



The RFID Factory[®] Concept 2023

Experience drives Innovation



COMPANY



- Owner-managed group
- International market leadership in the fields of
 - Parts & Systems
 - Semiconductor Related Products
 - Document Solution Related Products
 - TECURITY® Solutions
- The Mühlbauer Group's philosophy: Our customers are our partners!





BASIS

- 3,500 employees at 35 sites worldwide
- 400 engineers in R&D
- 400 trainees
- Excellent sustainability standards



BASIS

- Annual investments (approx. 15 million EUR) in
 - Latest technologies
 - Infrastructure
 - Systematical & logical completion of the product chain



MARKET POSITION

- PARTS & SYSTEMS – intersectoral parts manufacturing
- AUTOMATION – market leader in the areas of RFID
- TECURITY® – solution partner for identification & verification projects





- 35 production & service locations
- Technology centers in the USA, Slovakia, Serbia, Malaysia & China
- Inhouse precision-part production
- Provision of
 - High-end semiconductor & RFID systems
 - Reliable vision inspection technologies
 - Innovative ID document end-to-end-solutions
 - Secure access & border control systems



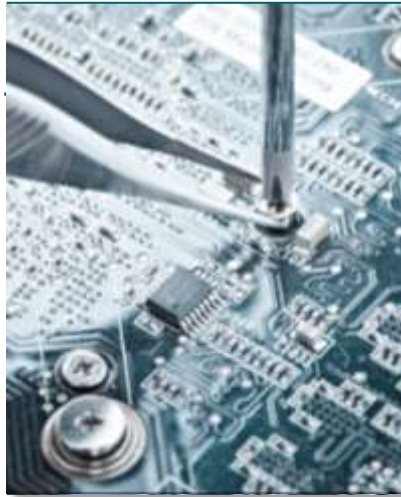
PARTS & SYSTEMS

Precision Parts
for Aerospace, Automotive,
Semiconductor & Engineering



AUTOMATION

Machines & Solutions
for SRP & DSRP



TECURITY®

Solutions
for Governments

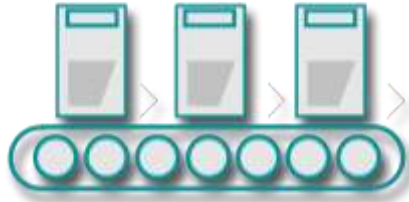




Industrial Revolutions – 1800 until Now



Mechanization



Electricity & Assembly Lines



Microelectronics & Computers



Digitalization & Connectivity

1800

INDUSTRY 1.0

Machines powered
by Water & Steam

Railway, Textile Mills

1900

INDUSTRY 2.0

Acceleration of
Working Processes

Telecommunication

1970

INDUSTRY 3.0

Automated
Production

*Personal Computers, Mobile
Communication, Internet*

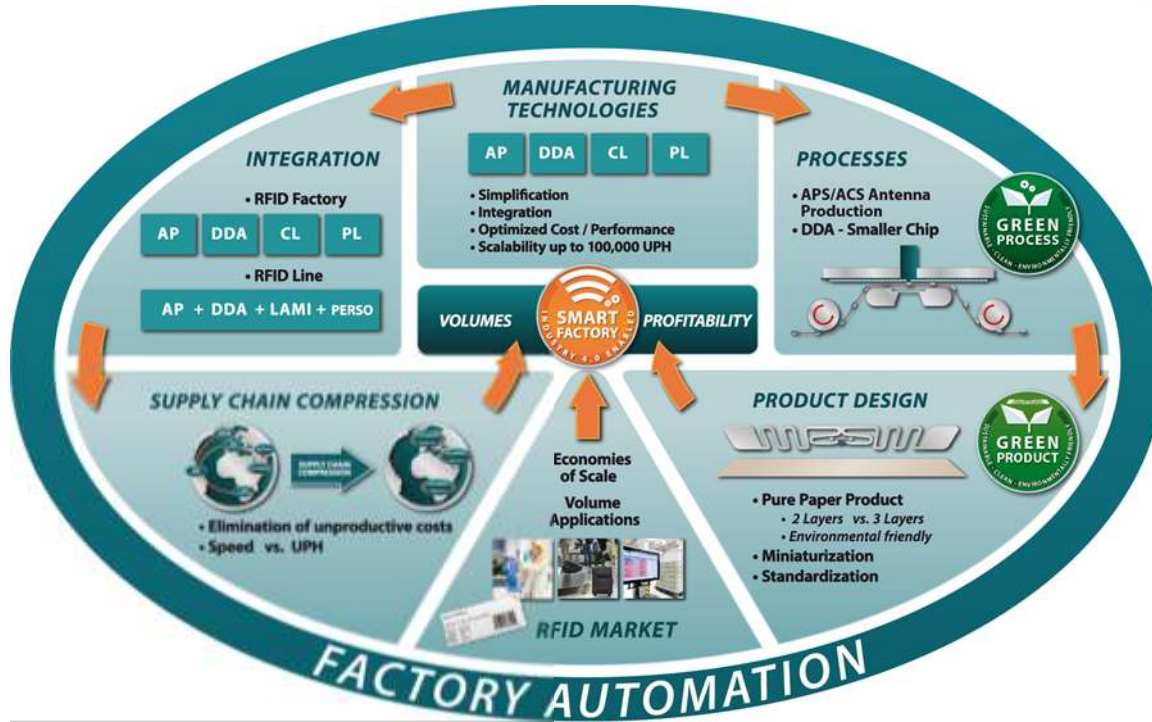
2000

INDUSTRY 4.0

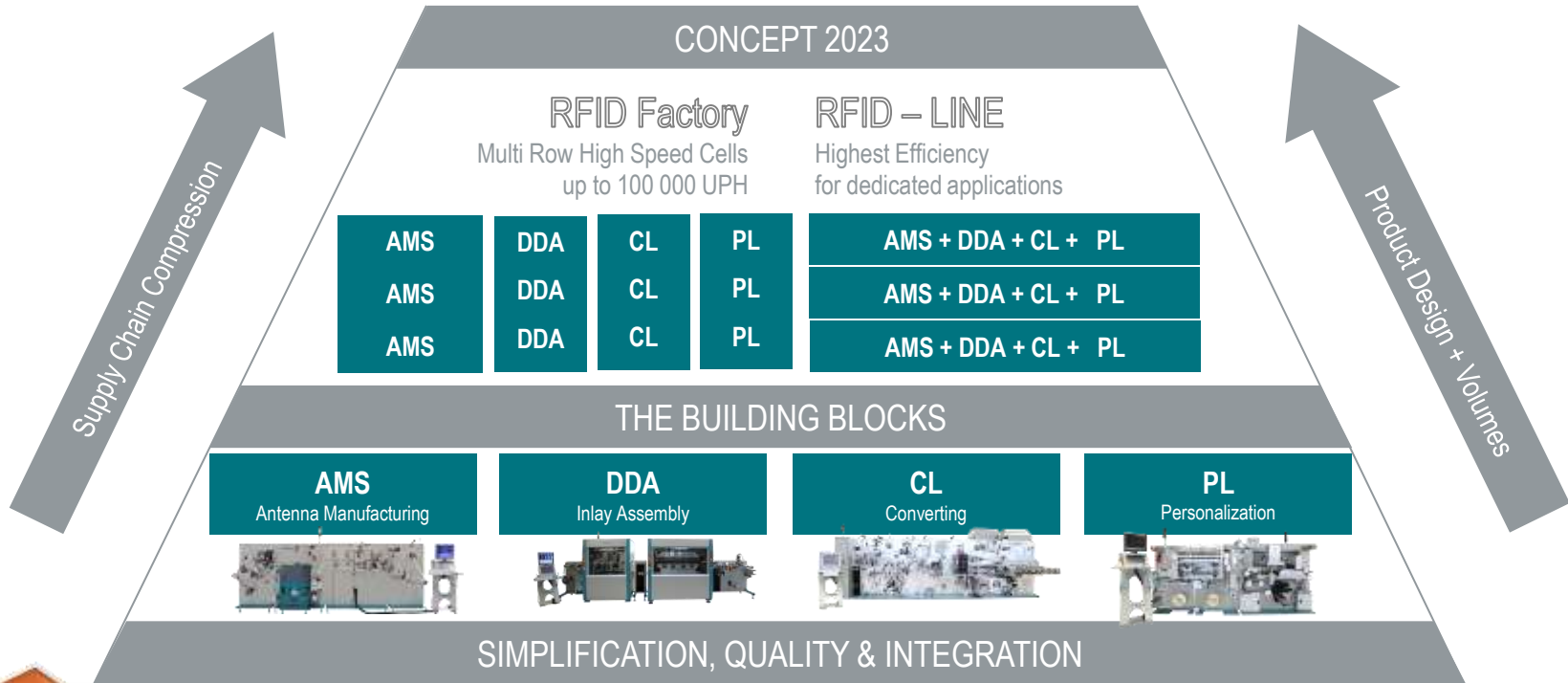
Internet of
Things

Everything becomes „Smart“



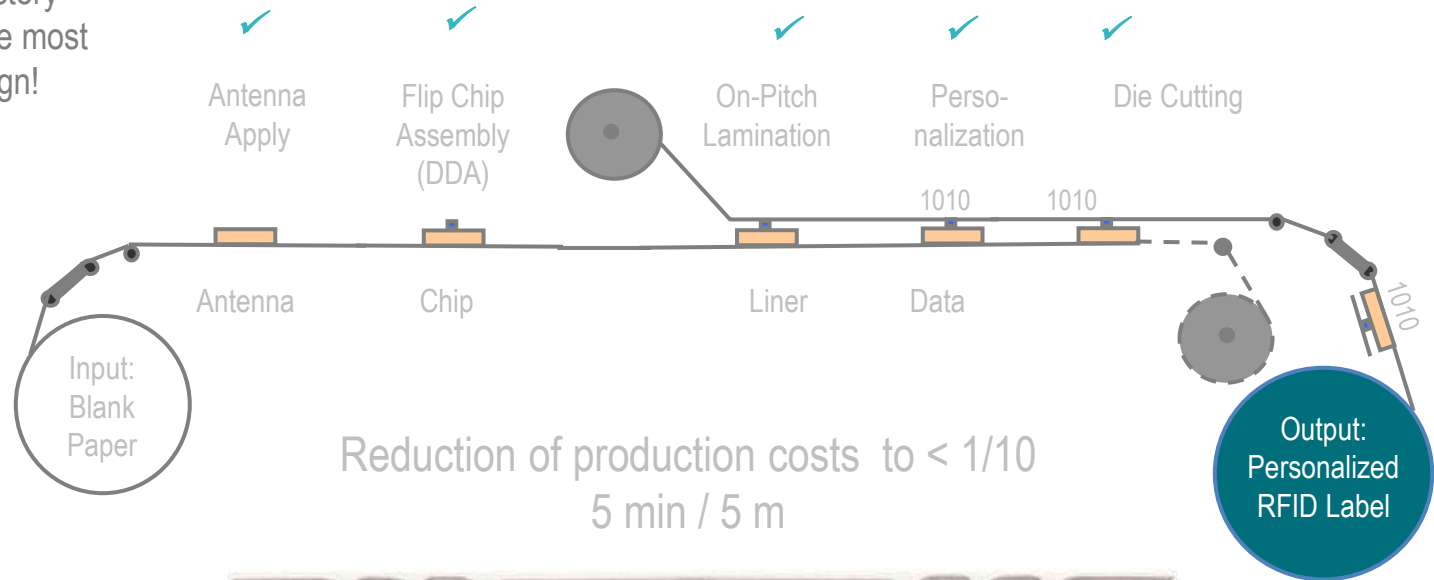


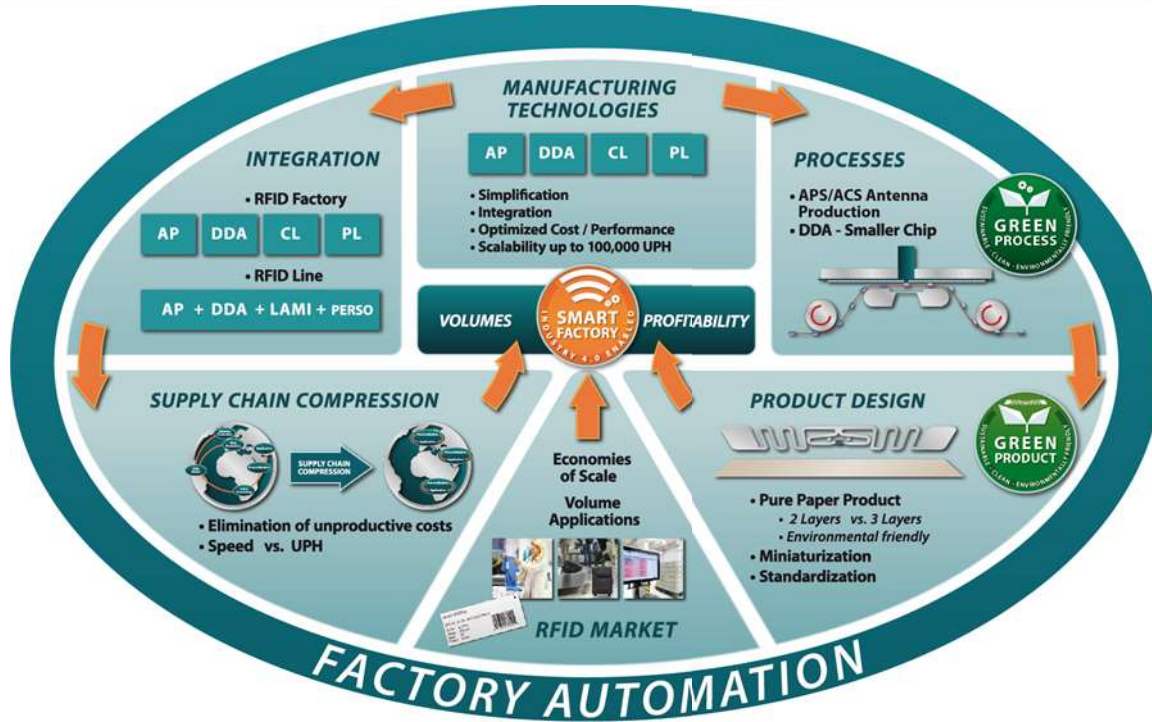
Our Vision – Building Blocks for Concept 2023



Our Vision – In Extreme

The most efficient factory
AUTOMATION for the most
efficient product design!





Process	1999 – < 1 billion RFID Labels	2019 – 20 Billion RFID Labels
Antenna manufacturing	etched antennas	etched antennas
Chip attach	4000 UPH	100.000 UPH (roadmap)
Label Converting	15 m/min single row	60 m/min multi row
Personalization	No industrial solution	50.000 UPH



How many etching lines are in production to cover the demand in 2019??

**About 40-50 production lines in 2 countries
=> how to handle 150 Billion in 2025??**



**Alu-etching will not be a reliable process for future growth!
Alternatives are needed!**





WHY DEVELOPING AN ANTENNA SYSTEM?

- Supply Chain Compression
 - ship your new RFID label in 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

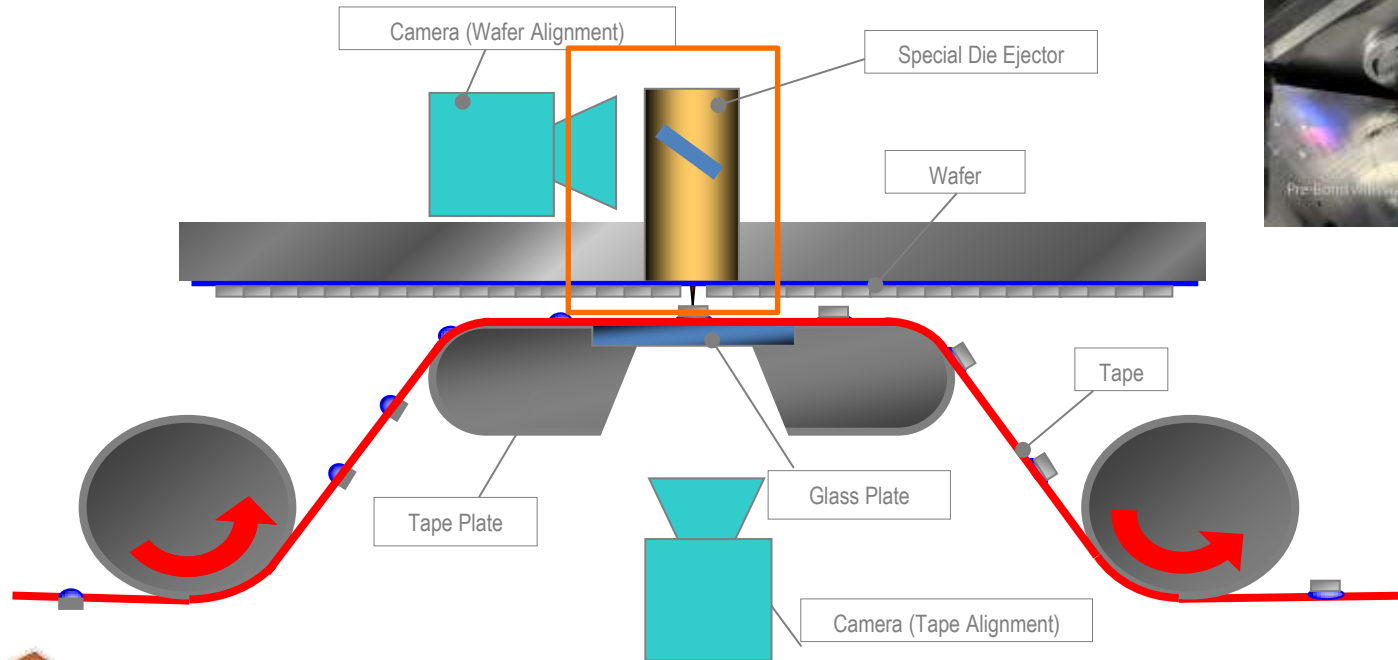




- Real green process - without chemicals
- Pure paper substrate
- Recyclable product
- Enables 2 layer product - less material & glue

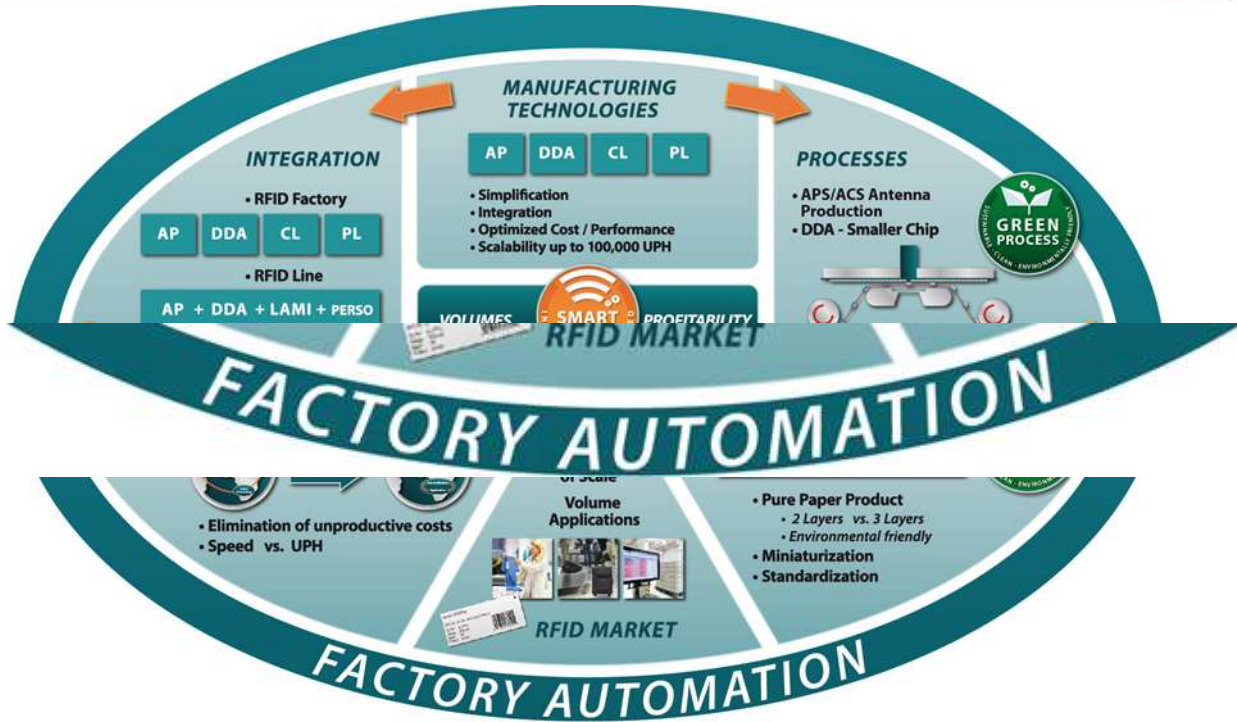


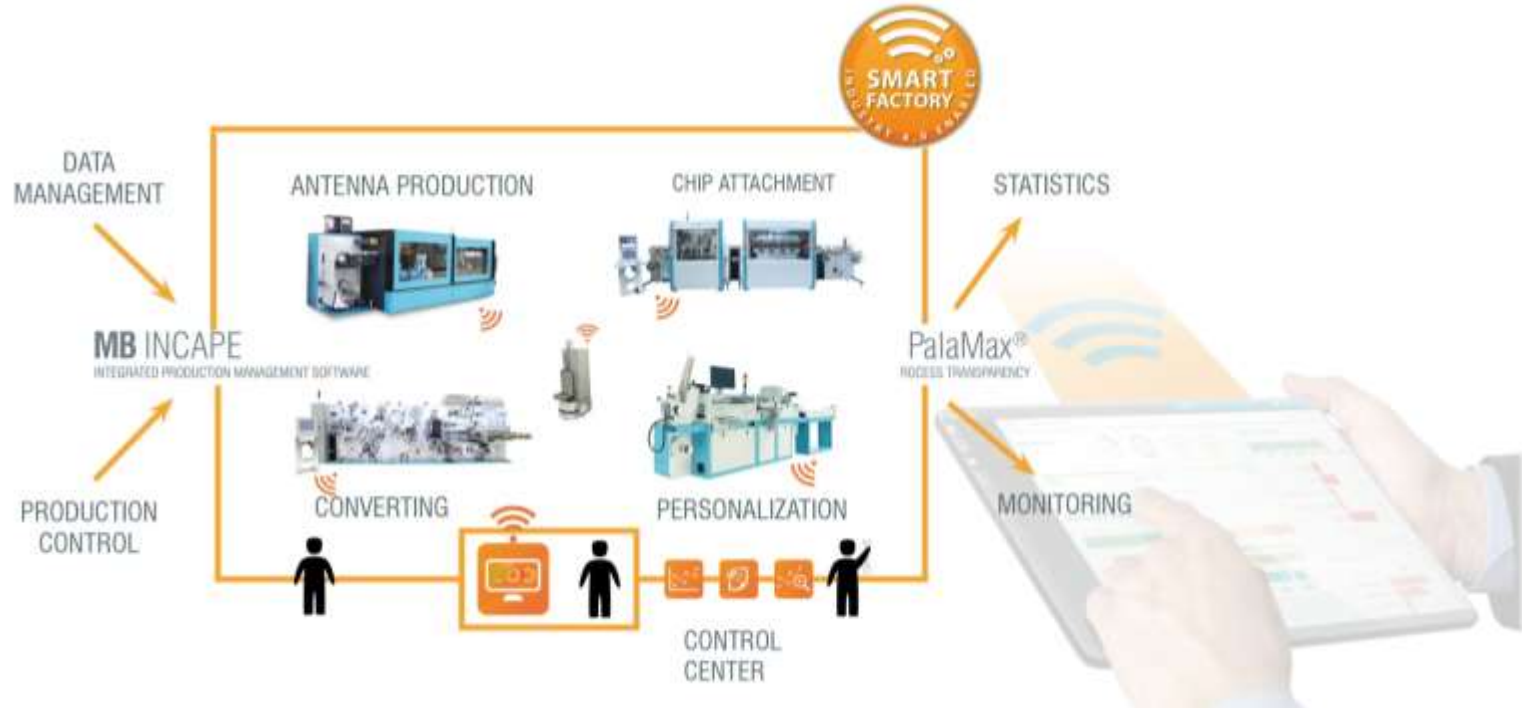
Direct Die Attach DDA - The Revolution in Flip Chip Die Attach



SIMPLIFICATION IS THE ULTIMATE SOPHISTICATION!
Ready for smaller Chip Sizes







WAREHOUSE
INCOMING



- 1) Checking stock
- 2) Start reorder process

Order income /
Order handling



- 1) Tracks when finished good arrives at warehouse
- 2) Informs order handling for processing delivery

WAREHOUSE
OUTGOING



- 1) Checking capacity based on loading
- 2) Checking possible slots for urgent manufacturing
- 3) Starting material flow process when all items available



WAREHOUSE
INCOMING



 MB PalaMax[®]
TOTAL PROCESS TRANSPARENCY

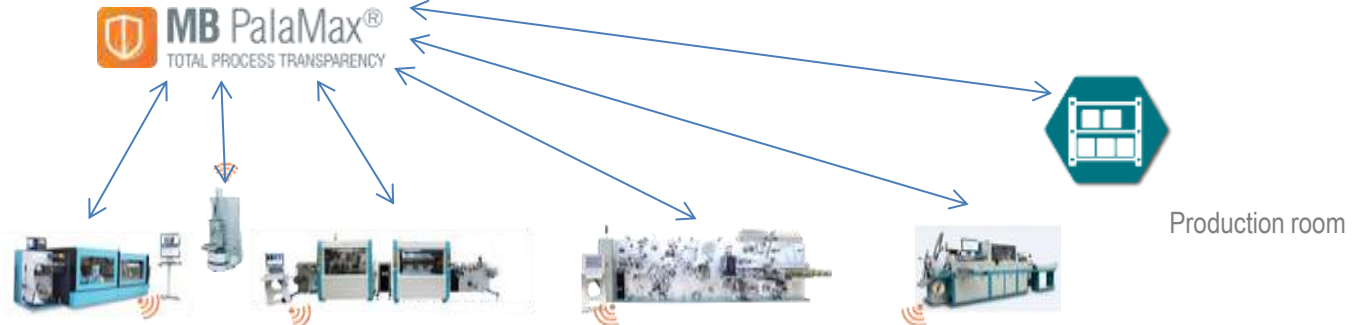


WAREHOUSE
OUTGOING



- No big material stock on the floor
- Just in time of material at MC
- Automatic info of product change over based on production planning
- No paper work (writing material flow documents) and automatic control that right material is at the right MC





1) From Palamax to MC:

- next type of product (information for product change over)
- list of arriving material

2) From MC to Palamax:

- Process parameters
- tracability datas
- new ID datas
- MC state information (login data, OEE, error..)

- Creating statistic of production, **QC- monitoring and traceability in real time.**
- Preventive maintenance
- Request new job before production is finished
- No paper work (writing equipment and operator statistics)



CONTROL CENTER





SMART PRODUCTION
MANAGEMENT



SMART MATERIAL
MANAGEMENT



TRANSPARENCY OF YOUR
PRODUCTION

- Real time monitoring during production
- Track & trace each individual product
- Minimize maintenance



PRODUCTIVITY

+50 %



EFFICIENCY & SPEED

+30 %



COST REDUCTION

+20 %

- SECURING FUTURE COMPETITIVENESS
- NEW BUSINESS MODELS
- NEW SERVICES

Mühlbauer's Smart Factories for Semiconductors, RFID, Smart Card & ID Documents





RFID/ SMART LABEL



MULTICOMPONENT
FLEXIBLE ELECTRONICS



FLEXIBLE SOLAR
TECHNOLOGY



LEDS GO FLEXIBLE



DIE SORTING



CARRIER TAPE

Great! Can *communicate* with everything!!



Supplier



Product



Shop



But this human interface!!



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