



Container Centralen chooses HID tamper-evident RFID tags to secure horticulture logistics.

“A tag that’s robust, watertight, tamper proof, cost effective and easy to fit. Created for Horticultural RTI specialist, Container Centralen”

Leonard Smitts, Team Leader, Container Centralen

Container Centralen are a successful, highly specialised company that have grown steadily since their inception in Denmark in 1977.

Their business model is relatively simple – they operate a membership pool for plant and flower growers in the Horticulture industry whereby the members have access to a ready supply of identical, high quality, well maintained, fit-for-purpose ‘Returnable Transport Items’ (RTI’s).

Container Centralen’s trolleys are designed specifically for the needs of plant sellers to get their produce to market in the best condition possible.

A simple model in some ways, but there are complex factors that come in to play given the scale and distribution of the network of members across Europe (21,000 growers using a fleet of 4.5M trolleys), the tough conditions that the RTI’s are subjected to and the high value of the assets (making them a target for counterfeiters).

In partnership with



CHALLENGE

Container Centralen had a solution in place to be able to identify their trolleys. This was a robust, red metal tag a bit like a padlock. It had served them well but they were keen to improve RFID functionality to aid tracking and monitoring and to make it harder for anyone producing a fake trolley to add a convincing looking tag (the red tags were being copied in high volumes). Particular issues letting the old tags down:

- They had a design flaw that meant they could be opened in a particular way and re-applied to another trolley.
- They were expensive to produce.
- The RFID element was not visible from just looking at the tag meaning that cheap, fakes could be produced which could only be identified by being read by an RFID reader and not by sight.

Container Centralen embarked on a tender process with a range of solution providers and awarded the contract to Omni-ID (now part of HID) and Lyngsoe Systems.

The brief was tough and the timescale was short as any new solution was required to be in place within a year in order that the new tags could be applied to 4.5M RTI's in time for a key selling/distribution period in the Horticultural industry.

The new tag solution would need to meet the following stringent criteria:

- Lightweight yet extremely tough - to resist impact and rough treatment in transit, during storage (stacking) or while in use in the 'field'.
- Ability to resist both very high and low external temperatures and other factors associated with normal European weather conditions (storage temperature -30oC to +70oC. Operating temperature -10° C to +60° C. Storage humidity up to 100%. Operating humidity up to 95%).
- Extremely waterproof – both from natural rainwater but also from regular watering of plants while on the trolleys.
- Very easy to deploy (under 5 seconds) with some kind of indicator that deployment was complete/successful.
- Easy identification that the tag is genuine.
- Based on the variation in trolley hook size the tag width must not exceed 2cm.
- Long RFID read range (at least 14 metres as achieved by the old tag).
- Very effective RFID performance (max reading time per base - 0.5 seconds, max reading time per stack of 6 bases – 6 seconds). The tag should also be readable when there are 3 tags next to each other to allow for future re-labelling scenarios.
- The read range must be constant during a lifetime of 5 years and no different performance level between the tags is allowed.
- Reading of the labels must be possible when bases are wrapped in plastic foil, sprayed with water and covered in stickers.
- Affordable unit cost (due to the massive volume required).
- Multiple tamper-evident features to prevent the removal from one trolley to then be placed on another.
- Very hard to copy by unscrupulous parties looking to supply counterfeit trolleys (ensure that significant investment would be required as a barrier to someone wanting to create a convincing replica).
- The performance of the new tag must not be affected by the old red tag if one is still in place (either mechanically or electronically).
- All material must be RoHS compliant.
- The weight of the new tag must be less than 23g.

SOLUTION

HID worked closely with Lyngsoe systems to put forward a solution that was not only way in advance of the incumbent tagging solution but also of the other companies in the tender process.

HID's technical and engineering departments started with a complete 'blank piece of paper' to design something totally bespoke to the needs of Container Centralen.

Key Tag Characteristics

Strength

In sourcing an appropriate material the HID team pinpointed the plastic used in car headlights as it is light yet extremely strong and very waterproof. Strength is important as the trolleys are stacked on top of each other when not in use and can also take quite a lot of impact during use or when in transit. Also, as a visible 'appendage' to the trolleys there is a tendency for people to pull them as a way of maneuvering the trolleys (or stacks of trolleys) so they need to support heavy weight and force.

Read Performance

The objective at the start of the project was for the read strength to be at least as good as the previous 'red' tag (14 metres). In fact the resulting read range delivered by the new tag is 16 metres. In stage one of production of the tags the entire first batch of 4.5 million were tested for RFID performance.

Resistance to Water, Chemicals and Temperature

The tags were extensively tested for water resistance (testing included immersion in 2m of water for 2 hours). They were also tested to resistance to solvents and chemicals used in agriculture and retail operations (like chlorine solutions).

The tags were also tested for storage at temperatures from -30oC to +70oC and for operating at temperatures from -10oC to +60oC (for up to 700 hours in each extreme condition). 182,000 tags were tested on all elements and performed extremely well in all the above tests.

Tamper Proof

The tags have a very clever design that means the RF circuitry is only fully effective when the tag is folded to its mounted position and clipped together. This not only means that it is then impossible to remove without destroying or cutting through the plastic (making re-attachment impossible) but also means that the antenna and RF circuit is also rendered virtually useless during forced removal (reducing RF performance by over 85%) meaning that the tag cannot be read (i.e. if a tag does not register on the scanner it has either been tampered with or is a fake).

Hard to Copy

There are many factors that make the tags very hard to replicate:

- Use of NXP brand identifier within the TID memory bank of IC used in RFID circuit.
- The aluminum antenna is visible through the casing of the tag which is virtually impossible to reproduce from a printing point of view making fakes with no RFID element easy to spot.

The resulting design has gained 21 European patents showing how many unique characteristics have been built into these highly innovative tags.



A number of trolley bases stacked on top of each other.



The tags are so strong that if pulled it is the metal fixing on the trolley that will often break off before the tag breaks (the average tensile strength of the tags is 120kg+).

- When joined there is a large 'button' of plastic at the joining end which is removed when the tag is broken apart making it easy to spot if one has been opened and attempted to be put back together again.
- The way the RF circuitry flows through the length of the tag.
- Embossing of the CC logo into the plastic.

Ease of Fitting/Mounting

The process of mounting the tags is beautifully simple. The first step is to remove the self-adhesive protective label. Then the tag is folded together using the hinges which creates the hanger for the trolley bar. As the two ends come together there are 2 audible clicks that tell the operator the installation is successful. At this point the tag cannot be removed without destroying the plastic and negating the RF performance.

Proof of the ease of fitting came when it was decided to ask the users to retrofit the tags to the existing fleet of trolleys (an impossible task otherwise with 4m trolleys in use at any one time across a huge European footprint).

RESULT

The project was completed within the short time constraints (design to delivery in under 6 months).

The new tags have met the customers stringent cost constraints per unit (in fact the new tag is a third of the cost of its predecessor).

The RAIN® RFID UHF tags are performing extremely well in the harsh conditions - in the first 12 months the number of tags that needed replacing was reduced from 60,000 in the previous 12 months with the old tag to 40,000 with the new tag.

Copying the tags is proving very hard indeed – with the previous red tags copies could be seen within 3 weeks of deployment whereas the first copies of these new tags were not seen until after over 6 months. As a result there are at least 30% less fake trolleys in the pool – creating a considerable cost saving.

The success of the tags has generated considerable goodwill amongst the end users themselves as they are happy to fit new tags as required given how easy the process is and are also much more inclined to scan the tags to provide data given how easy that is too (scanning is up by nearly 40%).

Overall the robustness, performance, ease-of-use and lack of unauthorized replication of these tags has delighted the project owners at Container Centralen.

Visit www.hidglobal.com/rfid to learn more or e-mail tagsales@hidglobal.com



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 2023-01-18-cc-idt-container-centralen-cs-en PLT-06928
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Solutions:

Custom designed tamper evident RAIN RFID tag

DESIGNED

- High UV tolerance
- Label should adopt as little dirt as possible (slippery/low moisture absorption)
- Weight below 23 grams
- Label pull strength above 15kg
- If the label is removed, it should be visibly damaged and not be reusable
- RFID performance should be the same or better as with the red tag

TESTED

- Water resistance (non emersion: exposure to rain and watering of plants)
- Resistant to solvent and chemicals used in agriculture grower and retail operation (like chloring solutions)
- Storing temperatures from -30° to +70°, operating temperatures from -10 to +60
- Material tested for the automotive industry

“Relabeling the containers was a huge challenge. To be honest, from day one HID had good solutions for every challenge we had.”

This label has been a great leap forward from the previous label and the co-operation between the two companies is nothing less than very, very special. A beautiful product, a beautiful solution.”

Leonard Smitts,
 Team Leader,
 Container Centralen