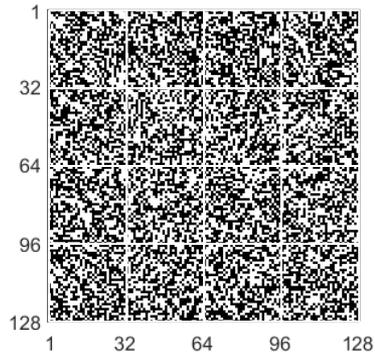
05:38



Digimarc Barcode: Signal Construction

Combine **Message Signal** with **Synchronization Signal** to create a

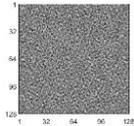
“TILE”



Exaggerated view for illustration purposes

Digimarc Barcode: Application

Tile

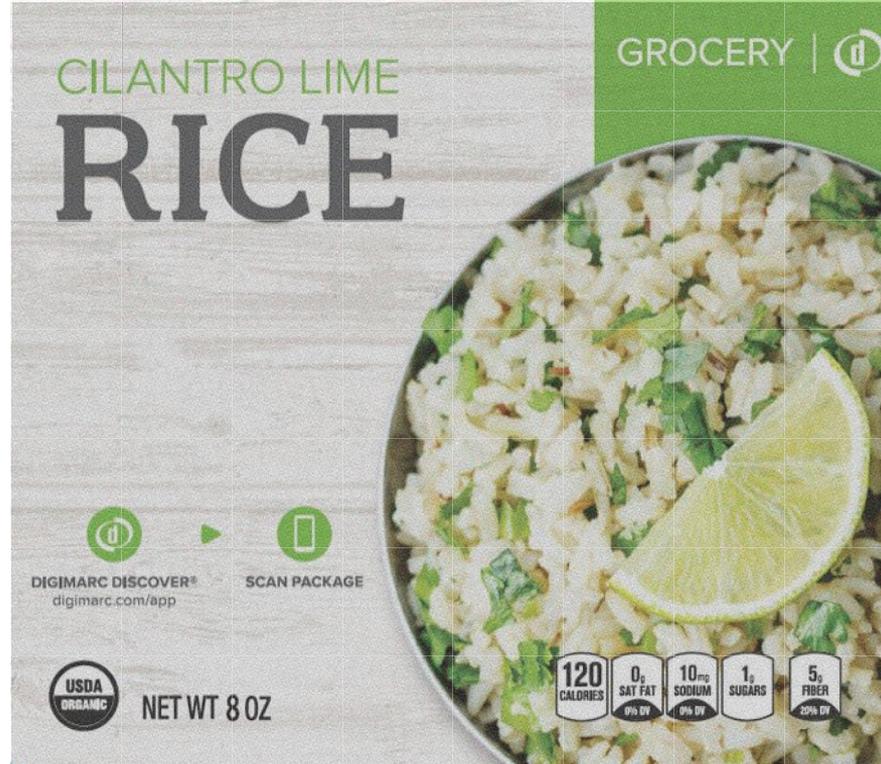


Repeated Spatially



Exaggerated view for illustration purposes

Digimarc Barcode: Strength



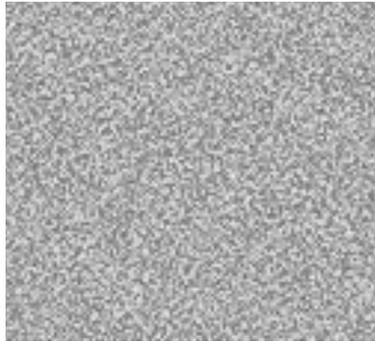
STRENGTH



Exaggerations for demonstration purposes only

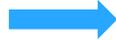
Digimarc Barcode for Recycling – Embossed in Plastic

Digimarc Barcode
Signal Tile

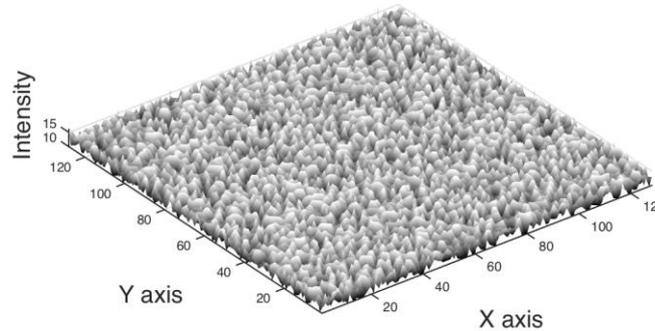


X-axis

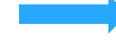
Exaggerated view



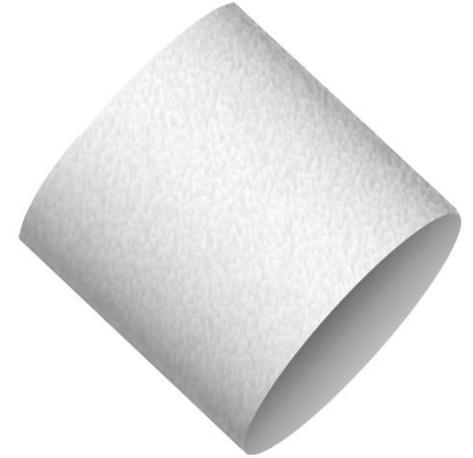
Signal Tile Showing Intensity
Variations as 3D Surface



Exaggerated view



Intensity Changes Induced by
Micro-topological Variations



Giving Plastics a “**Digital Recycling Passport**”

Digimarc Barcode engraved in mold using “Micro-topological variations”

- In addition to embedding in printed shrink sleeves and labels

Virtually unlimited codes that address major challenges

- Identify manufacturer and SKU (for modulation of EPR fees)
- Distinguish between food vs non-food packaging
- Identify multi-layer flexible packaging and components of layers, carbon-black, opaque, difficult-to-recycle objects
- Allow for new material introductions

Compatible with Circular Economy – no environmental impact or additives; uses ‘what is already there’ in plastic (or print)



For illustration purposes only

How Digimarc Barcode Works

ENHANCE

-  Packaging
-  Commercial Print
-  Labels & Tags

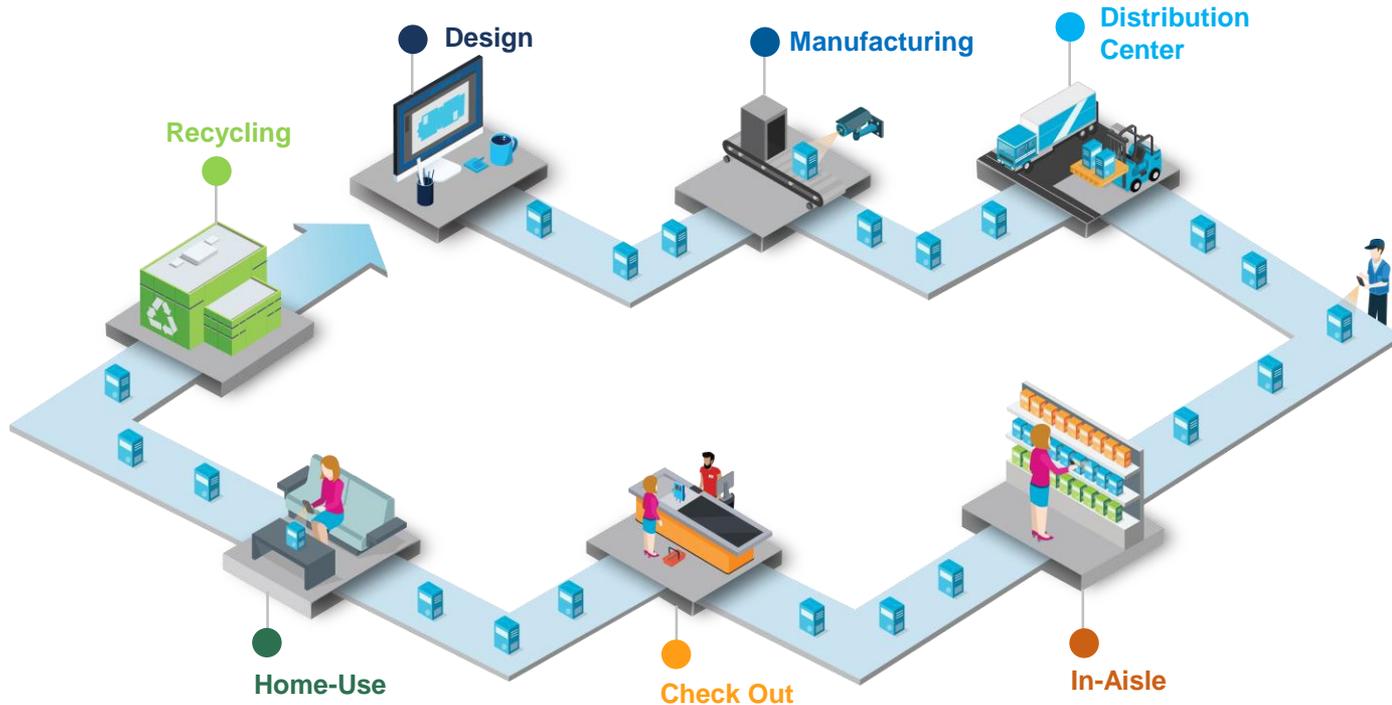
DETECT

-  Barcode Scanners
-  Inspection Systems
-  Mobile Apps



Digimarc Barcode can be applied to any printed material where a barcode, QR code and Data Matrix may be used.

Value Throughout the Package Journey



- **Design**
 - Incorporate barcode data into artwork
 - Integrate codes and link to content
- **Manufacturing**
 - Improve in-line inspection
- **Distribution Center**
 - More reliable labels
 - Print on corrugated packaging
 - Scan readily from a distance
 - Verify logistics and returns
- **In-Aisle**
 - Price checks
 - Manage planogram & availability (OSA)
 - Data Analytics
- **Check Out**
 - Easily scan products & labels
 - Improve first-pass read rate
 - Reduce misreads and manual keying
 - Improve customer experience
- **Home-Use**
 - Instructions for use
 - Brand and social content
 - Point and scan to buy now & reorder
- **Recycling**
 - Identify materials and substrates
 - Improve sorting mechanisms

True “Intelligent Sorting”

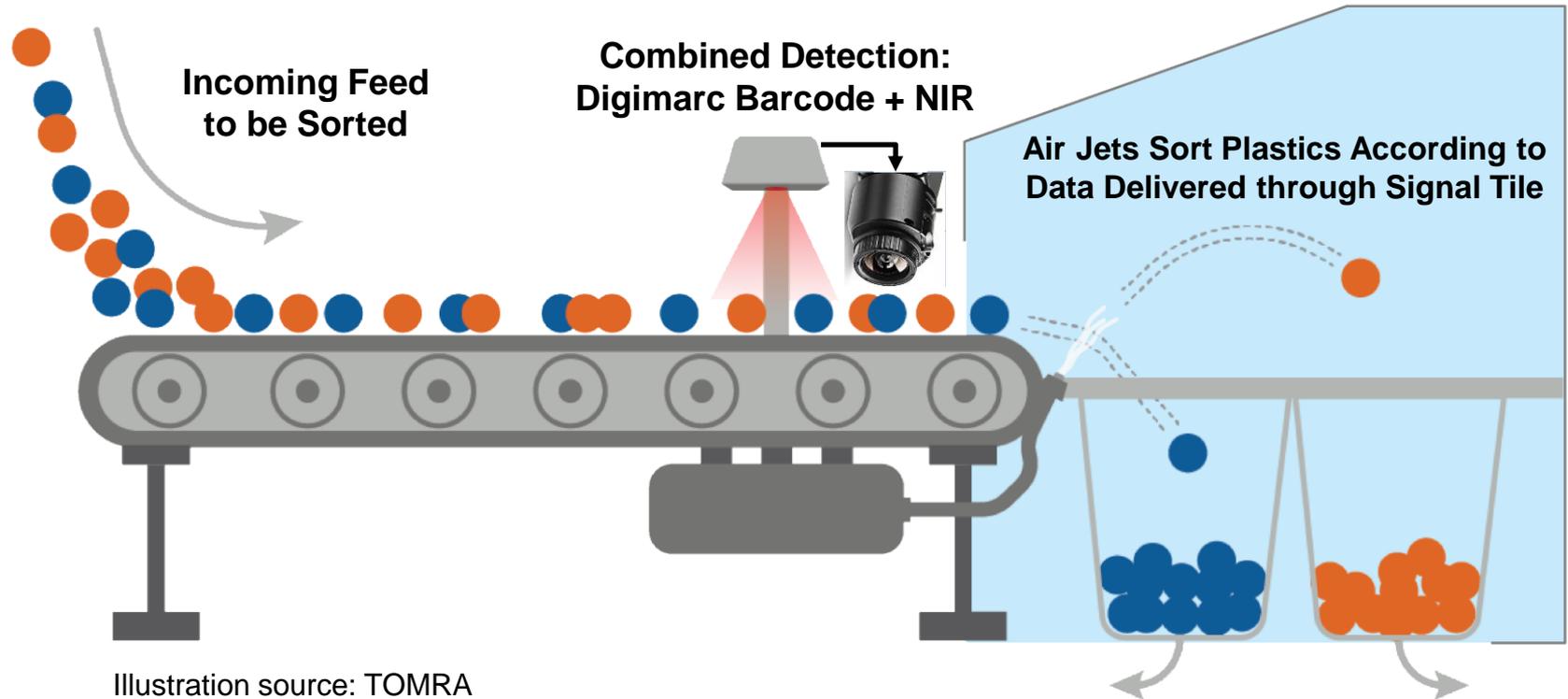
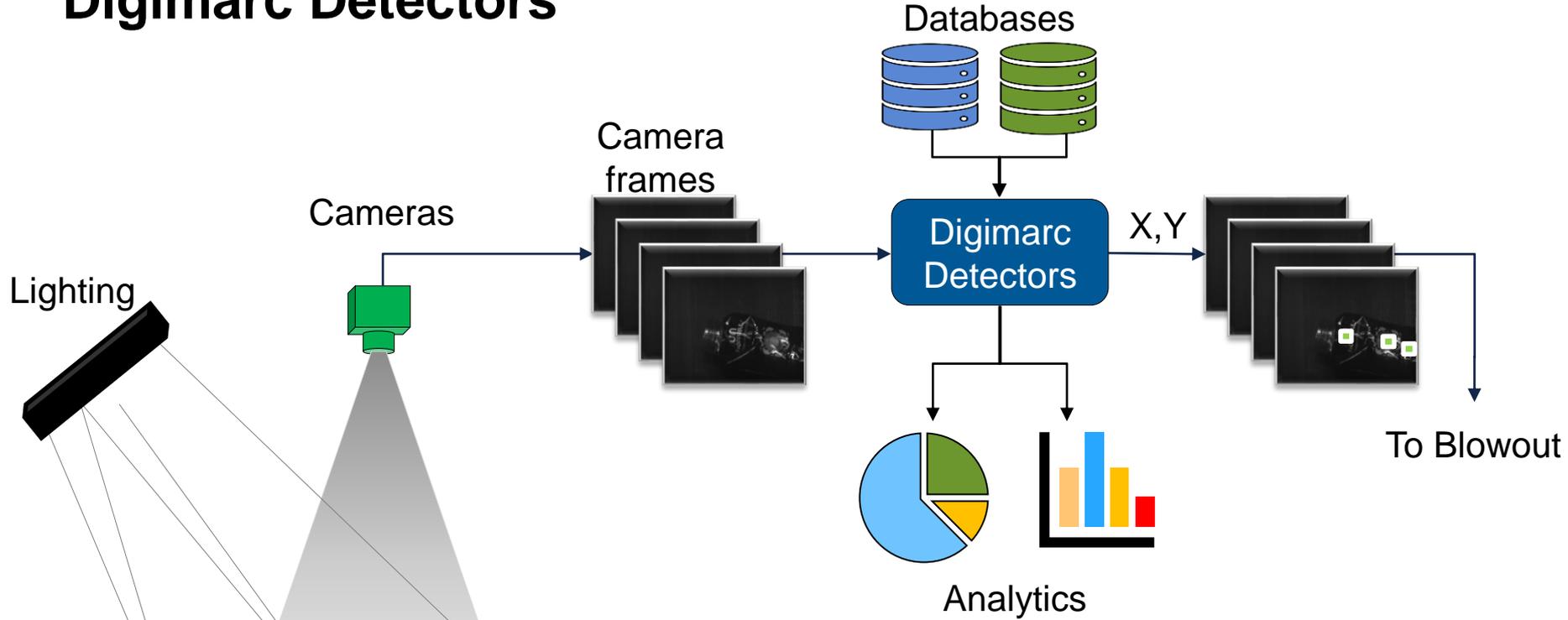


Illustration source: TOMRA

Digimarc Detectors



Camera View at 10% Conveyor Belt Speed of 3 m/sec



Databases – Conceptual Illustration (Specifics TBD)

Database for Digimarc Barcode for Print Packaging

GTIN	Producer	Composition	Food	Sort
1234043212	ABC	PET	Y	Y
3456112343	XYZ	HDPE	N	Y
1234011112	ABC	PET Thermoform	Y	Y
9405240084	DEF	PP	Y	N

Database for Digimarc Barcode for Plastics

Plastic ID	Producer	Composition	Food	Sort
891298	ABC	PET	Y	Y
123131	XYZ	HDPE	N	Y
131031	ABC	PET Thermoform	Y	Y
234568	DEF	PP	Y	N

October 22- 2nd Open House Demo

Print (packaging labels):

- IML packaging
- Composite board
- Label on bottle
- Sleeve food
- Sleeve non-food
- Flexibles
- Printed trays
- Poly Bubble Mailer
- Lids

Plastics:

- PET non-food
- HDPE
- PET thermoform

HolyGrail 2.0 – In Formative Stages

Industry-led, expanded participants – 70+ brands, retailers, manufacturers, waste management, sorting equipment makers

Digimarc technology for recycling is proven, focus is now on scaling up and acceleration for broad commercial deployment

- EU-focused industrial-scale trials/pilots
- Guidelines for embedding in print and embossing in plastic
- Detector specifications for integration by sorting equipment makers
- Prototype detection modules
- Exploration of neutral, trusted third-party to manage database

Commercial models being explored

- Provide a scalable, global and interoperable platform to meet industry and regulatory needs
- Exploration of appropriate arrangement(s) for trials, adoption, funding, etc.

Watch the HolyGrail Summary Video

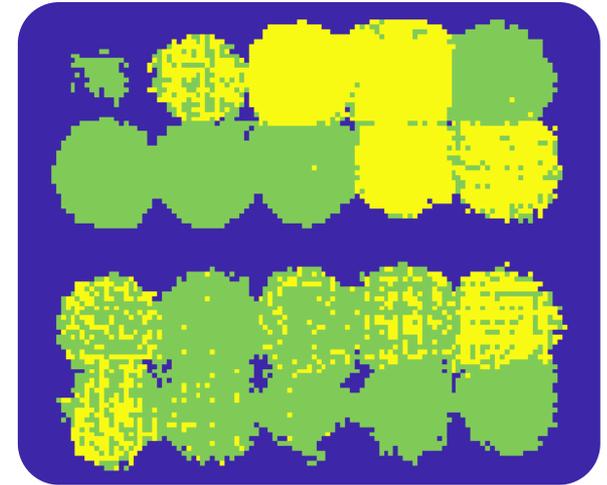
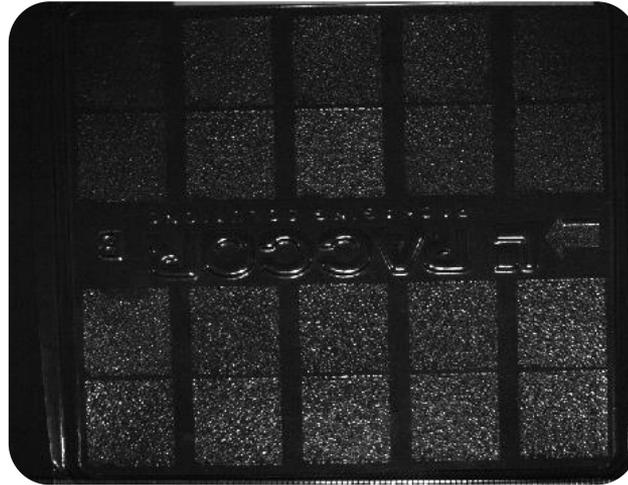
[Bit.ly/2AISQJp](https://bit.ly/2AISQJp)



Recent Updates – Plastic Molds

Digimarc Barcode in Plastic

- Advances in embossing in plastic since May
- Validation of Digimarc Barcode embossing in transparent thermoforms



Recent Updates – Berry Global

Berry Global and Digimarc to Promote Innovation in Recycling with HolyGrail 2.0 Initiative

EVANSVILLE, Ind.--(BUSINESS WIRE)--Oct. 18, 2019-- [Berry Global Group, Inc.](#) (NYSE: BERY) is pleased to announce its participation in the new recycling initiative, HolyGrail 2.0. The outcome of its predecessor, the Pioneer Project HolyGrail, led by Gian De Belder at Procter & Gamble, was the identification of digital watermarking (specifically, [Digimarc Barcode](#)) as a promising technique to “tag” plastic substrates or print materials (shrink sleeve, IML label, or paper label) with an identity that could include attributes such as plastic type, product manufacturer, product SKU, food or non-food usage, and composition of multi-layer foils. Digimarc Barcode can be added to the printed label/sleeve artwork and/or embossed into the plastic itself.

Berry will manufacture plastic packaging containing Digimarc Barcode for use in product sortation. The two companies are long-time partners, and Digimarc will advise Berry on adding the digital watermark onto drink cups and thin wall lids for containers as part of the project. “We continue to be amazed at the possibilities that Digimarc brings to us and our customers. It is exciting to see decoration have the potential to make such a positive impact on the recovery of plastics,” said Jennye Scott, Vice President of Creative Services for Berry.

In addition to its work with advancing recycling, Berry made an announcement in June to which it has become an official signatory of the [Ellen MacArthur New Plastics Economy Global Commitment](#). As part of the Global Commitment, Berry has made a pledge for all of their plastic packaging to be reusable, recyclable, or compostable by the year 2025. In line with the Company’s sustainability strategy, [Impact 2025](#), Berry is striving to increase the recovery of plastics through recycling. The Company’s hope is to accelerate the efforts toward a circular economy by pushing the boundaries of innovation in both material recovery and recyclable packaging.

The first scheduled test is at TOMRA Sorting’s facility in Mülheim-Kärlich, Germany, on October 22, 2019, during the K-2019 Show (Dusseldorf). A shuttle bus will be provided to interested parties from the K-2019 Show to the TOMRA facility. Packaging professionals, plastics industry service providers, trade association members, and those attending the K-2019 show are encouraged to register and attend: <https://solutions.tomra.com/holy-grail-2.0%20>



“We continue to be amazed at the possibilities that Digimarc brings to us and our customers. It is exciting to see decoration have the potential to make such a positive impact on the recovery of plastics”.

Oct 25, 2019

THE SUSTAINABILITY AWARDS **2019 Finalist**
thesustainabilityawards.com

FachPack
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PACKBOX FORUM

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<https://packagingeurope.com/holygrail-project-wins-top-prize-at-sustainability-awards-20/>

Sustainability Leaders Awards 2020: Shortlist of finalists revealed

14 November 2019, source [edie newsroom](#)



Circular Economy Innovation of the Year

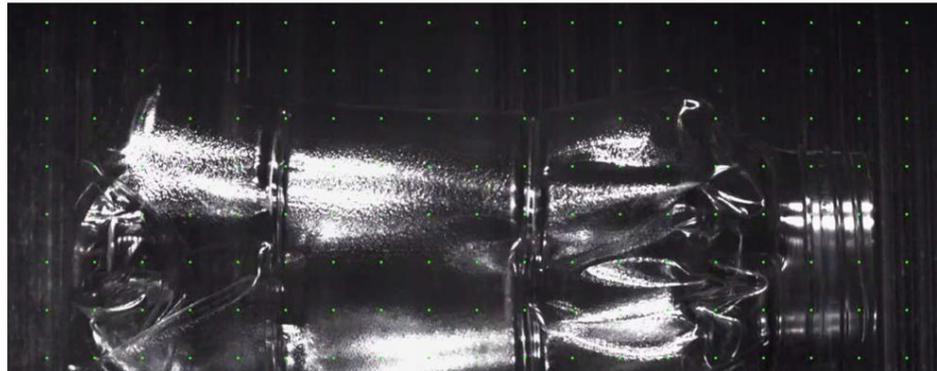
- Aceleron
- Cisco Systems
- MWH Treatment – SMBJV
- P&G, HolyGrail 2.0
- Searious Business
- Tarkett
- TerraCycle/Loop
- The Alternative Pallet Company
- Unilever
- World of Books Group



11.25.19 | WORLD CHANGING IDEAS

These invisible bar codes make plastic more likely to be recycled

By making it possible for recycling facilities to quickly scan a bottle or packaging and learn what it's made of and where it's from, this new tech could make recycling more efficient and accurate.



For more information

Gian De Belder

debelder.g@pg.com



@giandebelder