PIONEERING DIGITAL WATERMARKS FOR SMART PACKAGING RECYCLING IN THE EU

Digital Watermarks Initiative HolyGrail 2.0
CIRCULAR ECONOMY

BY 2030
100% of plastic packaging to be reusable, easily recyclable, or compostable

BY 2030
55% of plastic packaging to be effectively recycled

BY 2030
30% average recycled content across all plastic beverage bottles

Eliminate problematic or unnecessary single-use plastics

FOR PACKAGING

FACING THE NEW CIRCULAR REALITY
How can we achieve a Circular Economy for Packaging in the EU?

One of the biggest challenges is how to maximize our resources through optimal sorting and recycling.

We need to better sort our post-consumer waste in the EU waste management systems by accurately identifying (plastics) packaging, resulting in more efficient and higher-quality recycling.
Digital watermarks for smart packaging to **revolutionise the way packaging is sorted**

Opens **new possibilities** currently not feasible with existing technologies
September 2020: Under the auspices of AIM, European Brands Association, 85+ companies and organisations from the complete packaging value chain have joined forces

Objective: Prove the viability of digital watermarking technologies for accurate sorting and the business case at large scale

Website: www.aim.be/priorities/digital-watermarks
2nd iteration of the **Pioneering Project HolyGrail 1.0** led by the Ellen MacArthur Foundation 2016-2019

HolyGrail 1.0 investigated **different innovations to improve post-consumer recycling** (digital watermarks & chemical tracers)

**Digital watermarks** were found to be the most promising technology, gathering support among the majority of stakeholders and passing a basic proof of concept on a test sorting line.
Pioneering DIGITAL WATERMARKS for smart packaging recycling IN THE EU
Imperceptible codes, the size of a postage stamp, covering the surface of a consumer goods packaging

Able to carry a wide range of attributes (e.g. manufacturer, SKU, type of plastics used and composition for multilayer objects, food vs. non-food usage)
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Digital Watermarks @work

FOR PRINT

1. Repeated Tile
2. Pieces of multiple tiles can be combined to recover a Barcode
3. The encoder applies the tiles to graphics in a mosaic manner
4. Uses existing pixels
   - No special inks
   - No special printing process

Exaggerated view for illustration purposes
Digital Watermarks @work
FOR MOLDS

01
Micro-topological variations in substrate create signal tiles

02
Works in variety of mold types
HOW DO DIGITAL WATERMARKS WORK ON A SORTING LINE?

SMART PACKAGING SORTING FOR A CIRCULAR ECONOMY

1. Packaging waste coded with digital watermarks arrives at the sorting plant
2. Standard high resolution camera detects the digital watermarks & decodes their information
3. Packaging waste is sorted into different streams for recycling (e.g., food vs non-food)
HOLY GRAIL 2.0

3 FOCUS AREAS

01 Intelligent Sorting
02 Data Mining
03 Consumer Engagement
POTENTIAL BENEFITS OF DIGITAL WATERMARKS across the package life

01 Manufacturing
- Improve in-line inspection

02 Design
- Incorporate barcode data into artwork
- Integrate codes and link to content

03 Distribution Center
- More reliable labels
- Print on corrugated packaging
- Scan readily from a distance
- Verify logistics and returns

04 Check Out
- Easily scan products & labels
- Improve first-pass read rate
- Reduce misreads and manual keying
- Improve customer experience

05 Home-Use
- Instructions for use
- Brand and social content
- Point and scan to buy now & reorder

06 Recycling
- Identify material and substrates
- Improve sorting mechanisms

07 Data Analytics
- Price checks
- Manage planogram & availability (OSA)
- Data Analytics
PHASE 1
Developing detection unit prototype

2020

2021

PHASE 2
Brand owners and retailers are welcome to join with min. 2-3 SKUs coded with digital watermarks

Start semi-industrial testing

End semi-industrial testing

PHASE 3
Brand owners and retailers that are operating in the chosen test market are expected to participate with a minimum of 10 SKUs coded with digital watermarks

Start industrial testing loc. 1
Start industrial testing loc. 2
Start industrial testing loc. 3

End Report

2022
MEMBERSHIP

HG2.0 Membership
Associate & Full Initiative Members

Technical Working Groups:
- Involvement of all members based on expertise and knowledge
- WG leaders appointed
- Under supervision of Technical Project Manager

Leadership Team:
- Core members representing each of the sectors engaged in the initiative
- Leads, coordinates and manages the activities of the initiative
- Ensures effective use of membership fees and involvement of member companies
- Overlooks the activities and decides on the set-up of technical working groups
LEADERSHIP TEAM

Brand manufacturers (4/4)
- Danone
- Nestlé
- PepsiCo
- P&G

Retailers (3/4)
- Coop
- Schweiβ
- Lidl
- Kaufhof
- Carrefour

MRFs: Multi Re-use Facilities (1/2)
- Suez

Converters (2/2)
- Constantia
- JVD
- MCG

Extended Producer Responsibility Organisations (2/2)
- CITEO
- Expres

Recyclers (2/2)
- Borealis

- Elected LT Chair: Gian de Belder, Procter & Gamble
HolyGrail 2.0 Structure

HG2.0 STRUCTURE BASED ON HOLYGRAIL 2.0 CHARTER UNDER THE AUSPICES OF AIM, EUROPEAN BRANDS ASSOCIATION:

**SUPPORT**

- **Secretariat – AIM as Initiative Facilitator:**
  - Overall management of initiative
  - Contact point for members & external stakeholders
  - Ensuring regular updates / information flow to all HG2.0 members

- **Technical Project Manager – An Vossen (Plarebel):**
  - Drafting a technical test plan
  - Coordinating the different technical working groups
  - Overseeing the work on the test sorting line
  - Supporting members with technical expertise & in their work with technology suppliers

- **Legal Counsel:**
  - Present at all meetings of leadership team and HG2.0 members
HolyGrail 2.0 Structure

**ADVICE**

Advisory Group:

Panel for dialogue, exchange and input into both the operational implementation of key activities and the overall strategy of HG2.0.

Provides advice to HG2.0 Leadership Team, constituting the public and policy complement to the cross value chain initiative HolyGrail 2.0.

Comprised of key stakeholders in the Circular Economy debate, including representatives from NGOs, Media, European and national public agencies, European and national policy-makers, other key stakeholders.
Innovation, sustainability and digital are the 3 key ingredients we are combining with smart packaging through digital watermarks to achieve the objective of the Green Deal towards a clean, circular and climate neutral economy.

MICHELLE GIBBONS
DIRECTOR GENERAL, AIM
Digital Watermarks Initiative HolyGrail 2.0

The Digital Watermarks Initiative HolyGrail 2.0 – facilitated by AIM, the European Brands Association, as the next iteration of the initial HolyGrail project under the Ellen MacArthur Foundation (2016-2019) – is a pilot project with the objective to prove the viability of digital watermarking technologies for accurate sorting and consequently higher-quality recycling, as well as the business case at large scale.

Digital watermarks are imperceptible codes, the size of a postage stamp, covering the surface of a consumer goods packaging and carrying a wide range of attributes. The aim is that once the packaging has entered into a waste sorting facility, the digital watermark can be detected and decoded by a standard high resolution camera on the sorting line, which then – based on the transferred attributes (e.g. food vs. non-food) – is able to sort the packaging in corresponding streams. This would result in better and more accurate sorting streams, thus consequently in higher-quality recyclates benefiting the complete packaging value chain.
Digital Watermarks Initiative HolyGrail 2.0
AIM – European Brands Association
Avenue de Gaulois 9
B-1040 Brussels, Belgium
EU Transparency register ID no.: 1074382679-01