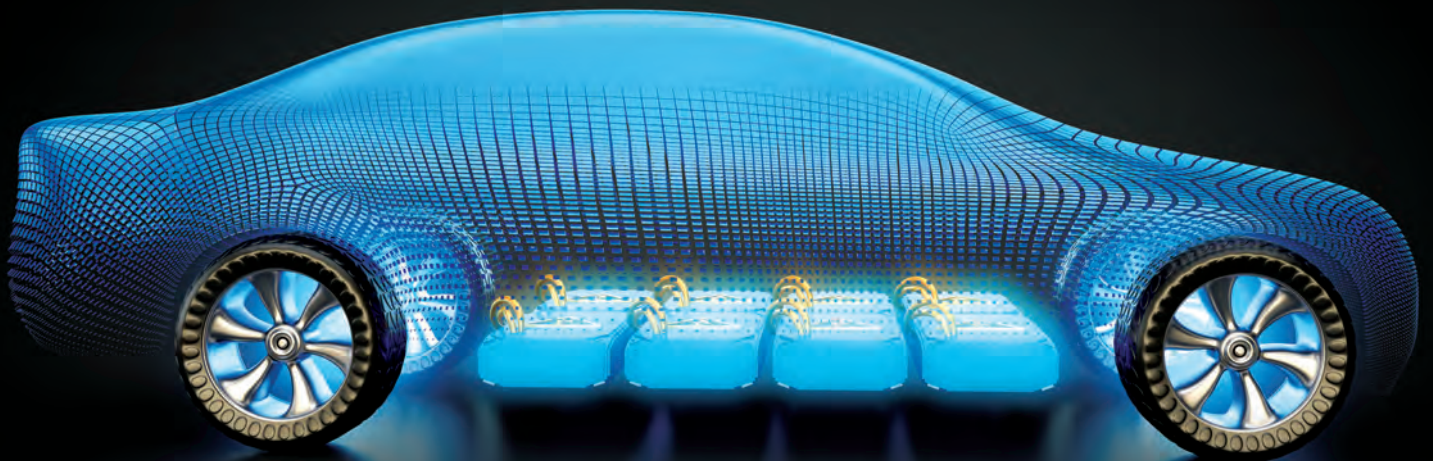


# Improving battery production at every stage

Precision technology solutions that power  
global battery manufacturing from start to finish



 **Nordson**



# From the smallest cell to the largest solar array, **we have the capacity to help**

**With every element of component manufacturing, cell and module manufacturing and final pack assembly covered, Nordson is better connected to improve quality, efficiency and output.**

Whether it's our comprehensive portfolio of extrusion and coating technologies for lithium-ion battery manufacturers, or our world-leading knowledge of dispensing thermally conductive adhesive for electric vehicle batteries, we lead the way in technology and expertise.

Our innovative products are used by everyone, from R&D start-ups to the world's biggest manufacturers, for the accurate and efficient dispensing of adhesives, coatings, sealants and thermal interface materials.

Additionally, our systems provide fluid management, polymer processing and test and inspection technologies, integral to the end-to-end manufacturing process.

All supported with unrivalled expertise and direct global sales and service available in more than 35 countries.



## Any material

Conformal coatings, one component and two component adhesives, sealants, and thermal management materials? Or micro jetting applications and high volume encapsulation? Whatever your requirement, our solutions are designed to deliver optimal precision, accuracy and machine life, with equipment that dispenses exactly the right amount every time; even with highly abrasive materials.



## Application expertise

We provide industry-leading, field proven solutions for end-to-end battery manufacturing. Our customers rely on us to deliver improvements, efficiencies and solutions for everything from dies for separator manufacturing to anode and cathode bonding to applying abrasive thermal management materials. This expertise extends beyond battery manufacturers to include research centers, material suppliers and integrators.

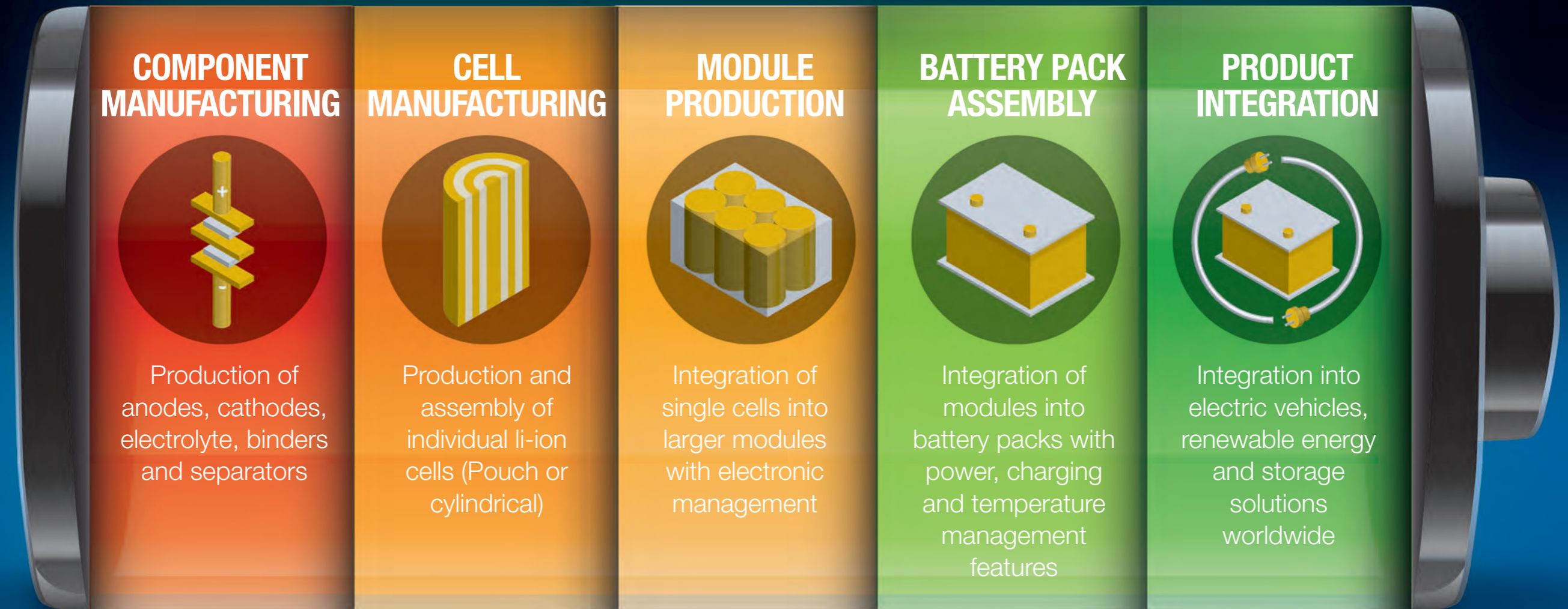


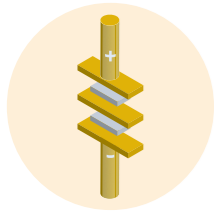
## Complete solutions

In addition to a full line of dispensing products, we also support robotic automation, test and inspection equipment; combining them into complete scalable systems designed to optimize production throughput, deliver superior quality, and easily integrate into your factory. All engineered to be easy to use and maintain, to minimize labor required and reduce the total cost of ownership.

# Nordson. Improving battery production at every stage

From the smallest components to the largest energy storage solutions, Nordson technology plays a crucial part in every stage of the battery manufacturing process.





# Component manufacturing

**A battery is only as good as its weakest component. We help make sure that every element is manufactured to pack more power.**



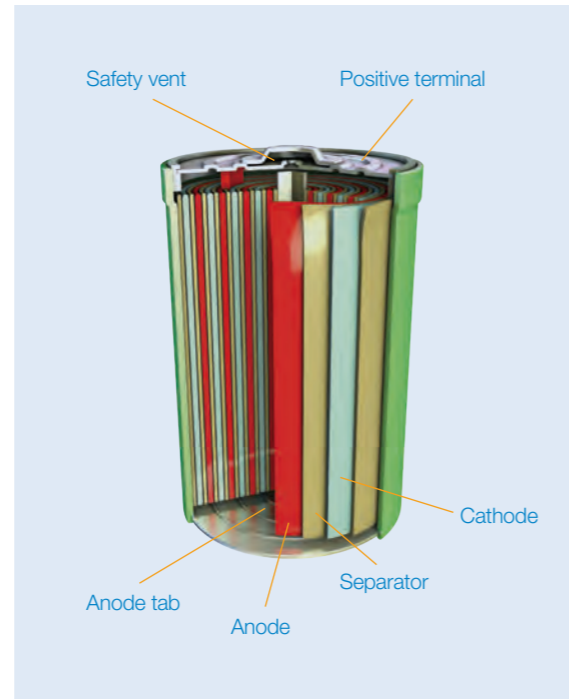
**OVER 500 SYSTEMS GLOBALLY**

As global leaders in polymer processing solutions, our technology is used worldwide to melt, extrude and pelletize polymers.

Our custom-engineered extrusion and slot die systems are used to support battery customers and OEMs in the production of key components used in cell manufacturing. This includes the manufacturing of separators and soft-pack external casings. We also provide ancillary equipment for added safety and reduced maintenance downtime, and enhanced product quality through customized manifolds.

This technical know-how is backed by years of experience in the field of die design and manufacturing, providing you with superbly reliable equipment that won't just refine your final product, but maximize the overall efficiency of your production process.

Innovative hot melt gluing solutions contribute in next gen z-fold or separator stacking battery and solid state battery.



# Cell manufacturing

**Fluid dispensing that's so reliable and accurate, over 70% of the world's battery manufacturers rely on it every day.**

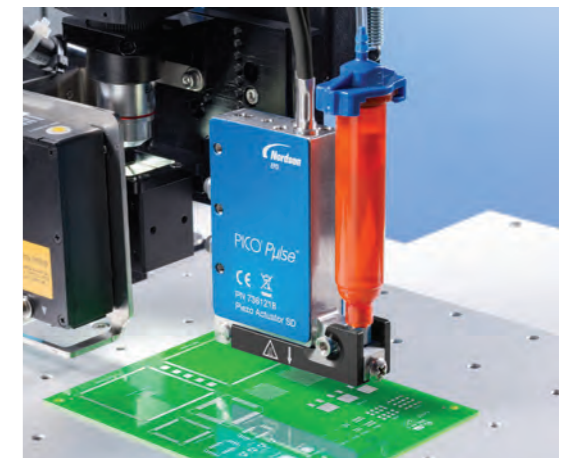


**25 YEARS INDUSTRY EXPERIENCE**

When it comes to cell manufacturing, we deliver precise, reliable fluid dispensing systems to help the world's battery manufacturers meet their efficiency needs. Our technologies deliver highly repeatable, consistent fluid deposition while reducing material waste, rejects and rework.

Our products dispense materials for anode and cathode coating and bonding, electrolyte filling, electrode cell bonding, winding friction prevention, cell edge protection, and separator fixing. This broad range of precision solutions includes benchtop dispensers, dispense and spray valves, innovative jetting technologies, and automated dispensing robots.

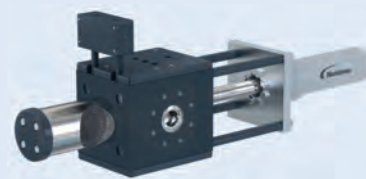
In addition to a full line of dispensing solutions, we also support quality assurance through x-ray testing and other inspection technologies. From overhang measurement and layer count verification, to weld and bond destructive testing or pull and shear testing, our proven technology ensures the highest quality standards and consistency from cell to cell.



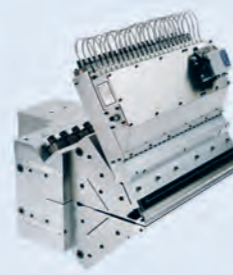
## Our range includes:



**Polymer Processing Systems - Melt Pump**



**Polymer Processing Systems - Screen Changer**



**Polymer Processing Systems - Autoflex VI-RE extrusion die**



**Polymer Processing Systems - Premier slot die**



**Matrix - XCT High-Power Offline AXI platform with CT Technology**



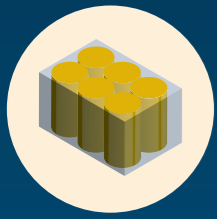
**Dage - 4600 Bond tester**



**EFD - 797PCP-2K series progressive cavity pump**



**EFD - PICO Pulse non-contact jetting system**



# Module production

**With the right technology on board, assembling cells into modules is quicker, and more accurate with less chance of error.**

Our module production solutions are flexible enough for any size and speed of manufacturing process, from manual applications to fully automated production. Whether cylindrical, prismatic or soft-pack, we have a solution to bond, secure, or apply thermal management materials for the assembly of cells into modules.

We can also dramatically improve speed and accuracy of module assembly, cell stacking, component bonding, battery cell bonding, solder paste dispensing, module cover sealing, module structural bonding, and encapsulation.

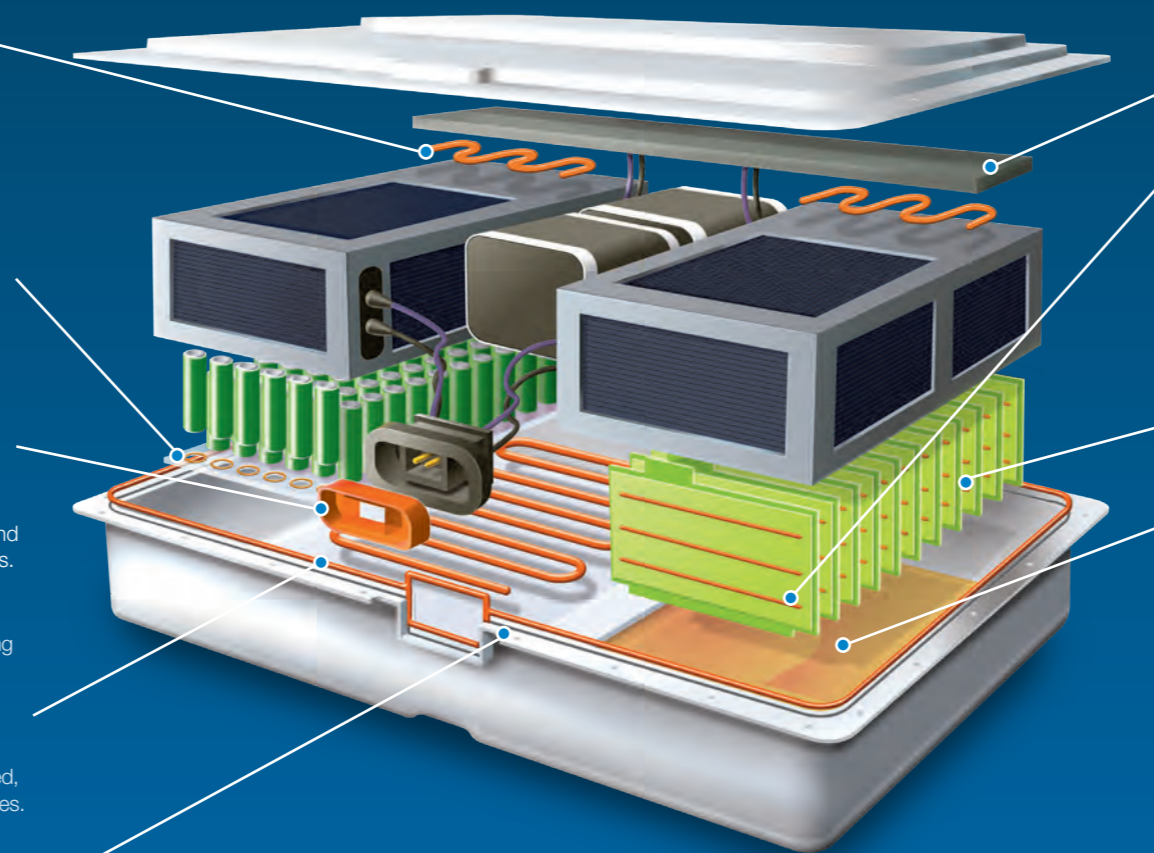
Thermal management materials are dispensed to draw heat away from sensitive components, and toward outer casings or heat sinks.

Cylindrical cell bonding provides structural rigidity and manufacturing ease.

Potting / sealing electrical components helps prevent moisture or other foreign matter from entering the battery case and causing malfunctions, essential in automotive, recreational, and general use battery markets.

Case bonding and gasketing completes the full battery assembly, adding final structural rigidity and protection. Typically, epoxy or silicone materials are used, both offering fast curing times.

1K foaming gasket makes the battery pack water proof, reopenable and serviceable.

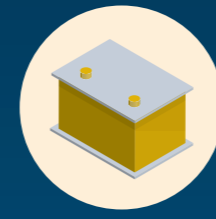


Current collector bonding.

Pouch cells are bonded together in rows to create a compact layout and provide additional strength and rigidity when the battery is in operation. Single component or two component epoxy materials are typically used.

Hot melt PSA Solution can save up to 90% of the cost.

Pack filling / encapsulation ensures components remain in place, and repel moisture and heat in a structurally sound battery case. Materials dispensed for this purpose can also offer some thermal management properties, which are found in epoxies, urethanes, and TIMs, either one or two component.



# Battery pack assembly

**Minimized overflow and cleaner pack assembly means less waste and reduced rejects. A powerful argument for Nordson expertise.**

Ensuring a battery cell module provides enough power with the correct form and fit for the end product is no simple task. Precisely why we offer a variety of solutions that allow materials to be dispensed accurately into difficult to access channels and locations, preventing material overflow and ensuring clean pack assembly.

With years of experience in this field, we can call on the expertise required to provide precision potting and gap filling solutions to support power distribution and thermal management throughout the battery pack. In fact, we've developed applications for everything from cars to buses to aircraft and energy storage including pack lid bonding, pack cover gasketing, power distribution potting, battery pack encapsulation, thermal management and materials dispensing.

## Our range includes:



NSE - Micro-Meter 2K series



NSE - 2k valves & EFD - mixers



Asymtek - Helios™ SD-960 series automated dispense platform



Product Assembly - AltaBlue / DuraBlue



EFD - GV Series gantry automated dispensing system with CCD smart vision



NSE - Pro-Meter 2K series



NSE - Gear pumps



NSE - Rhino pumps



Product Assembly - Ultra Foam Mix

# From car to wind and energy storage, **Nordson has a solution**

**Our expertise in production solutions is powered by a dedication to innovation.**



**Powering  
over 500,000  
electric cars**

Nordson's automated systems have been revolutionizing automotive production lines for decades. And now we're doing the same for the battery manufacturing industry, by accelerating production with zero compromise on quality.

The systems we deploy are purpose built to meet and exceed the demanding standards of the battery industry. With the most comprehensive range of dispense valves and meter mix solutions, our technology can be configured to meet the most demanding production specifications, however stringent.

From electric vehicles to energy storage, our specialists design a custom process from the ground up, to help make your production more predictable and controllable than ever. So you can rely on the same product, finished to exactly the same standard, with minimum material waste or inconsistency.

We think it's the kind of technological advance that is precisely what battery manufacturers have been waiting for.



## Electric vehicle solutions

- Supporting manufacturers to keep pace with vehicle battery demand
- Wide range of precision solutions for cylindrical, prismatic and soft pack production
- Dispense thermally conductive adhesives and interface materials with more precision



## Renewable energy

- Streamline production for solar, wind and hydroelectric battery manufacturing
- Precision dispensing solutions for solar panel and wind turbine assembly



## Storage

- Residential, commercial, and industrial storage assembly solutions
- Low and high volume dispensing systems sized to support the smallest residential systems to the largest industrial solutions
- Dispensing of chemical barriers or membranes used in larger non-solid state batteries.
- Ability to integrate with large automation equipment that enables efficient dispensing process on larger scale battery systems.



# Why choose Nordson?

## Precision technology that touches your life every day everywhere

Nordson delivers precision technology solutions to help more customers succeed worldwide. Founded in 1954 and headquartered in Westlake, Ohio, USA, we now operate in more than 30 countries.

We're world leaders in precision dispensing, fluid management and related technologies. We engineer, manufacture and market differentiated products used for dispensing adhesives, coatings, sealants, biomaterials and other materials; for fluid management; for test and inspection; and for UV curing and plasma surface treatment.

Our products can also be found hard at work in a wide range of consumer non-durable, durable and technology end markets including packaging, nonwovens, electronics, medical, appliances, energy, transportation, construction, and general product assembly and finishing.

This technology is supported with application expertise and direct world sales and service that brings our production precision and innovation to every corner of the globe.

### Adhesive Dispensing Systems

- Nonwovens
- Packaging
- **Polymer Processing (BKG, EDI, Xaloy)\***
- **Product Assembly\***

### Advanced Technology Systems

- **Nordson ASYMTEK\***
- Nordson DIMA
- Nordson MARCH
- **Nordson TEST AND INSPECTION\***
- **Nordson EFD\***
- Nordson MEDICAL
- Nordson SELECT

### Industrial Coating Systems

- Automotive Assembly
- **Container Coating\***
- Liquid Painting
- **Nordson SEALANT EQUIPMENT\***
- Powder Coating
- UV Curing

\* Supporting battery markets

## Worldwide operations



Discover more at: [www.nordson.com/battery](http://www.nordson.com/battery)

**Nordson Corporation** Westlake, Ohio, USA

Find a Nordson facility at: [www.nordson.com/global-directory](http://www.nordson.com/global-directory)

