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3D-Micromac AG is the industry leader in laser micromachining. We develop processes, machines and turnkey solutions at the highest technical and technological level. Our aim is to provide superb customer satisfaction even for the most complex projects.

3D-Micromac delivers powerful, user-friendly and leading-edge processes with superior production efficiency. These proprietary technology innovations are now readily available on a worldwide scale.



Changes in accordance to technical progress are reserved.  
Rev. 2022-04

## microFLEX™

### ROLL-TO-ROLL LASER PROCESSING OF FLEXIBLE SUBSTRATES

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

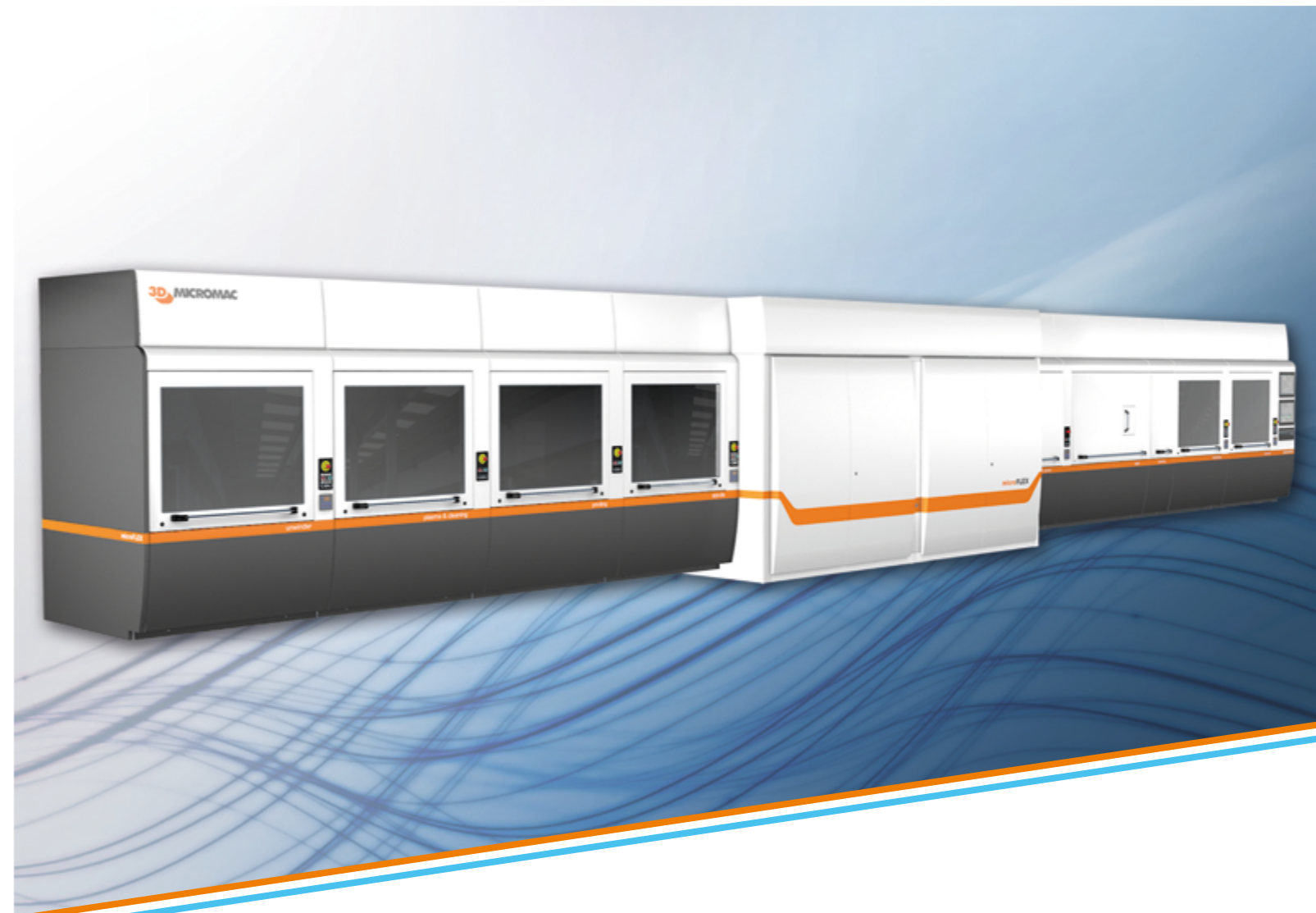
The production systems can handle various substrates, material thicknesses, and types such as polymer films, stainless steel, and thin glass.

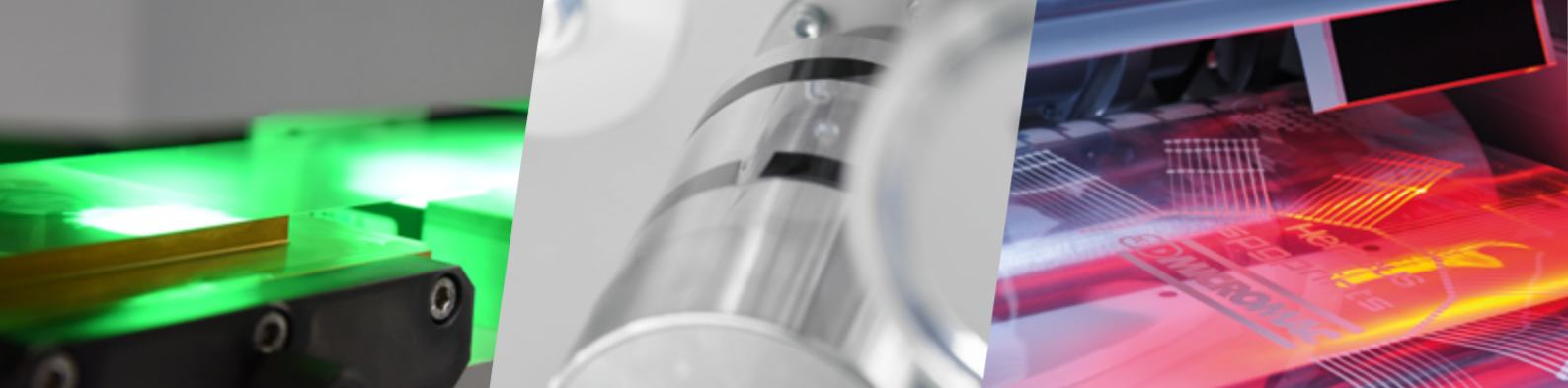
The microFLEX™ systems combine high-precision laser processing with cleaning and packaging technologies as well as inline quality

control. Due to its modular concept, various customized solutions are available, reaching from industrial mass production to pilot lines as well as applied research.

#### HIGHLIGHTS

- Highly versatile micromachining system
- High-precision laser processing
- High throughput and efficiency
- In-situ quality control
- Use of different micro-environments





## microFLEX™ System Configuration - Examples

Application Example	Ablation of Thin-Film Layers for Medical Sensors	Laser-Annealing of Flexible Thin-Film Devices	P1, P2, P3, PT Structuring of Flexible Solar Cells	Customized Configuration
Web Width (ww)	< 50 mm	< 350 mm	400 mm < ww < 1,300 mm	< 1,500 mm
Material	PET	Stainless Steel	PI	Thin and rollable
Material Thickness	200 µm	100 µm	< 50 µm	< 500 µm
Processing	On-the-fly	Step-and-repeat-mode	Step-and-repeat-mode	Step-and-repeat-mode
Web Speed	50 m/min	0.5 m/min	1 m/min	< 80 m/s
Throughput Equivalent	600,000 m²/a	85,000 m²/a	100,000 m²/a	Customized configuration
Positioning Accuracy	± 0.025 mm	± 0.01 mm	± 0.025 mm	< 5 µm
Laser Source	Excimer	ns laser	ps laser	Excimer, cw, ns, ps, fs
Beam Delivery	Mask projection	Moving line-beam optics	Galvo scanner	Customized configuration
Integrated Processes	Quality control Recycling of ablated material	Quality control	Quality control	Customized configuration



microFLEX™ 300  
Laser scribing of organic photovoltaic cells

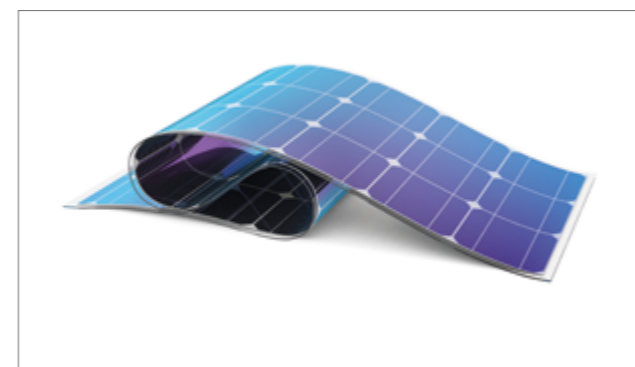


microFLEX™ 50  
Laser cutting of medical polymer



microFLEX™ 600  
Production of electronic devices

## microFLEX™ BENEFITS



Thin Film Photovoltaics

### High versatile micromachining system for:

- Laser structuring
- Laser patterning
- Laser cutting
- 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

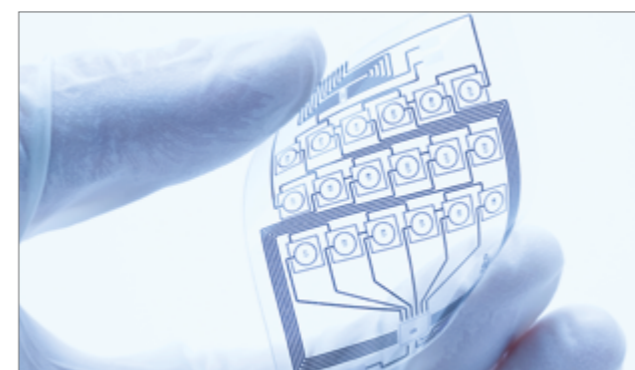
- In-situ optical inspection
- Automated process adjustment

### Cost advantages

- Long-term security of investment
- Reasonable cost of ownership
- Easy to upgrade and modify
- Use of different microenvironments (e.g. cleanroom 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



Single Use Sensors



Flexible Electronics