microFLEX™

Roll-to-Roll System for Processing of Flexible Substrates

3D-Micromac's highly versatile microFLEX™ production platform is the all-in-one solution for the manufacturing of flexible thin films in photovoltaics, electronics, medical devices, displays, and semiconductors.

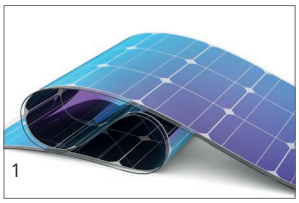
It combines high-precision laser processing with cleaning, coating, printing, and packaging technologies as well as inline quality control. Due to its modular concept various customized solutions are available, reaching from industrial mass production to pilot lines as well as applied research.

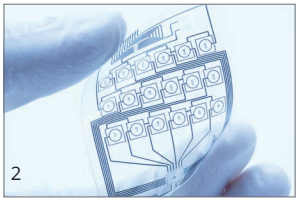
microFLEX™ offers:

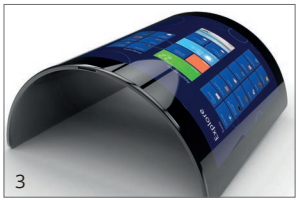
- Laser processing on-the-fly or in step and repeat mode
- Integration of different laser sources and wavelengths
- Various optical setups, e.g. galvo scanner, fixed optics, and line beam set-up
- Highest precision in web control: down to ± 1 µm tracking error
- Machining under ambient conditions, inert gas atmosphere or vacuum
- User-friendly, flexible system control including MES
- Roll-to-roll or roll-to-sheet configurations

3D MICROMAC

Product examples:


1
Thin film photovoltaics


2
Single use sensors


3
Flexible electronics

microFLEX™ - Benefits

High versatile micromachining system for:

- Laser structuring
- Laser patterning
- Laser cutting
- Printing and coating
- Laser annealing
- Laser lift-off

Top quality products

- High-precision laser processing (continuous/discontinuous)
- Gentle handling of all flexible polymer or metal substrates, thin glass and paper

High throughput and efficiency

- On-the-fly processing
- High machine uptime
- Multiple tension controllers
- Contactless substrate guiding

Quality control

- In-situ optical inspection
- Automated process adjustment

Highest flexibility

- Easy machine layout modification by modular concept

Cost advantages

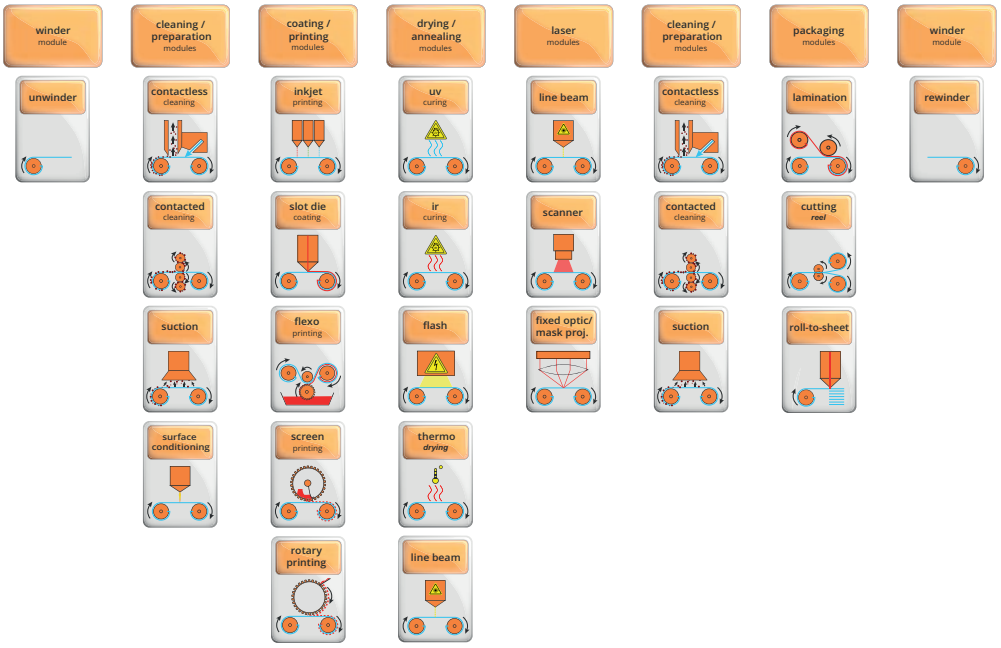
- Long-term security of investment
- Reasonable cost of ownership
- Easy to upgrade and modify
- Use of different micro environments (e.g. clean room classes)

Optimal usability

- Hardware components and machining parameters to be software controlled
- Intuitive user interface
- Interface to manufacturing execution systems (MES)
- Decentralized control by ethernet ports on each module
- High accessibility
- Easy serviceability

microFLEX™ System Configuration - Examples

Modular system concept with standardized interfaces between the modules



microFLEX™ 50 - Laser cutting of medical polymer

microFLEX™ 600 - Production of electronic devices

Application example	Ablation of thin-film layers for medical sensors	Manufacturing of printed organic solar cells	P1, P2, P3, PT structuring of flexible solar cells	Customized configuration
Web width (ww)	▪ < 50 mm	▪ 50 mm < ww < 400 mm	▪ 400 mm < ww < 1300 mm	▪ < 1500 mm
Material	▪ PET	▪ PET	▪ PI	▪ Thin and rollable
Material thickness	▪ 200 µm	▪ 100 µm	▪ < 50 µm	▪ < 500 µm
Processing	▪ On-the-fly	▪ On-the-fly	▪ Step- and repeat mode	▪ Step- and repeat mode
Web speed	▪ 50 m/min	▪ 5 m/min	▪ 1 m/min	▪ < 80 m/s
Throughput equivalent	▪ 600,000 m²/a	▪ 500,000 m²/a	▪ 100,000 m²/a	▪ Customized configuration
Positioning accuracy	▪ ± 0,025 mm	▪ ± 0,075 mm	▪ ± 0,025 mm	▪ < 5 µm
Laser source	▪ Excimer	▪ fs laser	▪ ps laser	▪ Excimer, cw, ns, ps, fs
Beam delivery	▪ Mask projection	▪ Galvo scanner	▪ Galvo scanner	▪ Customized configuration
Integrated processes	▪ Quality control ▪ Recycling of ablated material	▪ Printing ▪ Drying ▪ Packaging ▪ MES	▪ Quality control	▪ Customized configuration

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Rev. 2018-1

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