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.

HIGHLIGHTS
• High versatile micromachining system
• High-precision laser processing
• High throughput and efficiency
• In-situ quality control
• Use of different micro-environments
### microFLEX™ System Configuration - Examples

<table>
<thead>
<tr>
<th>Application Example</th>
<th>Ablation of Thin-Film Layers for Medical Sensors</th>
<th>Manufacturing of Printed Organic Solar Cells</th>
<th>P1, P2, P3, PT Structuring of Flexible Solar Cells</th>
<th>Customized Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Width (ww)</td>
<td>&lt; 50 mm</td>
<td>50 mm &lt; ww &lt; 400 mm</td>
<td>400 mm &lt; ww &lt; 1,300 mm</td>
<td>&lt; 1,500 mm</td>
</tr>
<tr>
<td>Material</td>
<td>PET</td>
<td>PET</td>
<td>PI</td>
<td>Thin and rollable</td>
</tr>
<tr>
<td>Material Thickness</td>
<td>200 µm</td>
<td>100 µm</td>
<td>&lt; 50 µm</td>
<td>&lt; 500 µm</td>
</tr>
<tr>
<td>Web Speed</td>
<td>50 m/min</td>
<td>5 m/min</td>
<td>1 m/min</td>
<td>&lt; 80 m/s</td>
</tr>
<tr>
<td>Throughput Equivalent</td>
<td>600,000 m²/a</td>
<td>500,000 m²/a</td>
<td>100,000 m²/a</td>
<td>Customized configuration</td>
</tr>
<tr>
<td>Positioning Accuracy</td>
<td>± 0.025 mm</td>
<td>± 0.075 mm</td>
<td>± 0.025 mm</td>
<td>&lt; 5 µm</td>
</tr>
<tr>
<td>Laser Source</td>
<td>Excimer</td>
<td>fs laser</td>
<td>ps laser</td>
<td>Excimer, cw, ns, ps, fs</td>
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<tr>
<td>Beam Delivery</td>
<td>Mask projection</td>
<td>Galvo scanner</td>
<td>Galvo scanner</td>
<td>Customized configuration</td>
</tr>
<tr>
<td>Integrated Processes</td>
<td>Quality control</td>
<td>Printing</td>
<td>Quality control</td>
<td>Customized configuration</td>
</tr>
<tr>
<td></td>
<td>Recycling of ablated material</td>
<td>Drying</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Packaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MES</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**microFLEX™ 300**
Laser scribing of organic photovoltaic cells

**microFLEX™ 50**
Laser cutting of medical polymer

**microFLEX™ 600**
Production of electronic devices
microFLEX™ BENEFITS

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

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 microenvironments (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
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.