Microfluidics

Comprehensive Microfluidics Solutions for Diagnostics and Life Science Research

IDEX HEALTH & SCIENCE

Intelligent Solutions for Life™

Fluidics | Optics | Consumables | Assemblies

Your ideas.
We make them flow.

INSIGHT INTO YOUR APPLICATIONS

As the world of life science becomes increasingly complex, developers are challenged to build solutions that enable more analysis on smaller samples with easier user workflows. Whether you're creating instruments for life science research or diagnostics, there's a likelihood your application will require microfluidics. Our experts enable microfluidics that simplify workflows for assays in a wide range of applications, and we partner with you to develop intricate technology while streamlining functionality, manufacturability, and costs.

ASSAYS ENABLED BY MICROFLUIDICS

As the global authority in optofluidic subsystems we are proud to be one of the few OEM suppliers with a demonstrated capability to make complex assays work on microfluidic cartridges. From functionalized flow cells and droplet generators for next generation sequencing, to complex sample-to-answer solutions for point-of-care or in-field testing, we are a recognized leader in miniaturizing of an entire laboratory setup into a single device — with on-card reagents, pumps, valves, sensors, and optical interfaces.

Applications

Capabilities

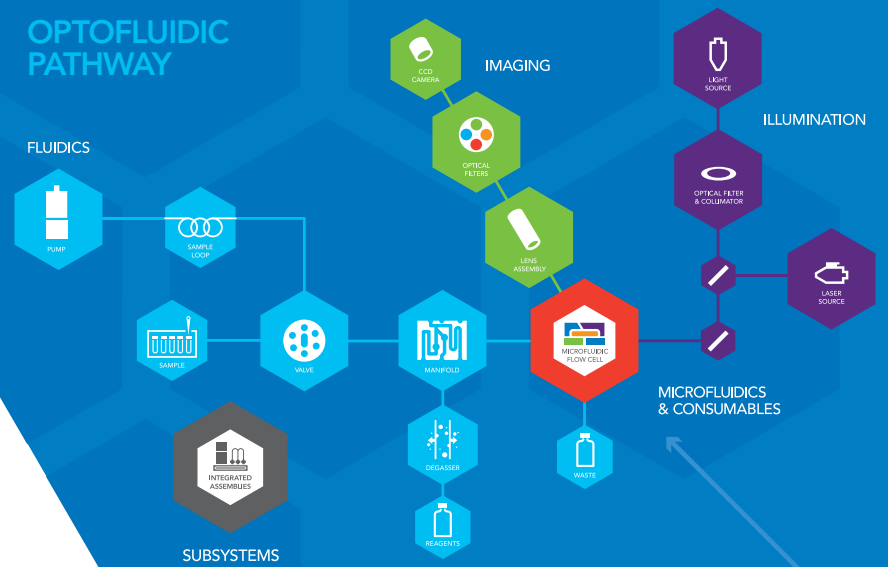
WE WELCOME THE MOST AMBITIOUS PROJECTS

Microfluidic development projects require highly sophisticated technologies and sensitive materials to provide optimized and reliable performance. Although microfluidic consumable devices are undeniably complex, our experts make it easier to develop the right tools for your application.

IDEX Health & Science is uniquely positioned to solve even the most demanding microfluidic challenges in a wide array of markets and applications. From our extensive experience working with our customers, we've evolved a best-practice collaboration path to guide the optimization of your optofluidics solution with expert precision.

BIG PICTURE OPTOFLUIDICS

Through intimate collaboration we deliver a broad range of microfluidic solutions for diagnostics and life science research that support and guarantee your success with masterful know-how that unites the intersections of fluidics, optics, and chemistry.



Design

- Fluidic Transport
- Reagent Handling
- Optical Detection
- Assay Detection Parameters
- Structural Layout for Complex Assays
- Laminar Flow Limited Mixing
- Material Selection
- Incorporating of Lab-on-a-Chip Functionalities
- Channel Size and Pattern Specifications

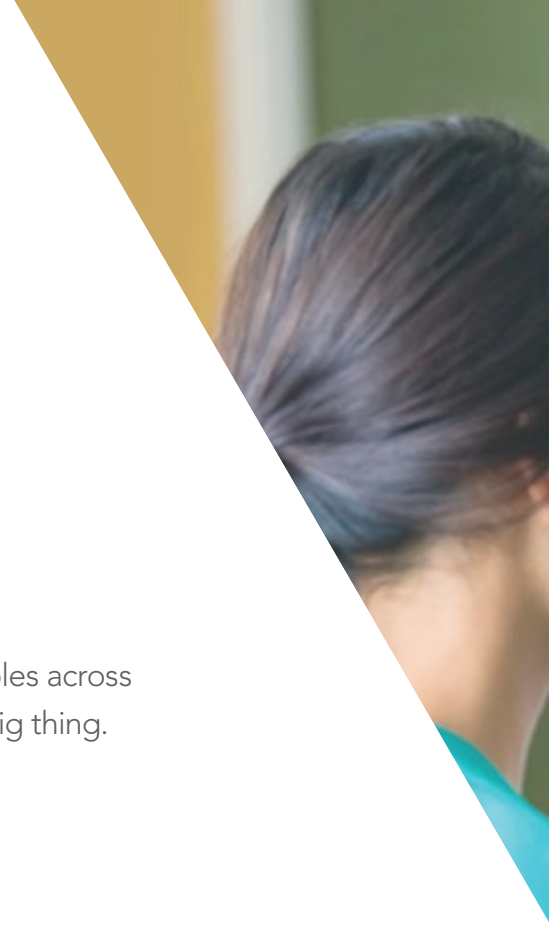
Development

- Incorporation into Current Workflows
- Cost Optimization
- Minimal Time-to-Market
- Flexible and Efficient Design Iterations

Manufacturing

- Scalability
- Regulatory Compliance
- Product Fulfillment
- Risk/Failure Analysis

We Thrive on Complex Problem-Solving Opportunities



As the number one provider of microfluidic consumables across the globe, we are ready to help you solve the next big thing.

Microfluidic Consumables

WE HELP YOU INNOVATE DOWN TO THE MINUTE DETAIL, SO YOU CAN ACHIEVE YOUR GOALS

Producing low-cost, highly-accurate, and large-volume consumables for the life science and diagnostics markets is not an easy task. We aim to exceed your quality and reliability expectations, because we understand what's at stake, recognizing that both critical research and patients rely on precise results at every level. The goal of most microfluidic systems is to achieve a higher degree of integration than otherwise possible, thereby reducing size and cost, as well as increasing workflow efficiency and/or analysis speed.

IDEX Health & Science has a proven history of enabling commercial success for OEMs within global life sciences markets. With decades of expertise in microfluidic design and manufacturing, we ensure your microfluidic consumable will comply with the strictest standards in reproducibility while achieving world-class performance. You can proceed to market quicker and with greater confidence to achieve your goals.

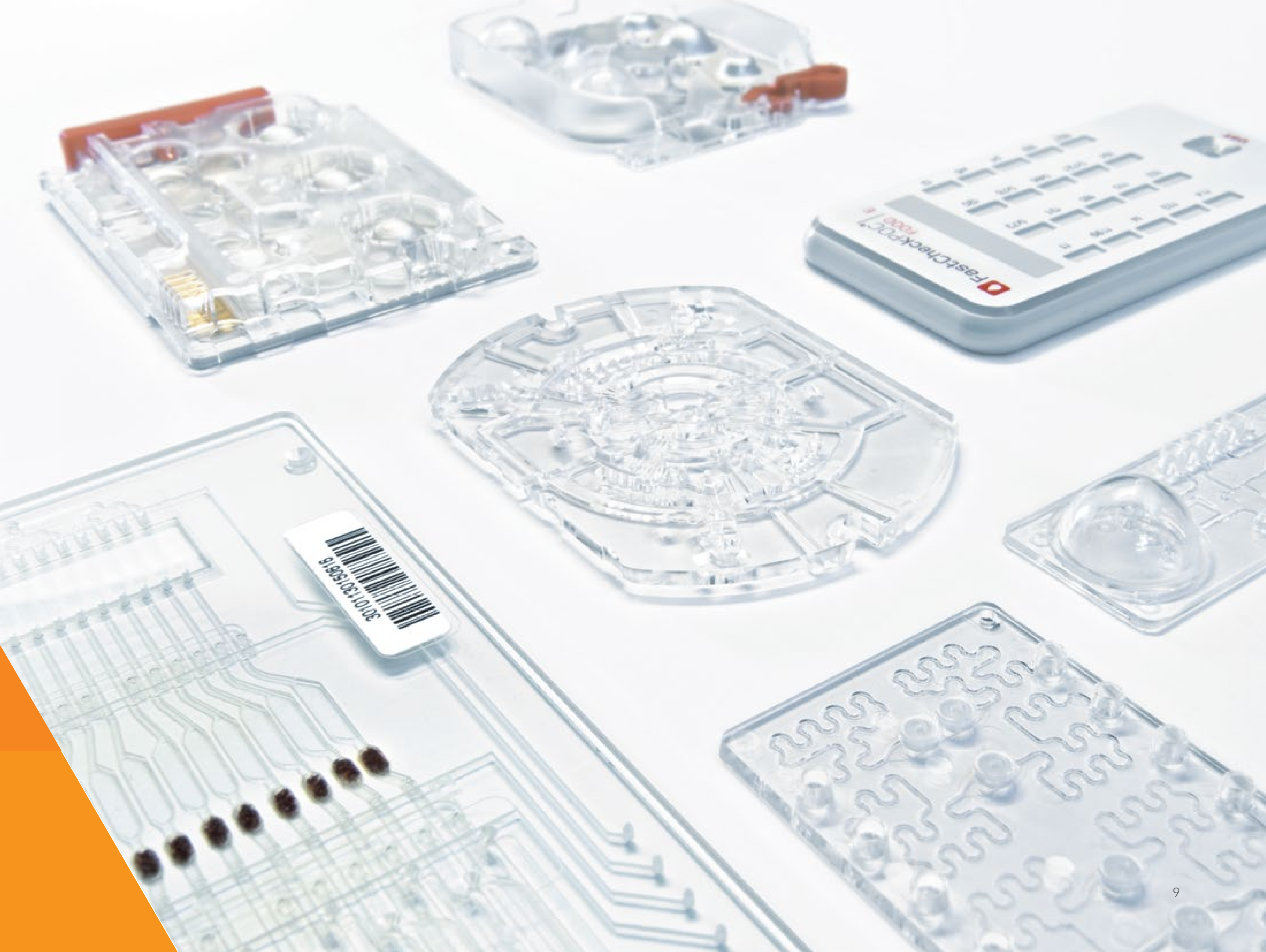
CELL ISOLATION

LIQUID BIOPSY

DROPLETS

FLOW CELLS

MICROFLUIDIC CHIPS


FastCheckPOC

Sample-to-Answer Solutions

WE SIMPLIFY COMPLEX CONSUMABLES INTEGRATION, SO YOU CAN KEEP MOVING FORWARD

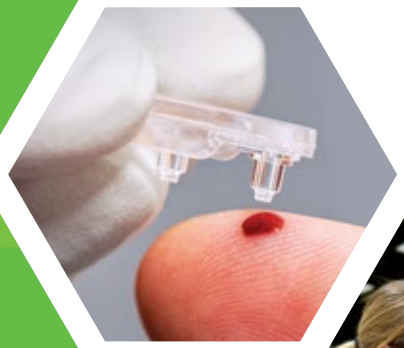
The design and integration of sample handling, wet and dry reagents management, and assay detection into a microfluidic system requires ingenuity and precision to assure testing accuracy and reliability in the field. Many developers of sample-to-answer solutions struggle with the challenges to minimize size, reduce cost, and simplify workflows. This is especially true when relying upon a mix of vendors and components that weren't designed together or designed by experts with deep life science consumables knowledge.

As the world's largest OEM partner for integrated consumables, we provide comprehensive solutions up and down the market to serve many applications. We have the technology, know-how, and experience to design for these challenges from the very beginning. From CAD to prototype, and from pilot to mass-production, we look to de-risk your development, allowing you to focus on achieving results.

When it comes to challenging sample-to-answer solutions, we have you covered. For on-board reagent and fluid management, our proprietary components and processes allow for wet or dry reagent storage in a safe and reliable solution. Our capabilities to manufacture and integrate plastic, glass, reagent, and detection components is unrivaled by others in the life science community.

We have microfluidic solutions for any conceivable life science consumable or development project. Our unique capabilities maximize assay performance, reduce risk, and enable complete optimization of your optofluidic pathway into a single integrated device.

- SAMPLE INTRODUCTION
- SAMPLE PREP
- MIXING
- FLUID TRANSFER
- ON-BOARD REAGENTS (WET & DRY)
- OPTICAL OR ELECTRICAL DETECTION (SENSING)
- INTEGRATED PUMPS & VALVES
- LYSE & PURIFICATION
- WASTE MANAGEMENT



1. HANDLE
2. SAMPLE INLET
3. WET REAGENT CONTAINERS
4. VALVES
5. REAGENT PLUGS
6. DETECTION AREA
7. REAGENT PLUGS
8. BELLOWS (DIAPHRAGM PUMP)

Supporting Labware

WE HELP YOU REDUCE RISK AND COST, SO YOU GET A STREAMLINED SUPPLY CHAIN

Developing a life science instrument extends way beyond the actual box. Managing a complex supplier network can lead to various challenges — from the regulation of long lists of vendors and partners that support your platform with consumable components, such as bulk reagents and injection molded components, to handling design change/control and cleaning concerns. We understand the needs of bringing a device to the life sciences market because we have nearly two decades of experience doing just that. We aren't just an injection molding house, we have deep knowledge in life science, material sourcing, molded components, labeling, and packaging which allows us to help our clients avoid risk. You can depend on IDEX Health & Science to help design and deliver the critical consumables your diagnostic system requires on-time and on-budget.

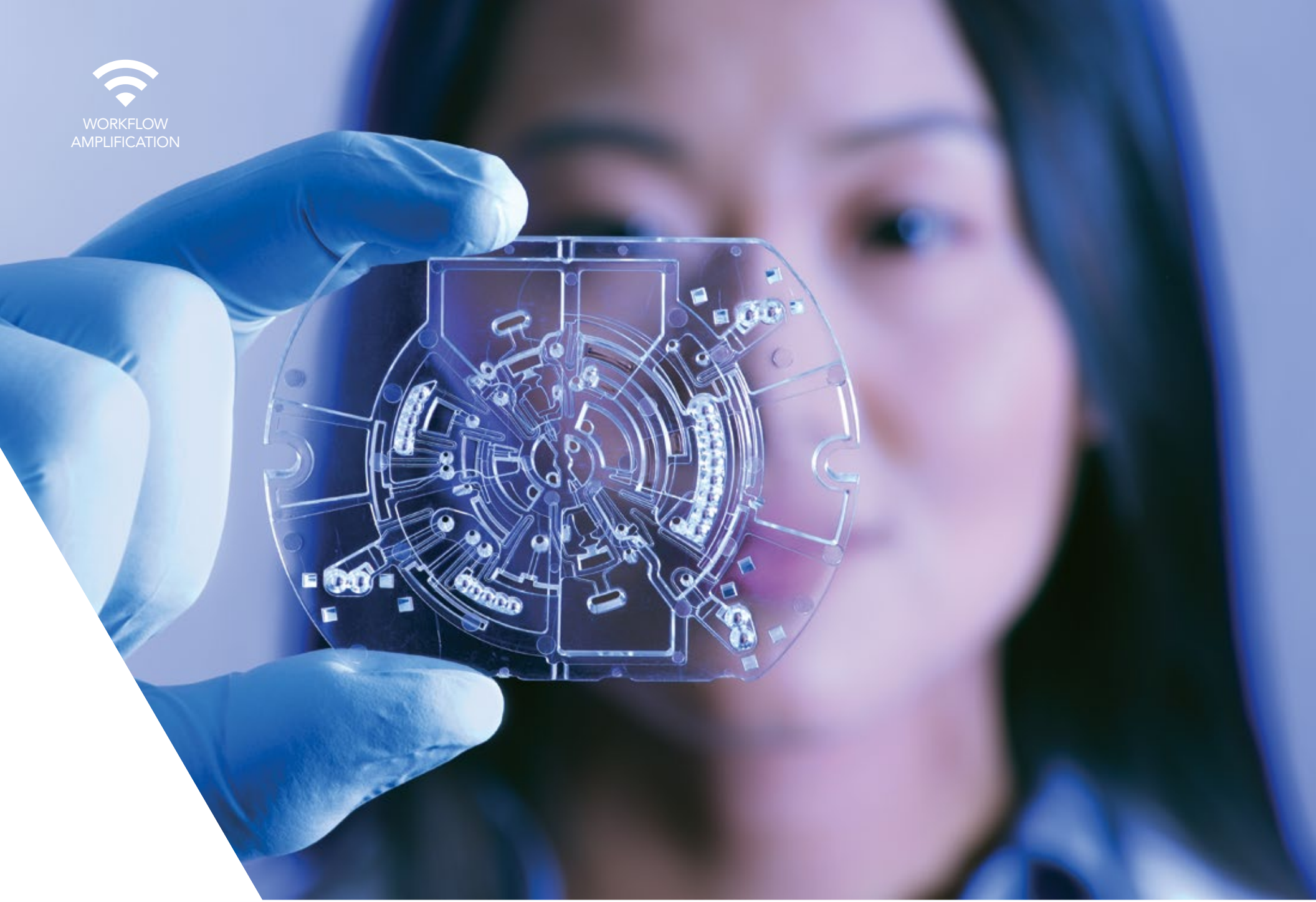
- INJECTION MOLDING
- IN-HOUSE TOOLMAKING
- ASSEMBLY AUTOMATION
- CLASS 10K CLEANROOMS (OVER 20,000 SQF)
- ISO 13485

Solving Problems

POWERFUL PARTNERSHIPS MAKE IT ALL POSSIBLE

We are responsible for designing unique solutions to complex diagnostic problems that require expertise in a wide range of fields that fully address the risks associated with bringing a new product to market.

Our access to sophisticated, state-of-the-art technologies in manufacturing – coupled with nearly two decades of experience in developing high-value, cost competitive, custom solutions – means we have the ability and confidence to guarantee project success. Through practiced collaboration we can enable your next success story, with innovation and support, always keeping time to market at the forefront.


WORKFLOW
AMPLIFICATION

Microfluidic Engineering Innovation

WE ENABLE YOUR PROGRESS BY OPTIMIZING MICROFLUIDIC SYSTEMS

Through strategic partnerships, IDEX Health & Science engineers innovative microfluidic and consumable components that result in optimized optofluidic systems. We don't just build components, we also create leading-edge solutions that maximize performance and enable the complete optimization of the optofluidic pathway. We manufacture highly trusted devices for life science instruments that perform precision microfluidic analysis tasks.

Browse through our partnership case studies on the next few pages to see how partnership is the new innovation for microfluidics:

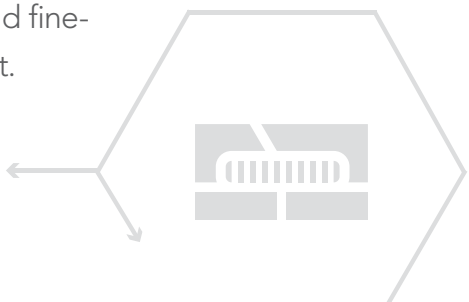
Pinpointed Detection

CUSTOMER REQUIREMENT:

The readout of Lab-on-a-chip consumables is mostly done by automated instruments, either electrical/electrochemical or optical. In case of an optical detection, the alignment of the consumable with the instrument plays a key role and should be addressed from the very beginning in the design and engineering phase. As an example, the typical beam diameter for optical readout in a laser-based flow cytometer is in the range of some hundred microns, while the critical detection area for many diagnostic applications is in the 10-50 microns range. How can the laser detect cells/ particles in such small areas, despite the fact that process related tolerances cannot be eliminated completely?

SOLUTION:

A Ronchi Grating was implemented directly onto the consumable, which allows an active alignment by auto-focusing. Since the grating is located in a defined proximity to the detection channel, the instrument can easily detect the position of the disposable and fine-tune for the optical readout.

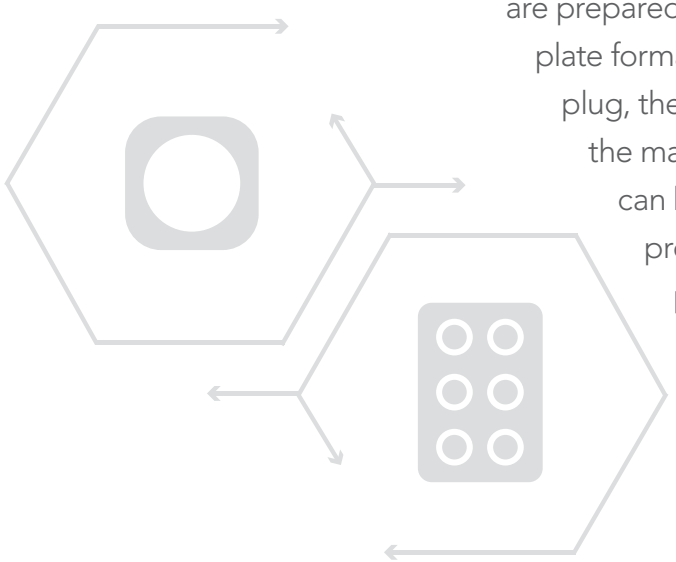


Dry Reagent Storage

CUSTOMER REQUIREMENT:

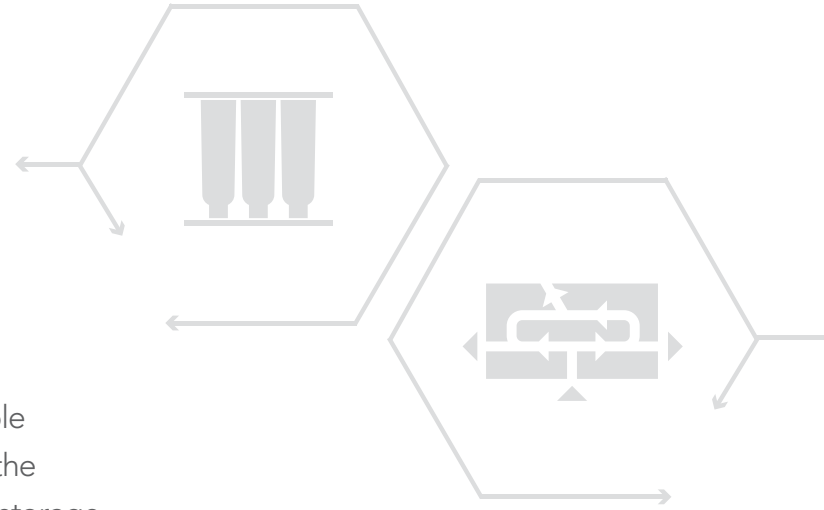
In addition to the storage of liquid reagents, complex assays often require storage of dry reagents. While dispensing reagents into cavities on the cartridge seems straightforward, realizing this concept on a production level has several drawbacks (e.g. handling of large parts, throughput for the drying process, and possible impact of the manufacturing and assembly processes on the reagent). Hence a reliable, cost effective, and scalable solution for bringing dry reagents onto Lab-on-a-chip cartridges is needed.

SOLUTION:



Reagents are dispensed and dried onto reagent carriers, so-called reagent plugs (“RP”). These plugs are prepared independently from the cartridge in larger batches, functionalized on a SBS titer plate format and assembled to the cartridge in a final assembly step. The plastic material of the plug, the capacity, and its surface properties/coatings can be optimized independently from the material of the fluidic cartridge. Furthermore, the processes for dry reagent preparation can be developed and performed independently of the cartridge manufacturing processes using standard equipment (e.g. titer-plate format). This concept has been proven to be scalable and compatible with industrial functionalization and assembly processes. In several projects yields and cartridge costs could be significantly improved over conventional storage concepts. In addition, the proprietary RP approach reflects the platform character of many POC applications, where different assays are reflected differently functionalized carriers, while the ordinary consumable manufacturing process chain keeps unchanged.

Liquid Reagent Storage



CUSTOMER REQUIREMENT:

Lab-on-a-chip consumables often require storage of liquid reagents on the consumable itself to provide a fully self-contained cartridge which runs without liquid interfaces to the instrument. Hence a reliable, cost effective, and mass manufacturable solution for the storage of liquid reagents is needed. In addition, the storage concept must fulfill the following requirements:

- Protection and preservation of reagent stability during manufacturing and assembly as well as long-term storage
- Chemical and/or biological compatibility with different reagent types to be stored, no leaching of substances which could affect the assay
- Application of a reproducible mechanism to open the storage container for reagent release and dispense

SOLUTION:

Liquid reagents have been stored on both blister packs and in cavities on the chip. For the blister storage concept, the blister pack is formed of a composite-layer film, assembled to the cartridge backbone, filled with the liquid reagent. A small channel connects the blister to the rest of the fluidic network of the cartridge. This channel provides a frangible seal. Once the blister is pressed by the instrument (or manually), this seal opens. With such a concept, a controlled release of the liquid reagent is achieved. The materials used offer protection against environmental conditions (gas exchange) and the reagent is stored without residual air in the blister. Depending on the number of reagents and the volume to be stored, the concept of storing liquid reagents in cavities on the chip can be advantageous. Since most Lab-on-a-chip platforms are made of polymers, it is essential to use polymers with sufficient barrier properties to allow storage of volatile reagents. Again, the cavities are closed with frangible seals or frangible seal film valves which are opened by the instrument.

On-Chip Pump Mechanism

CUSTOMER REQUIREMENT:

Consumables in the diagnostic and IVD market often require active fluid transportation on the chip to realize corresponding complex assay flow schemes. Traditionally, such transport is controlled pneumatically via an instrument. However, with this approach, pneumatic interfaces to the disposable are needed which always involve the risk of critical biological contamination. Especially for molecular assays incorporating the amplification of nucleic acids, a self-contained cartridge is stringently required.

SOLUTION:

Depending on the material being used, different on-chip pump mechanisms can be applied to realize fluid transportation in a closed system scenario. One possible solution is the fluid manipulation via one (or more) integrated elastomeric air reservoir, called bellow, realized by a two-component injection molding process. The bellow volume is modified by an instrument-based actuator and due to the hermetically sealed design of the consumable itself, this compression leads to a fluid manipulation. Bellow relaxation on the other hand enables reversal of flow direction.

A different approach is the implementation of a thin-film pump, also mechanically operated by the instrument, into a closed-loop fluidic network. Two layers of film being assembled to the consumable are deflected to form a pump cavity and are operated similar to a peristaltic pump. Both solutions are equally well suited for mass manufacturing processes and facilitate completely sealed and self-contained cartridge designs as a prerequisite for contamination control.

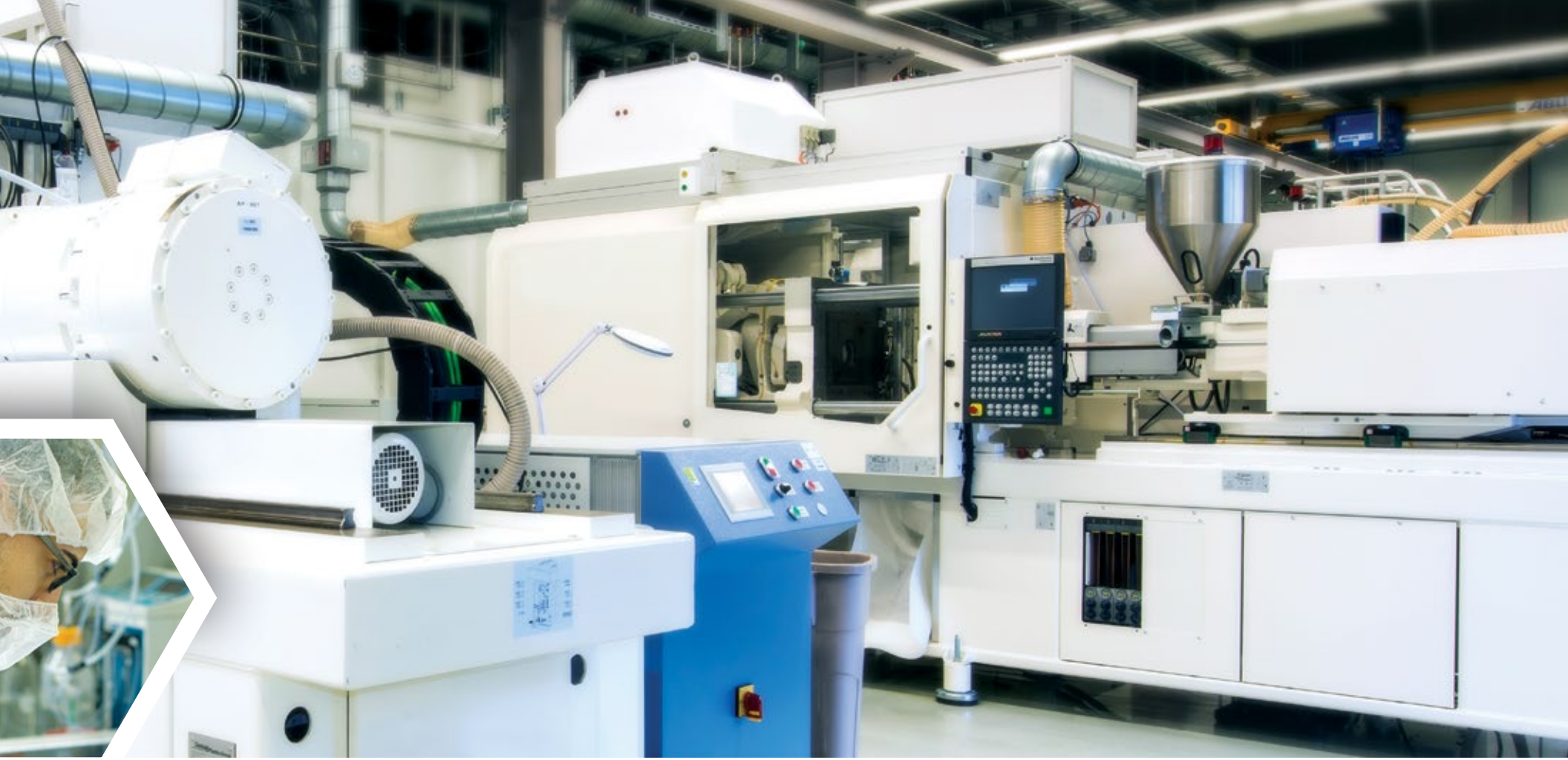
Materials and Processes

WE ARE YOUR HIGH QUALITY SINGLE-SOURCE PARTNER FOR MICROFLUIDICS AND MICROFLUIDIC CONSUMABLES

At IDEX Health & Science, we don't just build microfluidic components; we also create innovative solutions that maximize performance and enable complete optimization for your microfluidic assays. Our team of scientific and engineering experts are key in the manufacturing of highly-trusted, microfluidic products. We excel in the design and manufacturing of life science instruments that perform precise sample introduction, reagent handling, sample processing, separation, and other critical analytical tasks.

We invite you to increase performance and efficiency with a consumable or life-of-instrument flow cell that gives you advanced integration at the microfluidic scale.

- INNOVATIVE SOLUTIONS
- HIGHLY TRUSTED
- INCREASE PERFORMANCE
- CLASS 10K CLEAN ROOM



Materials

- Glass
- PDMS
- Polymers
- PSA

Bonding

- Plasma
- Adhesive
- Laminating
- Laser Welding
- Heat Staking
- Ultrasonic Welding

Structuring

- Glass Machining
- Knife Cutting
- Laser Cutting
- Injection Molding
- Additive Manufacturing

Reagents/ Chemistry

- Surface Chemistry
- Dry Reagents
- Wet Reagents
- Microarrays

Assembly

- Tool making
- Class 10k Clean Room
- Automation
- Supply Chain Management
- Process Validation

Collaboration

WE'RE WITH YOU, EVERY STEP OF THE WAY

Whether your application involves components for life science instrumentation or consumables, we have the technology, know-how, and experience to design, prototype, and mass-produce microfluidic devices for your applications.

As the number one provider of microfluidic consumables across the globe, with custom development capabilities to match, IDEX Health & Science is ready to help you solve the next big thing. We can do this through the implementation of our:

Development Process

IDEX HEALTH & SCIENCE

STEP ONE

Connect to Our Expertise

We will review your request and:

- Evaluate the technical feasibility of your designs and ideas
- Provide initial design advice
- Jointly scope the proposed project and provided schematics

STEP TWO

Collaborate on the Initial Review

If your design is a good fit for our capabilities, we will work with you on prototype or product development.

- Opportunity evaluation
- Schematic layout review
- Fluidic problem solving

STEP THREE

Iterative Partnership

Together we iterate through a series of design and development rounds utilizing a comprehensive process that allows us to innovate and alter as necessary.

- Rapid prototyping and tooling
- Repeating rounds of analysis
- Protect your intellectual property

OUR EXPERTISE:	REVIEW REQUEST	EVALUATE	ITERATE
YOUR IDEAS:	SUBMIT REQUEST	SHARE	ITERATE

CUSTOMER

Begin Exploring Solutions

- Submit a design application request
- Share your flow path, design, and timeline needs
- Visit www.idex-hs.com to review existing products
- If applicable, order existing products

Share Capabilities & Requirements

- Disclose your anticipated performance specification
- Define timelines for development
- Discuss operational parameters

Iterative Partnership

- Share design requirements
- Share process control and testing requirements
- Give insights to intellectual property requirements

WE OFFER CLEAR OBJECTIVES AND QUALITY RESULTS FOR YOUR TEAM

Knowing you can trust your partner is the most important part of any relationship. When collaborating with another company you need to know that your information is safe and that your time is respected. In order to ensure the highest possible customer satisfaction we have developed a project map of what to expect when working with us on a typical project, so we can work together seamlessly.

STEP FOUR

Design & Validate

We develop a solution in partnership with you.

- Design may incorporate off-the-shelf or custom parts
- Highly collaborative prototyping
- Interactive design meetings

STEP FIVE

Delivery of Components

IDEX Health & Science delivers optimized components and/or sub-systems.

- Packaged and delivered to your specifications
- Fluidics solutions can include sub-assemblies, parts, and kits
- Global customer service

STEP SIX

Continuous Improvement

We support you beyond initial development and are available to assist throughout your instrument life cycle.

- Assist with analytical methodology
- Life-of-instrument support

Our expertise provides you with significant development advantages by improving manufacturability, cost, and speed to market.

DEVELOPMENT
TEST
DELIVERY
PREPARATION
SUPPORT
INTEGRATION

GO TO MARKET

Provide Feedback on New Design

- Approve the initial design, or request changes
- Validate system capabilities
- Evaluate performance relative to initial specifications

Prepare for Subassembly Integration

- Examine components and review manuals and associated literature
- Consult with us on your first steps towards implementation

Integrate with Your Instrument

Provide feedback about your new instrument to IDEX Health & Science:

- Optofluidic performance
- Methodology changes
- Integration challenges

Life Science Manufacturing

WE KEEP IT CLEAN AND ON-TIME

Cleanliness plays a key role in microfluidics manufacturing. Whether we are leveraging our state-of-the-art cleaning facilities or our clean-rooms, we are capable of offering products with the surface qualities you require. We utilize ISO 13485 quality management processes and have the best facilities to create, assemble, and package your microfluidic consumables. We create a balance between functionality, cost, and scalability, and we guarantee you an optimal device that meets your requirements, with minimal time-to-market.

Technically challenging, injection-molded products require stable production processes for mass production. IDEX Health & Science is your dependable partner with a long-lasting culture of ongoing development and improvements. We operate in a highly regulated, climate-controlled environment and provide full program documentation and component/device traceability. From small-scale production of prototypes to large-scale production items, our experts adapt to your request. Pair that with our global delivery possibilities, we are your ideal partner for microfluidic consumables, consumable components, and sample-to-answer solutions.

LIFE SCIENCE QUALITY STANDARDS

MINIMAL TIME-TO-MARKET

RELIABLE SOURCING

COMPLETE FULFILLMENT

ISO 13485

Global Leaders

YOU SEE INNOVATION, WE SEE INTEGRATION

Whether you're pursuing a complex consumables design or a life-of-instrument flow cell, we support and guarantee your success with extensive experience that unites the intersections of fluidics, optics, and chemistry.

We are a strong force of committed people and innovative products for your complete optofluidic pathway, continually increasing our product offering, expanding our market relevance by connecting to new customers, and positioning ourselves as global leaders in optofluidics engineering.

WORLDWIDE OPTOFLUIDICS

As a global company, IDEX Health & Science has an international network of direct sales professionals and distribution partners in place to provide personal service to every customer. Our experts are ready to visit your operation, assess your needs, and develop intelligent solutions for your challenges.

CORPORATE RESPONSIBILITY

IDEX Health & Science is committed to preserving the environment. Our continuous improvement programs hold our facilities accountable to reduce waste, prevent pollution, and conserve resources. Many products comply with REACH and RoHS regulations.

Carlsbad, CA, USA

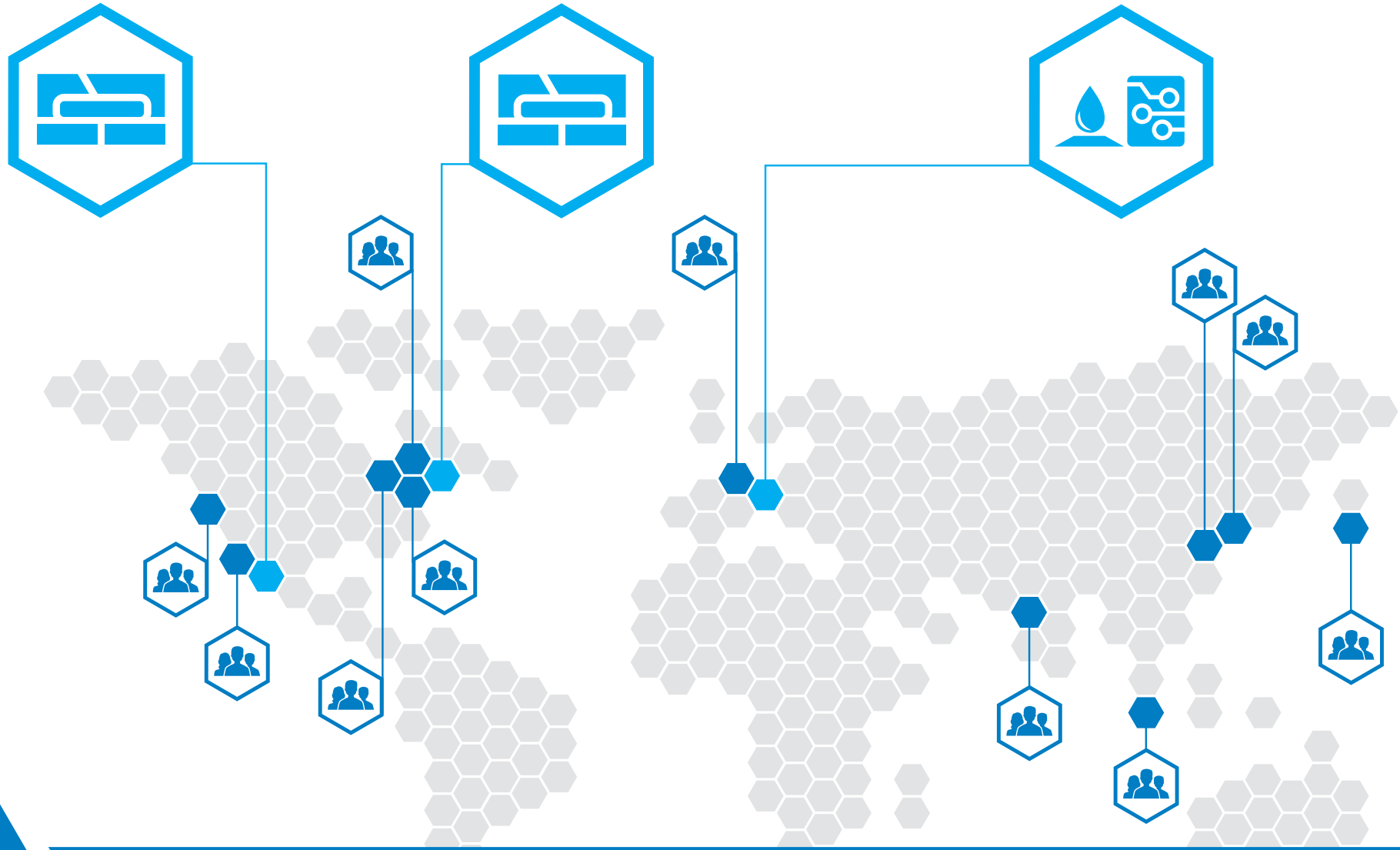
Center of Innovation: design and development of complex optical solutions for life science solutions.

Wallingford, CT, USA

Engineering and manufacturing dedicated to producing high quality, high precision products for the life sciences.

Zweibrücken, Germany

Development and production of disposable microfluidic devices for the life sciences.



North America

Bristol, CT, USA
Carlsbad, CA, USA
Middleboro, MA, USA
Oak Harbor, WA, USA
Rochester, NY, USA
Rohnert Park, CA, USA
Wallingford, CT, USA

Europe

Zweibrücken, Germany
Didam, Netherlands

Asia

Saitama, Japan
Shanghai, China
Beijing, China
Mumbai, India
Singapore, SG

IDEX HEALTH & SCIENCE

For ordering and technical support, please visit idex-hs.com/connect