

RFID Concept 2020

High Volume RFID Tag
Manufacturing & Personalization



**MÜHLBAUER
TECH WEEK 2018**

08 - 12 OCTOBER 2018 RODING, GERMANY

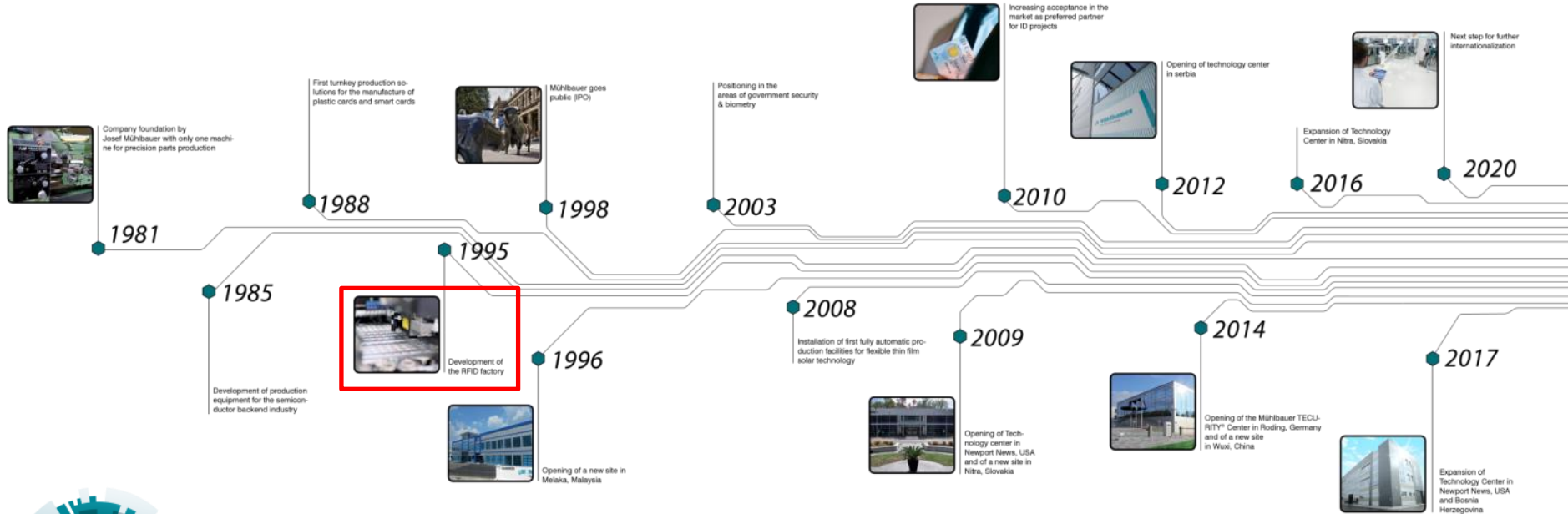
Florian Ober

Sales AUTOMATION

Mühlbauer GmbH & Co. KG

Mühlbauer Group

Experience Drives Innovation



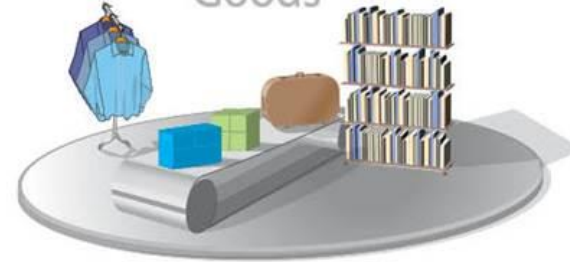
Your turnkey technology partner for

SMART IDENTIFICATION

People

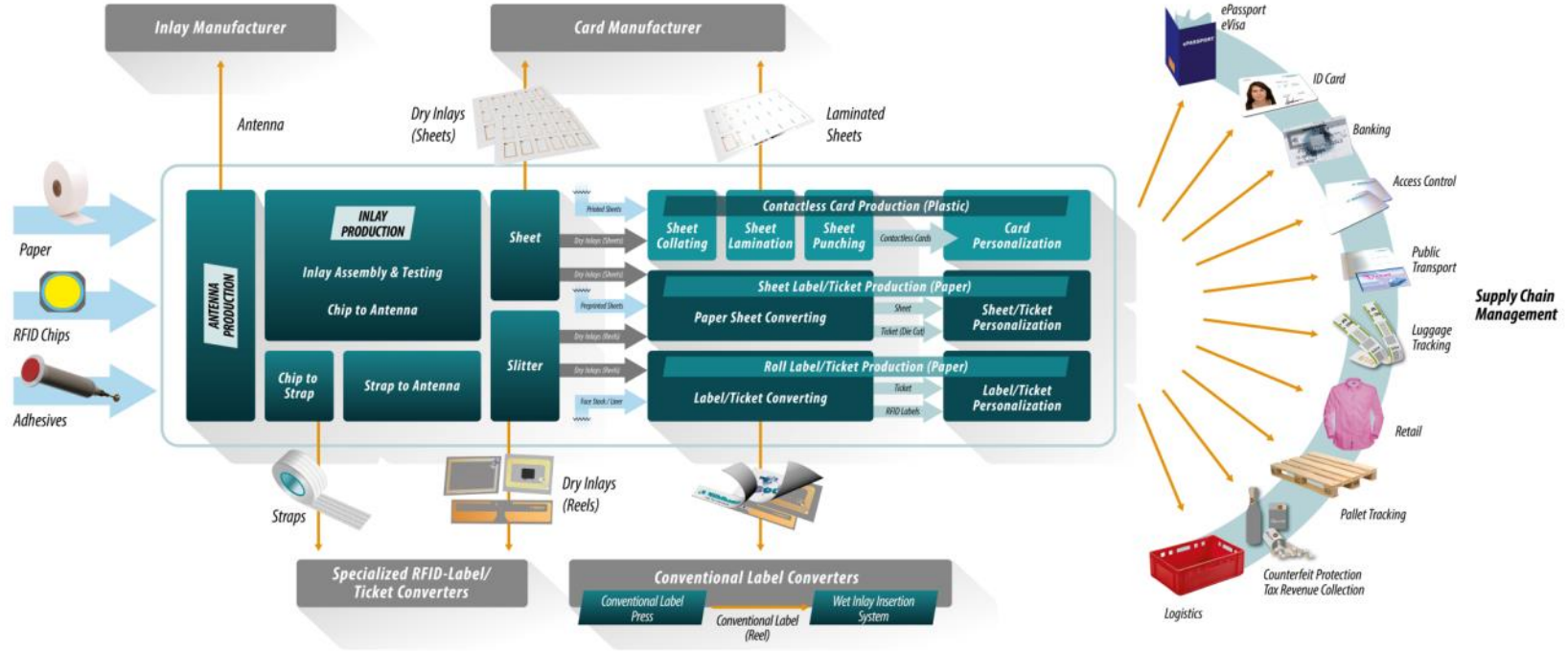


Goods



The RFID Factory

Ready Today



Concept 2020

- ▶ Experience Drives Innovation
- ▶ RFID Factory – Ready Today

RFID Market Update

- ▶ Growth in Size & Applications

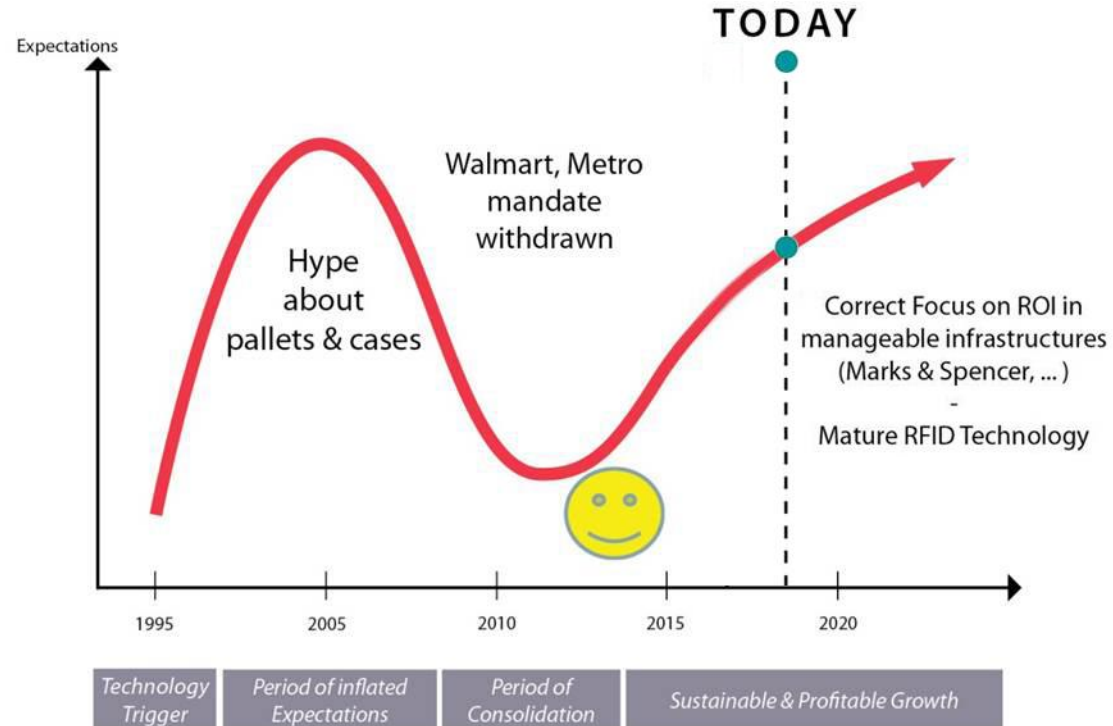
Mühlbauer & RFID

- ▶ Your Partner for Smart ID
- ▶ Customer References

The Hype Cycle

For Emerging Technologies

- The Hype Cycle represents a direct fit to RFID 1995 – 2020.
- The RFID technology now reaches the plateau of productivity.



RFID Technologies

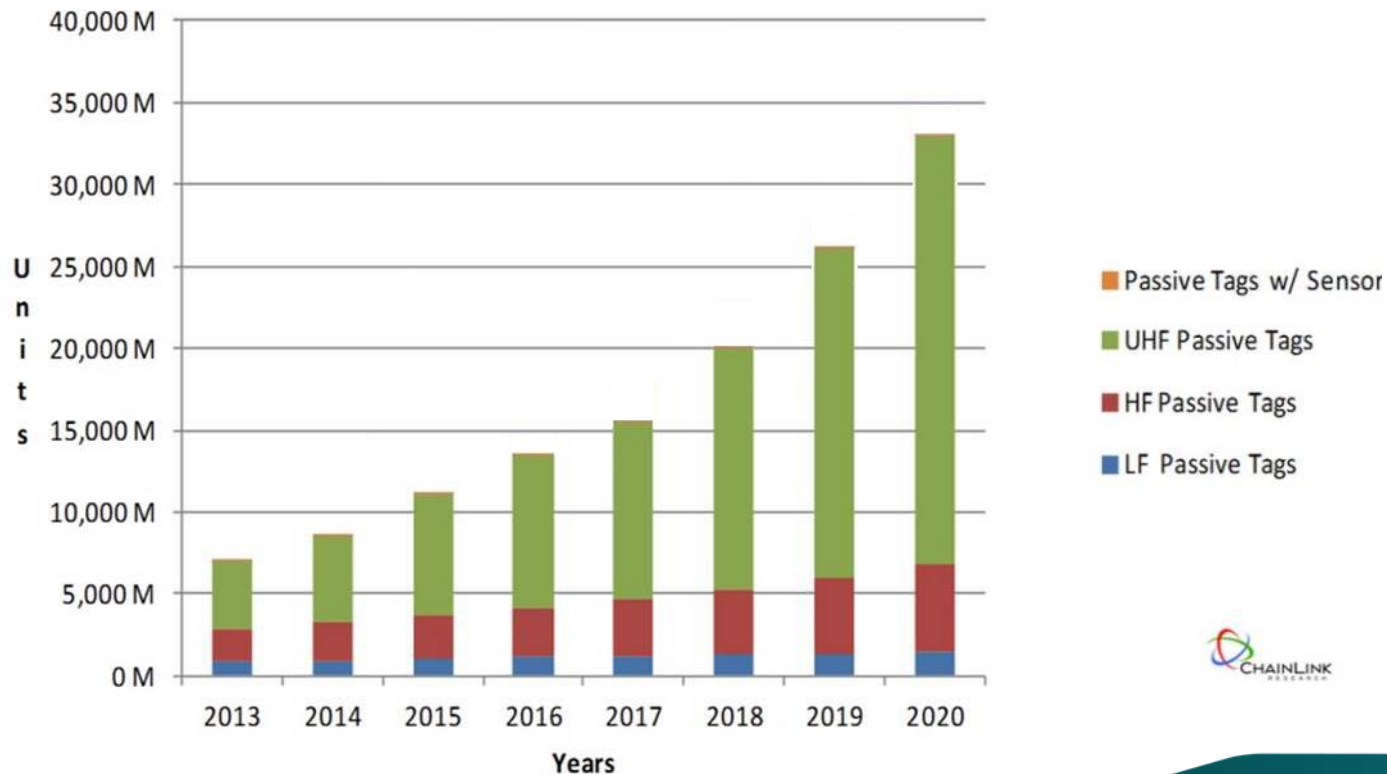
“Unlimited” Applications for HF + UHF



RFID Smart Labels

Sustainable & Profitable Growth

- The UHF Tag market is growing 35% YOY
- High-volume market UHF passive



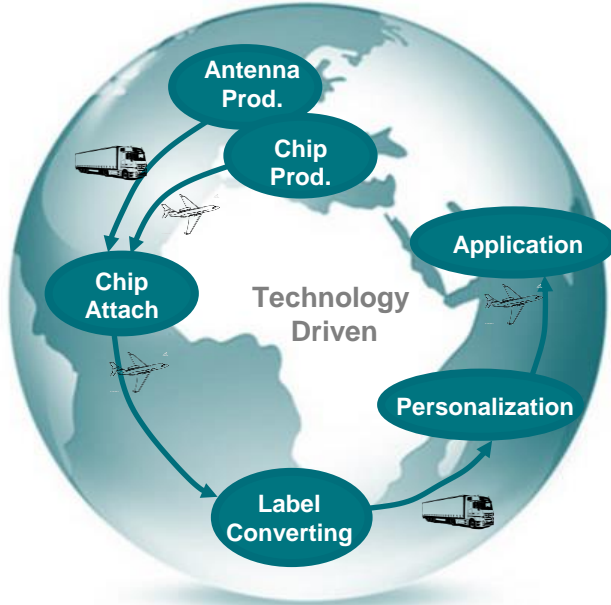
The Big Picture

Need for Optimization

High UPH

vs

High Speed



Speed ↑
Flexibility ↑
Costs ↓

**Supply Chain
Compression**

WIP ↓
Integration ↑
Localization ↑
Simplification ↑



Weeks – around the world

vs.

Minutes – within one room

Mühlbauer's RFID Factory

The Basis for CONCEPT 2020

CONCEPT 2020

Manufacturing Technologies

Supply Chain Compression

Product Design

Antenna
Production

Inlay
Assembly

Converting
& Lamination

Personalization

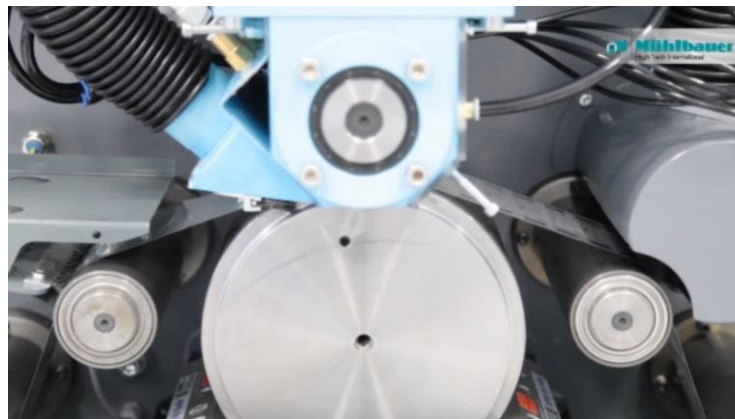


In-House Antenna Production

A Milestone for CONCEPT 2020

Why develop an Antenna System?

- ▶ **Supply Chain Compression**
Ship your new RFID label within 24 hours!
- ▶ **Just-in-Time Production**
for rapid prototyping & high volumes
up to 1 billion / year
- **50% cost reduction**
- **75% time saving**
- **100% environmentally friendly**



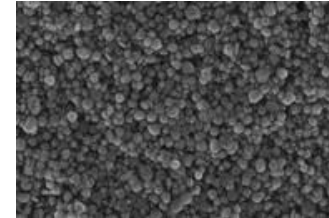
Antenna Printing: APS 100 / 350

For a RFID Pure Paper Label

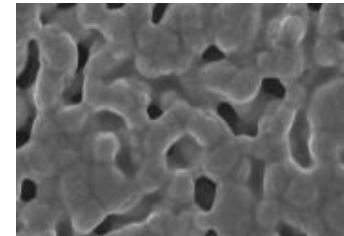


- ▶ Save one layer
- ▶ Pure paper: Environmentally friendly product

Picture Scale 500nm (after printing)



Picture Scale 500nm (after sintering)



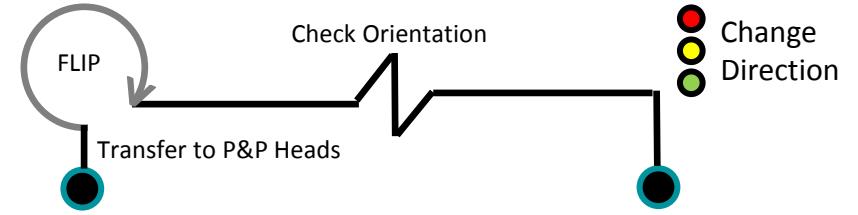
Final Antenna



Technology Innovation

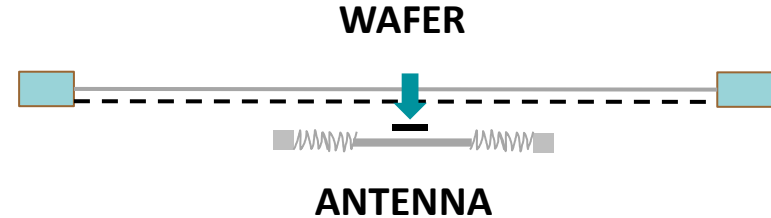
DDA – Direct Die Attach

Pick & Place



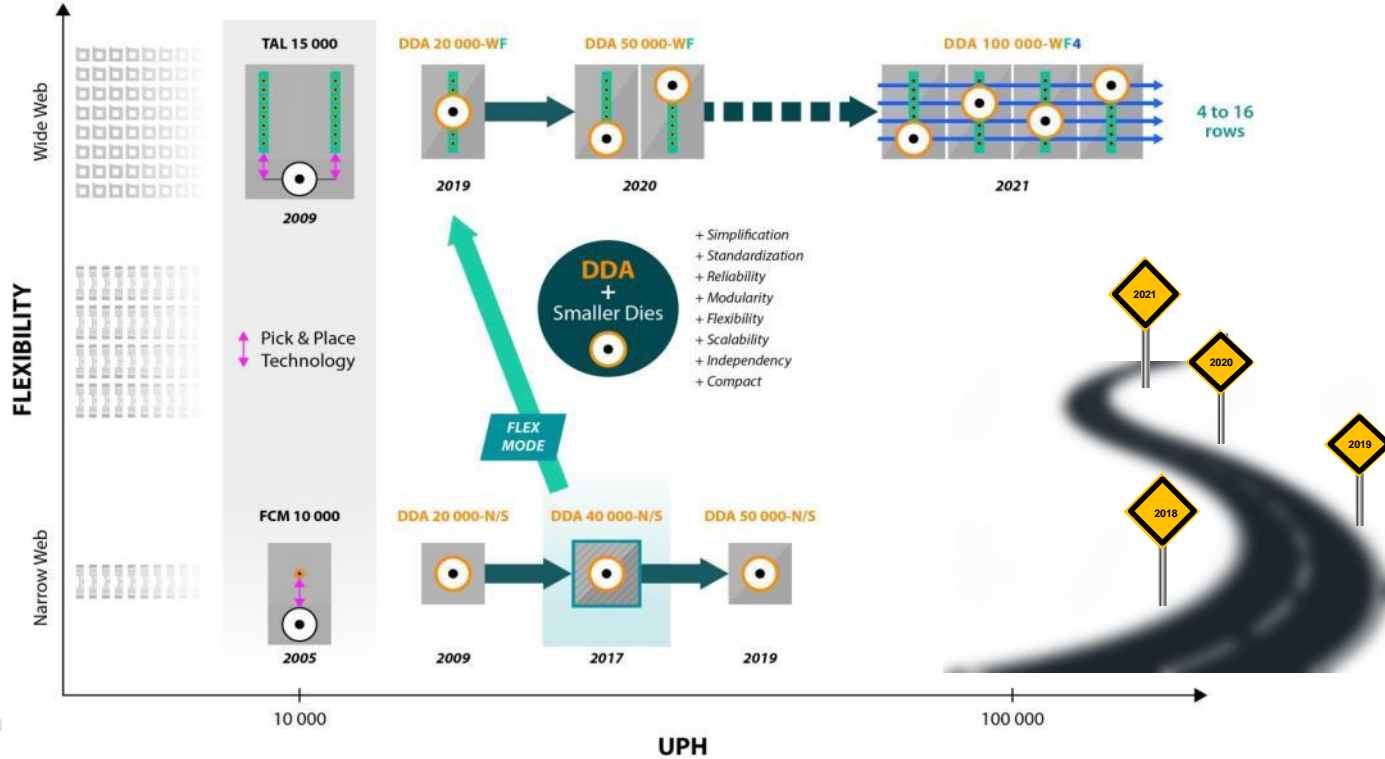
DDA

- Cutting chip attach costs to < 50%
- Enabling further chip size reduction



DDA – Direct Die Attach

Innovative Technology for Future Markets



Multi Component Production Line



MCL Process



Unwinder

Aluminum on PET
Max. width: 350 mm



Dispensing

Epoxy or Solder



SMD attach

With up to 32 or
64 Feeder bank



Thermode curing

Local curing at the LED
Min. pitch: 15x20mm
Used for ACP



Reflow curing / drying

Up to 350°C
Min. pitch: >4mm
Used for ICP



Flash test

100% process control
GO/NOGO optional light test



Upwinding

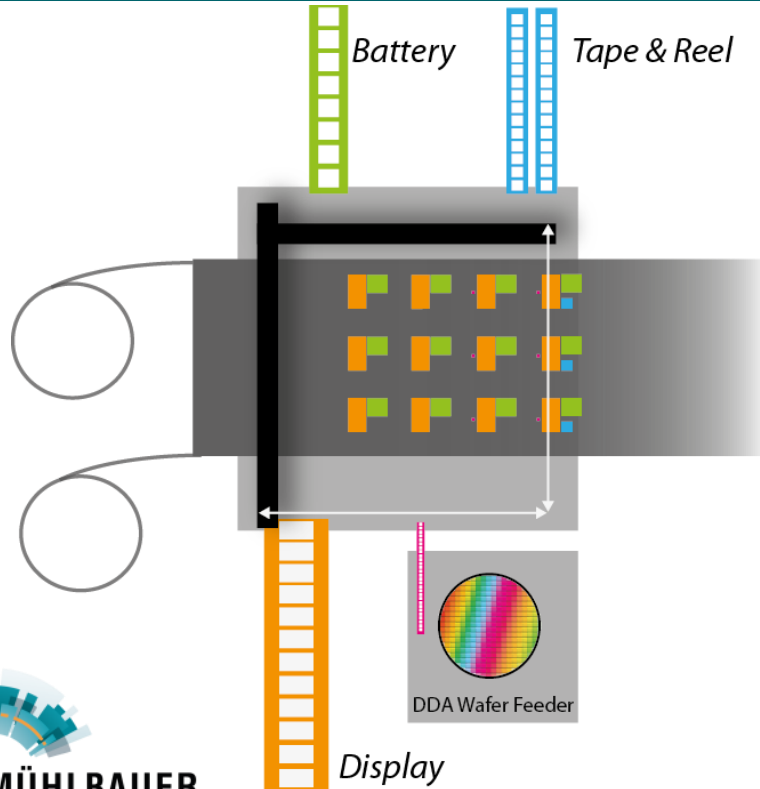
Optional slitting
and spacer tape

Multi Component Assembly on Flex

Fully-Automated Flexible Electronics Assembly



Mühlbauer
High Tech International



PHASE 1:

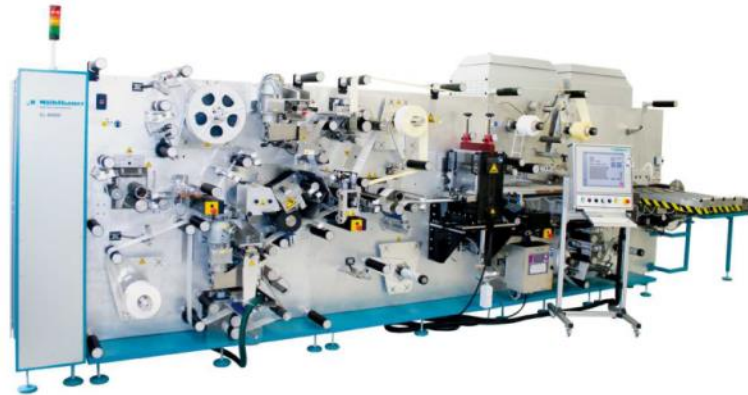
- Basic component attachment:
 - Battery
 - Display
 - Chip
- Modular design
- High flexibility in components

→ Up to **40.000**
components / hour



CL Wide Web

RFID Converting Line for High-Volume Label Production



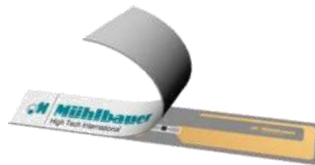
Highest flexibility



Highest output



Wide web solution



Small Footprint Personalization Equipment

PL light – Reel-to-Reel – Ticket-to-Ticket UHF / HF / NFC



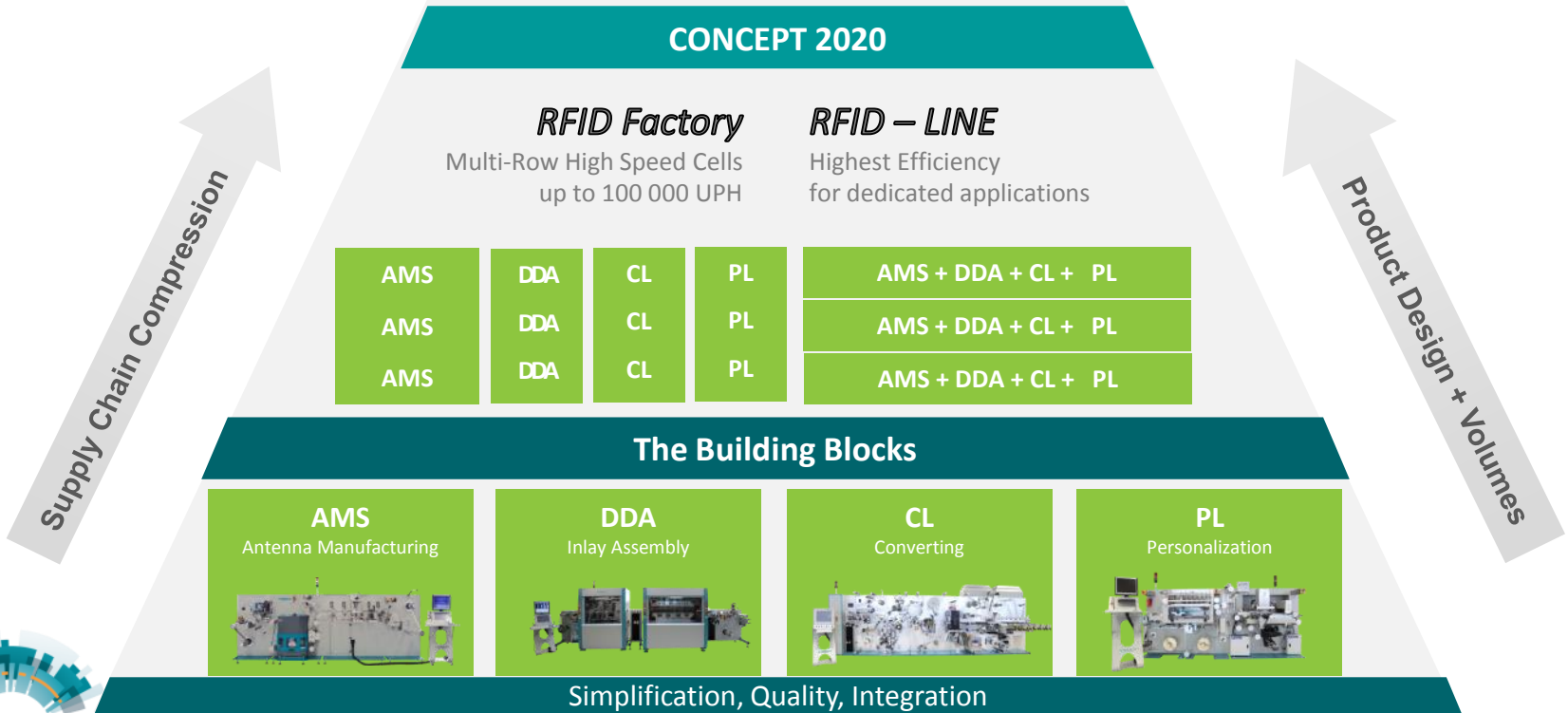
Electrical & graphical personalization



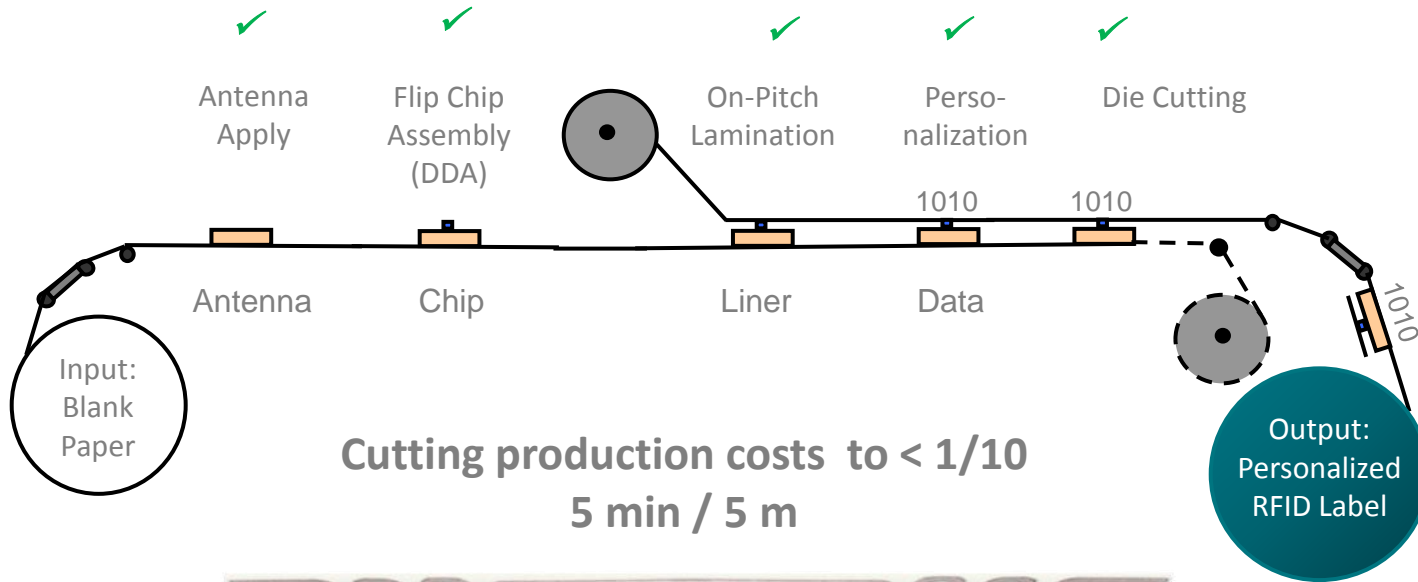
Secured data handling & validation



Suitable for selected NFC & HF chips



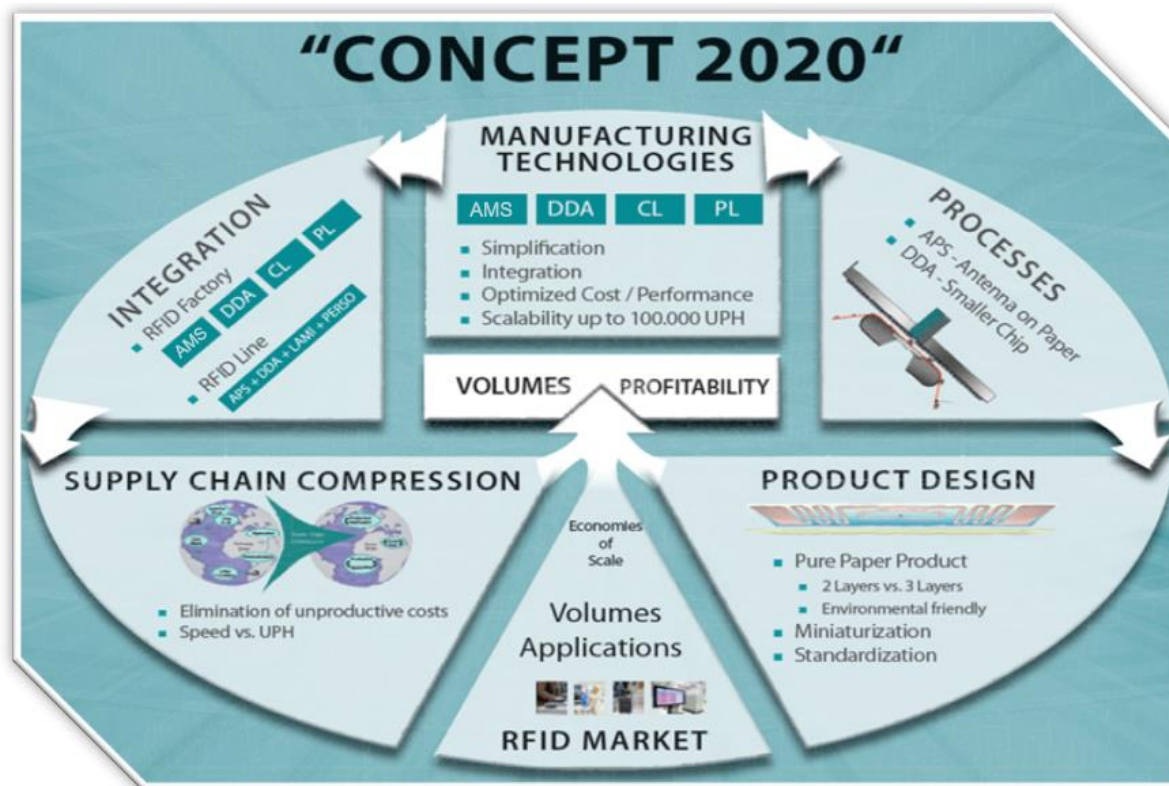
Our Vision – In Extreme



Cutting production costs to $< 1/10$
5 min / 5 m

Summary

Mühlbauer's CONCEPT 2020 - The Future of RFID Manufacturing





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**Thank you
very much for your
attention!**