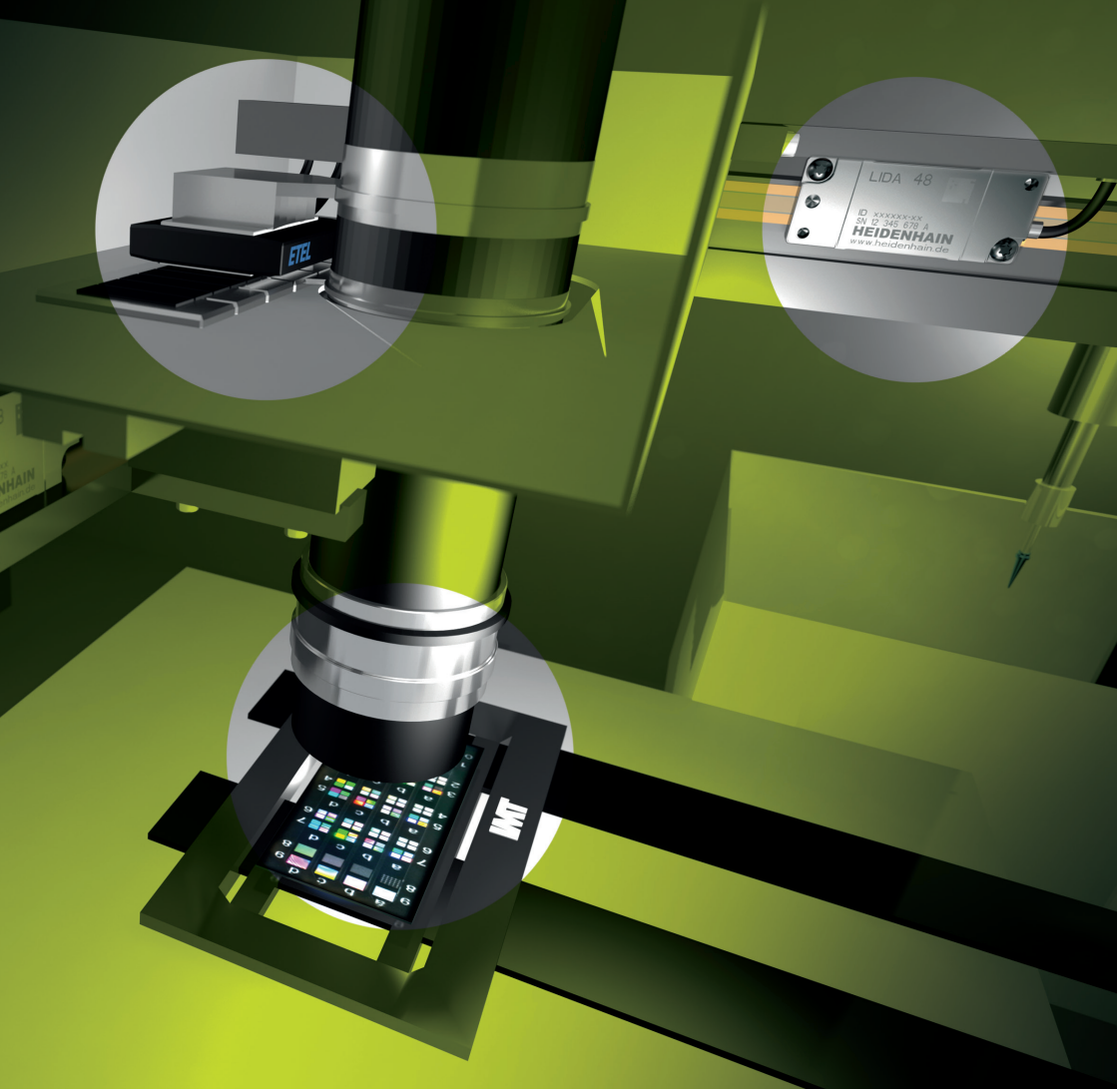


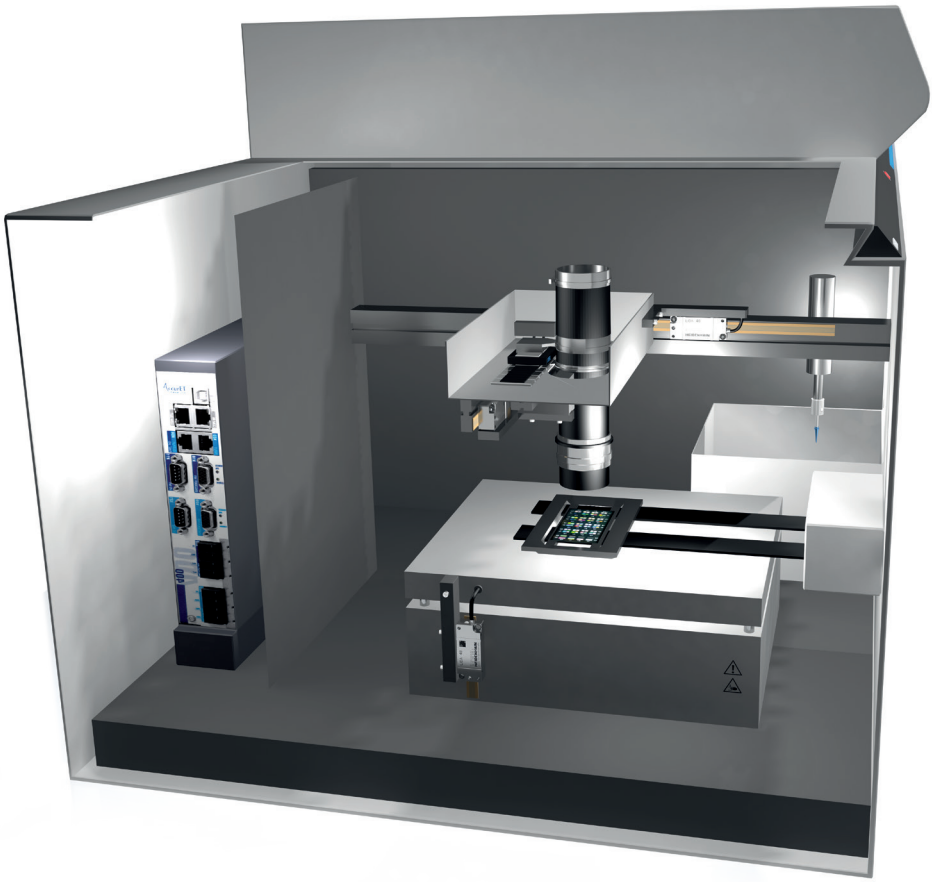

# Enabling Technologies

## Solutions for Medical Technology and Lab Automation

HEIDENHAIN | ETEL | IMT

# Enabling Technologies

High throughput and exceptional accuracy in sample analysis are essential characteristics of modern lab machines.
Technologies from HEIDENHAIN, ETEL, and IMT contribute significantly to achieving these objectives and provide higher productivity as well as
faster, more reliable processes.



HEIDENHAIN is committed to providing customers with enabling technologies for medical technology and laboratory automation to meet the continually increasing demands for accuracy, precision, speed and cost savings.

The product lines for components for laboratory automation include linear encoders, linear motors, motion control systems and read-out systems, enabling exceptional positioning and read-out accuracy while maintaining high throughput in sample analysis.

The product line microfluidics include customized micro- and nano-patterns and structures in glass, integration of electrodes, waveguides and structured functionalization, for life science applications. We provide flexible process offerings from design consultancy, prototyping to scalable manufacturing.

**A**

**HEIDENHAIN: Linear encoders**

- Optical scanning principle
- Precise and robust graduations
- Scalable to the needs of the application

**B**

**ETEL: Linear motors**

- Exceptional performance
- Simple integration
- Patented cogging-free motion

**C**

**ETEL: Motion control**

- Motion system optimized for the application
- Point-to-point motion
- Scanning motion

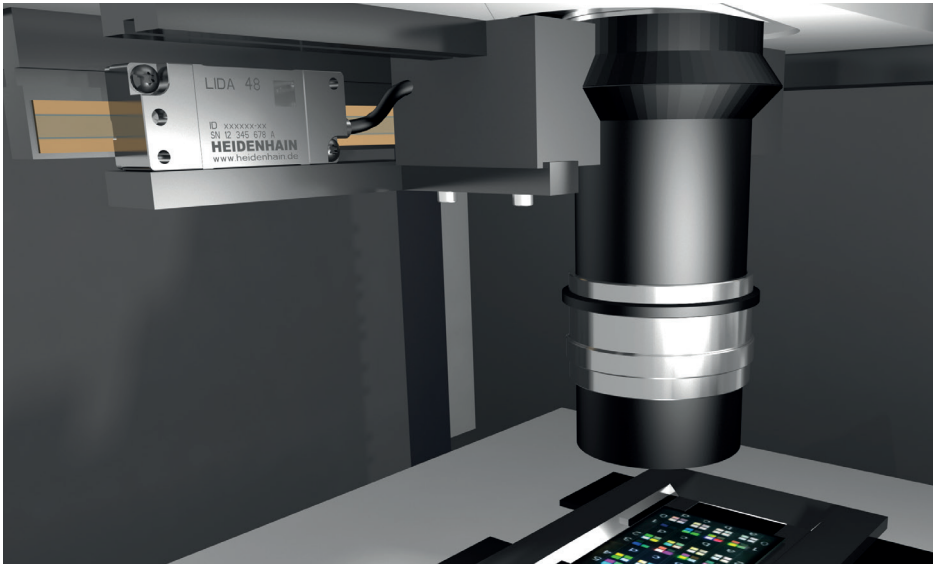
**D**

**IMT: Microfluidics**

- Microfluidic chips and flow cells for tomorrow's biotechnology
- Glass components facilitating: multiplexing, accurate position of analyte, increased signal to noise, decreased fallout rate
- Exact dosage of extremely small volumes

# Motion control

Precise motion control enables significant improvements in speed and system throughput while avoiding standstill and slow travel.




**HEIDENHAIN: Linear encoders**

As part of the control loop, linear encoders have a decisive influence on position accuracy and on smooth motion control.

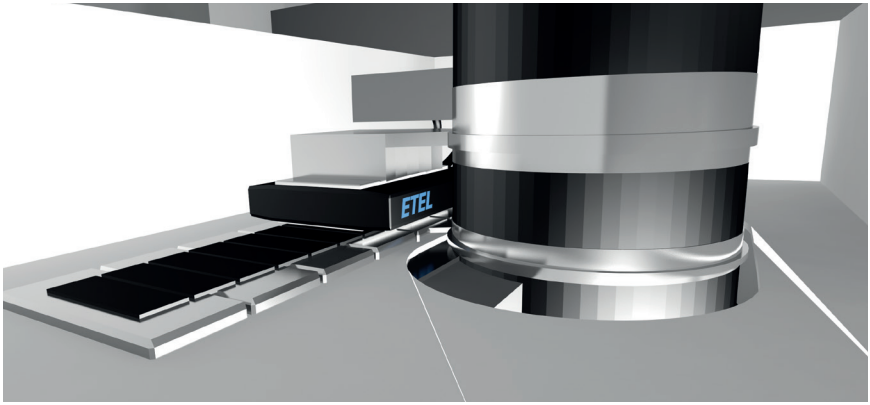
- Accuracy down to the nanometer level
- Measuring step of just a few picometers
- Variety of interfaces allows for easy implementation

**ETEL: Motion control**

- Scalable solutions, ranging from components such as motors and electronics all the way to complete motion systems
- Intelligent motion strategies
- Distributed architecture can handle multiple axes simultaneously

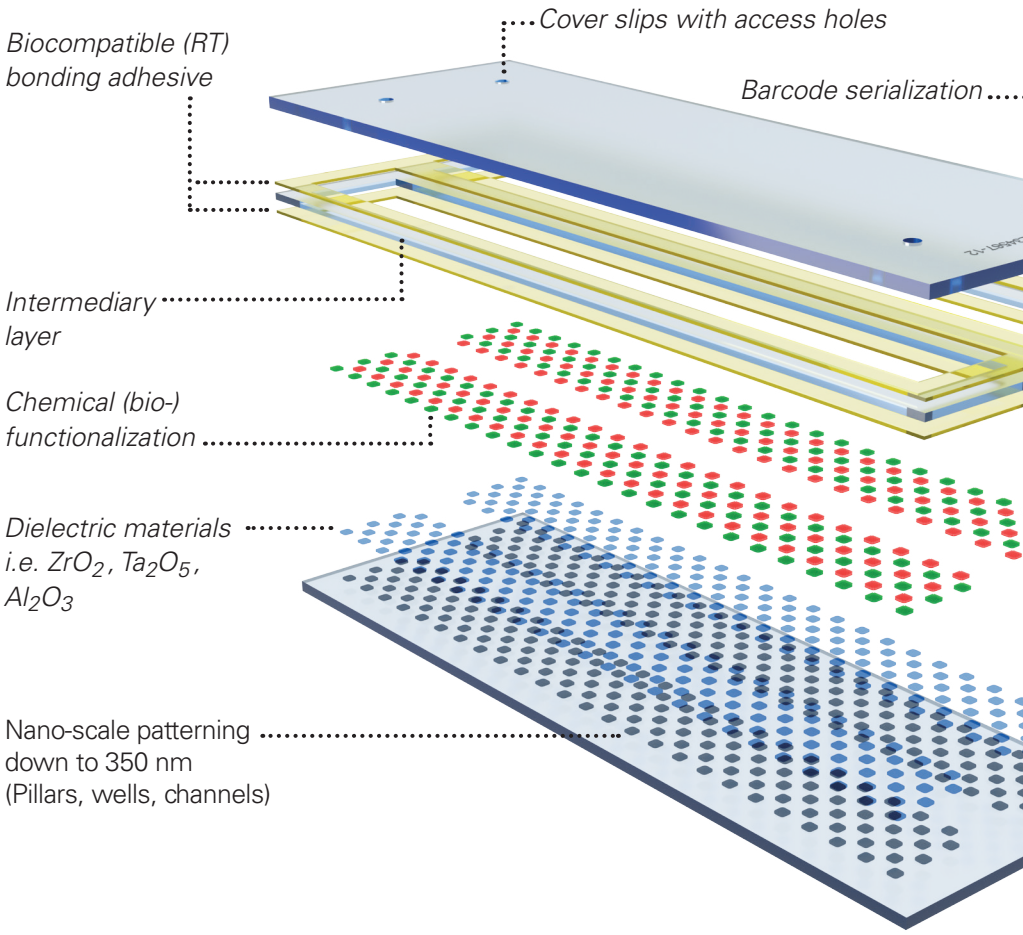
**ETEL: Linear motors**

- High acceleration
- Patented cogging-free motion
- Exceptional thermal efficiency

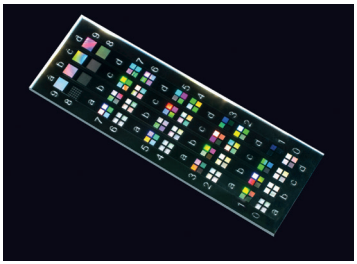


# IMT microfluidics

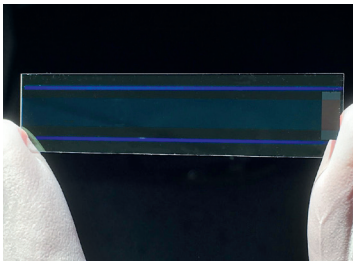
Flexible process offerings that enable customized mircofluidic solutions in glass: design consultancy, prototyping and scalable manufacturing



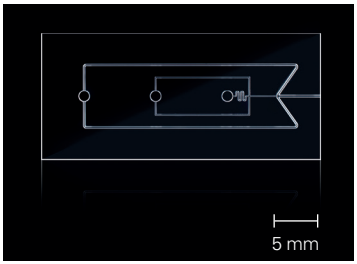

**Applications**
NGS flow cell, organ-on-a-chip, lab-on-a-chip, single-cell analysis, cell enrichment, sample preparation and many more



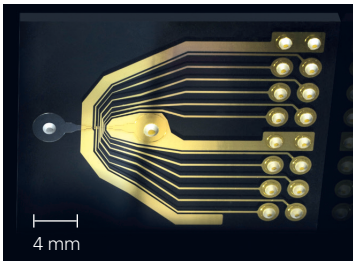
Nanopatterning enabling high-throughput multiplex assays and next generation sequencing



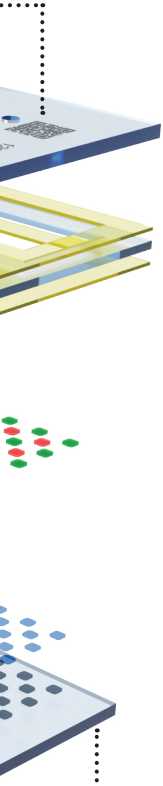
Structured waveguides enabling increased signal-to-noise ratio




Complex glass structuring enabling multiple-emulsion droplet generation




Electrode integration enabling e.g. pathogen detection
- Materials: i.e. Au, Pt, ITO, Ti
- Features sizes down to 2 µm



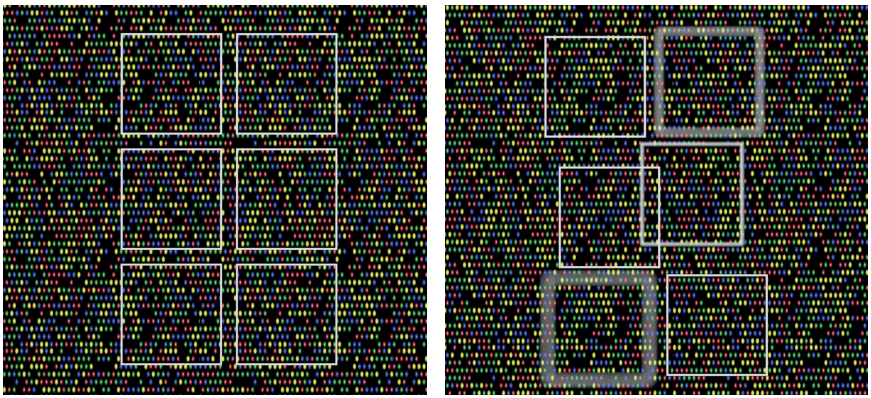
**Glass substrate with the following advantages**

- Bioinert substrate material
- Excellent chemical, mechanical, and optical properties
- Outstanding surface properties
- Large variety of glass types available
- Cost- and time efficient scaling from prototyping to mass manufacturing

# Optical detection system

For the rapid analysis of biomarkers, it is important that movements from one camera position to the next occur at high speed. Within a short period of time, a stable position should be established so that a sharp image can be recorded immediately. Motion technology from HEIDENHAIN supports this process with a short "seek and settle time" and by providing position stability at the focus (Z axis), for example.

*With HEIDENHAIN linear encoder: position stability for sharp images, accuracy, high throughput*



*Without linear encoder: unclear and unstable images*

**Sharp images**

- Position stability: avoid image jitter with HEIDENHAIN technologies
- Excellent surface properties, low coefficient of thermal expansion (CTE), low auto-fluorescence

**Accuracy**

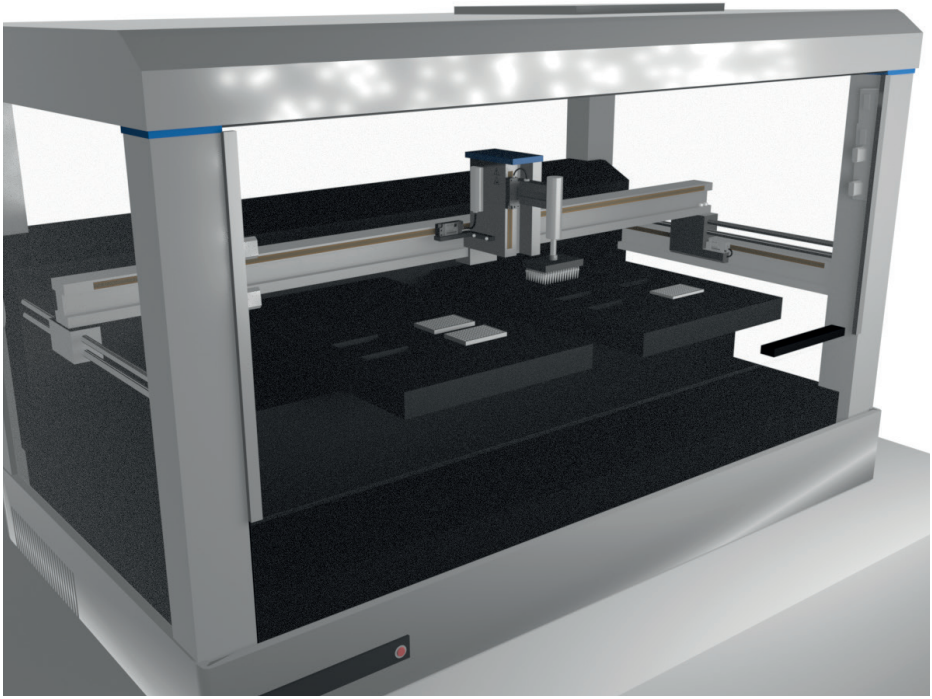
- Exact focus position enabled by linear encoder
- Field of view overlapping is avoided

**High throughput**

- Rapid movement from image to image
- Short seek and settle time

# Liquid handler

A modern lab analysis instrument is expected to feature high throughput as well as reliability in the handling of samples.
A system from ETEL, or the use of components from HEIDENHAIN, increases throughput. Smooth motion at high accelerations enables, for example, a high throughput without the formation of drops that cause sample contamination.

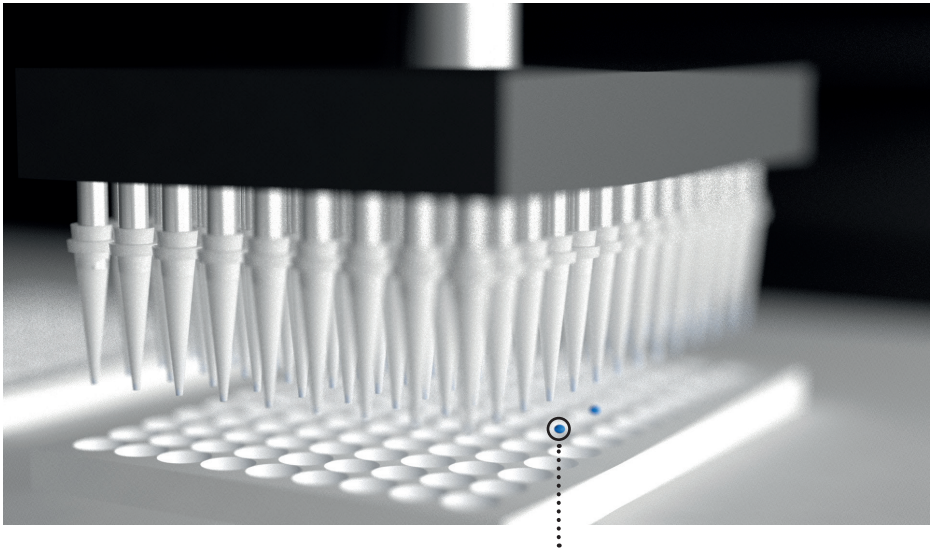


**High throughput**

- Fast and precise movement between samples
- Closed loop motion technology
- Modern linear motor technology

**No spilling**

- Optimized motion control
- Low jitter
- Cogging-free linear motor



*Spilling may occur when a conventional system is sped up to achieve higher throughput. Vibrations are introduced in such drives, which support spilling of small droplets. With technologies from ETEL and HEIDENHAIN the motion of the instrument is fast and very smooth at the same time. Vibrations are at a very low level and consequently contamination of the instrument by spilling is avoided.*

# The technology partners

HEIDENHAIN

HEIDENHAIN is the specialist for advanced encoder technology

www.heidenhain.com

ETEL

ETEL provides high-end motion control systems and components for nanometer precision

www.etel.ch

IMT

IMT is the expert for precise microfluidics devices on glass

www.imtag.ch

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