Project Fact Sheet

Stargate
within EU Green Deal

RFID

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement GA101037053

01 BASIC PROJECT INFORMATION

Project name	RFID
Partners involved	ACB with participating two freight forwarders and one ground handling agent.
Implementing airport / site	BRUcargo, Brussels Airport; pharmaceutical air cargo shipments.
Period tested	Proof-of-concept testing during the entire STARGATE period, 2022-2026
Project lead / contact	Project lead: ACB Content owner/reviewer: Davide Scatorchia

02 OBJECTIVE

What are we trying to solve or tackle with this project?

This project tests whether RFID technology can reliably automate shipment identification and tracking within the air cargo chain, with a specific focus on pharmaceutical freight at BRUcargo. Traditional manual counting and registration processes are labor-intensive, prone to errors, and offer limited end-to-end visibility during shipment handovers. The initiative addresses these inefficiencies by evaluating RFID's potential to improve transparency, reduce physical workload, and optimize handling speed.

Success criteria

Demonstrate reliable tag detection, reduce manual registration and errors, shorten shipment handover time, improve partner transparency and satisfaction, and identify the technical and operational conditions required for wider deployment.

03 APPROACH (HOW WE TESTED)

Test set-up & method

A proof-of-concept trial was set up involving Air Cargo Belgium (ACB), two freight forwarders, and one ground handling agent at BRUcargo.

RFID tags and fixed/handheld readers were deployed to track pharmaceutical air shipments during handovers. The trial evaluated packaging materials, tag placement, metal interference, pallet/ULD shielding, and reader coverage across operational zones

RFID tallying was also compared with manual registration for read accuracy and handover time.

Data & measurement

KPIs:

The proof-of-concept established three primary evaluation metrics:

- Tag-read accuracy: Comparing automated scan success rates against physical cargo counts.
- Handover processing time: Benchmarking automated RFID identification speed against manual registration methods.
- Stakeholder feasibility: Assessing operational usability through post-pilot interviews with forwarders and handlers

To build a robust dataset, more than 4,000 pharmaceutical shipments were tagged and monitored across forwarder and ground handler handovers at BRUcargo. Data collection focused on comparing automated RFID scan times directly against traditional manual registration workflows.

Risks & mitigations

Key risks were:

- metal interference
- pharma-packaging texture
- hidden tags inside built-up ULD pallets
- incorrect flag-tag placement.

Mitigation options include on-metal/high-performance tags, handheld readers, extra overhead antennas and multilingual staff training.

Limitations

The trial was designed strictly as a localized proof-of-concept focused on pharmaceutical cargo. Continuous end-to-end tracking throughout the broader international chain was out of scope, and final stakeholder satisfaction interviews were pending at the close of the pilot phase.

04 RESULTS & IMPACT

Key results

RFID showed strong speed potential. Automated RFID cargo identification took only a few seconds per shipment, compared to 2 to 5 minutes for manual processes. However, fixed readers successfully detected only 43% of tags due to metallic pharma packaging, inconsistent tag placement, and signal shielding inside built-up ULD pallets.

Because missed tags required manual verification checks, the trial delivered no net time savings in practice and exhibited a higher error margin than traditional manual counting.

The underlying concept remains promising for high-speed automated tracking, provided technical read-rate limitations are resolved.

Achieving operational viability requires improved reader coverage, standardized flag-tag placement protocols, optimized tag selection for metallic packaging, and updated operational practices for handling staff prior to any full deployment.



05 RATINGS (QUICK ASSESSMENT)

Deployment Approach

How standardised is the solution: can it be deployed off the shelf, or does it require extensive customization?

Off The Shelf — Custom-Built

Investment Magnitude

From low-cost deployment to major investment.

Low Investment (less than €10k) — High Investment (more than €15mio)

OPEX — CAPEX

Sector Readiness

From non-existing or emerging standards, regulations, and certification pathways to fully established industry practices.

Emerging Framework — Established Framework

Innovation Maturity

How does the solution score in terms of maturity, from low TRL experimental/pilot-stage to high TRL market-ready.

Experimental — Market-Ready

Operational Impact

Does the innovation deliver targeted improvements or rather drastically transform processes and/or operations.

Incremental Improvement — Transformational Change

Notes

The PoC confirms that RFID can make individual reads much faster, but reliability is the critical gate for adoption. Airports should validate performance with their own cargo mix, packaging, ULD configurations and warehouse environment before building a business case.

06 NEXT STEPS / RECOMMENDATION

Recommendation

Adapt and continue testing: do not scale operationally until tag detection is consistently reliable and manual verification is no longer required.

Next steps

1) Test on-metal and high-performance tags.

2) Add handheld readers or overhead antennas for hidden pallet cargo.

3) Standardise tag placement with short multilingual training videos.

4) Repeat accuracy/time tests and complete partner interviews before scale-up.