RAIN RFID 101 for Label Converters

Crash Course on RAIN RFID for Label Converters

Voyantic

TSC PRINTRONIX AUTO ID

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Introductions

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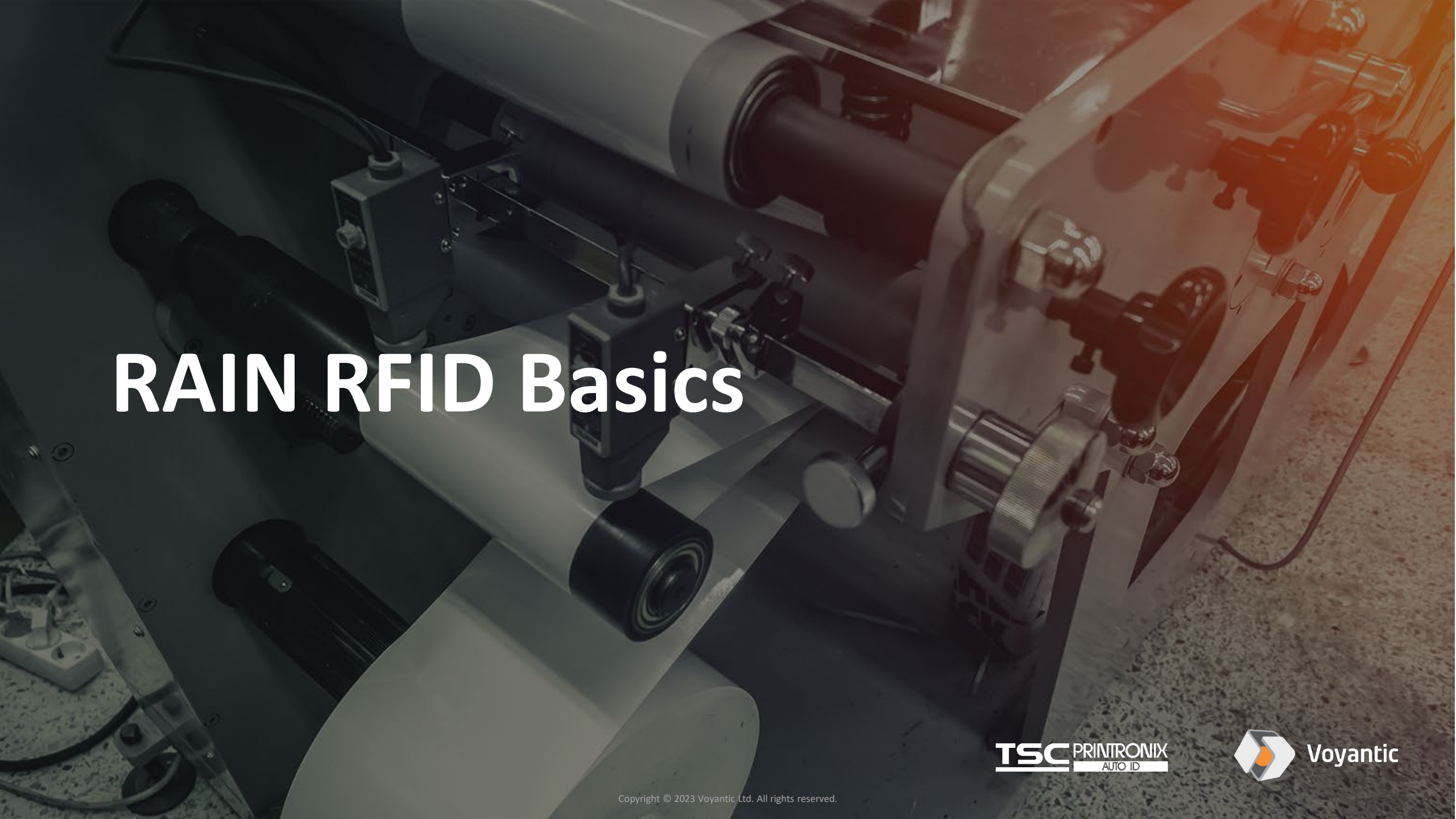

RAIN RFID Basics

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RAIN RFID

RAIN RFID is a wireless technology that connects everyday items to networks and the Internet, enabling businesses and consumers to **identify, locate, authenticate**, and **engage** each item.

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RAIN RFID Use-Cases in Practice

- Manual scanning with handheld readers
- Zone reading with overhead readers
- Point of sale, Self-checkout counters
- Transition reading, aka “gate” or “portal”
- Robots doing inventories
- 24/7 retail cabinets, smart shelves

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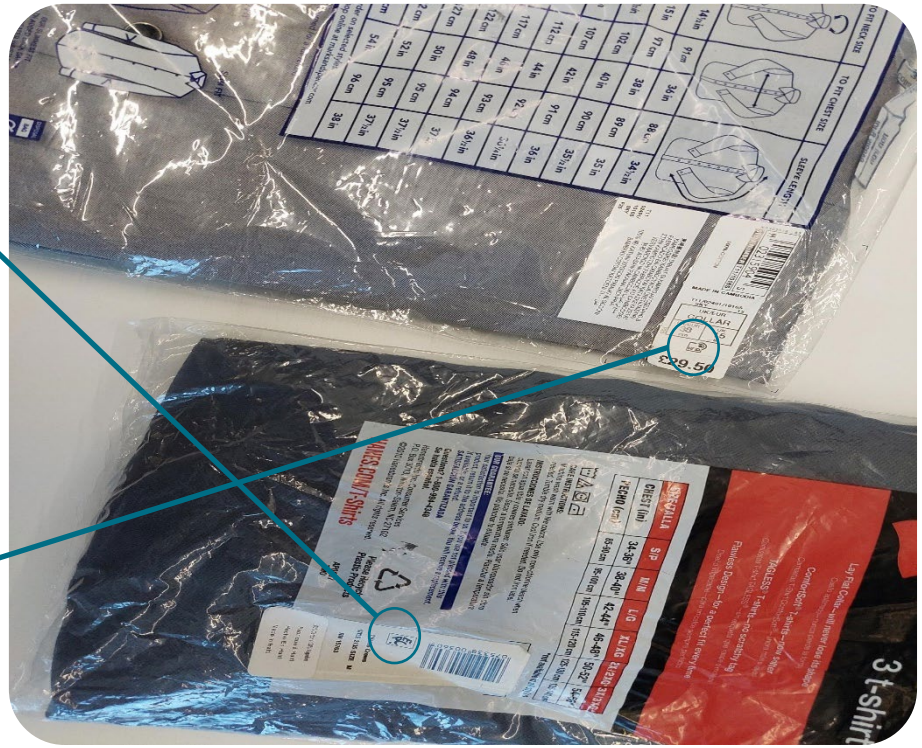
An Emblem Indicates RAIN RFID Functionality



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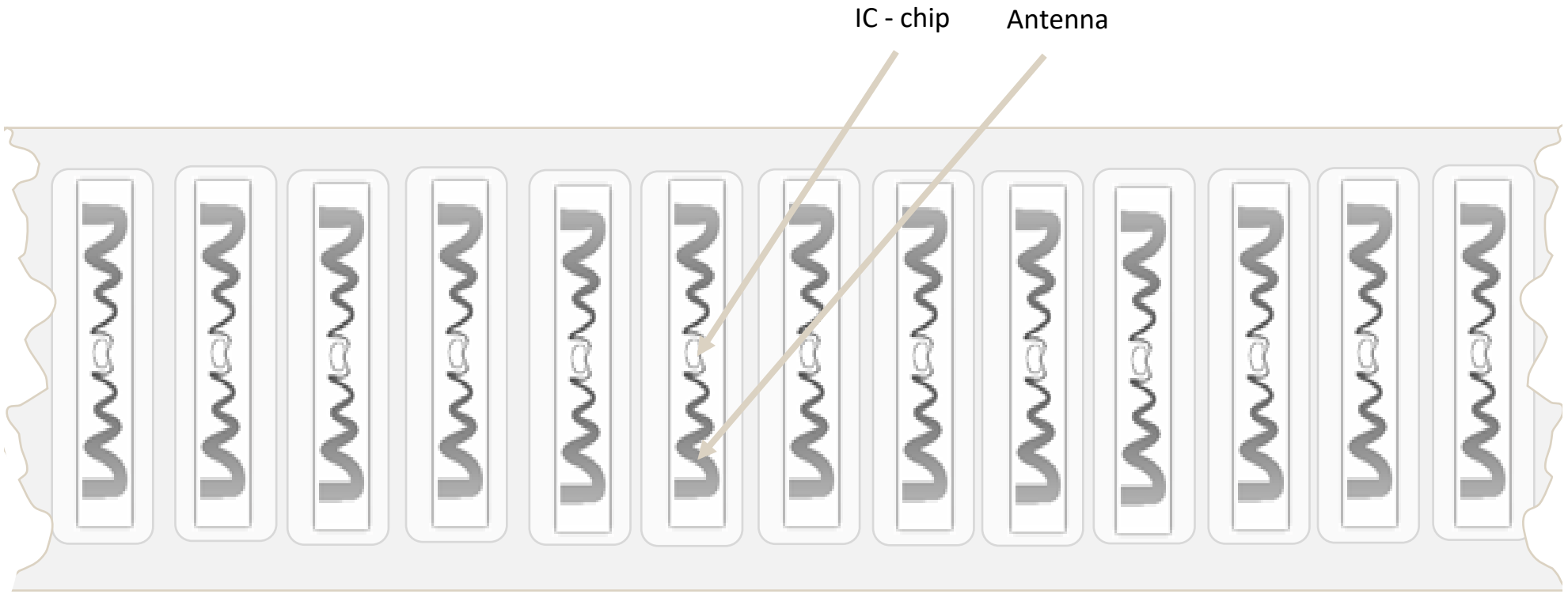
Inlay Structure



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Inlay Terminology

Dry / Wet inlays

PET / paper substrate

Cut / Uncut labels

Woven aka Care label

Hangtag

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RFID Market

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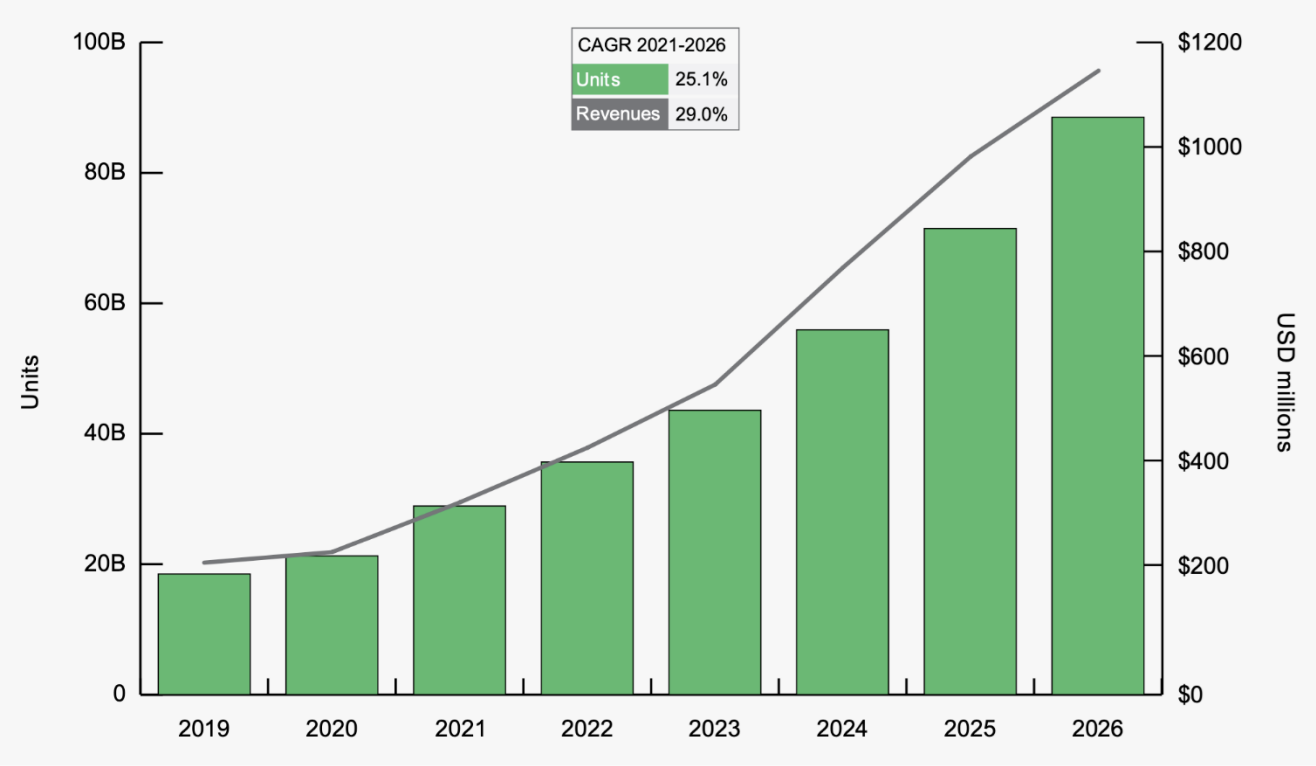
RAIN RFID Market is the Right Market to Be in

Exhibit 1-2: Global RAIN RFID Tag IC Forecast
(2021 Base Year)



Source – RAIN Alliance Market Research Report 2022

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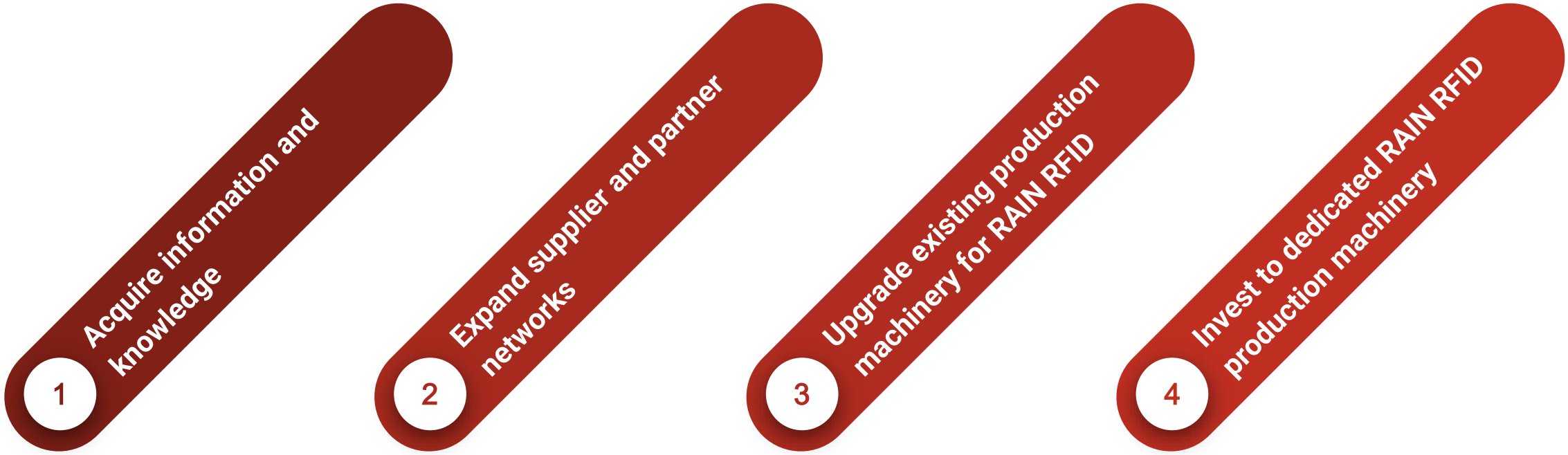
How Label Producers Are Reacting to the Increased Demand



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RFID Manufacturing Process

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Tagging Items with RAIN RFID Labels

CHIP ATTACH

Chip (IC) is connected to an antenna

LABEL CONVERTING

Inlays are separated and material layers are added

PERSONALIZATIO N

Label is programmed and printed

ATTACHMENT

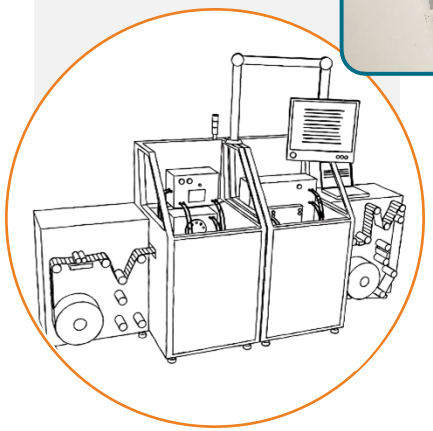
Label is applied on or attached to the item

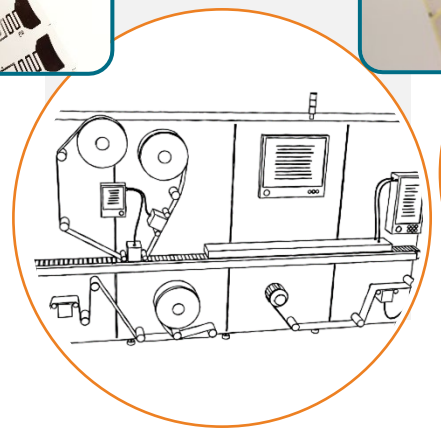
INLAY

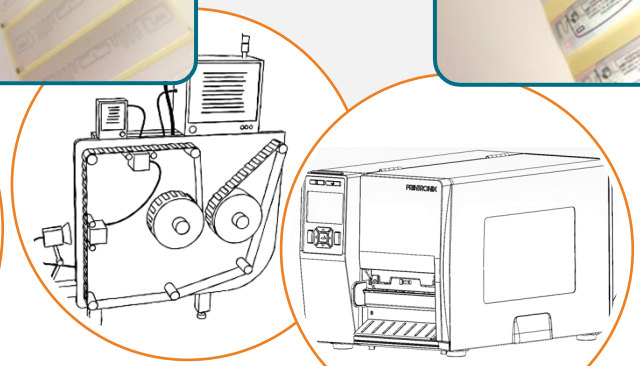
BLANK LABEL

FINISHED LABEL

TAGGED ITEM







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How to React to Increasing Volumes

Increase RFID label manufacturing throughput

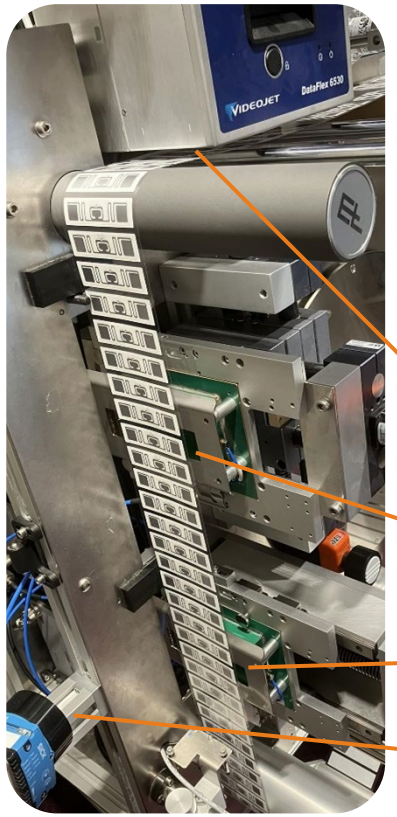
- Move from single-lane to multilane setups
- Tune process steps for higher speed and shorter cycle times

Simplify the label manufacturing process

- Cover more steps in the same process

Embed RAIN RFID to other product structures

- Add RFID on prime labels
- Add RFID directly on packages
- Integrate directly into items



Mark / print

RFID Encode

RFID Test

Optical scan

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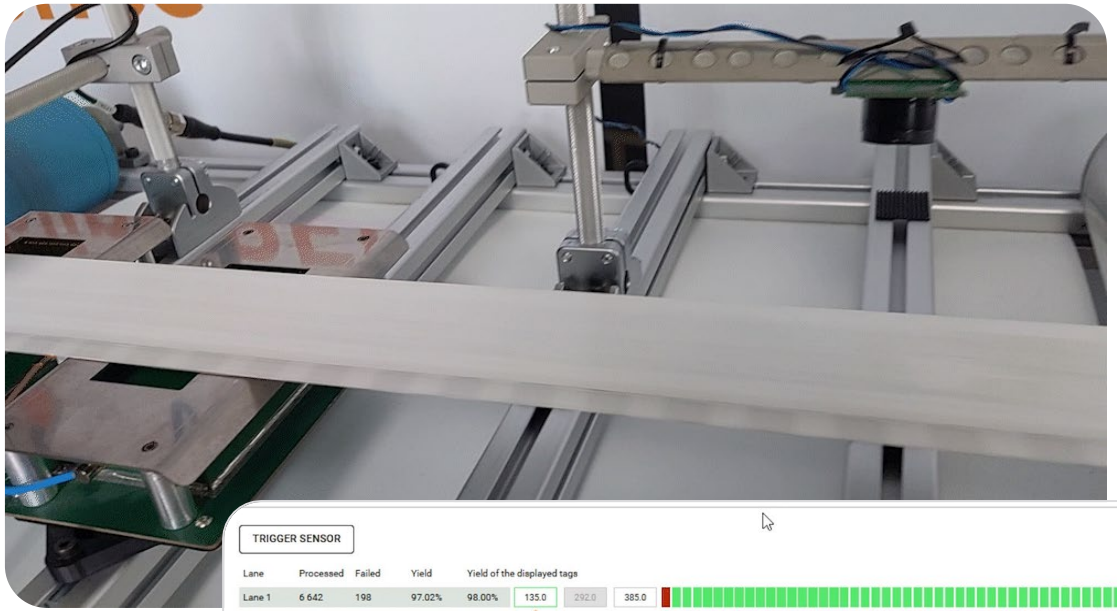
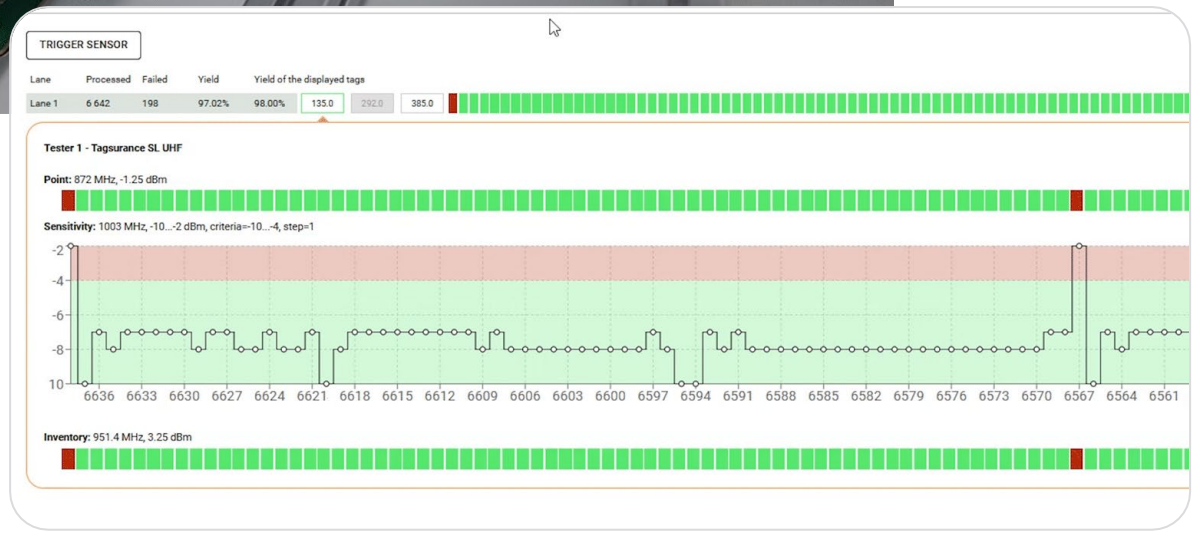
Quality Control





TAGS: PRODUCTION QUALITY, PRODUCTION TESTING

On-Demand Webinar: Quality Management Approaches in RAIN RFID and NFC Manufacturing

Denial is one approach. This webinar offers better alternatives...

Watch Now

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How to Get Started in RFID Converting?

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How to Get Started

My label customer needs to deliver goods with RFID!?!

Auburn RFID Lab?
GS1?
EPC?
Inlay?

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How to Get Started

1. Source inlays
2. Machinery to insert/laminate RFID inlay to a sticker or prime label
3. Add Quality Control
4. Encoding? If yes – encoding hardware and data models

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Retail RFID Mandate Terminology

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What Lingo Do You Need to Know?

Your customers are turning to you now and saying, “Hey, you do a great job with my labels, but now they need to have RFID too. Deliver.”

Fundamentally, you are converting a UPC / EAN barcode number to an RFID encoding and adding a serial number

- UPC ≈ EAN ≈ GTIN
  - GS1 number that identifies a product type
- Not to be confused with Electronic Product Code, EPC
  - GS1 term ≈ “RFID” or “RFID-encoded number”
  - EPC or ISO RFID logo usually required on labels
- SGTIN-96:
  - Mindset shift from product type to serialized items
  - GS1 RFID “conversion” of UPC / EAN number to RFID
  - Permalock (Lock not used in most mandates)

Image source: GS1

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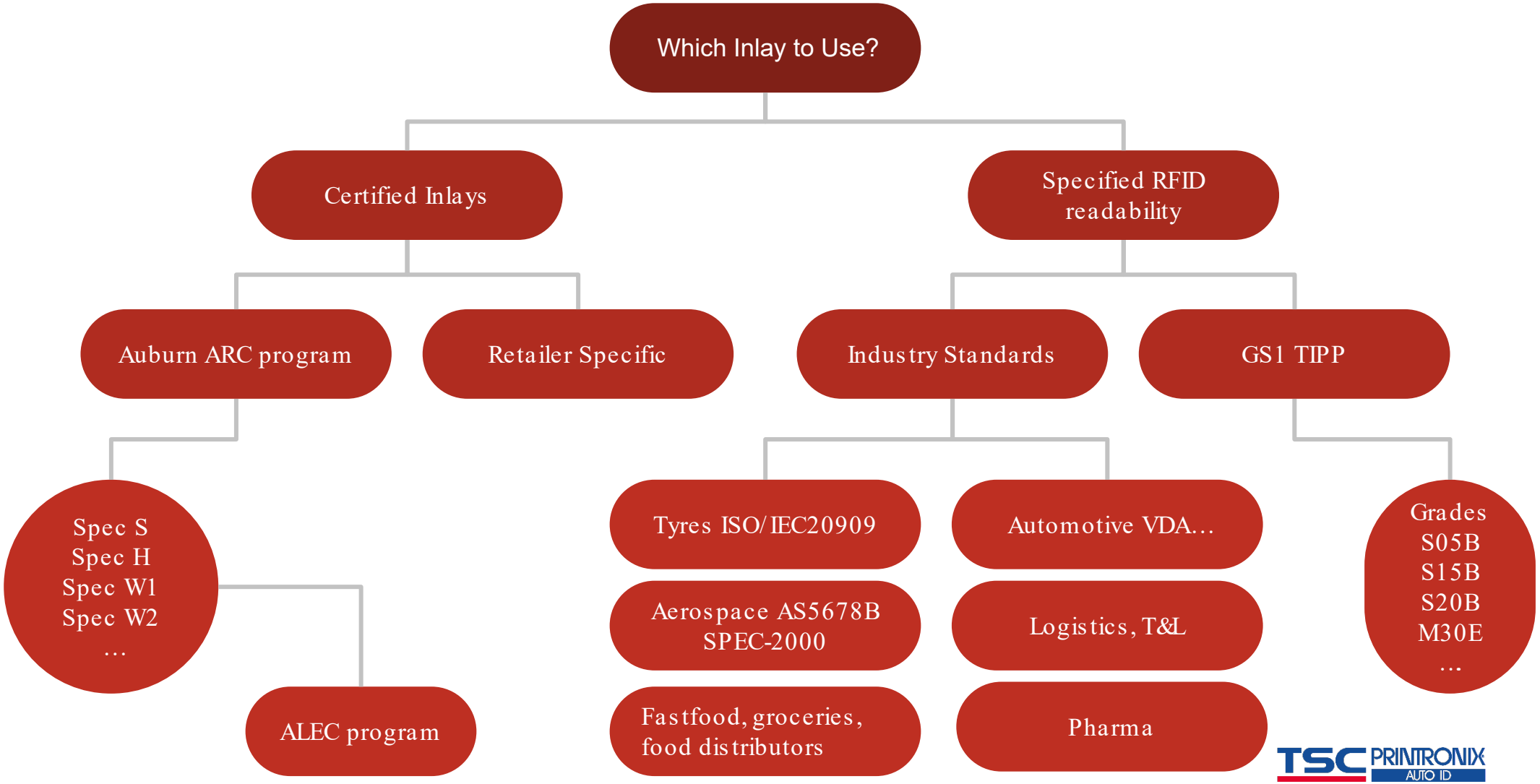
What Lingo Do You Need to Know?



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What Lingo Do You Need to Know?

Which inlays can I use?

- Check for allowable / de facto inlays
  - Decision-tree
- Inlay quality certifications
  - (Auburn) ARC Specs
  - Retailer in-house

Apparel

Department	Subcategory	Inlay Spec	Approved Inlay List
D23 – Mens	Apparel	W1	https://rfidlab.org/arc/spec-w1.php
D23 – Mens	Socks, Polybagged underwear, Banded underwear, Boxed apparel	W2	https://rfidlab.org/arc/spec-w2.php

Table source: https://rfid.auburn.edu/walmartspec/

What Lingo Do You Need to Know?

Print and encode terminology

Possible label types

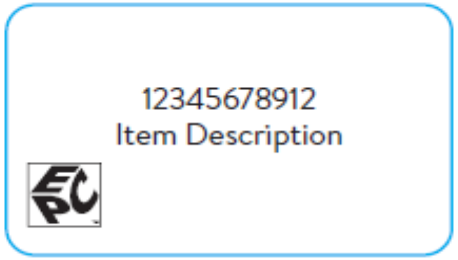
- Sticker with inlay + ≈1,5mm border
- Prime label, hangtag, embedded tag / packaging
- CAUTION: Facestock and adhesive requirements?

Label / sticker approval process:

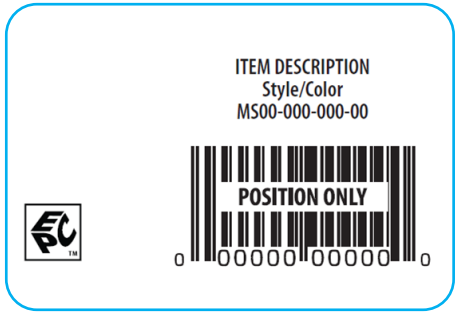
- (Auburn) ALEC program
- Retailer in-house

GS1 TIPP

- Similar to ARC and ALEC but for tagged items
- In use in Europe; Keep it on your radar for now



Sticker for product with pre-existing barcode



Sticker for product with no barcode

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What Does a Converter Need?

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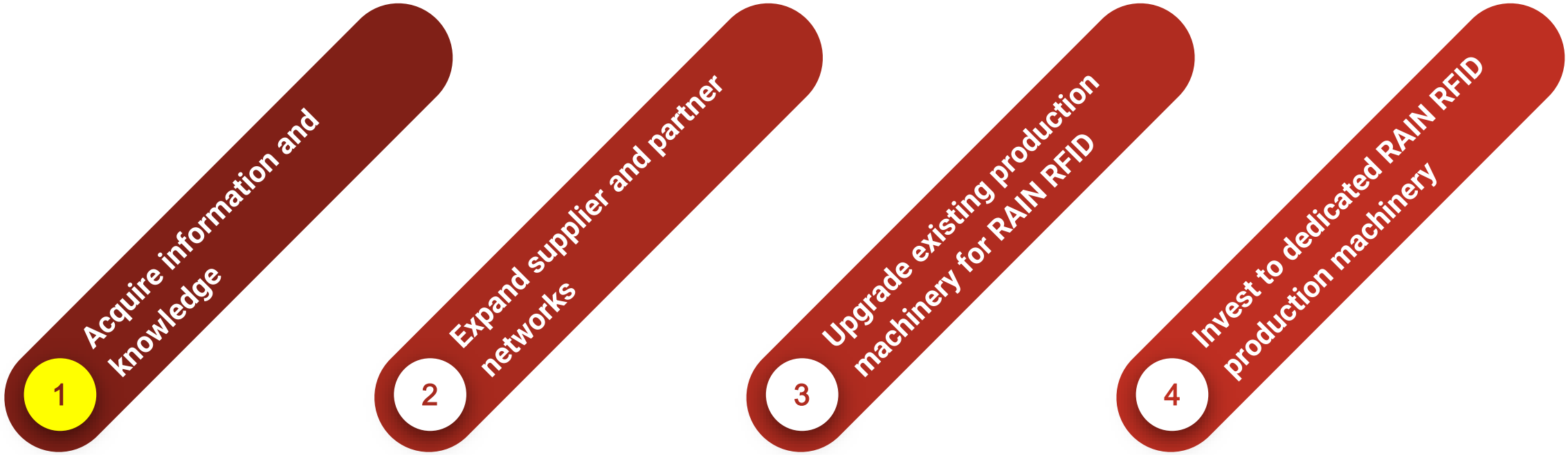

Understand the Requirement / Mandate

- Inlay defined or ARC Spec? Freedom to choose?
- Sticker, integrated hangtag, prime label?
- Printed, partially printed?
- Encoded? “Encoding Scheme” (aka “numbering system”)?
- Locked? Permalocked?

Voyantic and TSC Printronix are available to help interpret the requirement documentation

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1. Acquire information and knowledge
2. Expand supplier and partner networks
3. Upgrade existing production machinery for RAIN RFID
4. Invest to dedicated RAIN RFID production machinery

In-house Expertise on Retail Mandates Needed

- Connections and communication channels with retailers, Auburn, GS1
- Knowledge of the approval process from initial documentation up to approved labels
- Connections with inlay manufacturers
- Encoding schemes expertise (SGTIN-96 and soon GS1 TDS 2.0)
- Serial number management

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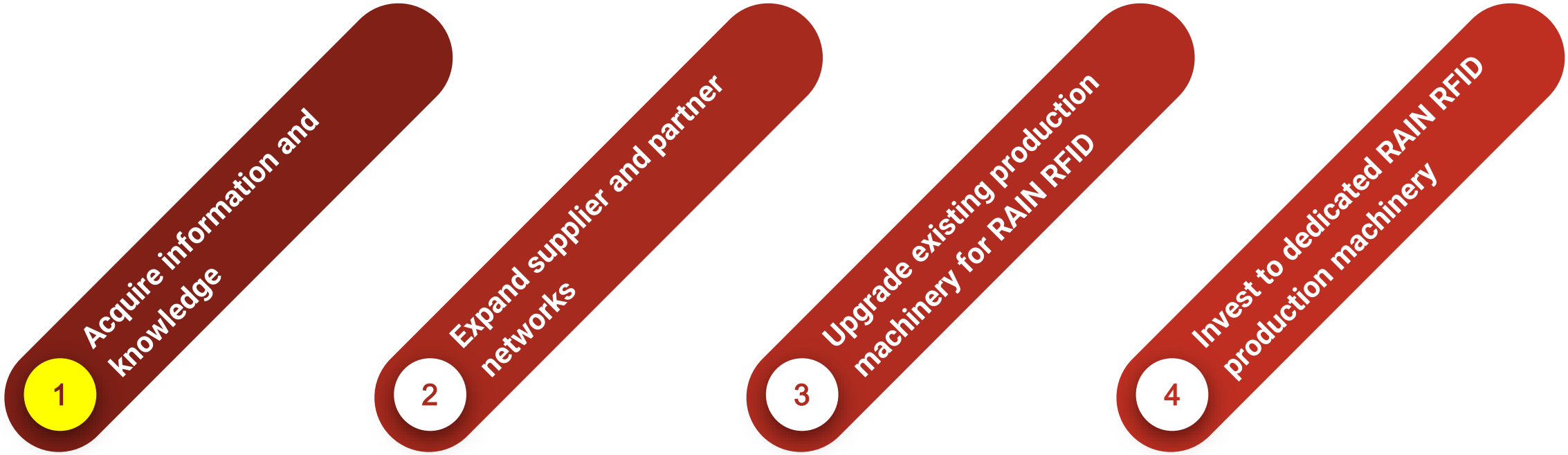

In-house Expertise on Retail Mandates Needed

“I’m sorry, that chip and/or inlay has been discontinued”

- Discontinued chips and/or inlays are both an obstacle and **an opportunity** for label suppliers
- Knowledge of chip specs: Memory, Locking / Permalocking, special IC features
- Alternate chips, alternate inlays

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Source Inlays

- Inlay is the core component of any RFID tag or label
- Capabilities of the converting machine may introduce limitations on the type of inlays that can be used
- Inlay needs to meet the performance specification from the retailer

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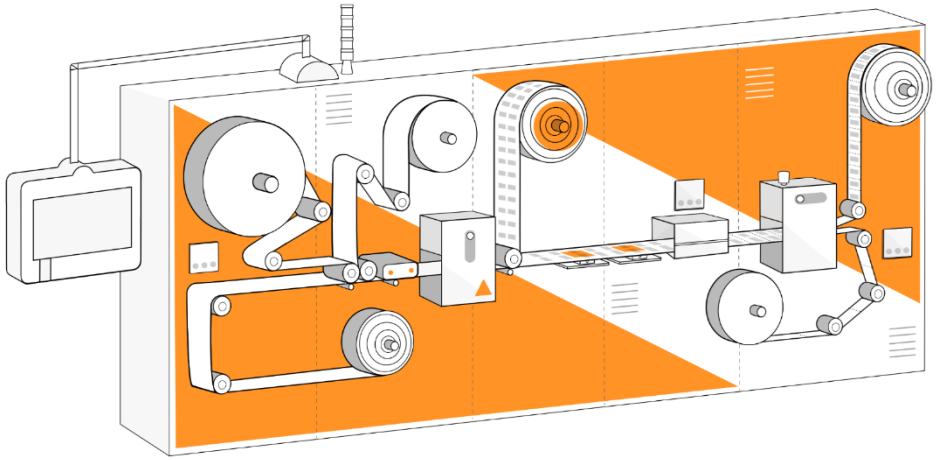
Converting Equipment

RFID inlay is a layer of material. Typically, “normal” insertion, laminating, die cuts, etc can be used.

Quality control is typically utilized, as it reduces production reruns and other unfavorable incidents.

Inlay is not continuous material, but a “sticker” on its own. Position control is critical – the inlay must be in a consistent position inside the label, and must not be cut, perforated, etc.



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Encoding Equipment

The ideal is inline, high-speed encoding for large volumes

- Mindset shift from everyday items with UPC / EAN to everyday items with RFID

Use an RFID printer for:

- Temporary solution
- Low- to mid-volume Stickers
- Low- to mid-volume prime labels that can be accommodated in a printer
- Short-run Service Bureau jobs

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