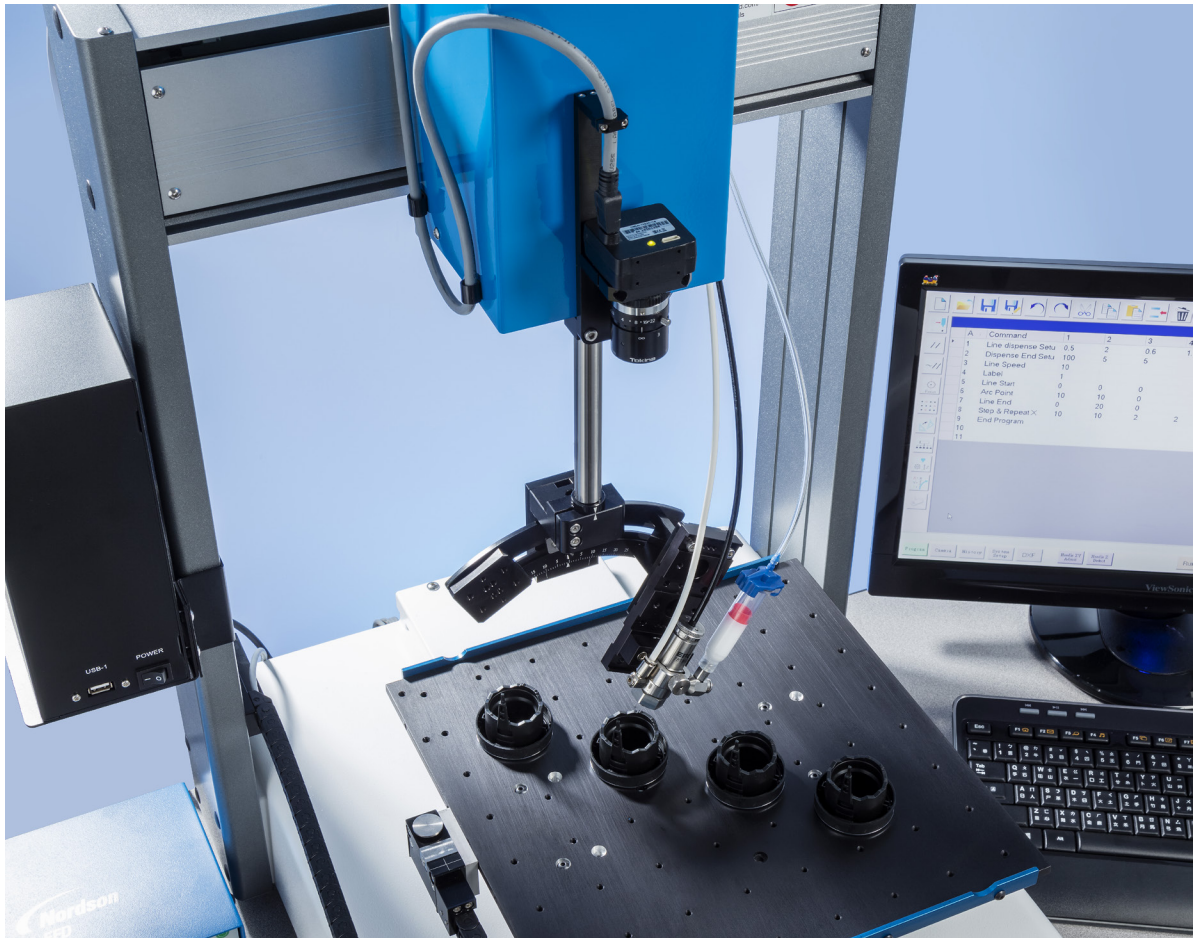


Automated Fluid Dispensing

7 Critical Steps to Implement Semi-Automation
to Your Dispensing Process





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1. Decide (What) to Automate

Walk your process, identify opportunities, and think small

Moving to automation is more than just deciding to automate—determining what to automate is key. The first step in moving to automation is to take a close look at an entire process to see if there is a piece of that process which, if automated, would improve safety, performance, or productivity. For example:

1. IS THERE A PARTICULAR STEP THAT IS HAZARDOUS OR INVOLVES HAZARDOUS MATERIAL?

A robot is a better choice than a human for performing delicate, difficult work or for dispensing hazardous materials.

2. IS THERE A STEP THAT NEEDS TO HAPPEN FASTER?

Dispensing robots can dispense intricate fluid patterns in a fraction of the time of a human operator.

3. IS THERE A STEP THAT INCURS CONSIDERABLE COST WHEN A MISTAKE IS MADE?

A robot can perform such a step exactly the same way, with little variation, time and time again.

4. HOW IMPORTANT ARE PRECISION AND ACCURACY?

Robots offer superior precision and accuracy, better than most humans.

5. ARE THE SUBSTRATES TOO SMALL TO DISPENSE ON?

The accuracy that automation can offer negates any issues created in the process by handling or dispensing on small substrates.

If done correctly, automation will change your process for the better.

Step 1:
Decide (What) to Automate

Walk your process

ID repetitive dispense cycles

ID opportunities

Start small

Look at steps with high rejects or slow cycle times

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2. Evaluate Your Automation Options

Choose the right degree of automation

Once you have identified a process that would benefit from automation, consider the degree of automation. It is generally best to start small. For example, a process that requires the application of adhesive to a part, then the adhesion of that part to another part, can be automated, but implementation could be time consuming and complex. It might be better to begin by automating just one step in that process, such as the fluid dispensing step. This is known as semi-automation. Semi-automation describes a system in which a human operator or a small production line feeds a product to a robot, the robot performs a single task on that product, and then the human operator removes the product and completes the task.

Consider your environment

Before choosing any automation products, you need to know the physical environment of the work location:

1. IS THERE A GOOD PLANT AIR SUPPLY?

Dispensing from a valve or syringe barrel requires dry, filtered air.

2. WHAT TYPE OF ELECTRICAL SERVICE IS AVAILABLE?

This varies by country.

3. HOW CLEAN IS THE ENVIRONMENT? DOES THE ROBOT NEED TO BE UNDER A VENT HOOD?

Robots are actually an excellent choice if the environment is potentially hazardous to human operators.

4. HOW WILL PEOPLE MOVE AROUND THE AUTOMATION EQUIPMENT? WHAT SIZE FOOTPRINT IS AVAILABLE?

There needs to be enough room for an operator to work with a robot without being bumped or jostled by other workers.

5. HOW HUMID IS THE AMBIENT TEMPERATURE?

There is a good robot option for every environment, but you need to know what the environmental challenges are in order to choose the right robot.

Continued next page

Step 2:
Evaluate Your Automation Options

- Select the right degree of automation
- Can automation be in-line or is a batch operation off line?
- Consider your environment
- Choose a suitable platform

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2. Evaluate Your Automation Options

Choose a suitable platform

Choosing a suitable platform means choosing the right type of robot. The most widely used types of fluid dispensing robots are cartesian (3 and 4 axis) tabletop robots and gantry robots (allow for production line integration). Tabletop robots, also known as XYZ tables, apply material to one component, or one pallet of components, at a time.

Once you choose a platform, there will be additional considerations, such as the size of the robot, the number of axes, the available inputs/outputs, and so on. Expert-level familiarity with the process for which the robot will be used is the key to selecting the best platform. In other words, to choose the best robot, you need to know exactly where it's going and how it will be used.

3. Evaluate Your Dispensing Options

You will also need expert-level familiarity with your process to make the best fluid dispensing choices.

Know your application

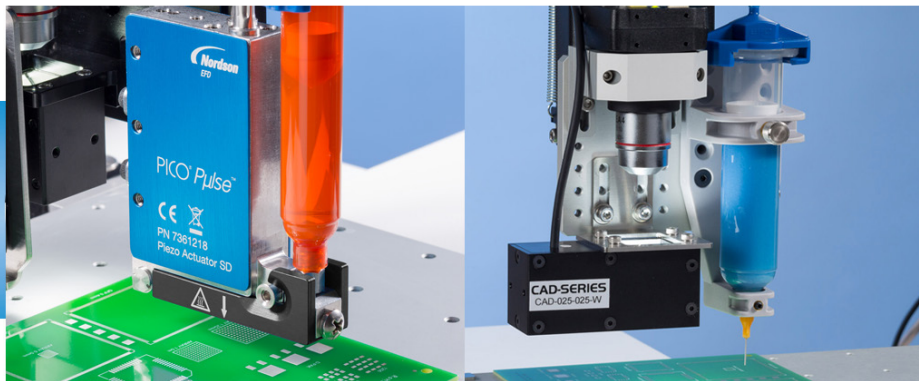
To effectively automate, you need to know what the product looks like:

- What is its shape?
- What is its color?
- What is its composition?
- Where on the product does material need to be applied?
- Is the substrate reflective or translucent?

For example, a translucent substrate can be difficult for optical equipment to identify so an upgraded vision system may be required.

Continued next page

Step 3: Evaluate Your Dispensing Options



✦ Selecting the best dispensing solution is most critical to success

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3. Evaluate Your Dispensing Options

Know your fluid

Exact knowledge of the material to be applied is just as important as exact knowledge of the product:

- What is the viscosity? Does its viscosity change significantly over time because of temperature swings in the production area? What is the useful working life of the fluid? Minutes? Hours?
- What is the fluid color?
- What is the composition? Is it a reactive adhesive like cyanoacrylate or an anaerobic adhesive? Does it require UV curing? Is the fluid particle filled? If so, does the fluid have to be agitated to keep particles in suspension or is it a homogenous composition?
- What are the hazards?
- What are the unique requirements of the fluid? Is it self-leveling or would it require a piston or follower in the reservoir to provide a wiping action on the side walls of the reservoir?

Choose your dispensing system

When you know the specifics of the component and fluid, you can choose the best method for dispensing the fluid onto the component. Robots are well-suited for syringe barrel-style or valve-style dispensing configurations. The best valve configuration choice depends intimately on the specifics of the process and the fluid:

- Difficult fluids, such as medical-grade cyanoacrylates (superglues) must be dispensed through systems of compatible composition; nylon or metal fluid fittings should never be used with cyanoacrylates.
- For thin to medium fluids, needle valves are often best because shutoff occurs close to the valve outlet or dispense tip.
- For thick fluids, a high-pressure valve with a balanced spool design will provide good control.
- If the dispensing equipment should not make contact with the product, high-speed jetting systems are a good option.
- If your process needs extremely consistent deposit results, a valve system with a dedicated controller is a more efficient approach than using a human operator.
- If your current system allows air into the process, then using a valve system with a purge function will greatly improve operation.

4. Design the System

Integrate the technologies, and don't forget the accessories

Once you have chosen a platform and a fluid dispensing technology, it will be time to integrate the two by installing the fluid dispensing system on the robot. Be sure to consider which necessary and optional accessories may be needed, such as:

- Regulators
- Safety guarding
- A light curtain
- Vision systems
- Pumps
- An emergency stop button
- Fixture plates
- Tip detectors
- Reservoirs
- Cables
- Height detection

Heed regulatory requirements

Be aware that the automation system must meet the applicable regulatory requirements of the location where it will be installed and used, not the location where it was purchased. This means it needs to meet OSHA standards in the U.S., CE requirements in the European Union, CSA or TUV standards in Canada, and so on. Additional accessories or safety equipment may be required depending on the installation location.

Estimate the cost-benefit and ROI

Now that you have a good idea what the system will look like, it's a good time to estimate how much it can reduce cost and improve productivity. There are a variety of automation return-on-investment (ROI) calculators freely available via the Internet, as well as plenty of general information on how to do this. Try using an ROI calculator to determine the following:

- How much more throughput might be obtained?
- How much more productivity?
- How much time reduction?
- How much fluid savings? Nordson EFD can provide you with a basic tool that assists with fluid savings estimates.
- What percentage yield increase can be achieved?

Step 4:
Design the System

Integrate the technologies

Remember accessories



Heed regulatory requirements

Estimate the cost-benefit and ROI

Find good ROI tools on the web



5. Pilot Testing

Start with expert application testing

After all the system decisions are made, it's time to let the experts test it. Successful automation of a process requires up-front setup and testing by knowledgeable and experienced engineers. If you select a Nordson EFD system, EFD will set up and perform the application in our lab and then provide video of the operation to you, at no charge.

Install and program the equipment

Once you know the automation works, it can be installed at your facility and integrated into your production processes. Look for automation vendors who will install and set up their equipment for you. EFD offers guided installation for a minimal fee. Automation can be challenging, and you will want to be sure that the process runs smoothly after installation and setup are completed and before you run the system on your own.

Evaluate the new process

When you add automation, it is best to implement on only one assembly line at a time; this way you can evaluate the new process and compare it to your existing processes. For example, if you hoped to achieve 50 % faster throughput, you want to make sure that's what you're getting. You may need to tweak one or more variables to achieve your desired goals. This usually takes a week or two. A good automation vendor will work with you until the newly automated process meets your expectations.

Step 5: Pilot Testing

Install and program
the equipment

Start with expert
application testing

Evaluate the
new process

EFD will test and video your application

6. Scale Up


When pilot testing is complete, you can apply what was learned to formal implementation, which includes **training your workforce, adding additional lines, and producing product.**

Step 6:
Scale Up



Plan ahead Train the workforce Ramp your production volume

 Implement lessons learned from pilot



7. Optimize the Process

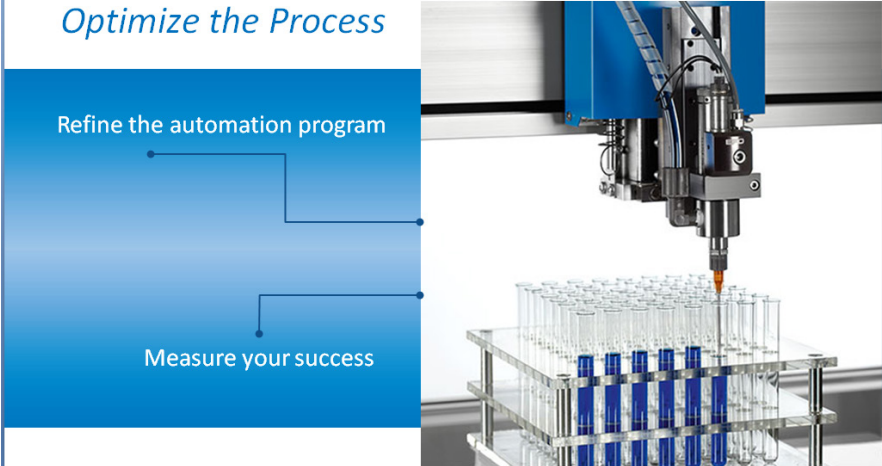
Refine the automation program

There are two components to refining your automated processes over time: (1) correcting any problems that occur and (2) constantly looking for ways to make a process better or more efficient. For example, cutting just one or two seconds out of a process can add up to a surprising amount of savings.

Measure your success


Automation lends itself very well to measurement, especially using methodologies such as Six Sigma and lean manufacturing. Just be sure to choose what you measure carefully—you want the metrics to matter. Your automation vendor should be there to assist you in refining your automation program on an ongoing basis.


Step 7:
Optimize the Process



Refine the automation program

Measure your success

 Select metrics that matter



A Quick Look at How BIG Your Savings Can Be

See how much you'll save by switching from a manual to an automated dispensing process.

Productivity

Output typically doubles when switching from a benchtop dispenser to an automated dispensing system. That means labor costs for the same task are generally cut in half.

$$\begin{array}{l} \text{Hours (_____)} \quad \times \quad \text{Cost (_____)} \quad = \quad \$ \text{_____} \\ \text{(\# production hrs per week)} \quad \quad \quad \text{(labor per hour)} \end{array}$$

x 0.5

$$\text{Production Saving} \quad = \quad \$ \text{_____}$$

x 48 weeks

$$\text{Total Annual Savings} \quad = \quad \$ \text{_____}$$

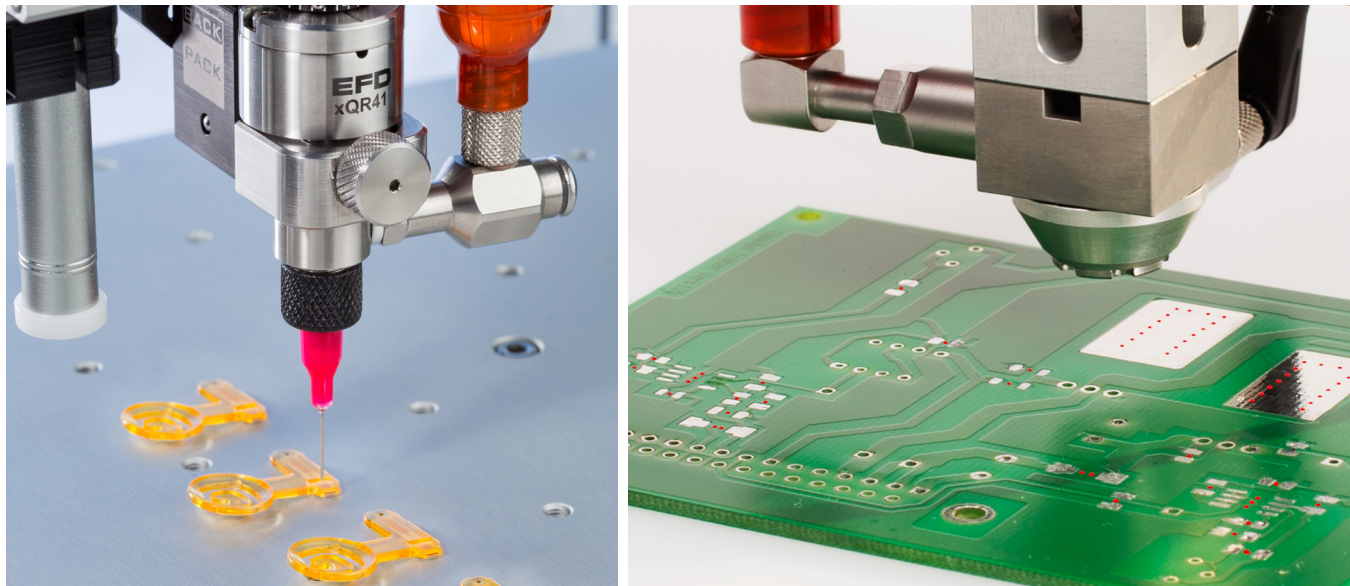


... and productivity is just the beginning

As an added bonus, you'll also...

- Reduce fluid waste – save up to 60% of your fluid costs per year
- Increase quality parts produced per hour by as much as 200%
- Quickly implement automation with easy-to-use dispensing software
- Lower production, material, and ownership costs
- Integrate automation easily in your existing operation

Why Nordson EFD?



Because so many factors can impact your dispensing process, it's important to consult an experienced fluid application specialist who knows what questions to ask to guide you to find the right solution for your dispensing application.

In fact, getting an EFD application specialist involved early in a project will help you not only choose the right automation system, but also help you develop the right process so you'll have fewer problems later in production.

Most EFD application specialists have 10+ years of experience helping customers find the right dispensing solutions for their fluid and application requirements. And with more than 15 global application labs, it's easy to test your fluid and parts with EFD dispensing solutions to validate an application prior to purchase.

Our global support team can provide on-site technical assistance and trusted recommendations — even for the most challenging dispensing applications — from offices in more than 40 countries worldwide.

Contact EFD at info@nordsonefd.com to request more information.

About the Author

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Johnathan Titone is the Product Line Specialist for Automation at Nordson EFD.

Johnathan has more than 12 years of industry experience. Since joining Nordson EFD in 2006, he has used his expertise in fluid dispensing and automation to assist customers in the development of precision dispensing.

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Request More Information

Nordson EFD’s worldwide network of experienced fluid application specialists are available to discuss your dispensing project and recommend a system that meets your technical requirements and budget.

Call or email us for a consultation.

800-556-3484

info@nordsonefd.com

www.nordsonefd.com/advice

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Visit our Video Gallery to access 150+ application, how-to, and product videos. See how EFD automated dispensing systems actually work in real-life dispensing footage.

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