SmartDispenser®
AirFree® Technology

Addressing a problem that keeps bubbling up

Air bubbles in assembly fluids may not seem like a big problem. But they are, because their very presence helps to destroy fluid dispensing repeatability and weaken bonds, factors which can negatively affect the performance of assembled products. How do air bubbles form? Air has a way of sneaking into places it has no business being, for instance when fluids are being formulated. Degassing and centrifuging are processes used to remove air bubbles but, sometimes, they fall a bit short of their goal. Worse, bubbles often come back to plague manufacturers during the product assembly process. This can happen in several ways. The most common of which is when manufacturers inject compressed air into the packaging offered by formulators after these suppliers have made painstaking efforts to remove bubbles or pockets. They can also develop during the thawing process when using pre-mixed and frozen assembly fluids, as well as when mixing a two-component epoxy and pouring it into a syringe reservoir. Perhaps the biggest cause of air bubbles forming is the turbulence that is created when manufacturers use dispensing systems offering little to no control over the delivery speed of fluids. These topsy-turvy conditions are most often produced by air driven systems.

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Tiny bubbles, major headaches

If air bubbles are not eliminated, troubles arise. As alluded to earlier, the problems grow worse for manufacturers relying on air-driven fluid dispensing systems. Not surprising since compressed air is a gas, and as such, it is unstable, ever-evolving, and highly compressible; properties that wreak havoc on process control. This volatile dispensing method, coupled with air bubbles, cause a spring-like action on the fluid, resulting in severe inconsistencies due to fluctuating fluid volumes. This is an especially thorny issue when assembling fiber optic connectors because entrapped air in the form of bubbles or pockets is known to disrupt the fibers, causing them to perform incorrectly. Compounding the problem, regardless of the type of product being assembled, is the fact that the inconsistencies brought about by compressed air remain present from syringe to syringe on account of the random amounts of air in each reservoir. All of which leads to a multitude of issues that include:

- **Weak bonds**
- **Product failures**
- **Lost production time**
- **Wasted fluid**
- **More rejects**
- **More rework**

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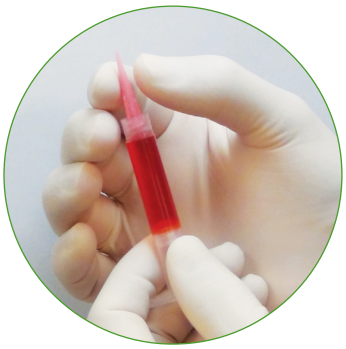
Air bubbles can be removed, but return if compressed air remains in the mix

Getting air bubbles in fluids is nothing new. Which is why to combat them manufacturers have turned to a number of ways to remove them. These approaches range from the fairly basic to the more technical.



The simplest technique used is to manually tip the syringe upwards and tap it with a finger. Just like what healthcare professionals do before giving injections to patients. This allows the air bubbles to rise. When they do, all one needs to do is slowly push the piston up and when the air bubbles flow to the top they can be easily purged out through the tip.

Another method employed is degassing. This is when fluid is placed into a vacuum chamber. When spun the air pressure is lowered. As the pressure evacuates the fluid, the air bubbles will expand, and rise to the surface and burst. Depending upon the fluid itself, the process may take several minutes before the degassing is complete.

The most common way to remove air bubbles is with centrifuging. This allows the air bubbles that are suspended in the fluid to migrate to the back end of the syringe and form one larger air pocket between the piston and the fluid, which by its position will not hinder the dispensing of adhesives. This technique typically takes several minutes to rid the fluid of all air bubbles.

For low to medium viscosity fluids, storing the syringes with the tips pointing up is a simple way that allows the air pockets to rise to the top end of the syringe that can then be purged before dispensing begins.

All these methods work well enough at removing air bubbles. However, when compressed air is used to dispense fluids, the act of forcefully shooting air into the syringe reservoir will reverse most of the benefits gained by employing these approaches. This happens because compressed air puts air back into the syringe reservoir, which puts assemblers back where they started.

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Bottom line: air gives rise to air bubbles

The most effective way to remove air bubbles is to remove air-driven fluid dispensing systems from the assembly process. What needs to replace them is a solution that does not inject compressed air into the fluid reservoir. Making the switch will significantly lessen the impact of air bubbles that are present due to the viscosity of fluids; a problem that frequently occurs when working with silicones. Such a solution will also ensure that manufacturers do not have to wrestle with a system that causes fluid dispense volumes to constantly fluctuate. Manufacturers that remain burdened by the unpredictability brought about by the continued use of compressed air wind up having to repeatedly adjust for changing fluid volumes in the hope of achieving the level of repeatability their applications require.

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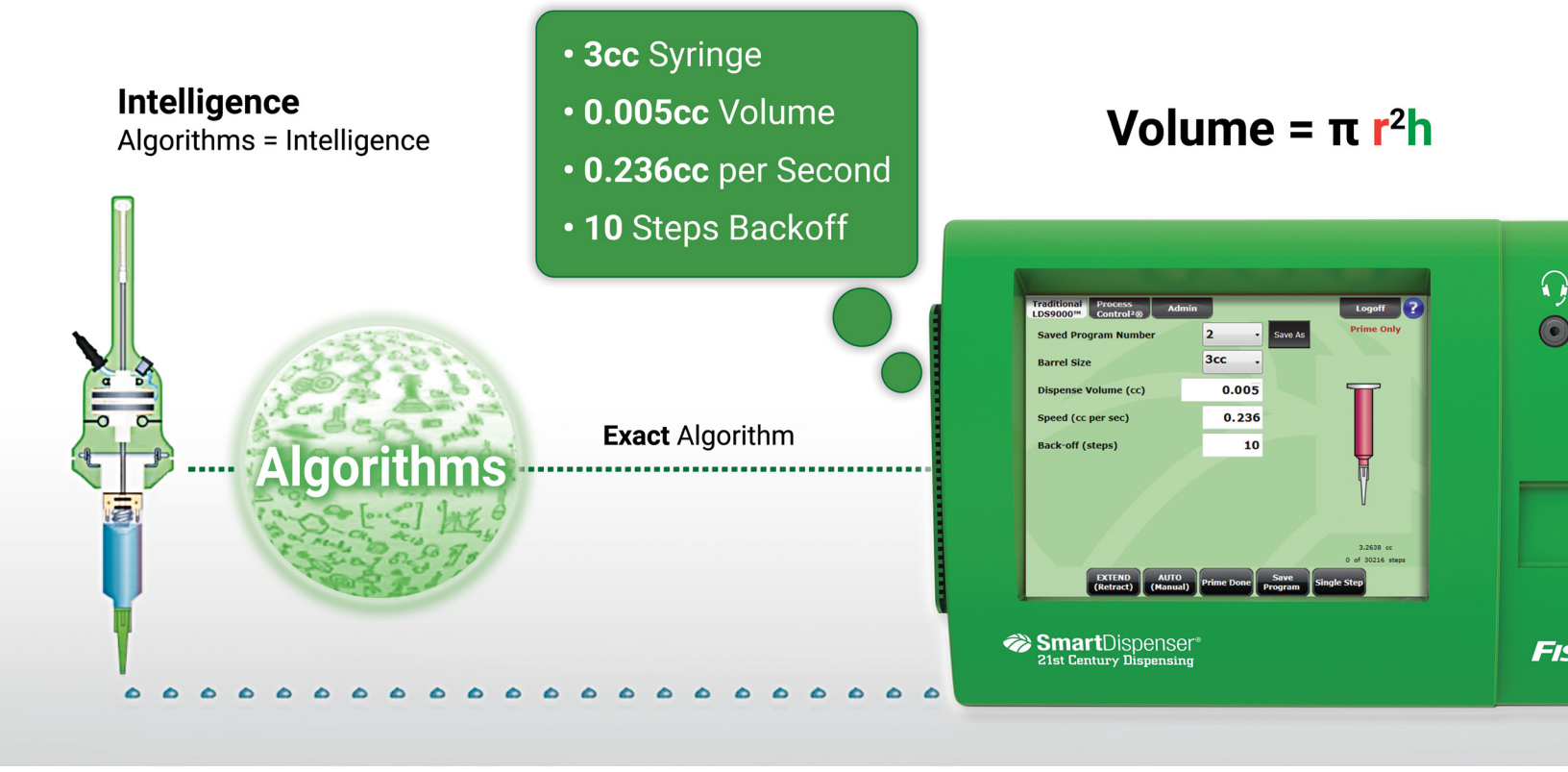

SmartDispenser® with AirFree® Technology—the bubble-bursting solution

Fishman® Corporation offers the only fluid dispensers that do not rely on air bubble-producing compressed air. The SmartDispenser® with patented AirFree® Technology replaces the need for and the use of compressed air. It does so, in part, because of another innovation offered by Fishman®– AlgorithmicControl™. This breakthrough gives the SmartDispenser® the ability to apply algorithms to the mechanical drive, which allows assembly fluids to be dispensed gently with far greater control and precision, and with virtually no air bubbles. AlgorithmicControl™ also makes adjustments simple because parameters such as fluid deposit size, speed, and reverse motion are numerical inputs instead of hit-or-miss calculations. All this mitigates the impact of an epoxy's changing viscosity on fluid deposits, ensuring consistent repeatability which makes workstation to workstation performance standardization possible.

AlgorithmicControl™ AirFree® Technology

AirFree® Technology

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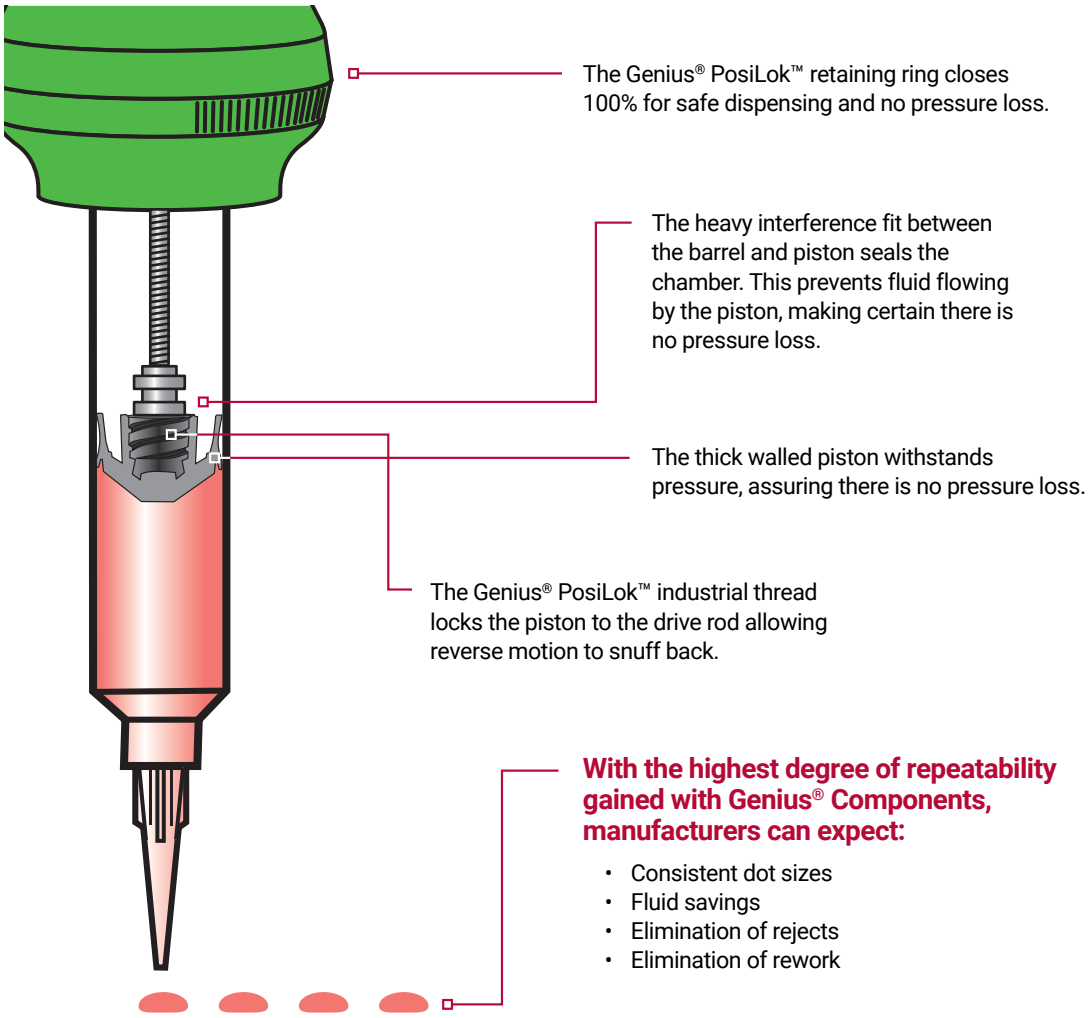
Adding more smarts removes more air bubbles

The advantages that come from using the SmartDispenser® are enhanced when combined with Genius® Components from Fishman® Corporation. Genius® Syringe Reservoirs greatly aid in the process of air bubble removal because they provide a heavy interference fit between the syringe piston and the syringe barrel which completely seals the reservoir chamber. Conversely, syringes used with air-driven fluid dispensers have a loose interference fit that allows air to penetrate the fluid chamber. Genius® Syringe Reservoirs also feature inner diameters (IDs) and lengths that are programmed into the SmartDispenser® software ensuring the highest levels of repeatability.

Genius® Components offer benefits from top to bottom.

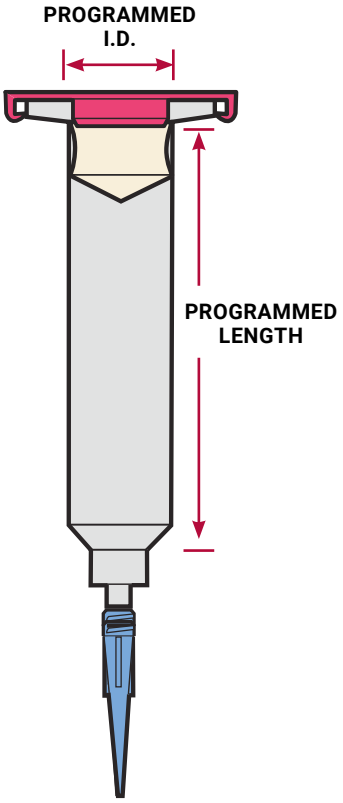


The Genius® PosiLok™ retaining ring closes 100% for safe dispensing and no pressure loss.

The heavy interference fit between the barrel and piston seals the chamber. This prevents fluid flowing by the piston, making certain there is no pressure loss.

The thick walled piston withstands pressure, assuring there is no pressure loss.

The Genius® PosiLok™ industrial thread locks the piston to the drive rod allowing reverse motion to snuff back.



With the highest degree of repeatability gained with Genius® Components, manufacturers can expect:

- Consistent dot sizes
- Fluid savings
- Elimination of rejects
- Elimination of rework

Rewards like these greatly improve the assembly process, which increases productivity, yields and profits.

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Genius® Components stand up to compressed air, too

Although Genius® Components are designed specifically for use with the SmartDispenser®, their versatility makes it possible for them to perform just as effectively when used with air-driven fluid dispensing systems. Thanks to this flexibility, manufacturers running applications that do not call for the control and precision of the SmartDispenser®, are able to reap the many rewards that come from using Genius® Components.

Proprietary plastic made for the stickiest situations

Genius® Clear Polypro Syringe Reservoirs and Genius® Clear CA Polypro Syringe Reservoirs are manufactured with a proprietary plastic that prevents cyanoacrylate fluids from bonding the syringe piston to the syringe barrel and the syringe tip cap to the syringe luer. More assuredly, this non-bonding benefit is realized regardless of the type of cyanoacrylates being used. The fact that Genius® Syringe Barrels come with inner diameters (IDs) and lengths that are programmed into the SmartDispenser® software is also beneficial when using cyanoacrylate fluids because the tight interference fit they provide seals the fluid chamber, eliminating moisture filled compressed air from entering. This is critically important when working with cyanoacrylate fluids because atmospheric moisture ions are the catalyst that causes the activation of cure cycles of fast-drying adhesives such as Loctite 4311.

Genius® Components
AirFree® Technology

For more information on how the SmartDispenser® with AlgorithmicControl™ and AirFree® Technology, and how it and Genius® Components offer manufacturers a number of intelligent ways to rid themselves of the burden associated with air bubbles, please visit *fishmancorp.com*

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