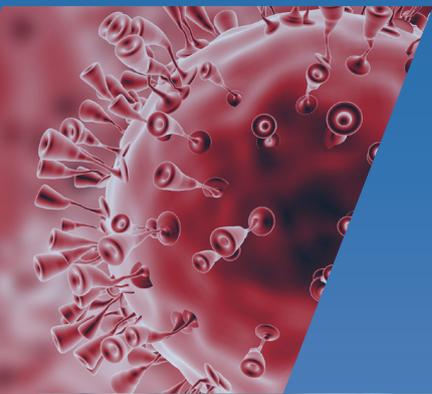


# BioDot Lateral Flow Solutions

Precision tools and expertise  
for developing and scaling high-  
performance rapid diagnostic tests.

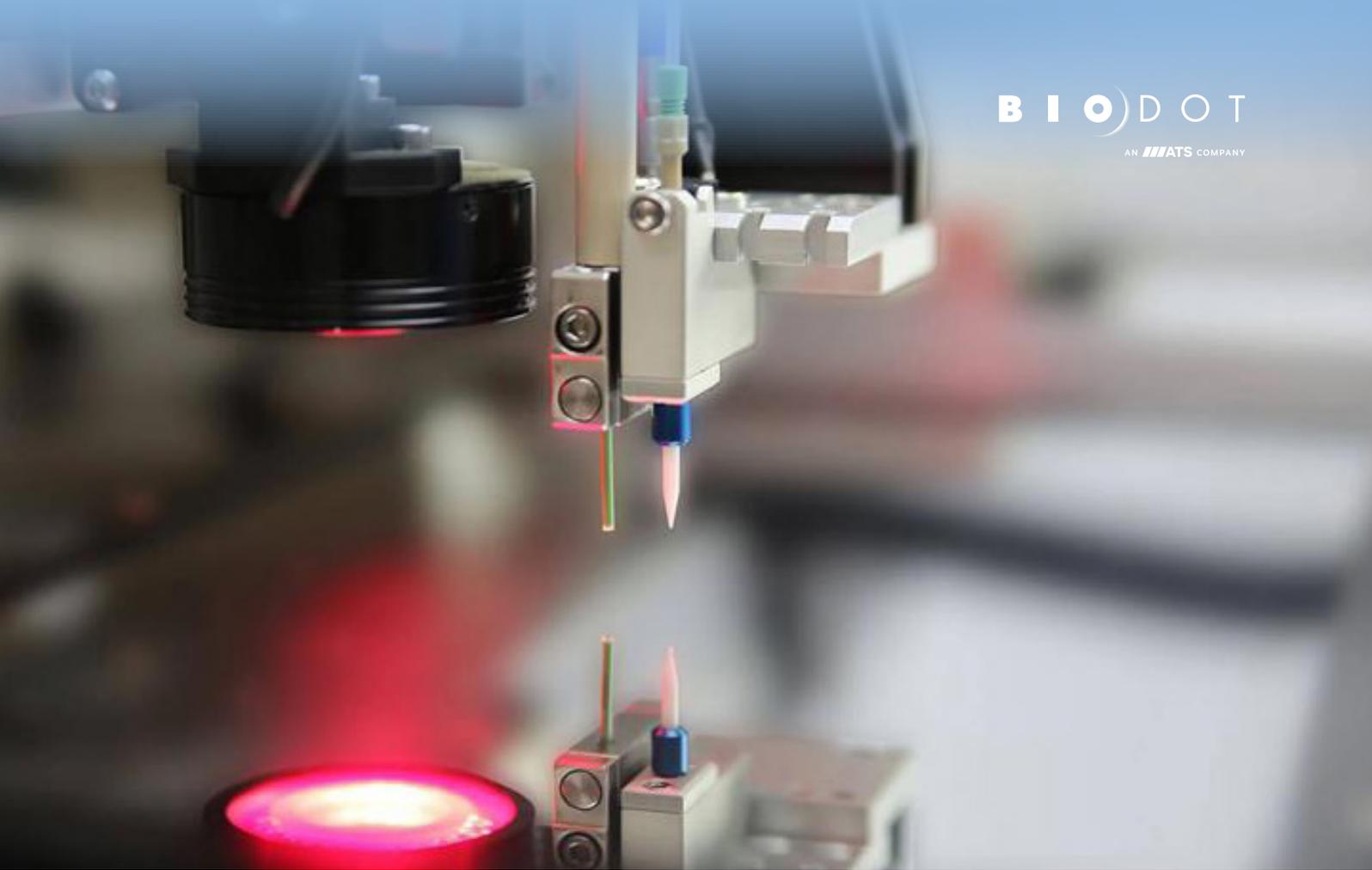


**B I O D O T**

AN **ATS** COMPANY

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# Meet BioDot

BioDot is a global leader in precision dispensing, web handling, and diagnostic manufacturing technologies. For more than two decades, BioDot has supported life science innovators with systems that enable accurate, repeatable, and scalable processes—from early R&D through full-scale production.

## Our Role in Lateral Flow

BioDot supports the full life cycle of lateral flow assay development. Our systems enable critical processes such as:

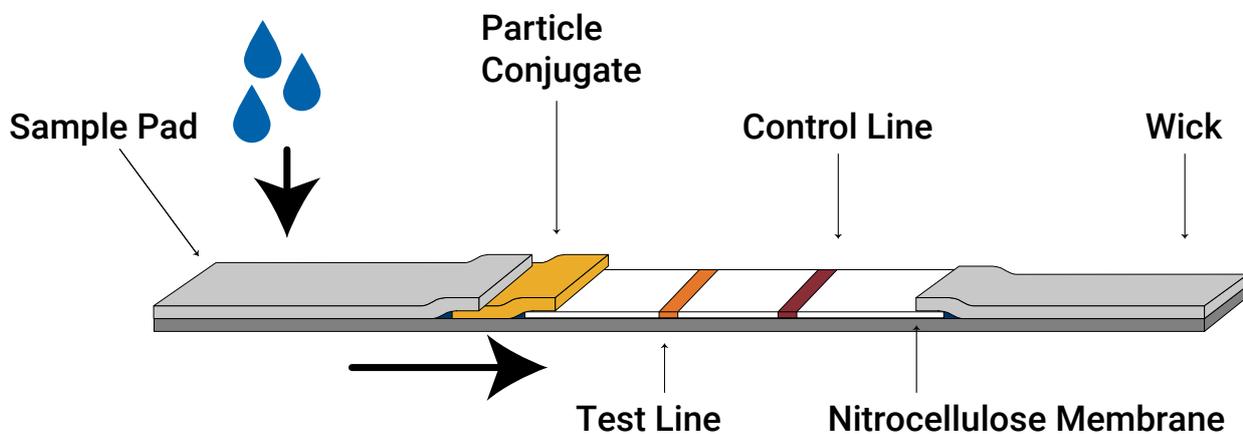
- Reagent deposition.
- Membrane striping.
- Conjugate pad coating.
- Lamination of multilayer assemblies.
- Drying and curing.
- Precision cutting and singulation.
- In-line reel-to-reel manufacturing.

Every BioDot platform is designed to help teams transition smoothly from R&D to pilot scale and ultimately to high-volume manufacturing.

# What Is Lateral Flow?

Lateral Flow Assays (LFAs) are rapid diagnostic formats that rely on capillary flow of a liquid sample across a nitrocellulose membrane. Each component – sample pad, conjugate pad, membrane, and absorbent pad – must be precisely aligned and treated to ensure reliable performance.

Success depends heavily on controlled reagent placement, pad treatment consistency, and reproducible assembly. BioDot is the premier equipment provider to the lateral flow device industry. Since 1994, its dispensing, cutting and lamination technologies have enabled developers and manufacturers to create high-quality lateral flow tests.



## BioDot Support Across the LFA Workflow

BioDot covers every step of the LFA manufacturing workflow:

- Test & control line deposition.
- Conjugate pad coating (gold, latex, paramagnetic).
- Sample and pad treatments.
- Full membrane dispensing.
- Lamination of multilayer assemblies.
- Cutting into test strips.
- In-line automation for scale-up.

This end-to-end coverage ensures consistent performance and scalability.

# Lateral Flow Workflow

Lateral flow test development and manufacturing require precise control at every stage to ensure consistency, sensitivity, and reliability. BioDot's systems support each step of this workflow, from reagent application to final packaging, enabling scalable, high-quality production for diagnostics and point-of-care tests.

## 1 Application of Reagents

Dispense and coat functional materials onto test components.

- **Dispense:** Test lines, control lines, conjugates.
- **Coat:** Conjugates, blockers, pad treatment.

## 2 Drying

Reduce moisture to stabilize reagents before assembly.

- Target moisture: < 4%.
- Used immediately after reagent application.

## 3 Lamination

Assemble the layered test structure.

- Attach individual layers with thin adhesive films.
- Backing and cover layers are pre-laminated with adhesive.

## 4 Inspection & Marking

Ensure quality prior to cutting.

- Check for dispensing defects.
- Identify material defects.
- Verify lamination alignment.

## 5 Cutting

Convert sheets into individual test strips.

- Cut widths: **3–10 mm**.
- Remove parts flagged during inspection.

## 6 Quality Control

Verify lot-level performance.

- Sample testing for functionality and consistency.

## 7 Packaging

Prepare tests for distribution and use.

- Seal strips in foil pouches with desiccant.
- Add pipettes or accessories as needed.

# Our Precision Dispensing Technologies for Lateral Flow

## FrontLine™ Contact Dispensing ..... 7

FrontLine technology features a flexible tip that glides on the substrate surface while dispensing fluid. The fluid flow rate is synchronized with the system motion to dispense a quantitative volume-per-unit length of reagent on the substrate surface. FrontLine dispensing is ideal for printing lines on membranes and other substrates used in lateral flow and immunoblot diagnostic tests.

## BioJet™ Non-Contact Dispensing ..... 8

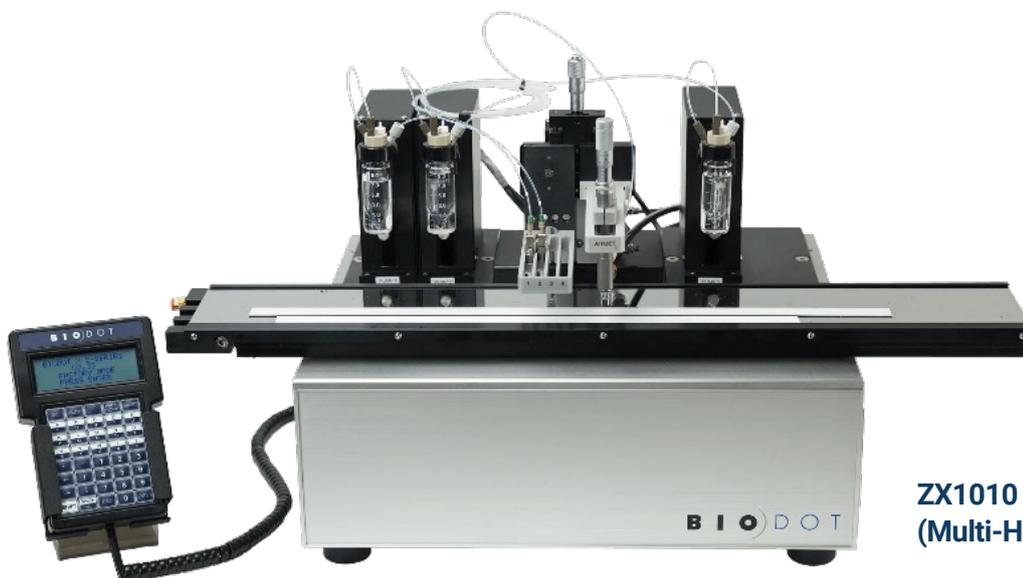
This proprietary, quantitative, non-contact technology couples the BioJet “Drop-on-Demand” valve with a high-resolution syringe pump. The BioJet meters precise amounts of reagent, incorporating the benefits of non-contact dispensing and the ability to program exact drop volumes.

## AirJet™ Aerosol Coating ..... 9

BioDot’s AirJet uses pressurized air to atomize fluid passing through the dispensing nozzle to create a non-contact, quantitative aerosol spray that can generate a dot or line. This proprietary technology couples the dispensing nozzle with a high-resolution syringe pump to dispense quantitative volumes.

## Rainmaker™ Piezoelectric Dispensing ..... 10

The Rainmaker features BioDot’s proprietary non-contact piezoelectric low-volume dispensing technology and allows users to select a wide range of volumes as a single drop or high-frequency burst. Liquid volumes, from picoliters to nanoliters, can be dispensed On-the-Fly or in Step-and-Repeat. Rainmaker’s On-the-Fly printing supports multiple tip dispensing to discrete locations for true high-speed arraying.



**ZX1010 Dispense System  
(Multi-Head Platform)**

# FrontLine

## Features

- Line Volume: > 0.5  $\mu$ L/cm.
- Line Width: 0.25 - 2.5 mm.
- Contact Dispensing Technology.
- Bulk Dispensing from Reservoir.
- Programmable Line Volumes.
- Precision Low-Volume Drop Dispensing.
- Scalable from R&D to Production Environments.

## System Availability

- Direct Dispense: [ZXLITE](#), [ZX1010](#), [XYZ3060](#), [XYZ3210](#), [RR120](#).  
*\*Typical application ranges. System, Reagent, Materials and Speed Dependent.*

## Applications

- [Lateral Flow Tests](#).
- [Immunoblots](#).

## Options

- Fluid Path Kits.



Learn more about Frontline,  
visit <https://www.biodot.com/technology/frontline>

# BioJet

## Features

- Drop Volume: 2.0 nL to 2.0 µL.
- Line Volume: 0.5 - 3.0 µL/cm.
- Drop Size: >130 µm.
- Line Width: 0.25 - 2.55 mm.
- Program Single Drops or Burst of Drops.
- Non-Contact Printing.
- Direct Dispense or Aspirate & Dispense.
- Precision Low-Volume Drop Dispensing.
- Scalable from R&D to Production Environments.
- Printing "Step-and-Repeat" and "On-the-Fly" modes.

## System Availability

- Direct Dispense: [ZXLITE](#), [XYZ3060](#), [XYZ3210](#), [RR120](#), [CDS](#), [ZX1010](#).
- Aspirate & Dispense: [AD1520](#), [Omnia](#), [Omnia Discovery](#), [AD3220](#), [Glucodot](#), [AD6020](#).
- Cytogenetics: [CellWriter S](#).

*\*Typical application ranges. System, Reagent, Materials and Speed Dependent.*

## Applications

- [Lateral Flow Test](#).
- [Flow Through Test](#).
- [Microarrays](#).
- Cell, DNA, Protein Dispensing.
- Multiplex ELISAs.
- [Biosensor / Biochip](#).
- Lab-on-a-Chip.
- Microfluidic Devices.
- [Low-Volume PCR](#).
- [FISH](#).
- [Karyotyping](#).
- [FFPE](#).
- Custom Applications.

## Options

- Custom Head Designs.
- Extended Tubing (Aspirate & Dispense Systems).
- Tip ID (Aspirate & Dispense Systems).



Learn more about BioJet,  
visit <https://www.biodot.com/technology/biojet>

# AirJet

## Features

- Line Volume: 0.1 - 24  $\mu$ L/cm.
- Line Width: 0.5 - 10 mm.
- Aerosol and Syringe Pump Technology.
- Adjustable Dispense Morphology.
- Programmable Volumes.
- Non-Contact Printing.
- Bulk Dispensing from Reservoir.
- Scalable from R&D to Production Environments.

## System Availability

- [ZXLITE](#), [ZX1010](#), [XYZ3060](#), [XYZ3210](#), [RR120](#).

*\*Typical application ranges. System, Reagent, Materials and Speed Dependent.*

## Applications

- [Lateral Flow - Conjugate Dispensing and Blocking](#).
- Custom Coating Applications.

## Options

- Fluid Path Kits.



Learn more about AirJet,  
visit <https://www.biodot.com/technology/airjet>

# Rainmaker

## Features

- Drop Volume: 25 pL to low  $\mu$ L.
- Drop Size: 30 - 900  $\mu$ m.
- Non-Contact Printing.
- Direct Dispense or Aspirate & Dispense.
- Program Single Drops or Burst of Drops.
- Create High Density Microarrays.
- Precision Low-Volume Drop Dispensing.
- Scalable from R&D to Production Environments.
- Printing "Step-and-Repeat" and "On-the-Fly" modes.

## System Availability

- Aspirate & Dispense: [Omnia](#), [Omnia Discovery](#), [AD6020](#).

*\*Typical application ranges. System, Reagent, Materials and Speed Dependent.*

## Applications

- [Lateral Flow](#).
- [Microarrays](#).
- Cell, DNA, Protein dispensing.
- Multiplex ELISAs.
- [Biosensors/Biochips](#).
- Lab-on-a-Chip.
- [Low-Volume PCR](#).
- Custom applications.

## Options

- Nozzle sizes.



Learn more about Rainmaker,  
visit <https://www.biodot.com/technology/rainmaker>

# Dispense Systems for Lateral Flow

## ZXLITE™ Dispense System..... 12

ZXLITE offers efficient, reproducible test/control line printing for lateral flow manufacturing, using FrontLine and  $\mu$ AirJet technologies on a secure nest.

## ZX1010™ Dispense System ..... 13

The ZX1010 prints lines or dots on membranes for diagnostic tests. It features up to 8 dispensing channels and customizable dispensers for flexible workflows.

## XYZ3060™ Dispense System ..... 14

The XYZ3060 system is versatile for diagnostic test development, capable of simultaneous line and dot printing with contact or non-contact dispensers.

## XYZ3210™ Dispense System ..... 15

The XYZ3210 series offers powerful tools for rapid test development and manufacturing, featuring a larger deck than the XYZ3060 platform.

## AD3220™ Aspirate Dispense System ..... 16

The AD3220 is ideal for R&D and pilot production, offering high-speed aspirating and dispensing to slides, microtiter plates, membranes, or custom surfaces.

## Omnia™ Discovery ..... 17

Designed for accuracy and speed, Omnia Discovery optimizes workflows, reduces reagent waste, and offers value for advancing microfluidic and assay development.

## MODULIS™ ..... 18

The BioDot MODULIS dispensing platform takes today's complex, miniaturized, and novel assays from parts per day (PPD) to parts per minute (PPM).

Learn more about other BioDot dispensing technologies,  
 visit <https://www.biodot.com/technology>

# ZXLITE Dispense System

## Features

- 1 - 4 Dispensing Channels.
- [µAirJet](#) & [FrontLine](#) Dispensing Technologies.
- Program Line Length and Volume.
- Manual Positioning in the Y-Axis.
- Micrometer Adjusted, Pneumatic Z-Axis (height).
- Dispense area of 495 x 85 mm.
- Independent Volume Control for Each Channel.
- Quantitative, Simultaneous Dispensing.
- Vacuum/Magnetic Nest.
- R&D to Moderate Production Throughput.
- Menu-Driven Operating Software.
- Data Storage for Multiple Programs.
- Easy Setup, Operation and Maintenance.
- Compact Footprint.

*\*Not for sale in the USA, EU, UK*

## Applications

- [Lateral Flow](#).
- Custom applications.

## Options

- 1 - 4 Dispensing channels.
- [µAirJet](#) & [FrontLine](#) Dispensing Technologies.
- [Service Packages](#).



Learn more about ZXLITE, visit  
<https://www.biodot.com/products/zxlite-dispense-system>.

# ZX1010 Dispense System

## Features

- 1 - 8 Dispensing Channels.
- [μAirJet](#), [AirJet](#), [BioJet](#), [FrontLine](#), and [PolyDrop](#) Technologies (only 4 AirJets).
- Program Line Length and Volume.
- Manual Positioning in the Y-Axis.
- Micrometer Adjusted, Pneumatic Z-Axis (height).
- Dispense Area of 495 x 85 mm.
- Independent Volume Control for Each Channel.
- Quantitative, Simultaneous Dispensing.
- Dot and Line Dispensing.
- Vacuum/Magnetic Nest.
- R&D to Moderate Production Throughput.
- Menu Driven Operating Software.
- Data Storage for Multiple Programs.
- Easy Set Up, Operation and Maintenance.
- Compact Footprint.

## Applications

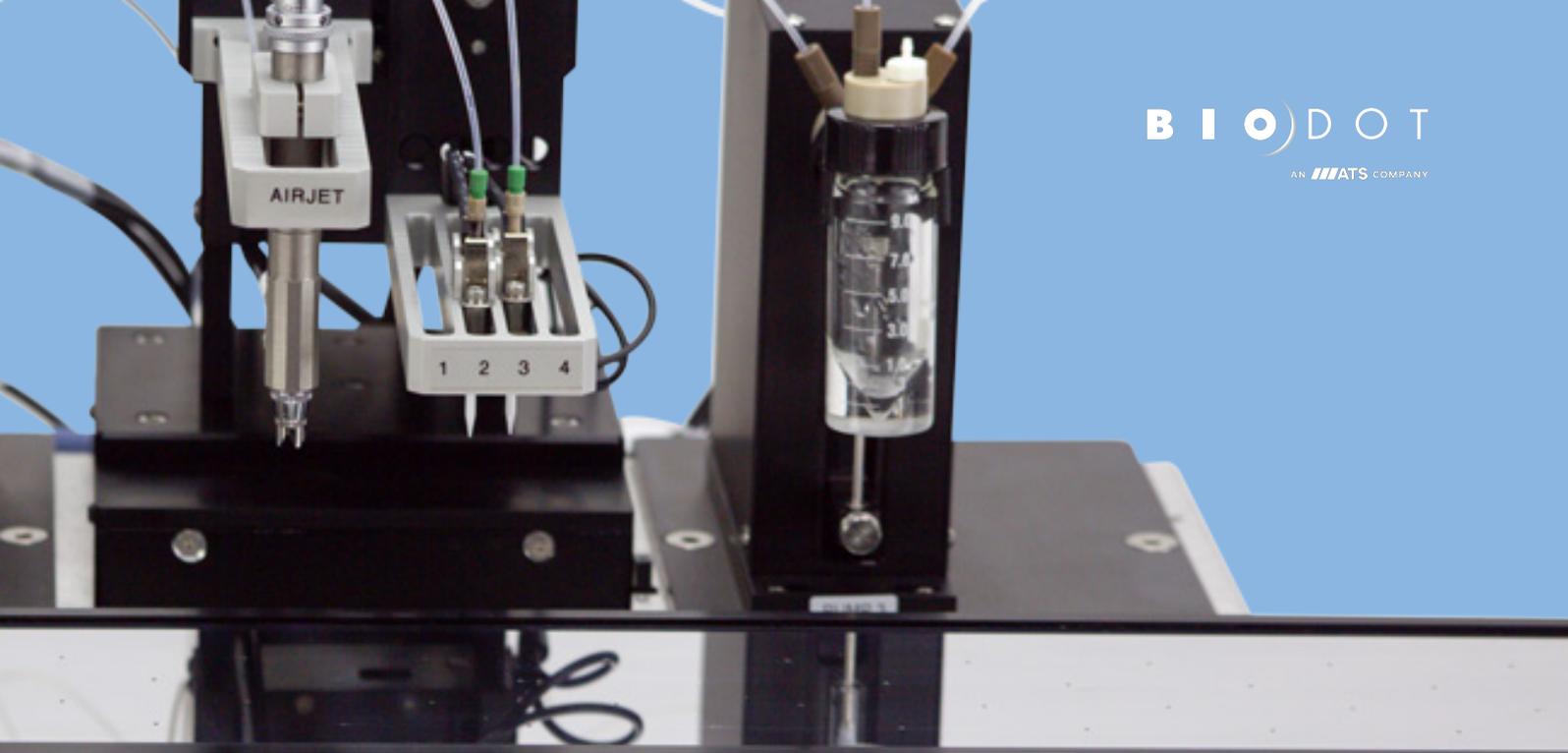
- [Lateral Flow](#).
- [Flow Through](#).

## Options

- 1 - 8 Dispensing Channels.
- [μAirJet](#), [AirJet](#), [BioJet](#), [FrontLine](#), and [PolyDrop](#) Technologies (only 4 AirJets).
- [Service Packages](#).



Learn more about ZX1010 visit  
<https://www.biodot.com/products/zx1010-dispense-system>.



# XYZ3060 Dispense System

## Features

- 1 - 8 Dispensing Channels.
- [µAirJet](#), [AirJet](#), [BioJet](#), [FrontLine](#), and [PolyDrop](#) Technologies (only 4 AirJets).
- Programmable X, Y and Z Axes.
- Dispense Area of 495 x 85 mm.
- Independent Volume Control for Each Channel
- Quantitative, Simultaneous Dispensing.
- Dot and Line Dispensing.
- Vacuum/Magnetic Nest.
- R&D to Moderate Production Throughput.
- Menu Driven Operating Software.
- Data Storage for Multiple Programs.
- Easy to Use, Operate and Maintain.
- Compact Footprint.

## Applications

- [Lateral Flow](#).
- [Biosensors](#).
- [Immunoblots](#).
- [Flow Through](#).
- Custom Applications.

## Options

- 1 - 8 Dispensing Channels.
- [µAirJet](#), [AirJet](#), [BioJet](#), [FrontLine](#), and [PolyDrop](#) Technologies (only 4 AirJets).
- Humidity Chamber.
- [Vacuum Pump](#).
- Custom Nest.
- [Service Packages](#).



Learn more about XYZ3060, visit <https://www.biodot.com/products/xyz3060-dispense-system>.



# XYZ3210 Dispense System

## Features

- 1 - 8 Dispensing Channels.
- [µAirJet](#), [AirJet](#), [BioJet](#), [FrontLine](#), and [PolyDrop](#) Technologies (only 4 AirJets).
- Program Line Length and Volume.
- Programmable X, Y and Z Axes.
- Large Dispense Area of 495 x 265 mm.
- Independent Volume Control for Each Channel
- Quantitative, Simultaneous Dispensing.
- Dot and Line Dispensing.
- Magnetic Nest.
- R&D to Moderate Production Throughput.
- Menu Driven Operating Software.
- Data Storage for Multiple Programs.
- Easy to Use, Operate and Maintain.
- Compact Footprint.

## Applications

- [Lateral Flow](#).
- [Biosensors](#).
- [Immunoblots](#).
- [Flow Through](#).
- Custom Applications.

## Options

- 1 - 8 Dispensing Channels.
- [µAirJet](#), [AirJet](#), [BioJet](#), [FrontLine](#), and [PolyDrop](#) Technologies (only 4 AirJets).
- Humidity Chamber.
- [Vacuum Pump](#).
- Custom Nest.
- [Service Packages](#).



Learn more about XYZ3210 visit  
<https://www.biodot.com/products/xyz3210-dispense-system>.

# AD3220 Aspirate Dispense System

## Features

- Up to 8 Dispensing Channels.
- Nanoliter to Microliter Volumes (see options).
- Aspirate/Dispense and Direct Dispense.
- Motorized X, Y, Z Axes.
- Dispense Area of 420 x 260 mm.
- Dispense onto Slides, Plates or Membranes.
- Includes Choice of Nest (see options).
- Integrated Wash/Vacuum Station.
- Vision LITE Camera System for Positioning.
- ILD5000 In-Line Degasser.
- PC Control Workstation with LINK2020 Software.
- R&D and Production Throughput.
- Footprint (800 x 425 x 350 mm).

*\*Dispense Volumes are Dispenser Technology Dependent*

## Applications

- [Biosensor / BioChip.](#)
- [Microarray.](#)
- [Lateral Flow](#) (multiplex).
- DNA, Cell, Protein Dispensing.
- Multiplex ELISAs.
- Lab-on-a-Chip.
- Microfluidics.
- [Low-Volume PCR.](#)
- Custom Applications.

## Options

### nL to $\mu$ L Dispensing Technologies:

- [BioJet.](#)
- [PolyDrop.](#)

### Nest Options:

- 8 Microwell Plate Nest.
- 50 Slides Nest.
- Vacuum/Magnetic Nest.
- Custom.

### Additional Options:

- Humidity Enclosure/Control.
- Anti-Static.
- Vacuum Pump.
- [Service and Support Packages](#)



Learn more about AD3220, visit <https://www.biodot.com/products/ad3220-aspirate-dispense-system>.

# Omnia Discovery

## Features

- Up to 2 Channels.
  - Rainmaker (standard).
  - BioJet (optional add-on).
- Volume Precision: < 3% CV.
- Bulk Dispense, Aspirate/Dispense, Step-and-Repeat, On-the-Fly.
- Motorized X, Y, Z Axes.
- Dispense area of 325 x 275 mm.
- Dispense onto Slides, Plates or Membranes.
- Flat Datum Nest.
- Integrated Wash/Vacuum Station.
- Horizontal Camera for In-Process Drop Optimization & Tuning.
- ILD5000 In-Line Degasser.
- PC Control Workstation with Link2020 Software.
- R&D and Pilot Production Throughput.

*\*Omnia Discovery will be built with a Rainmaker. BioJet is an added option*

*\*\*Dispenser, Speed, Material and/or Reagent Dependent.*

## Applications

- [Biosensor/Biochip.](#)
- [Microarray.](#)
- DNA, Cell, Protein Dispensing.
- Multiplex ELISA's.
- Lab-on-a-Chip.
- [Low-Volume PCR.](#)
- Custom Applications.
- [Lateral Flow.](#)
- Microfluidics.
- [Flow-Through.](#)
- Mass Spectrometry.
- 3D Cell Printing.
- Synthetic Biology.
- Single Cell Dispensing.
- Direct Titration/IC 50.
- Drug Discovery.
- Drug Delivery.
- Plate Array/Microarray.

## Options

### pL to nL Dispensing Technologies.

- [Rainmaker.](#)

### nL to µL Dispensing Technologies (optional add-on).

- [BioJet.](#)



Learn more about Omnia Discovery visit <https://www.biodot.com/products/omnia-tm-discovery>.

# MODULIS

## Features

### Seamless Integration

The BioDot MODULIS combines the SuperTrak CONVEYANCE™ high-speed system with the ATS Cortex™ Vision System and BioDot's precise, ultra-Low-Volume dispensers. Achieve consistent, scalable results in a flash!

### Modularity

The BioDot MODULIS platform allows a variety of different modules and dispensing reagents to be controlled and dispensed from one hub.

### Speed and Precision

Independently controlled shuttles move up to 4 m/s, with a CV of ±0.01 mm.

### Small Footprint

By combining multiple dispensing units into one platform, the BioDot MODULIS is able to reduce the square footage necessary to scale manufacturing.

## Applications

### Miniaturized/Multiplexed Diagnostics

- [Biosensors/Biochips](#).
- Microfluidics.
- Low/Medium/High Density [Microarrays/Plate Arrays](#).
- Micro ELISA.
- SBS/MPT Formats (96, 384, 1536, 3456 wells, and custom well sizes > 10,000).
- [Lateral Flow/Membrane-Based Assays](#).
- Next Generation Consumer Diagnostics.

### Life Sciences

- Massively Scaled Assay Construction.
- High Throughput Screening (HTS) for Genomics, Proteomics, Cellomics.
- 96, 384, 1536, 3456 MTP Formats.
- Lab-on-a-Chip.
- Novel, Next Generation Devices.

## Options

### Infinite Module Expansion

- 'n' Dispensing Station Modules produce at 1/'n' cycle times.
- Horizontal Drop Camera.
- 1-24 Dispensing Channels Per Station.

### ATS Illuminate Process Monitoring and Reporting

### Part Loading/Offloading

### Additional Process Step Integration

- High Precision Assembly.
- Drying/Cooling.
- Packaging.
- Custom Solutions.



Learn more about MODULIS, visit <https://www.biodot.com/products/modulis>.

# Our Lamination and Cutting Solutions

## LM5000™ Manual Lamination System ..... 12

The LM5000 manually assembles lateral flow test strips, aligning membrane, conjugate, and absorbent pads precisely to create a master test strip card.

## LM9000™ Auto Lamination System ..... 13

LM9000 automates continuous lamination on adhesive-lined backing. Modular design supports various materials and configurations for diverse product requirements.

## CM5000™ Guillotine Cutter ..... 14

CM5000 Cutter is for R&D and production, cutting lateral flow tests and biosensors. Program cut width/quantity; rollers guide materials to the blade precisely.



**LM5000 Manual Lamination System**



**CM5000 Guillotine Cutter**

Need more details? Contact your Sales Rep directly  
or contact BioDot <https://www.biodot.com/contact-us>

# LM5000 Manual Lamination System

## Features

- Precision Alignment.
- Easy to Use, Maintain and Service.
- Custom Nests.
- Interchangeable Nests for Multiple Designs.

## Applications

- [Lateral Flow Tests](#)

## Options

- Additional Nests.
- [Vacuum Pump](#).
- [Service Packages](#).



Learn more about LM5000,  
visit <https://www.biodot.com/products/lm5000-manual-laminator>

# LM9000 Auto Lamination System

## Features

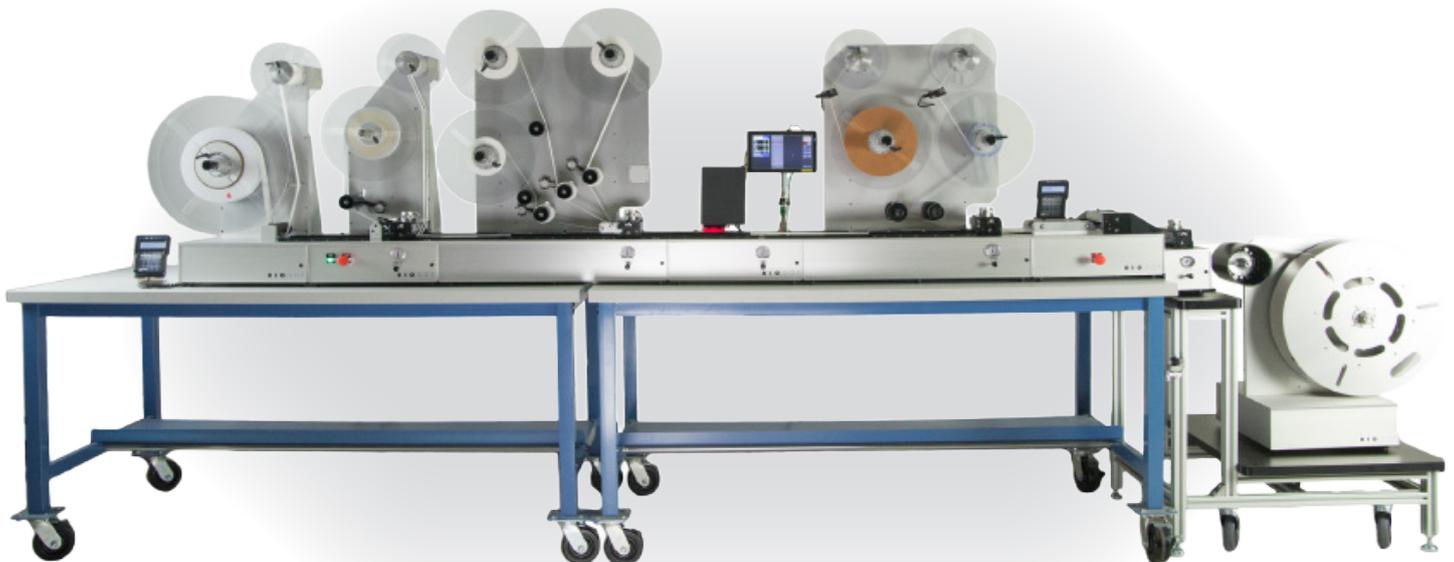
- Precision Continuous Lamination of Web Materials.
- Flexible Design for Multiple Processes or Products.
- Membrane Payout Module w/ Micrometer.
- Controlled Auto Tracking.
- Quick Release and Adjustable Guide Rollers.
- Ability to Add Modules in the Future.
- Moderate and High Volume Production Throughput.
- Data Storage to Support Multiple Setups.
- Easy to Set up, Operate and Maintain.
- Chassis Mounted.

## Applications

- [Lateral Flow Tests.](#)
- [Immunoblots.](#)
- Custom Applications.

## Options

- Material Payout Modules.
- Cover Layer Payout Modules.
- Cutting Module.
- Inspection Modules.
- Laminated Material Take-up Reel Modules.
- Magazine Collection of Cut Material Module.
- Environmental Enclosures.
- Custom Modules and Configurations.
- [Service and Support Packages.](#)



Learn more about LM9000,  
visit <https://www.biodot.com/products/lm9000-auto-lamination-system>

# CM5000 Guillotine Cutter

## Features

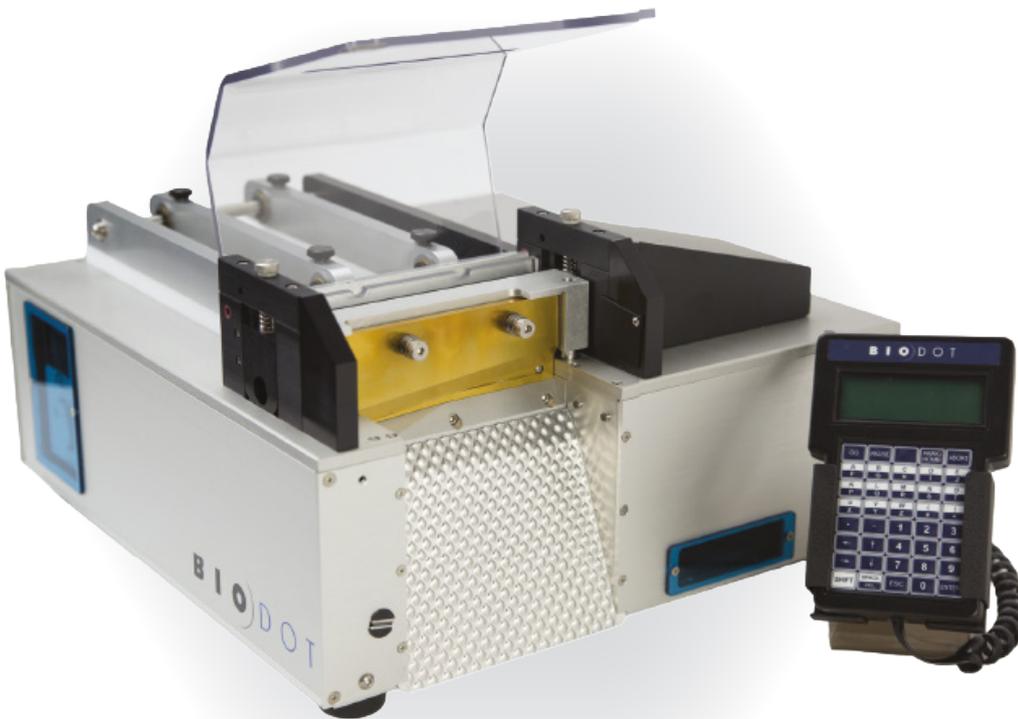
- Minimal Waste.
- Handles a Variety of Materials.
- User-Friendly Operation.
- Safety Interlock Device.
- Easy Blade Removal for Cleaning.

## Applications

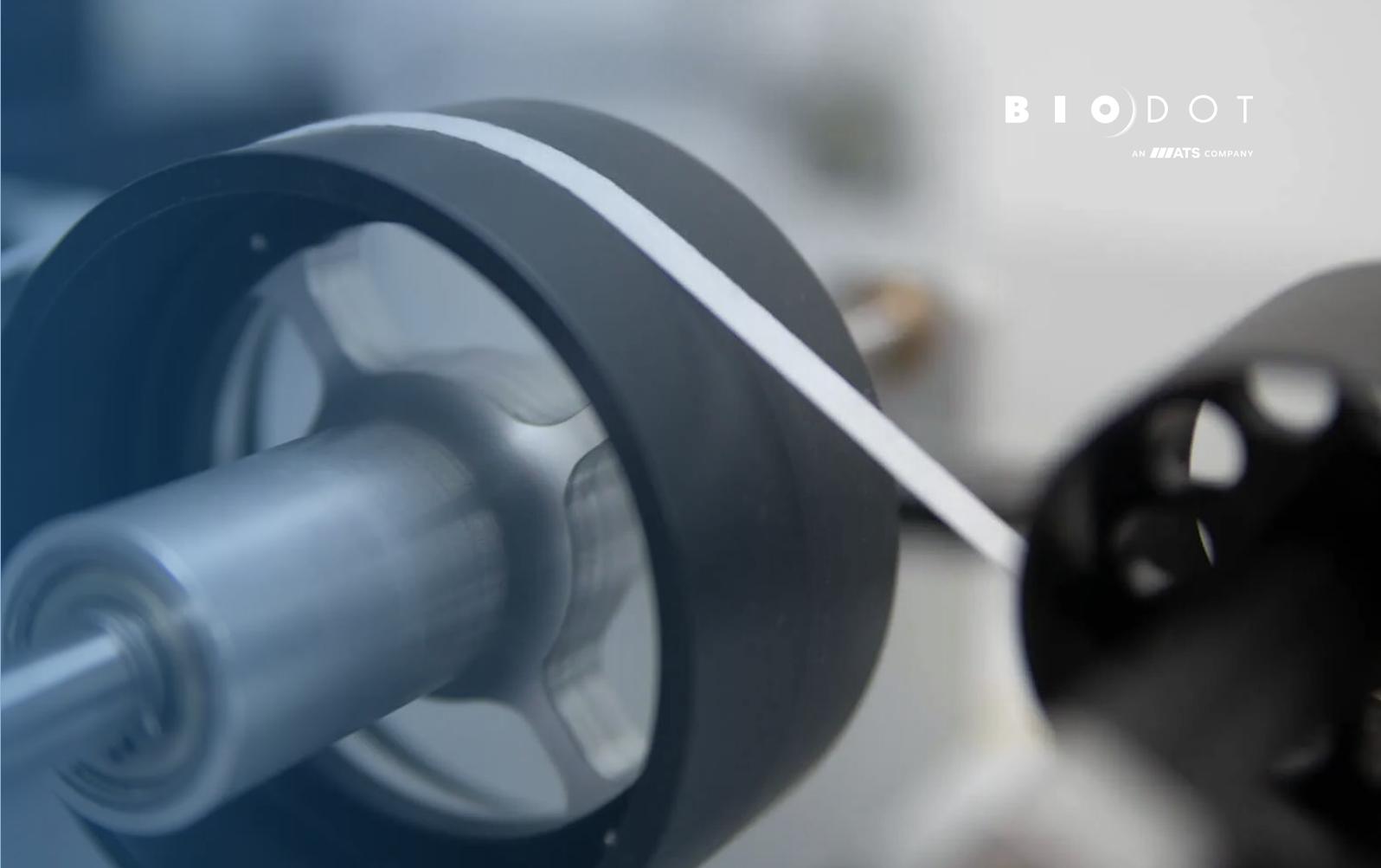
- [Lateral Flow Tests.](#)
- [Biosensors.](#)
- Custom Applications.

## Options

- Leading Edge Sensor.
- Target Sensor.
- Anti-Static.
- Reel Feed.
- Bottle Collection.
- [Service and Support Packages.](#)



Learn more about CM5000,  
visit <https://www.biodot.com/products/cm5000-guillotine-cutter>



# Our In-Line Automation & Assembly

## **AR3000™ Assembly Roller ..... 16**

The AR3000 Assembly Roller semi-automatically closes lateral flow housings. Manually align devices on the conveyor belt for precise pin positioning.

## **RR120™ Web Handling System ..... 17**

RR120 is a high-volume system for printing, coating, inspecting, and drying rolls. Its modular design offers flexibility for specific applications and needs.

Need more details? Contact your Sales Rep directly  
or contact BioDot <https://www.biodot.com/contact-us>

# AR3000 Assembly Roller

## Features

The belt is motor-driven for a smooth and quiet operation.

- Motor-Driven for a Smooth Operation.
- Quiet Operation.
- Low Maintenance.

## Applications

- [Lateral Flow](#).



Learn more about AR3000,  
visit <https://www.biodot.com/products/ar3000-assembly-roller>

# RR120 Web Handling System

## Features

- 1 - 7 Dispensing Channels (Tandem Pumps).
- [BioJet](#), [FrontLine](#) and [AirJet](#) Dispensing Technologies.
- Print up to 7 Lines Simultaneously.
- Automated Dispense Tracking for Precision Line Placement.
- Perform Multiple Applications on One System.
- Adjustable Tension for Handling Backed/Unbacked Membranes.
- Easy to Set up, Operate and Maintain.
- Data Storage to Support Multiple Applications.
- Many System Options Can be Upgraded after Purchase.

## Options

- Choice of Dispensing Technologies.
- Dip Tank with Fluid Level Sensor and Pump.
- Release Liner Take Up and Payout Reels.
- Drying Tower(s) with Temperature Sensing in 6 Zones.
- Vision Inspection of Dispensed Lines with Bad Part Marking.
- Environmental Enclosure for the Dispense Module and Take Up Reel.
- Humidity Control for the Take Up Enclosure.
- Ultra Low Tension for Low Tensile/Fragile Materials.
- Custom Modules and Features.

## Applications

- [Lateral Flow Tests](#).
- Dry Chemistry.
- Custom Applications.



Learn more about RR120,  
visit <https://www.biodot.com/products/rr120-tm-web-handling-system>



# Customer Success Stories

## 18-19

### Enfer Scientific: Multiplex Testing in Animal Health

## 20-21

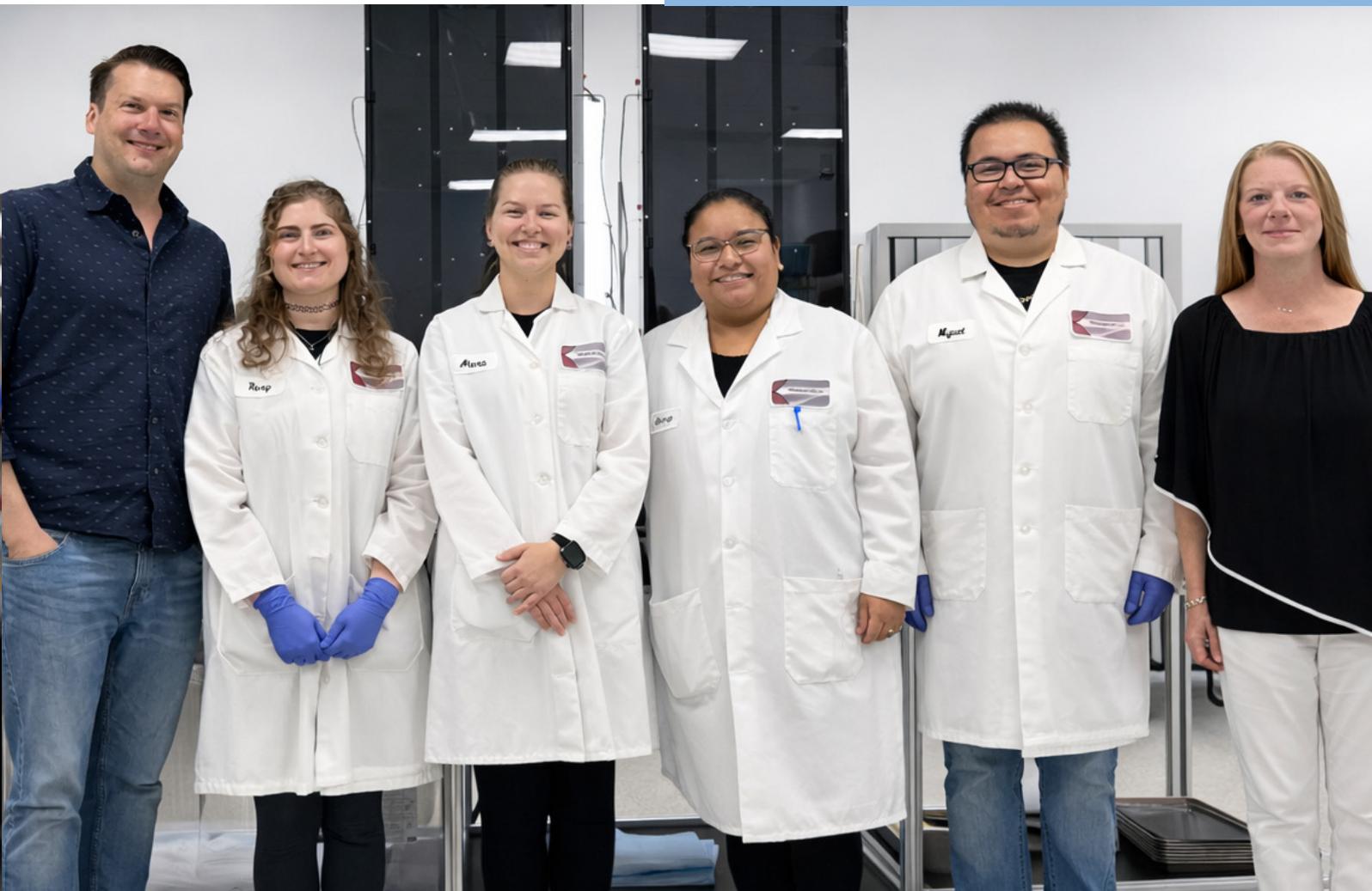
### DCN Dx: End-to-End Work- flow Excellence



# Customer Success Stories

## 22-23

### IVD Research: 20 Years of POC Manufacturing Quality



# The Power of Multiplex Testing in Animal Health

*Monitoring the spread of infectious diseases is an essential process for industries and situations that rely on animal husbandry, whether it's screening agricultural herds that will enter the food chain, testing animals involved in zoo breeding programs, or countrywide surveillance of wildlife populations. Irish veterinary technology company Enfer Scientific is at the forefront of this testing, supplying a wide range of diagnostic assays to help control disease and safeguard animal and human health. The company relies on BioDot instrumentation to manufacture its multiplex arrays, taking advantage of the accuracy and flexibility on offer to produce assays for use in a multitude of species.*



**The Enfer Scientific team relies on BioDot instrumentation to develop its diagnostic assays.**

Early detection of infections is crucial in agriculture to prevent outbreaks that can devastate livestock and impact food safety and security. Vets, farmers, researchers and even wildlife conservationists therefore perform comprehensive testing to follow the evolution and spread of prevalent microbial strains in both wild and domesticated animal populations. The diversity of species under scrutiny, and the environments in which they live, represent significant challenges, especially as some diseases can easily spread from wild populations to livestock, even across species. Tracking, catching and testing wild animals, although logistically difficult, is an important element in preventing the infection of farm animals, as well as in identifying zoonotic diseases that could cross into human populations.

Rapid and accurate testing is a critical tool in this battle, and Irish veterinary technology company Enfer Scientific – part of the Enfer Group – develops and manufactures diagnostic assays and kits for numerous veterinary testing applications at its site in County Kildare. Dr Amanda O'Brien, Research and Development Supervisor, explained: "Enfer Scientific was initially founded to develop tests for identifying illegal growth hormone promoters in cattle and, from there, it naturally

progressed to similar technologies for livestock diseases, such as tuberculosis (TB), bovine spongiform encephalitis (BSE) and scrapie."

"The company has continued to diversify, and we now develop diagnostic assays for a whole range of animals. We have worked with camelids, like alpacas, llamas and camels; bovines, from bison to everyday cattle; other farm animals, such as sheep and goats; and even deer, lions and monkeys. We manufacture standard kits for common diseases such as TB, but also develop custom assays for customers with more unusual requirements, including testing animals transferring between zoos, or monitoring the spread of a disease in a wild population. In addition, we collaborate with many companies, institutes and universities around the world to understand important diseases and develop relevant tests."

Many of Enfer Scientific's diagnostic assays use multiplex ELISAs that allow the simultaneous detection of multiple pathogens or biomarkers in a single sample. By using a series of different antigens, each specific to a different target, these diagnostic arrays provide comprehensive and efficient identification of complex diseases, or multiple diseases at the same time. Amanda



“We have now been working with BioDot for over 15 years. The company’s instruments have been real workhorses for the lab throughout this time.”

continued: “When a customer asks us to develop a test, we start by searching the literature to understand the disease and its complexity, and see if its whole genome has been previously published. This helps us to identify target biomarkers that are specific to that disease, and to confirm if they are suitable for ELISAs, as that is not always the case. The multiplex format is a real advantage for identifying complex diseases and multiple strains of a pathogen. We can use several markers in one well to improve accuracy, so each assay has a different number of antigens. For example, our bovine kit has 11, while others only have three or four. Many of our goat and sheep kits are also customizable; one customer may have four diseases that they want to test for, while another might have six, so we adapt each ELISA to their individual needs.”

“When we first started to develop multiplex assays, we tried lots of different companies that provided microarray printers, but quickly settled on BioDot dispensers, because they did exactly what they were meant to do; reliably printing 50 nanoliter dots of several antigens into a single well of a microplate. After validating a loan system, we eventually purchased an AD6000™, and later added an AD3420™ to give us extra capacity. We create a unique program for each specific assay, load up the

machine with the necessary reagents and plates, then just press go; it does all the work.”

While most of Enfer Scientific’s current tests are based on multiplex ELISAs, attention is now turning to the development of LFTs as an alternative technology that can be more readily used in the field. LFTs provide immediate results from a small biological sample, and can also include several antigens on a single test strip. Enfer Scientific is using a BioDot XYZ3210R™ to develop new lateral flow formats that will be a significant step forward for field veterinary diagnostics. Amanda added: “So far, not many LFTs have been developed for veterinary use, but BioDot is already a renowned expert in this field, and has been able to give us a lot of assistance and support in what we are trying to achieve.”

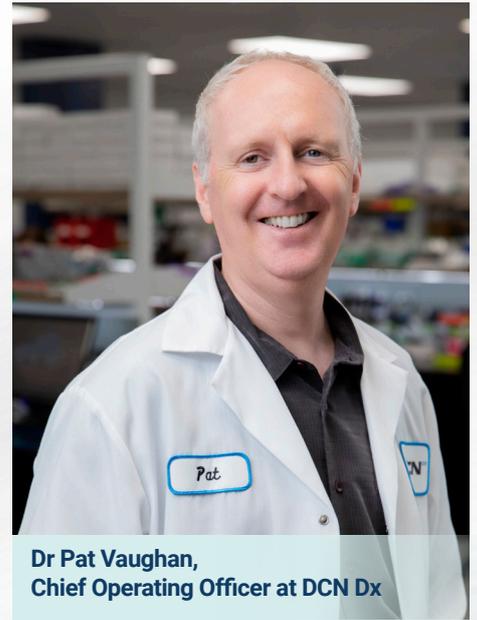
“We have now been working with BioDot for over 15 years. The company’s instruments have been real workhorses for the lab throughout this time; they are very robust, while still offering the precision to handle liquids on such small scales. The printers are also very adaptable, allowing us to offer the level of customization that our customers need; they work very well for our needs,” she concluded.

For more information about the BioDot systems, see [www.biodot.com/products](http://www.biodot.com/products)

Read more about Enfer Scientific at [www.enfergroup.com/services/diagnostic-solutions](http://www.enfergroup.com/services/diagnostic-solutions)

# Keeping Things Flowing from End-to-End

*California-based DCN Dx began life as a consultancy service with a focus on lateral flow. The company has since evolved to offer end-to-end services – from assay development and validation to manufacturing and clinical research services – and relies on BioDot equipment for its deposition needs.*



**Dr Pat Vaughan,**  
Chief Operating Officer at DCN Dx

DCN Dx, based in Carlsbad, USA, is a globally recognized provider of contract research, development and manufacturing (CRDMO) services for in vitro diagnostics. Spun out from BioDot in 2006, the company initially offered consultancy services focusing on the development of POC assays, particularly lateral flow. Since then, DCN Dx has expanded considerably, as Chief Operating Officer Dr Pat Vaughan explained: “The company’s original emphasis was on lateral flow – plus some flow-through assays and ELISAs – but we have expanded our scope substantially over the years. Today, we are a fully fledged CRDMO, offering everything from assay development and manufacture to consumables and reader customization, as well as clinical trials for all types of in vitro diagnostics.”

LFTs came to the fore in everyone’s mind during the COVID-19 pandemic, leading to a surge of interest in POC testing formats for a wide range of indications. However, manufacturers looking to make the leap from laboratory testing to POC settings face a number of challenges. Pat continued: “An immunoassay based on ELISA technology, for example, will not necessarily transfer directly to a lateral flow format. It requires a great deal of expertise to achieve a smooth transition; you can’t assume that it will simply work as intended. The antibodies and conjugates often need to be manipulated and optimized, and it might be necessary to experiment with different ways of striping and spraying to successfully print the assay onto a device. This is where our many combined

years of experience are beneficial, helping to accelerate development and time to market.”

“We use BioDot equipment for all our deposition needs, and these systems are central to our services, from assay development right through to product manufacture.”

“Our customers range from start-ups to established IVD companies, each with different requirements,” said Pat. “Start-ups may prefer to use end-to-end services to get their first assay to market as quickly as possible without major investment in infrastructure, while longer-standing companies may have some capacity themselves, and just need support for one aspect of their assay development. We can therefore act in varying capacities: as an extension of an in-house R&D team to speed up development of an assay, as an independent party to undertake validation studies, or as a solutions

provider that can scale up a manufacturing process to high throughput at either our own or the customer's facility. We might also be involved in refining an assay prior to high throughput production, and offer full clinical research services, with extensive experience in obtaining regulatory approval for a wide range of diagnostic assays, from simple POC tests to laboratory instrument-based applications."

"We use BioDot equipment for all our deposition needs, and these systems are central to our services, from assay development right through to product manufacture. We have seven benchtop XYZ Dispense Systems – including the XYZ3210 and XYZ3060™ platforms – that we use for striping and spraying on a small scale, as well as two large RR120™ reel-to-reel deposition systems for high throughput production. This enables us to scale up processes efficiently, and gives us enormous capacity for high quality product manufacturing. A key advantage of the BioDot instruments is that the core components – FrontLine™ technology, pumps and spray heads – on the benchtop XYZ Dispense Systems are the same as those on the reel-to-reel systems, making the technology transfer from development to manufacturing much easier. This gives us the reassurance that an assay produced on the lab bench platforms will perform predictably when transferring to high throughput production."

Chief Revenue Officer Mitzi Rettinger added: "Alongside our CRDMO services, we offer hands-on lateral flow training for people wanting to set up their own lab or develop assays in house. Essentially, we teach people how to develop an assay. A basic course will include examples, but sometimes an organization will have a specific assay in mind, but not know how to develop it. We start with the basic chemistry, then teach them how to stripe and spray on a BioDot instrument, so that they gain practical experience. When they go back to their own lab and need to invest in equipment, they tend to replicate what they've learned during training."

Science doesn't stand still though, and it has been important for DCN Dx to continue to innovate. Pat commented: "We are routinely applying our experience to multiplexed assays, using the BioDot equipment to stripe multiple test lines per strip. The challenge here is to ensure that the assays are compatible with each other, so that you still have optimal sensitivity and specificity for each one. The same formulation must be used for each

assay, they must work individually initially and eventually all together with no cross-reaction, and the dynamic ranges must be compatible. If the assays are not fully compatible and cannot be applied to the same test strip, we look for ways around this. For example, we might design a sample handling cassette to accommodate two test strips side by side, with a shared sample port. We have also developed a lateral flow reader, the miniDxR, that can be customized to a specific assay to deliver a quantitative result and, importantly, removes the subjectivity of interpreting results. The reader can even be integrated with a hospital LIMS to provide a permanent record of the result."

**“Technology continues to move forward, with improvements in sensitivity and increasingly complex assays being introduced into POC devices.”**

Lateral flow has come a long way since the introduction of the first pregnancy tests, and it's important to keep up to date with the latest developments. To this end, DCN Dx hosts the annual Advanced Lateral Flow Conference, a BioDot-sponsored global event for assay developers, manufacturers and others working in the sector to learn about the latest developments in the field. "Technology continues to move forward, with improvements in sensitivity and increasingly complex assays being introduced into POC devices. The way that science changes is really impressive, and it is enabling us to do more and more," Mitzi concluded.

To find out more about BioDot, visit [www.biodot.com](http://www.biodot.com)

To discover more about DCN Dx, go to [www.dcndx.com](http://www.dcndx.com)

# Partners in Quality: Supporting 20 Years of Point-of-Care Test Manufacturing

*Lateral flow testing is increasingly being used in POC settings to provide rapid results and increase access to diagnostics, particularly in remote locations and low income countries. The fundamental immunochemistries underpinning these assays are well established and understood, but cost-effective manufacturing of reliable and robust tests to a specific price point can be challenging. As a result, many providers turn to contract development and manufacturing organizations (CDMOs) for the large-scale production of lateral flow kits. IVD Research, Inc. has been manufacturing LFTs for POC applications for over 20 years, and relies on benchtop and inline dispensers and laminators from BioDot to meet its customers varied needs.*



IVD Research is a CDMO based in Carlsbad, California, specializing in the development and production of LFTs for a wide range of screening and diagnostic applications. Founded in 1996 alongside sister company SafePath® Laboratories, LLC – which caters to the veterinary diagnostics market – this family-run business has grown into a global supplier of high quality immunoassay products, with a strong track record in both ELISA and lateral flow formats. Chief Operating Officer Chris Lambillotte explained: “IVD Research and SafePath were originally created with the aim of developing new, high quality ELISA formats for a variety of human and veterinary diagnostic applications. I joined the company in 2001 and, not long after, we used our understanding of immunoassay technologies to expand into the production of LFTs for POC applications. We currently manufacture a range of assays focusing on rare diseases, waterborne infections and neglected tropical diseases – as well as having an established portfolio of fertility tests – but, as a CDMO, we can produce LFTs for whatever indication a client needs.”

Lateral flow approaches offer a number of benefits for POC settings, as Denise Glascock, Director of Business Development, outlined: “Lateral flow testing has been around for decades, and has always been popular for the

speed at which you can get an actionable result, but the COVID-19 pandemic has really brought the format to the attention of the general public. ELISA testing is great if you’re in a lab running 50, 100 or 1,000 tests at a time, but lateral flow can be used in a doctor’s office, rural clinic or a patient’s own home to provide a result in as little as 10 minutes. For example, women can use the fertility tests we manufacture – in combination with a mobile phone app – to get an accurate reading of their hormone cycles in almost real time, avoiding the need to go to a lab or clinic and wait several hours for their results. This ease of use is crucial in low resource settings, particularly in low- and middle-income countries with patchy healthcare provision. It allows testing to be performed there and then, enabling better informed, more immediate treatment decisions.”

Quality is a central tenet of the company ethos, and IVD Research is an ISO 13485 certified facility and FDA Registered Manufacturer operating under cGMP guidelines. Chris continued: “As sister companies, IVD Research and SafePath Laboratories are housed under the same roof, but we manufacture every test we make according to ISO 13485 and FDA regulations, regardless of the intended application. We take pride in upholding this standard as, even though our name



may not be on the final product, we want to support our partners in achieving their goals by producing the very best quality assays on their behalf. The equipment we use in our manufacturing processes is a key part of that quality standard, and we have been working with BioDot since we began manufacturing LFTs. We now have both benchtop and inline dispensers and laminators from BioDot, and this not only ensures reliable and reproducible production at the bench scale, but also allows an easy transition to high volume production without the need to reoptimize workflows or reagents.”

Denise commented: “The BioDot brand has made a real mark in the industry, as it was basically the first company offering products specifically designed for lateral flow manufacturing and, in our experience, its machines have remained the first and foremost devices capable of reliably performing this type of work. I come from a background in high throughput, high-end manufacturing – working with large kit providers in India and across Asia – and all these companies use BioDot equipment. The company’s strong reputation means that, when talking to customers, the fact that we use BioDot equipment is actually a strong selling point for us.”

“The concept behind lateral flow testing may be well established, but the industry hasn’t been standing still,” Chris added. “BioDot has been very supportive as we’ve developed our capabilities and product offerings over the last two decades, and we have a good working relationship with the company, especially as it’s based only an hour away. For example, when we first introduced our inline dispensers, the team worked closely with us to ensure that the production process for our four line multiplex tests – which are quite complex, with a lot of different layers printed on a single card – would seamlessly transfer from the bench scale. This required one of the largest BioDot laminators ever built, and we’re

scientists here at IVD Research – not engineers – so we were dependent on the BioDot team to design a system that could meet our needs. We are also working with BioDot on developing immunoassay arrays based on dots instead of strips, which is technically complex, but would allow numerous analytes to be tested in a single cartridge from a small sample. This approach would be particularly beneficial in rural communities and countries with limited healthcare provision, cutting the cost of diagnostics and simplifying the care pathway for those who need it most.”

“The BioDot brand has made a real mark in the industry, as it was basically the first company offering products specifically designed for lateral flow manufacturing.”

To find out more about BioDot, visit [www.biodot.com](http://www.biodot.com)

Read more about IVD Research at [www.ivdresearch.com](http://www.ivdresearch.com)



# BioDot Expertise

## Why Partner with BioDot

- Precision dispensing and web handling.
- Modular systems for every stage of development.
- Proven scalability from R&D to manufacturing.
- Global support, training, and applications expertise.
- 20+ years supporting successful rapid diagnostic products.

“Our partnership continues to evolve, and this largely comes down to the BioDot team, who truly feels like an extension of our own team.”

- Phil Paik, CEO at Molecular Assembly

“The systems are incredibly straightforward to use, and we generally do most of the troubleshooting ourselves.”

- Dr Bianca Lux, Head of Membrane Production at MEDIWISS ANALYTIC

“We have now been working with BioDot for over 15 years. The company’s instruments have been real workhorses for the lab throughout this time.”

- Dr Amanda O’Brien, R&D Supervisor at enfer Group

Need more details? Contact your Sales Rep directly or contact BioDot <https://www.biodot.com/contact-us>



# Resources & Support



For all enquiries about BioDot's lateral flow technologies, contact your Sales Rep directly or contact BioDot [www.biodot.com/contact-us](http://www.biodot.com/contact-us).

Call us at (949) 440-3685

## Other Services



**Feasibility Study**



**Application Support**



**OEM Systems**



**Product Support**



AN **///ATS** COMPANY

# Lateral Flow Solutions

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