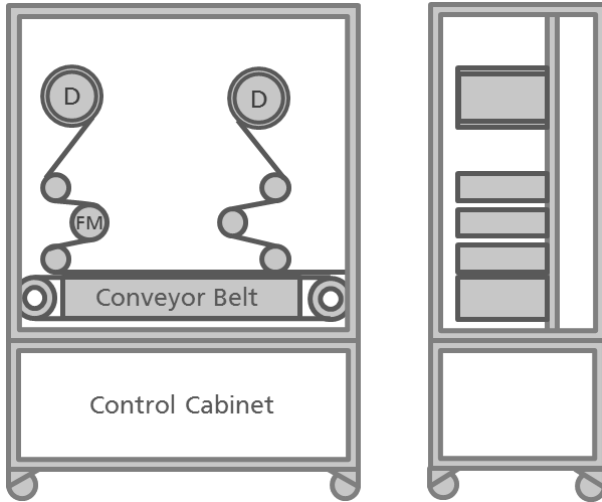


ML² - Deliverable 10.1

» Concept for production line«

R2R production test bench

General specifications

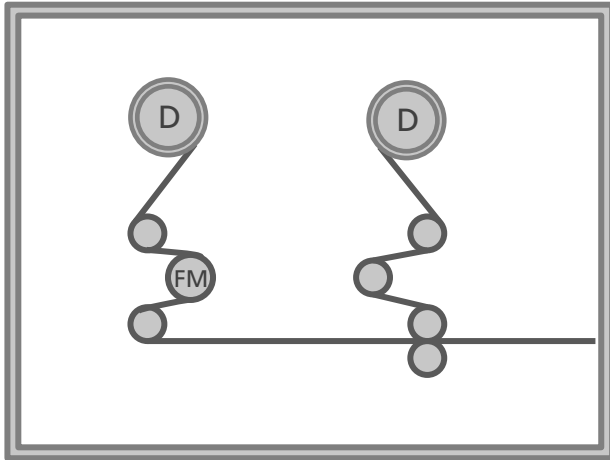


Design concept

- Processing of polymer films:
 - Max. 250 mm width
 - Max. 0,5 mm thickness
 - Max. reel diameter: 300 mm
 - Max. reel weight: 25 kg
 - Core diameter: 6" (3")
 - Totally transparent substrates
- Processing of plates:
 - Max. plate dimensions: 400 x 250 x 6 mm³
 - Transparent substrates
- Substrate speed: max. 50 m/min
- Substrate tension: 0,1 – 1 N/mm
- Modular test bench concept (functional modules)
- One-sided roller fixation
- Modular Control Concept

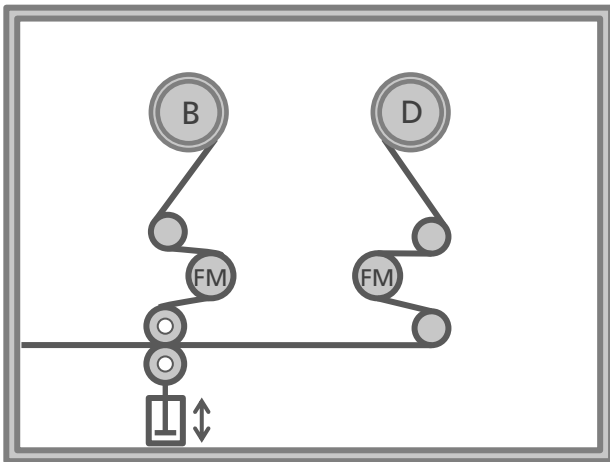
R2R production test bench

Unwind/ Rewind module



■ Functions:

- Unwinding of polymer substrate
- Delamination of protective liner
- Rewinding of protective liner
- Measurement of substrate tension
- Compensation of winding errors and substrate alignment

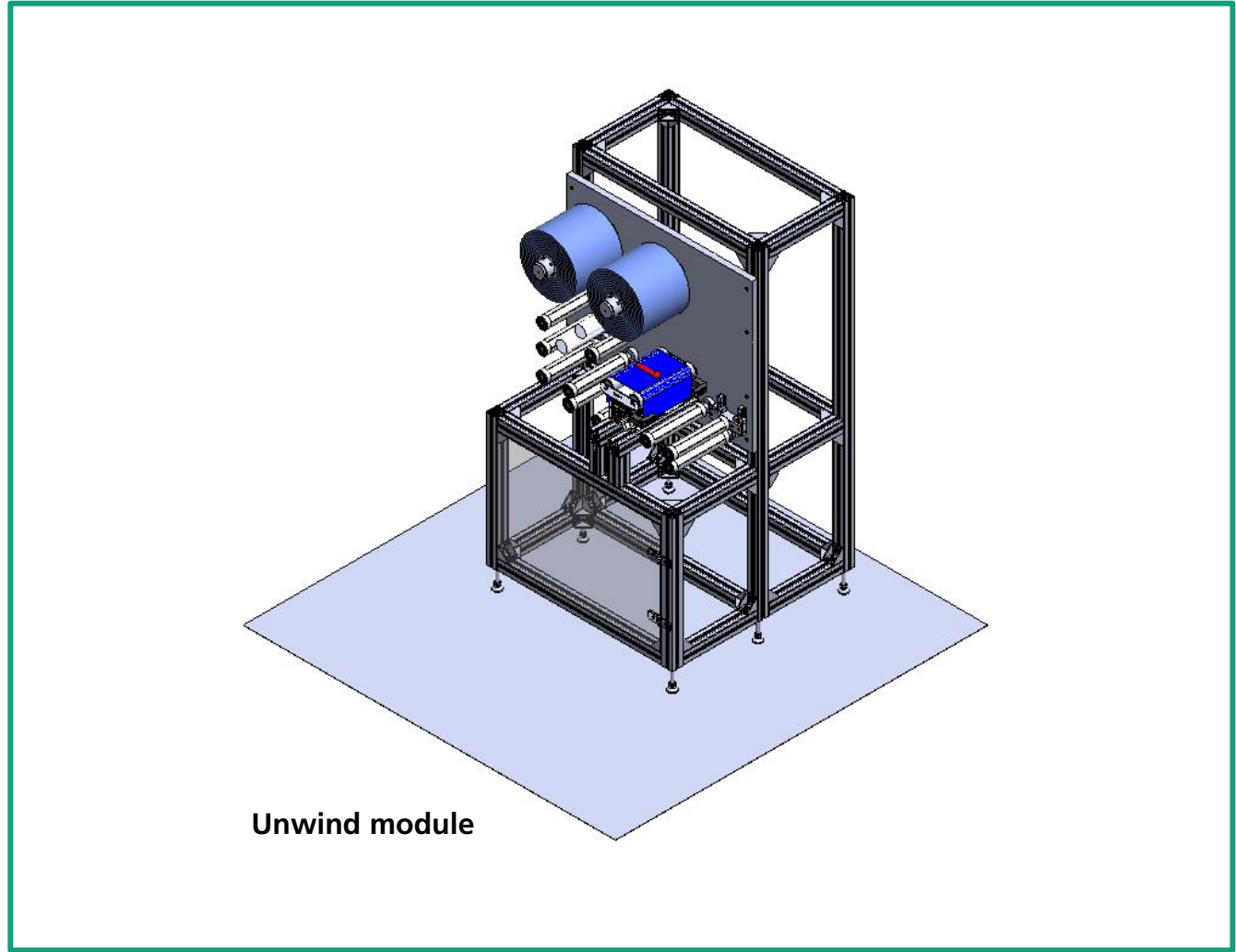
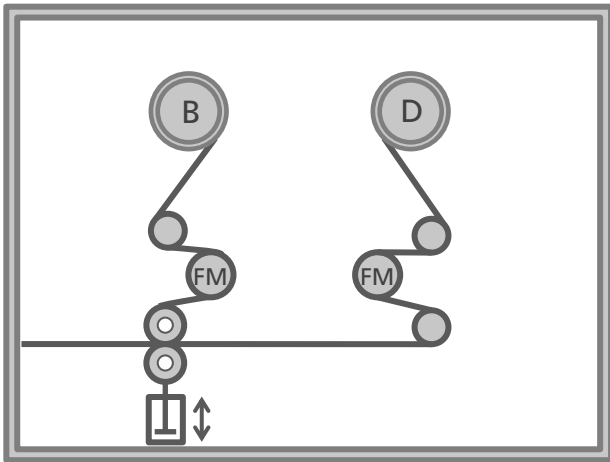
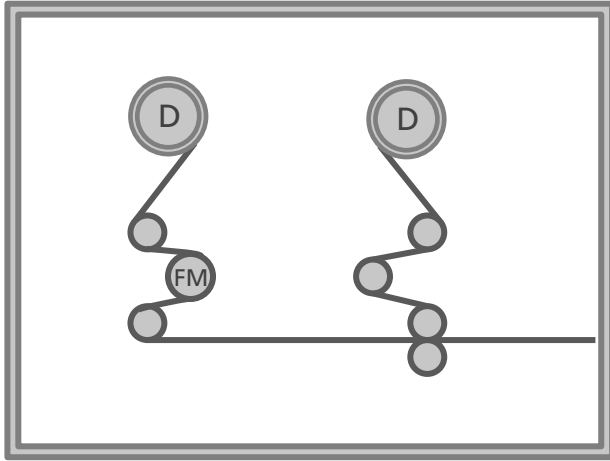


■ Functions:

- Rewinding of polymer substrate
- Unwinding of protective liner
- Lamination of protective liner
- Measurement of substrate tension
- Substrate alignment

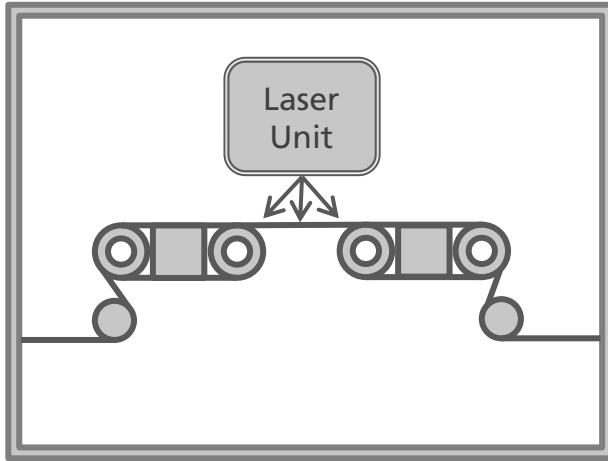
R2R production test bench

Unwind/ Rewind module



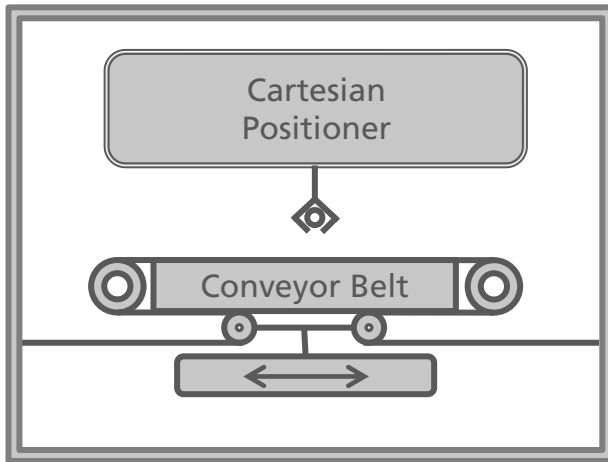
R2R production test bench

Laser/ Pick-&-place module



■ Functions:

- Laser structuring of polymer surface
- Cutting of through holes (VIA)

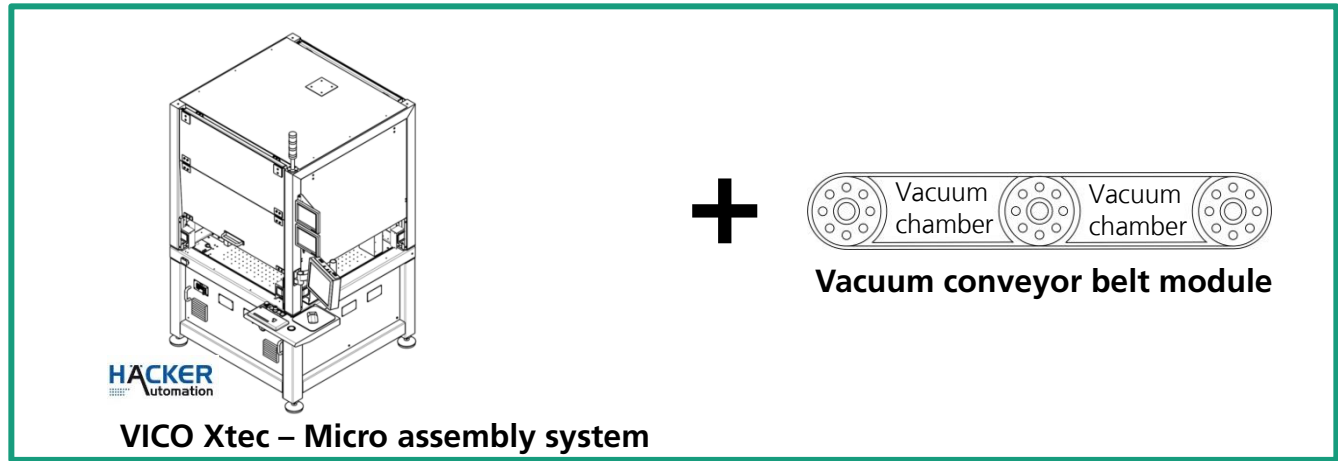
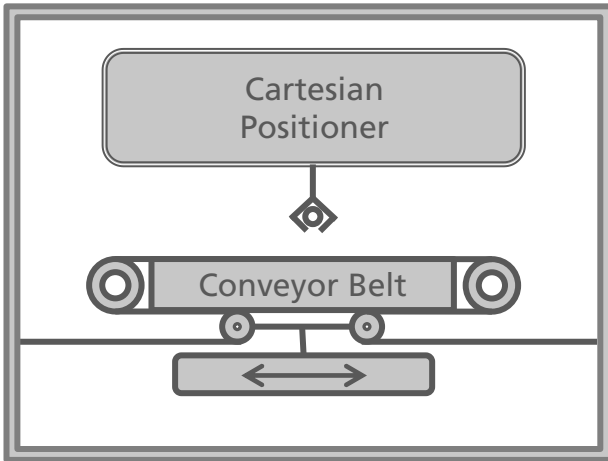
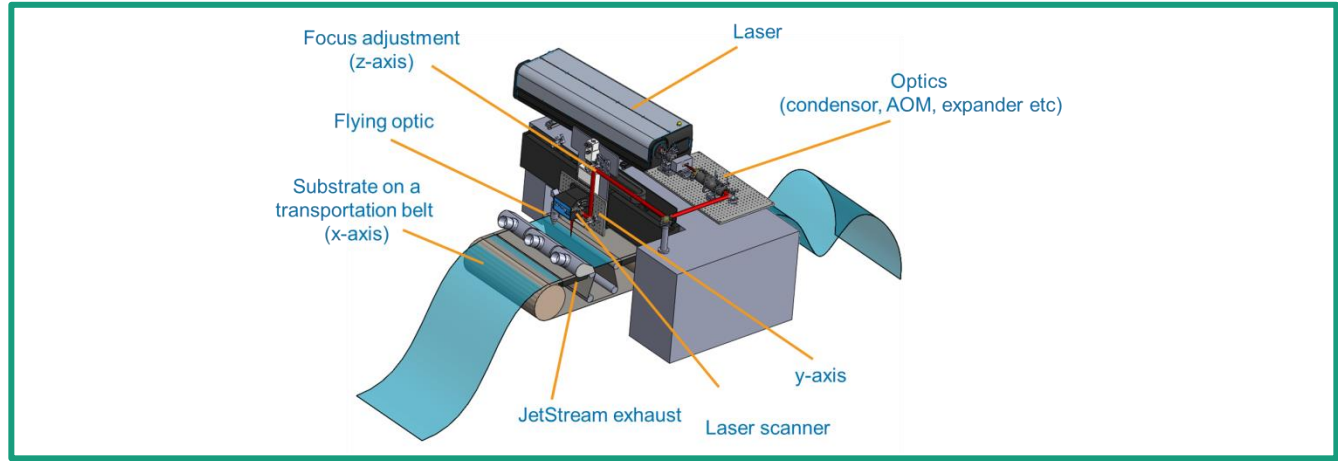
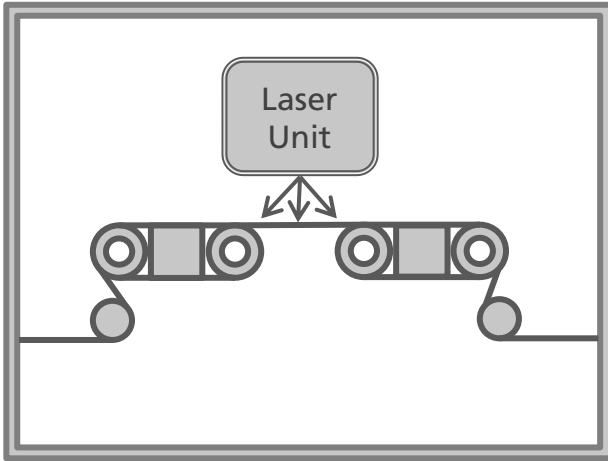


■ Functions:

- Step-&-Repeat substrate transport
- Placement of bulky components on substrate
 - Component inspection
 - Component placement
 - Dispensing
 - Curing (UV, Laser)

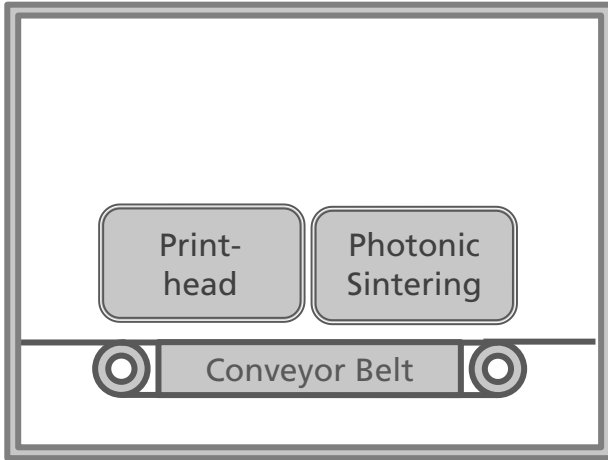
R2R production test bench

Laser/ Pick-&-place module



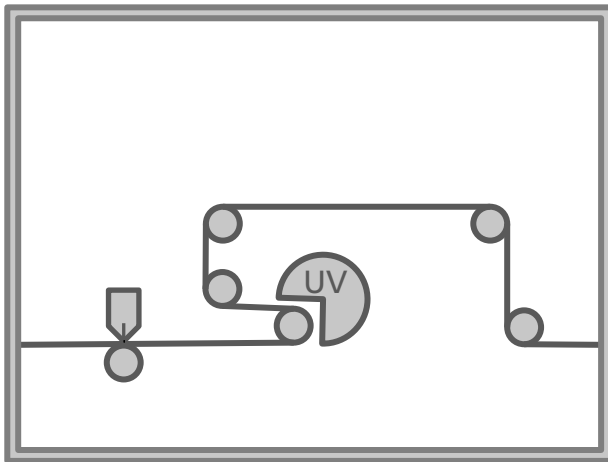
R2R production test bench

Printed electronics module



■ Functions:

- Printing of electronic circuits path/ components
- Photonic sintering of printed structures

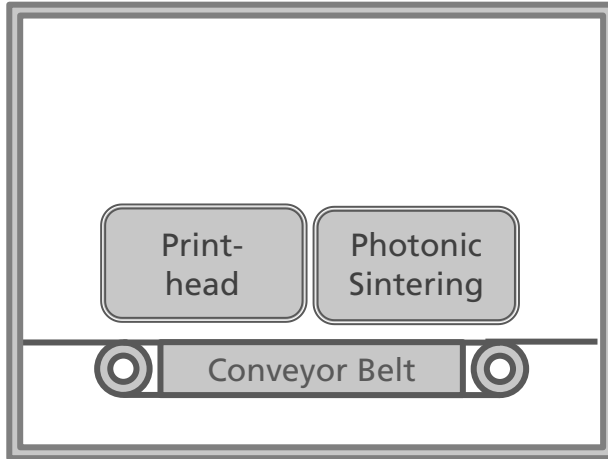


■ Functions:

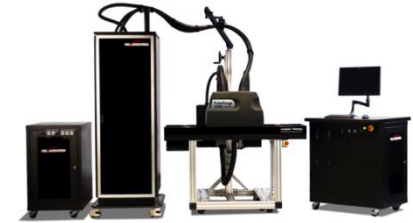
- Coating of substrate (slot die, knife, dip coating)
- Replication of drum structures into UV-curable laquer
- UV-curing

R2R production test bench

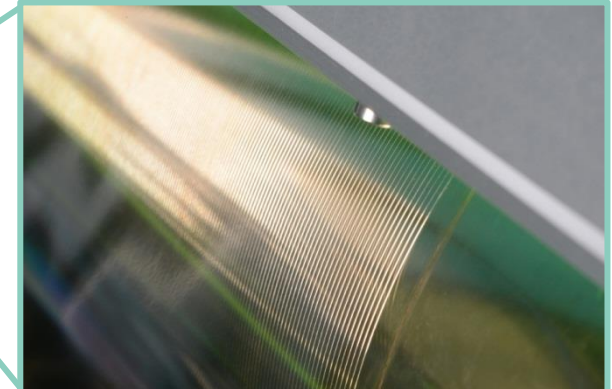
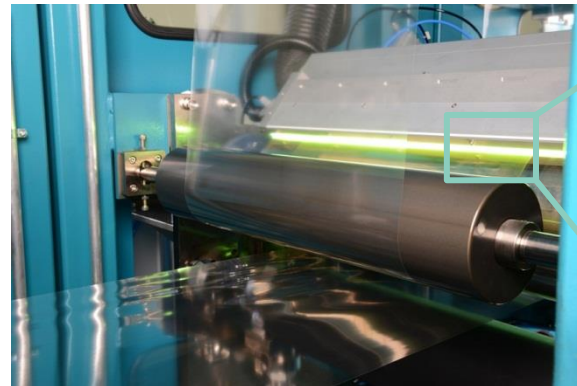
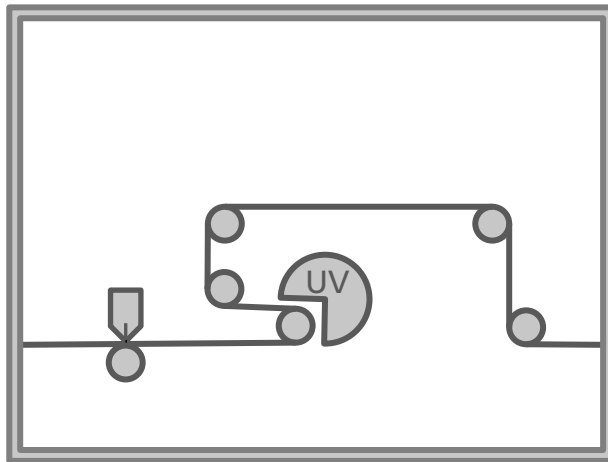
Printed electronics module



Drop-on-Demand print head
FujiFilm SAMBA Technologies

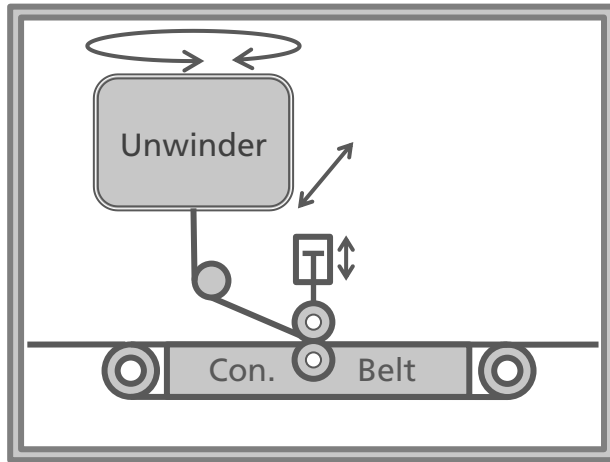


Photonic Sintering Module
NovaCentrix PulseForge 3200X2



R2R production test bench

High precision lamination module



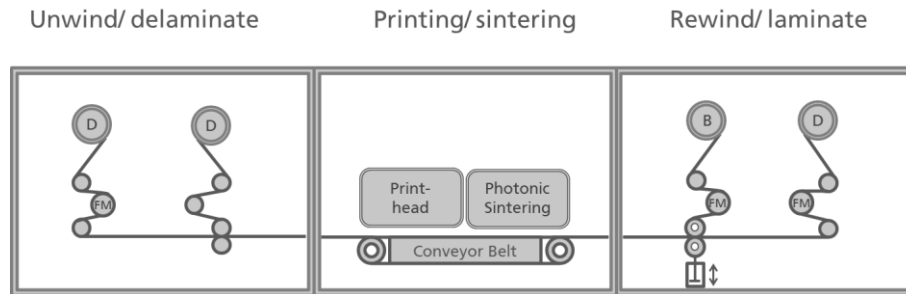
■ Functions:

- Transport of base layer
- Unwinding of attached layer
- Manipulation of attached layer
- Precise lamination of attached onto base layer ($\ll 50\mu\text{m}$)

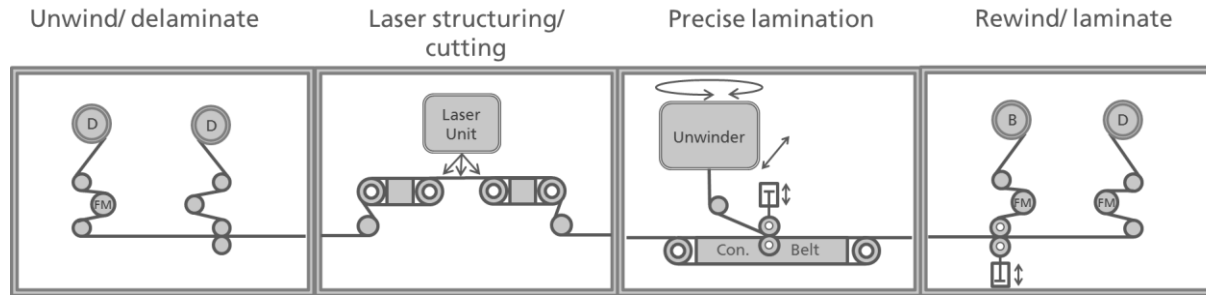
R2R production test bench

Module combinations (examples)

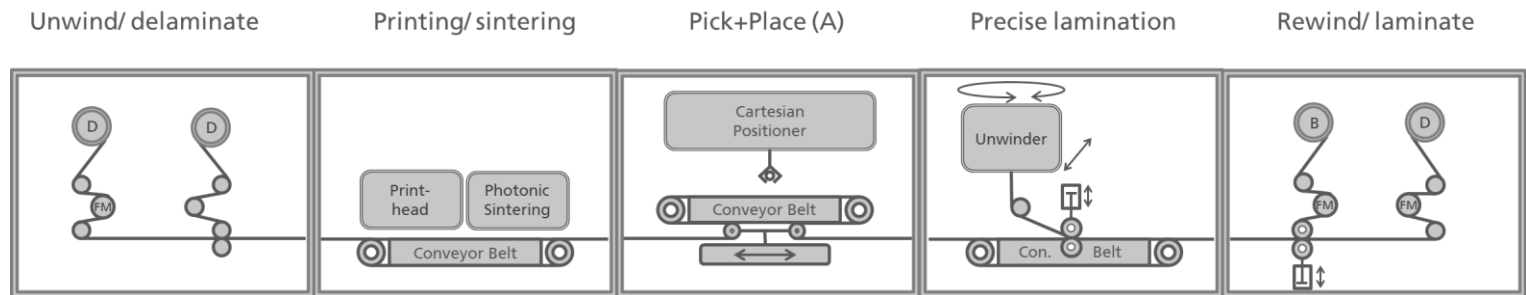
Flexible printed circuit boards



Surface structuring



Electronic functions



R2R production test bench

Automation concept

■ Modular control architecture:

- Decentralised control concept for flexible changes in production system and process structure
- n modules = $n \times$ (motion control units + periphery)
- Automated production system setup by communication protocol

