

The background of the slide is a vibrant blue gradient. It features abstract, glowing circuit board traces, binary code (0s and 1s), and wavy, interference-like patterns. A central focus is a detailed, glowing image of a microchip or integrated circuit. The overall aesthetic is high-tech and digital.

Product Traceability During the Product Lifecycle Case Studies

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Executive Summary

The fashion and apparel industry is under growing pressure to account for what it makes, where it goes, and what happens to it at the end of its life. Two forces in particular are driving brands to act now. The first is regulatory: the European Union’s Digital Product Passport (DPP), introduced under the Ecodesign for Sustainable Products Regulation (ESPR), will require brands selling into the EU market to provide verifiable, item-level data on a product’s materials, carbon impact, repairability, and end-of-life options. Textiles and footwear are among the priority categories, with requirements expected to phase in from 2027 onwards. The second is sustainability: over 100 billion items of clothing are sold annually, and more than 70% end up in landfills or incinerators. Brands increasingly recognise that circularity — keeping products in use longer and recovering materials at end of life — is only achievable if every product carries a persistent digital identity throughout its lifecycle.

RAIN RFID, combined with consumer-facing QR codes, has emerged as the practical solution to both challenges — creating the data foundation that DPP compliance demands and that genuine circularity requires. These case studies examine how two fashion and apparel brands, On Running and Hessnatur, are putting this into practice today, with technology partners Nedap (iD Cloud platform) and Trimco Group together with circularity.ID® from circular.fashion respectively. Together, they demonstrate how connected product identity drives measurable outcomes in sustainability, operational efficiency, consumer engagement, and regulatory readiness.

At a Glance: Side-by-Side Comparison

Dimension	On Running	Hessnatur
Brand	On Running	Hessnatur
Product Category	Footwear, apparel, accessories	Denim garments
Tag Technology	RAIN RFID + QR code (OnCode)	RAIN RFID heat transfer + QR code

Dimension	On Running	Hessnatur
Lifecycle Coverage	Factory → DC → Store → Return/Recycle	Manufacturer → Retailer → Consumer → Sorter
Key Sustainability Goal	100% circular by 2030	Reduce the number of garments ending in landfills
EU DPP Alignment	Yes – explicit readiness stated	Yes – material, care and recycling data

Case Study 1: On Running

RAIN RFID-Enabled Circular Supply Chain Visibility and Consumer Transparency

Overview

On Running integrates RAIN RFID technology across the entire product lifecycle — from factory to consumer and back — enabling every product to be uniquely identifiable. Through the OnCode program, each product combines an RAIN RFID tag and a QR code to connect physical goods to their digital twins.

This system provides real-time visibility, supports recycling and reuse, prevents counterfeiting, and engages consumers with personalised product information. All of this contributes to On's mission of achieving full circularity by 2030.

Sustainability Impact

- **Circular economy enablement:** Each product is digitally traceable, allowing On to ensure items are returned for recycling or reuse rather than ending up in landfills.
- **Resource efficiency:** Automation of logistics and returns reduces waste, errors, and the carbon footprint of manual processes.
- **Waste reduction:** RAIN RFID-based visibility eliminates fraudulent returns and improves stock accuracy, minimising overproduction.
- **Product lifecycle extension:** Authentication and reselling through OnCode promote second-life use and consumer trust in pre-owned products.
- **Regulatory readiness:** OnCode positions On Running to comply with EU Digital Product Passport (DPP) regulations by providing traceable material, CO₂ impact, and journey data for each product.

Target metric: 100% of products returned for recycling by 2030. Full automation of warehouse and return centre verification processes, eliminating the need for manual inspection of returned items.

Role of RAIN Technology

On Running applies item-level tagging to every product category — footwear, apparel, and accessories. Each RAIN RFID tag captures a unique EPC alongside origin, production batch,

logistics milestones, sale data, and return/recycling status, creating a complete digital record that travels with the product throughout its life.

The technology covers every lifecycle stage: factory production, warehouse inbound and outbound movements, in-store inventory and checkout, and returns verification. This end-to-end coverage enables authenticity checks at resale or repair, real-time monitoring of circularity rates, and fully automated refund and warranty processing.

Stakeholders

- On Running — brand owner and initiator of the RAIN RFID and OnCode programme
- Manufacturing Partners — apply item-level RAIN RFID tags during production
- 3PL Logistics Providers — manage tagged products through distribution centres
- Retailers / Stores — enable in-store scanning and checkout processes
- Return Service Providers — authenticate and route returned items
- Nedap — RAIN RFID software platform (iD Cloud) and infrastructure provider
- Consumers — engage via QR codes for authentication, repair, and recycling
- EU Regulators — compliance with the Digital Product Passport initiative

Technical Prerequisites

- RAIN tags embedded in shoes and sewn or attached to apparel and accessories
- RAIN reader infrastructure deployed in factories, warehouses, and stores
- Nedap iD Cloud platform integrated with On's ERP systems and consumer-facing app
- Data architecture aligned with EU DPP requirements

Measurable Outcomes

Impact Area	Before RAIN RFID	After RAIN RFID
Return Fraud	Frequent "empty box" or fake returns	100% authenticated via serial match
Warehouse Efficiency	Manual inspection	Fully automated verification

Impact Area	Before RAIN RFID	After RAIN RFID
Circularity	No visibility on product returns	Traceability for 100% of returned goods
Customer Experience	Paper receipts, slow warranty	Digital ID allows instant warranty validation
Brand Trust	Counterfeit risk	Authentication via OnCode

Case Study 2: Hessnatur / Trimco Group

A Collaborative Effort Towards Circularity — In-Garment RAIN RFID Tags with QR Codes

Overview

Hessnatur, a sustainable German fashion brand, promotes circular economy principles by embedding innovative technology directly into its garments. Working with Trimco Group and circularity.ID® from circular.fashion, Hessnatur has piloted in-garment RAIN RFID heat transfer tags combined with QR codes in its denim collection. Denim was chosen specifically as the pilot category because heat-transfer tags provide the durability required for repeated washing cycles, while limiting the scope to one product group gave the brand the opportunity to introduce the technology properly and gather structured feedback from suppliers, customers, and sorters at the end of the pilot.

The programme delivers transparency about material composition, care requirements, and recycling instructions to all actors across the value chain: manufacturers, retailers, consumers, and end-of-life sorters. The circularity.ID® digital platform from circular.fashion provides the data backbone that links physical tags to product information, leading Andrea Homann, Co-CEO of hessnatur, to state: “It takes all of us to close the loop, companies and customers alike. The circularity.ID® enables us to pass on essential information regarding the components, the care, and the recycling of our products to our customers and to the sorters.”

Sustainability Impact

- Reduces clothing waste: 70% of garments currently end in landfills or incinerators. Traceability and recycling strategies directly target this statistic.
- Empowers consumers with product data to support sustainable purchasing and care decisions.
- Supports end-of-life recyclability through the use of mono-materials and recycling of production waste.
- Reduces water consumption by reusing organic cotton jeans and recycling 80% of wastewater in its production processes.
- Prolongs product lifecycle through a care & repair guide and a dedicated second-hand shop, keeping garments in use longer.

Role of RAIN Technology

RAIN RFID heat transfer tags are used in denim garments specifically for their durability — withstanding the thermal and mechanical stress of repeated washing cycles. Each tag stores data essential for circularity: recycling instructions, material composition, and care information, making this data available to every relevant actor across the value chain.

The RAIN RFID tags enable tracking along the complete garment lifecycle — from manufacturer to retailer, to consumer, and finally to end-of-life sorter — enhancing visibility of each garment's individual journey. This persistent identity supports automated sorting for recycling, ensuring the right garments are directed to the right recycling streams.

Stakeholders

- Hessnatur — sustainable fashion brand and programme initiator
- Trimco Group — label and tag solutions provider, supplying the RAIN RFID heat transfer tags and QR code solutions
- circularity.ID® from circular.fashion — digital product passport platform linking physical RAIN RFID tags to material composition, care, and recycling data
- Manufacturers — apply heat-transfer RAIN RFID tags during garment production
- Retailers — scan tags for inventory visibility and consumer transparency
- Consumers — scan QR codes for care instructions, repair guides, and second-hand resale
- Sorters / Recyclers — read RAIN RFID/QR data for automated garment sorting and recycling routing

Technical Prerequisites

- Durable, heat-resistant RAIN RFID tags designed to withstand garment washing processes
- RAIN RFID and QR code readers deployed at key points along the supply chain
- Use of mono-material garment construction to enable end-of-life recyclability
- Data platform capturing and sharing material composition, care, and recycling information

Lifecycle Traceability: Stage-by-Stage Comparison

Stage	On Running	Hessnatur / Trimco
Manufacturing	RAIN RFID tag embedded at production; EPC, batch, origin data captured	Heat-transfer RAIN RFID tag applied in garment; material composition encoded
Logistics / DC	Inbound & outbound warehouse scanning; automated verification replaces manual checks	Supply chain scanning; data passed to retailers
Retail / Store	In-store inventory and checkout scanning; stock accuracy improved	Retailer reads tag for inventory and consumer-facing transparency
Consumer Use	QR/OnCode scan: authentication, warranty, repair info, second-hand resale	QR scan: care instructions, material info, repair guide, second-hand shop
End of Life	Return authenticated via serial match; automated recycling routing; circularity rate tracked	Sorter reads RAIN RFID/QR for recycling instructions; supports BetterRecycling collection

Key Themes and Takeaways

1. RAIN RFID as the Foundation of Circularity

Both cases demonstrate that a persistent, item-level digital identity — enabled by RAIN RFID — is the essential foundation for circular product systems. Without knowing where a product is, what it is made of, and where it has been, true circularity is impossible. RAIN RFID provides the machine-readable, durable, and scalable data layer that makes this visibility achievable at volume.

2. Combined RAIN RFID + QR Unlocks the Full Value Chain

Both On Running and Hessnatur pair RAIN RFID with QR codes, using each technology for its strengths: RAIN RFID for automated, high-throughput supply chain scanning; QR for consumer-facing engagement, including repair, resale, and recycling guidance. The combined approach extends traceability beyond the B2B supply chain into the hands of consumers and end-of-life actors.

3. EU Digital Product Passport Readiness

Both implementations directly support the requirements of the upcoming EU Digital Product Passport (DPP) regulation. By capturing and storing material composition, CO₂ impact, care information, and lifecycle journey data at the item level, both brands are building the data infrastructure that DPP compliance will require — positioning them ahead of regulatory deadlines.

4. Operational Efficiency as a Co-Benefit

While sustainability drives both programmes, the operational benefits are equally compelling. On Running's automated return verification eliminates manual inspection of every returned item. Hessnatur's sorter-readable tags enable automated recycling routing. In both cases, RAIN RFID transforms manual, error-prone processes into scalable, accurate, and auditable workflows.

5. Scalability and Cross-Category Application

On Running's deployment spans footwear, apparel, and accessories at full commercial scale with a target of complete rollout by 2025. Hessnatur's pilot demonstrates the viability of in-garment tagging in demanding product categories (denim) where tag durability is critical. Together, these cases show that RAIN RFID traceability is not limited to a single product type — it is a scalable platform for the entire fashion industry.

About the RAIN Alliance

The [RAIN Alliance](#) enables organizations to improve traceability, effectiveness, and sustainability by simplifying, standardizing and accelerating the adoption of RAIN technology through global collaboration and innovation. Its global membership consists of companies and organizations which develop and deploy RAIN technology solutions across many vertical markets.

RAIN is a standards-based wireless technology that enables businesses and consumers to identify, locate and authenticate billions of items connected to the Internet of Things. RAIN technology uses the ISO/IEC 18000-63 protocol (also known as GS1 UHF Gen2).

For more information, please visit therainalliance.org