Reusable Containers with RFID
Facts and Information About Smart Labeling
Industry 4.0 Starts with Smart Container Tracking
Comparison of Industry 3.0 and Industry 4.0

Industry 3.0
- Centralized container control
- Rigid and complex production
- Kanban systems optimize container flow
- Established value-added chains
- Pre-planned production systems
- Optimization by mere cycle improvement
- Containers are passive objects in placement for processing
- Inflexible management of empties

Industry 4.0
- Local self-organization at container level
- Decisions depending on individual contexts
- Virtual ad-hoc organization
- Autonomous, self-organizing containers
- Smart containers actively control the production process
- Swarm intelligence coordinates optimum container tours
- Comprehensive use of data
- Flexible manufacturing cells use integrated container systems
- Optimized empties management
Evolution of Reusable Containers

- Container with number
- Container with code
- Container with RFID
- Container with cyber-physical crosslinking

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Perfect Crosslinking of All Process Partners
Container Management

Control by container

Control by container

Swarm
Savings Potential Through RFID

- 20-30% reduction of new purchases
- Cost allocation of loss per user
- Real-time pick and place system according to the kanban system
- Real-time inventory information in empties management
- Automated separation after washing prompt
- Bulk inspection of incoming goods without counting individual containers
- Correct goods at the correct manufacturing cell

- Automated supply chain tracking including suppliers
- Evidence of passage right on the container
- Release status display for material per container
- Work assignments on the container for control
- Local conveyor control through container
- Bulk inspection of outgoing goods without counting individual containers
- Mobile information about container content on the external surfaces
Solutions for Consistent RFID Container Tracking

For continuous RFID container tracking, all container variants must enable RFID detection. Standard UHF RFID labels function only on plastic containers but not on containers made of metal or ESD or if the containers pass through heat or drying processes. Schreiner Group offers RFID labels for all kinds of containers.
RFID Label Solutions for Container Applications

Objectives of RFID Container Tracking

☐ Automated capture in filling
☐ Automated capture in assembly
☐ Container control during their passage at conveyor level
☐ Documentation of washing processes with automated separation
☐ Reliable activation of machines through release of material at container level
☐ Automated bulk reading upon warehousing
☐ Automated, complete capture according to the Kanban system
☐ Optimized route logistics through bulk tracking
☐ Automated bulk capture during incoming/outgoing goods inspections
☐ Actual data of empties management and bulk reading of empties
☐ Reduction of new purchases of containers
☐ Automated recording of external container inventory at company level
Requirements for RFID Container Tracking

☐ Definition of processes and optional RFID tracking points
☐ Selection of the adhesive and label materials holding up to the long-time application
☐ Selection of RFID inlays facilitating the suitable reading range for the intended application
☐ Decision on the proper data content and its location on the chip
☐ Decision on the ideal kind of application and the number of labels needed per container
☐ Definition of basic performance requirements that all RFID labels must meet
☐ Determination of the human-readable label text
☐ Feasibility test at the critical points of the practical application
RFID Label Solutions for Container Applications

Requirements for the Selection of the Suitable RFID Chip/Inlay Combination

- How many characters (incl. spaces, symbols) are to be on the chip?
- How will the content be categorized on the chip to enable the depiction of different container versions?
- Will variable data be stored on the label during passage?
- Should the container be able to control its passages itself (without 100% software connection)?
- What is the container material (plastic, metal, ESD, wood)?
- What are the maximum dimensions of the smooth surface available for label application?
- Do containers of different materials have to be read at the same reading points?
- Is bulk reading of the containers (e.g., on pallets) required? If so, how many containers (maximum)? At what speed?
- What are the max. reading ranges to be achieved (e.g., width of the logistics gate)?
- Does the chip have to comply with different standards such as EPC Gen2, GS1, VDA, etc.?
Requirements for Practical Applications

☐ How long at the least does the label have to function?
☐ How long must the human-readable text be legible?
☐ How many times on average will the containers be washed?
☐ At what temperature and with what detergent are the containers washed?
☐ Is it possible to place the label in a small protective recess or under a bar?
☐ With ESD or metal containers: Are the labels placed in a recess or directly surrounded by bars?
☐ Can it be guaranteed that a pair of two identical labels is applied on every container?
☐ How is it possible to visually identify the new RFID containers as such?
☐ How many new containers per year are purchased?
☐ How many existing containers need to be labeled?
☐ From what moment on will a pool of RFID containers sufficient for using automated processes be available?
Optimum Label Compound

RFID layer inside

Barcode or 2D code

Optimized adhesive resistant to cleaning processes

Container type

Department or the like

Container number

Protective laminate resistant to cleaning processes

White film
When applying only one RFID label, always direct the labeled container side toward the RFID reader – especially when the container is being filled with metal.

RFID label pairs adhered diagonally on opposite sides ensure constant optimal reading results provided that the containers are stacked crosswise on the pallet.

RFID label pairs adhered diagonally on opposite sides ensure constant optimal reading results provided that the containers are stacked lengthwise on the pallet.

RFID label pairs adhered diagonally as well as facing one another on all sides ensure constant optimal reading results.
Container Layouts in Practical Applications

When RFID labels are applied to the container sides with no containers in the middle the containers can always be read – even when being filled with metal.

When RFID labels are applied to the narrow container side with no containers in the middle the containers can always be read – even when being filled with metal.

Containers placed in the middle of a stacking layout are difficult or impossible to read if they contain large quantities of metal or liquid.
RFID Product Solutions for Reusable Containers
RFID Label Solutions for Container Applications

((rfid))-RTI Label

RFID Label for Large Reading Ranges on Plastic Containers of up to 8 m

- Available laminated, printed and programmed (wash-resistant)
- Ideal for RFID tracking involving gate passages with forklifts
- Ideal for RFID bulk reading
- Ideal for optimum empties management
- Ideal for kanban processes
- Ideal for incoming goods inspection at pallet level
- Ideal for forklift controlled route optimized processes at pallet level

Approx. 100 x 35 mm ((rfid))-RTI Label: available laminated, printed and programmed (wash-resistant)
RFID Label Solutions for Container Applications

((rfid))-RTI Label

RFID Label for Medium Reading Ranges of up to 5 m on Plastic Containers

■ Ideal for RFID tracking involving loading gates with clearance widths of up to 5 m
■ Ideal for RFID bulk reading from difficult reading angles
■ Ideal for empties management
■ Ideal for kanban processes
■ Ideal for incoming goods inspection at pallet level
■ Ideal for forklift controlled route optimized processes at pallet level
■ Omnidirectional UHF inlay for optimum readability from any angle

Approx. 50 x 50 mm ((rfid))-RTI label: available laminated, printed and programmed (wash-resistant)
RFID Label Solutions for Container Applications

((rfid))-DistaFerr ESD Longrange

RFID Label for Long Read Ranges of 6 to 7 m on ESD Containers

- Ideal for empties tracking in all processes
- Ideal for automatic bulk reading when forklift trucks pass through gates in receiving and shipping departments
- Suitable for RFID tracking on line conveyors
- Suitable for RFID container data acquisition in Kanban systems of assembly operations
- Handheld reading is possible

90 x 36 mm ((rfid))-DistaFerr ESD Label: optionally blank or printed and programmed (wash-resistant)
RFID Label Solutions for Container Applications

((rfid))-DistaFerr ESD B

RFID Label for Small to Medium Reading Ranges of 1.5 to 2 m on ESD Containers

- Ideal for tracking empties pallets on roller conveyors
- Ideal for RFID tracking involving flat or overhead conveyors
- Ideal for RFID container capture in kanban pick and place systems for assembly
- Ideal for capture via handheld devices
- Ideal for guiding individual containers up to the plant/system
- Ideal for reading trays

69 x 15 mm ((rfid))-DistaFerr ESD label: available neutral or printed and programmed (wash-resistant)
Different RFID Labels for Applications on Metal Containers in Europe, USA and China

RFID Label for Special Frequencies in the US/NAFTA Countries/EU and China

- EU/South Africa frequency 868-870 MHz ETSI standard to be operated with a maximum output of 2 Watt.
- USA/NAFTA/China frequency 915-920 MHz FCC standard to be operated with a maximum output of 4 Watt.

On metal, different frequency bands are to be observed.

Different standards are only relevant for UHF labels on metal.
RFID Label Solutions for Container Applications

((rfid))-DistaFerr SL2 (Version ETSI or version FCC)

RFID Label for Medium to Large Reading Ranges of up to 4 m on Metal Containers

- Ideal for RFID tracking involving flat or overhead conveyors
- Ideal for RFID container capture in kanban pick and place systems for assembly
- Ideal for capture via handheld devices
- Ideal for guiding individual containers up to the plant/system
- Ideal for capture involving clearance widths of up to 4 m
- Suitable only for capture in Europe

50 x 22.5 mm ((rfid))-DistaFerr SL Label (European version): available neutral or printed and programmed (wash-resistant)
RFID Label Solutions for Container Applications

(((rfid))-DistaFerr HT (ETSI))

RFID Label for Medium Read Ranges of 1.5 to 2 m on Metal

- DistaFerr HT for heat up to 160 °C
- DistaFerr HT for heat up to 230 °C
- Ideal for RFID tracking of forklift transports
- Ideal for RFID data acquisition of containers in assembly or drying processes
- Ideal for handheld reading
- Ideal for automatically controlled painting processes
- Suitable only for data acquisition in Europe
RFID Label Solutions for Container Applications

((rfid))-DistaFerr Global ((rfid))-DistaFerr Global LR

RFID Label for Read Ranges of 3.5 to 6 m on Metal
- 3.5 m with NXP UCode7 XM chip (VDA version)
- 6 m with NXP UCode 8 chip (128 Bit EPC)
- One size, two versions
- Ideal for RFID tracking on line or overhead conveyors
- Suitable for RFID container data acquisition in Kanban systems of assembly operations
- Ideal for handheld reading
- Ideal for guided single container processes all the way to the machine
- Ideal for reading when passing through gates up to 4 m
- Suitable for worldwide reading on metal

50x40 mm ((rfid))-DistaFerr Global Label & Global LR: optionally blank or printed and programmed (wash-resistant)
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