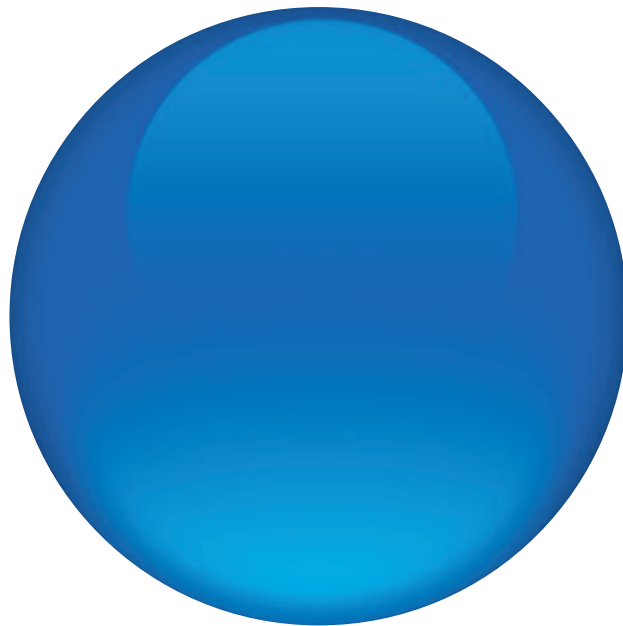


# 12 Techniques to Get Better Fluid Dispensing Control in Today's Life Sciences Market



# Introduction

The purpose of this white paper is to showcase the many ways in which manufacturers in the life sciences industry have improved their process control by changing one or more of their fluid dispensing techniques.

The 12 examples provided show how a change in technique can lead to better results — better control, better part-to-part consistency, reduced costs, a safer work environment, and even a greener operation. In each case, a dispensing technique goes from one which is uncontrolled and unmeasurable to one that is controlled, highly repeatable, and highly measureable.

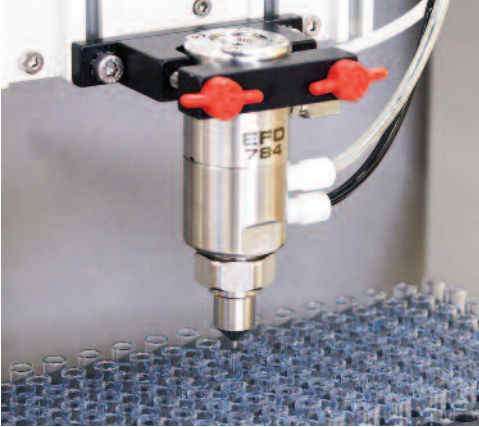
In any manufacturing environment, it is difficult to evaluate a process that cannot be quantified and measured. Today's precision dispensing technologies provide many ways to achieve accurate, repeatable, and measureable results.

This paper summarizes several examples to help you review your own processes from a fresh perspective — and to consider dispensing techniques you might not have previously considered. The 12 examples are subdivided by the following types of dispensing applications:

- [Spraying/coating](#)
- [Filling](#)
- [Bonding](#)
- [Dispensing dots and lines](#)

For each, this paper provides a list of typical fluids and products, along with a brief summary of the relevant examples. At the end, two additional fluid dispensing techniques — semi-automation and jetting — are discussed as bonus topics. You will find links to additional free information on these at the end.

# Spraying & Coating



EFD 784S aseptic spray valve

## Fluid types:

- Silicones
- Anti-microbials
- Anti-coagulants
- Lubricants

## Typical products:

- Stents
- Hypodermic needles
- Pills
- ID/OD of tubes/syringes

## 1. From hand-held spray bottle to spray valve

When an orthopedic equipment manufacturer replaced the use of a manually-operated spray bottle with a precision spray valve to flush contamination from a product in its final stage of production, they changed an inexact, unmeasurable method to a precise and measurable process.

Now the company knows exactly how much fluid is used to flush each product and for how long. This provides a cost savings across multiple areas, including less fluid use, greater productivity, and a more controlled process that provides exact data to demonstrate regulatory and safety compliance.

**Key takeaway:** Moving from a manual to a more automated dispensing process delivers benefits far beyond just fluid savings.

## 2. From one type of valve to another

A glass tube manufacturer in Asia was using a locally-sourced spray valve and spin cap that did not meet stringent quality controls, thus causing problems such as overspray and inconsistent fluid patterns. When they changed to a spray valve and spin cap from a different source, their overspray and application problems disappeared.

In many cases, switching from a lower quality component to a higher quality component in your dispensing system is an investment that pays for itself quickly by eliminating the extra costs caused by poor application quality and high reject rates.

**Key takeaway:** This is a great example of the fact that cost savings are all around you — you just need to look even closer at the products which may put your dispensing process at risk.

## 3. From cotton swab to radial spinner

In this example, a clinical consumables company achieved a stunning 70% process reduction time by switching the manual application of a silicone oil in the inside of a vial (using a cotton swab) to a radial spinner dispense valve system.

The problems caused by the cotton swab application method were significant: multiple operators were required to keep up with production, the fluid amount applied varied greatly by operator, spills on the product and the work surface were inescapable, and the rework rate was 50% (and those were just the most critical issues).

Changing to a radial spinner that evenly sprayed a specific volume of fluid into the vial virtually eliminated rejects and rework, meaning a significant savings in product production. It also eliminated the need for multiple operators, which meant another significant savings in production cost.

**Key takeaway:** Oftentimes, a simple operation isn't always quite so simple — companies can benefit from a dramatic payback by researching their hidden costs.

# Filling



EFD 754V aseptic dispense valve

## Fluid types:

- Medical gels
- Reagents
- Solvents
- Solutions

## Typical products:

- Tubes
- Vials
- Syringes
- Glass and plastic containers

## 4. From manual filling to robot

Many life sciences applications require precision in both the amount of fluid dispensed and in the precise placement of that fluid. A reagent distributor who replaced a manual filling process with a robotic, valve-based filling process was able to greatly reduce problems with inconsistent fill volumes and spillage. A robot, unlike a human operator, can dispense exactly the same amount of fluid into the exact same location time and time again for extremely accurate and stable process control.

**Key takeaway:** Semi-automated dispensing robots provide a much higher level of process control and accuracy since are less dependent on operator variability.

## 5. From one valve to three

Although it might seem like a cost savings to use only one dispensing valve to do the job of three, the reality is that it costs more to address the problems caused by such a process than it does to use more valves. When a single valve is used to dispense three different fluids at different points of the process, the primary problem is cross-contamination, which results in increased rework and product reject rates.

In this example, a diagnostics company switched from using one valve to fill vials to a three-valve dispense system. Previously, the one valve was used for three different agents, which meant manual flushing and cleanup between each fluid change. By installing two additional valves, which then allowed one valve dedicated to each fluid, they were able not only to greatly reduce cleaning, flushing, and prep costs, but also to show increased compliance with regulatory requirements. The resulting cost savings more than made up for the one-time cost of installing the extra valves.

**Key takeaway:** Investing in the right equipment for a process saves money in the long run by eliminating costly labor-intensive operations.

## 6. From a drippy valve to a non-drip valve

If any amount of the fluid that protects a contact lens in its blister pack falls onto the sealing surface of that blister pack, the entire pack becomes a reject at the end of its manufacturing life cycle (being a product that cannot be reworked). This is clearly a costly mistake.

A contact lens manufacturer was able to eliminate such waste simply by switching to a higher quality valve that doesn't drip after each dispense cycle. Eliminating rejects, especially when a manufactured product is nearly complete and cannot be reworked, creates significant savings – even when balanced against the one-time investment in upgrading to improved valve technology and performance.

**Key takeaway:** Investing in the best equipment for a process reduces the cost and waste associated with rejects or rework.

# Bonding



EFD 741V MicroDot™ valves

## Fluid types:

- Light-cure adhesives
- Glues
- Cyanoacrylates

## Typical products:

- Needles
- Catheters
- IV kits
- Heart pumps

## 7. From four lines to six in the same amount of space

It isn't only the products themselves that are getting smaller as technology advances; the equipment used to make those products is also evolving and getting smaller.

A medical device manufacturer who switched to smaller-footprint valves, without compromising dispensing performance, was able to increase output by 50% because they could install a greater number of valves in the same area within the machine. Using the smaller-footprint valves can also mean fitting in more production lines. This same company was also able to reduce their machine real estate requirements when they ultimately added two additional lines.

**Key takeaway:** Size is not an indication of quality. High quality performance can be realized from smaller products, allowing you to maximize your investment on the production floor.

## 8. From one curing method to another

Advances in technology apply in many production areas. In this example, a medical device manufacturer switched from UV curing to LED curing. Because LED curing is faster and uses less power, the company reduced power consumption and sped up the curing process.

In addition to being energy efficient, LED lamps also have a longer life and require less maintenance. Plus their operating temperature is low, which results in a safer work environment. LED curing is safe for the environment as well, and is completely mercury and ozone free. Making changes such as this allows companies to demonstrate their commitment to green initiatives and sustainability.

**Key takeaway:** Incorporating the latest technological advances into your application can not only improve the process, it saves energy and benefits the environment.

## 9. From contact to non-contact

A significant cost saving can be realized by rethinking the way fluid is applied to a surface. If you are using a contact dispensing method, which requires equipment that can move a dispensing valve up or down on a Z-axis, consider whether it would be more efficient to jet the fluid.

One medical device manufacturer who switched from a contact dispensing application to a jetting application increased throughput by 50% and also achieved better process control.

Switching to non-contact jetting can result in cost savings by eliminating the need to move the dispensing device up and down, which can in turn allow the production line to run faster. It can also reduce setup time and increase product flexibility because more than one product can be produced on the same line.

**Key takeaway:** It doesn't make sense to keep doing something just because it's always been done that way. A new fluid dispensing process can result in dramatic improvements in both production quality and reduced production cost.

# Dispensing dots & lines



EFD HP high-pressure dispensing tool

## Fluid types:

- Marking inks
- Medical adhesives
- Antiseptic creams
- Sealants
- Ampoules

## Typical products:

- Ampoules
- Hypodermic needles
- Pacemakers
- Endoscopy devices

## 10. From a slow flow rate to a faster flow rate

There are numerous ways to increase throughput by making only one change. A medical device manufacturer who switched to valves with a higher flow rate for a solvent bonding application achieved a 30% increase in production speed.

After the higher-flow-rate valves were installed, the production line dispensed more fluid in a shorter amount of time, therefore increasing output per unit of time. What previously took 30 seconds now takes 20 seconds. Changing to the right valves with a higher flow rate is an easy way to increase throughput without compromising dispensing integrity.

**Key takeaway:** You don't always need to make a significant, costly change to obtain a significant benefit. Sometimes one small change can make a big difference.

## 11. From a hard-to-use dispensing needle to a high-pressure device

Optimization doesn't always mean switching from a manual to an automated process. In this example, a medical device manufacturer had to backfill a very thick material through a very thin tube. It was a challenge that required a lot of manual force and exposed the operators to repetitive motions and ergonomic issues.

When the manufacturer switched to a high-pressure, handheld dispensing device, they eliminated multiple problems: the risk of operator injury due to repetitive motion and poor ergonomics, slow production times, application inconsistencies, and poor product quality.

**Key takeaway:** Don't assume that a manual process can only be improved by advancing to an automated process; advances in dispensing methodologies apply to manual dispensing as well.

## 12. From irregular beads and dots to perfect beads and dots

When a vaccine manufacturer switched to jetting technology for the application of beads and paint dots on ampoules, they reduced their reject rate by 60%. Because the visible beads and dots indicate what material is inside an ampoule, clarity is critical.

With the old method, the beads were either too thick, too thin, or overlapped, and the dots of paint were too big or too small. Sometimes the beads or dots were dragged across the surface, rendering the product unusable.

Jetting technology was ideal for improving this application because it eliminated surface contact. When you want to dispense precise sizes of beads or dots of fluid onto a very specific spot on a surface, then non-contact dispensing is the obvious solution. Jetting technology provides repeatability — the exact same deposit time after time in the correct place time after time.

**Key takeaway:** For your contact dispensing applications, ask yourself if switching to a non-contact jetting process would eliminate costly application problems.

# Semi-Automation with Robots

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



EFD precision dispensing robots

- 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, without error, 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. For more information on moving to semi-automation, download another EFD white paper, “[7 Critical Steps to Implement Semi-Automation to your Dispensing Process.](#)”

## Jetting/Non-Contact Dispensing

For applications in which the dispensing equipment contacts the product, consider jetting, or non-contact dispensing. Non-contact jetting offers many advantages in multiple arenas: types of fluids that can be dispensed, types of products onto which fluids can be dispensed, extreme precision and range in deposit sizes and volumes, and extreme range in deposit speeds.



EFD PICO® jetting valves

### Fluid types:

- Enzymes/Biomaterials
- Reagents
- Silicones
- Adhesives

### Typical products:

- Test strips
- Needles
- Catheters
- Medical textiles

### Equipment advantages

- No vertical motion
- Fewer height senses
- High cycle rates
- Ability to place fluid in difficult to reach areas
- Less sensitive to dispense height

## Summary

The right dispensing technique improves your process control and, in the end, saves time and money. It pays to take the time to carefully evaluate your application, process parameters, and constraints. In particular, focus on processes that have a high reject rate or that cause a bottle-neck in production.

As you evaluate your processes, try to change perspectives and think outside any traditional processes that have “just always been done that way.” Sometimes, just one small change can lead to a significant improvement in reducing waste, improving production speed, improving operator health and safety, or even just reducing cleanup, maintenance, or energy costs. You might be surprised by how much you can do by simply using an alternate technique for applying a fluid to a product.

Use the many examples provided in this paper to think about your own manufacturing floor. Walk around and cast a critical and attentive eye on each part of a production process. When you do make a change, choose a technique that is flexible enough to adapt to future process changes, and always consider the total cost of ownership, not just the up-front costs.

## 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](mailto:info@nordsonefd.com). To see videos of EFD dispensing robots, visit [nordsonefd.com/videos](http://nordsonefd.com/videos).



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