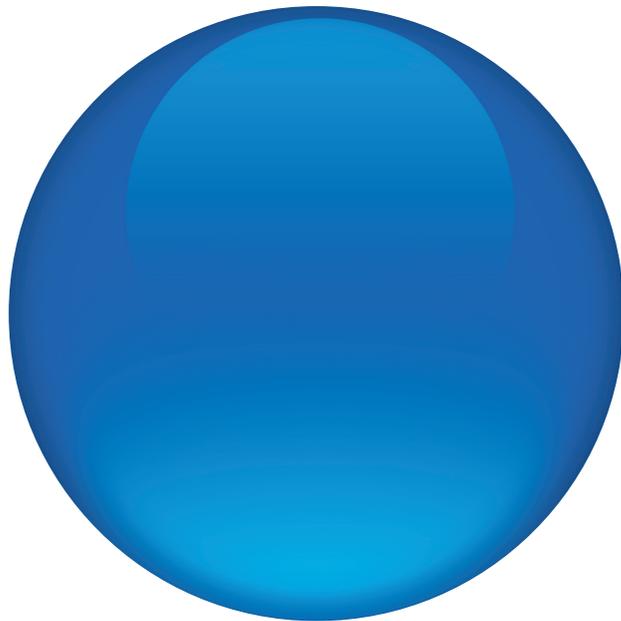


7 Critical Steps to Implement Semi-Automation to your Dispensing Process



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:

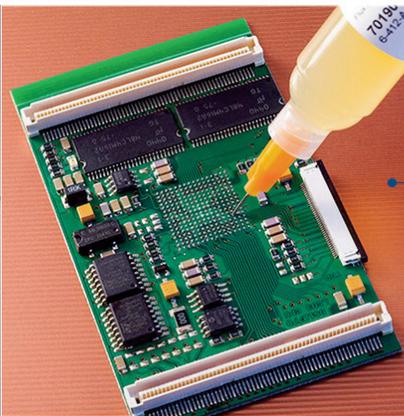
- Is there a particular step that is hazardous or involves hazardous material? A robot is a better choice than a human for performing delicate, difficult work or for dispensing hazardous materials.
- Is there a step that needs to happen faster? Dispensing robots can dispense intricate fluid patterns in a fraction of the time of a human operator.
- 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.
- How important are precision and accuracy? Robots offer superior precision and accuracy, better than most humans.
- Is a human operator performing a step that is very routine and thus making errors because of fatigue or boredom? A robot never tires, becomes bored, or calls in sick.

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

Step 1:

Decide (What) to Automate

Walk your process



ID opportunities

Start small



Look at steps with high rejects or slow cycle times



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:

- Is there a good plant air supply? Dispensing from a valve or syringe barrel requires dry, filtered air.
- What type of electrical service is available? This varies by country.
- How clean is the environment? Robots are actually an excellent choice if the environment is potentially hazardous to human operators.
- How will people move around the automation equipment? Is there enough room for an operator to work with a robot without being bumped or jostled by other workers
- How humid is the ambient temperature? There is a good robot option for most every environment, but you need to know what the environmental challenges are in order to choose right robot.

Step 2:
Evaluate Your Automation Options

Select the right degree of automation

Consider your environment

Choose a suitable platform



SCARA robots apply material as parts go by



Choose a suitable platform

Choosing a suitable platform means choosing the right type of robot. The most widely used types of fluid dispensing robots include tabletop robots and SCARA robots. Tabletop robots, also known as XYZ tables, apply material to one component, or one pallet of components, at a time. SCARA robots can apply material to components as they go by on a production line.

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?

For example, if the product is an all-black component and you need to dispense dark fluid into an interior cavity, it would be difficult for a camera to determine where to apply the fluid. The characteristics of the product directly affect the automation choices.

Know your fluid

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

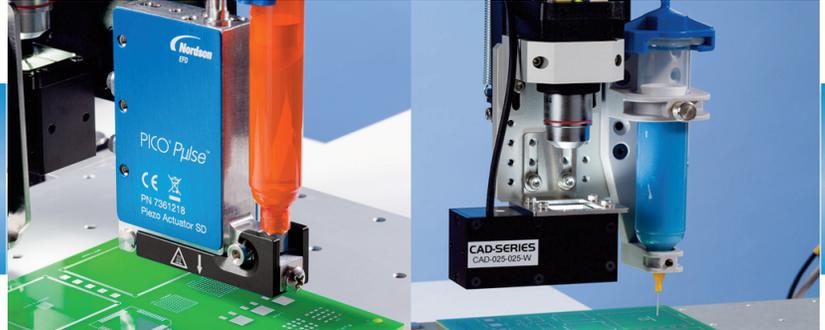
- What is the viscosity? Does its viscosity change significantly over time because of temperature swings in the production area? What is the useful working life of the fluid? Minutes? Hours?
- What is the color?
- What is the composition? Is it a reactive adhesive like cyanoacrylate or an anaerobic adhesive? 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.

Step 3: Evaluate Your Dispensing Options



High-speed jet dispensing valve

Automated dispensing system with smart vision camera



Selecting the best dispensing solution is most critical to success



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
- Pumps
- Reservoirs
- Safety guarding
- An emergency stop button
- A light curtain
- Fixture plates
- Cables
- Controls (computer software vs. a teach pendant)

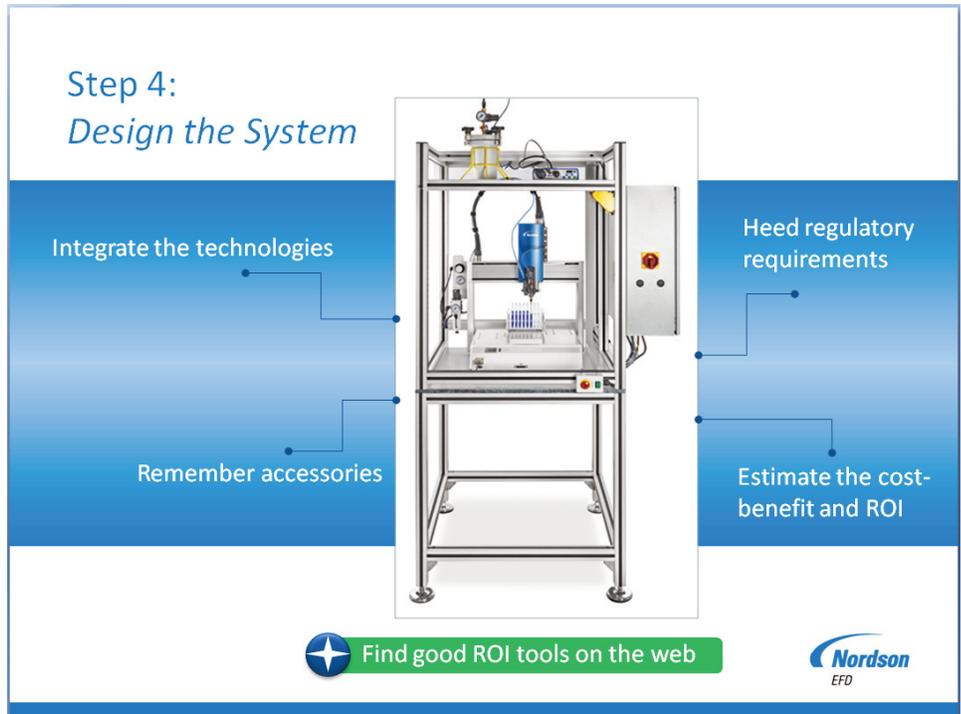
Heed regulatory requirements

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 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.



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, again at no charge. 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 percent 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*

Start with expert
application testing



Install and program
the equipment

Evaluate the
new process



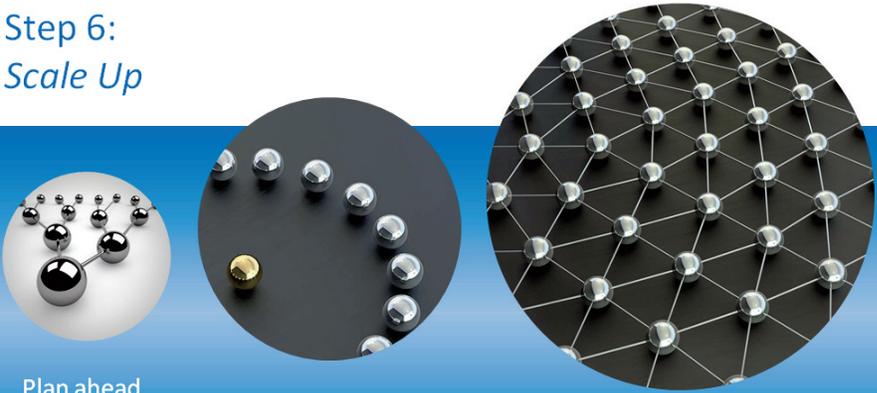
EFD will test and video your application



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

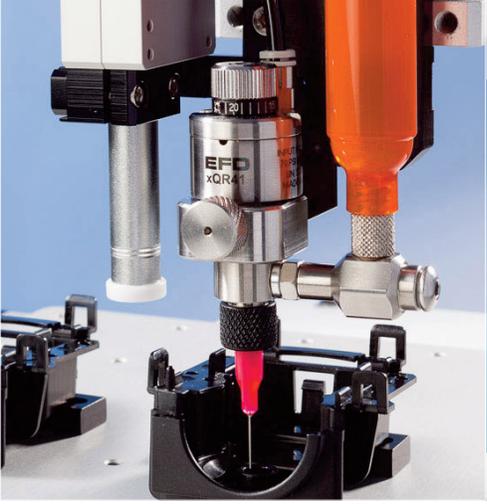
Refine the automation program

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



About the Author

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Claude Bergeron is the Global Product Line Manager for Valves and Valve Systems. Claude has 30 years of fluid dispensing experience that encompasses a wide range of industries, applications and assembly fluids.

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For more Information

Thank you for your interest in EFD's dispensing solutions. For a discussion of how semi-automated dispensing can help improve your manufacturing process, we invite you to contact EFD's Fluid Application Specialists at 800-556-3484 or info@nordsonefd.com. To see videos of EFD dispensing robots, visit nordsonefd.com/videos.

