



Blow-Fill-Seal Temperature Management

QUICK FACTS

- Advances in BFS technology and mold design have allowed for the process to fill-finish a wide range of biologics and vaccines
- ApiJect engineers have been able to improve BFS temperature control through both pre- and post-cooling designs and innovations
- BFS is used globally to fill more than 50 billion sterile liquid units a year
- BFS is recognized by the industry as an advanced aseptic sterile liquid packaging technology
- Our team at ApiJect has decades of experience managing lines that use both rotary and shuttle BFS machines

INTRODUCTION TO BLOW-FILL-SEAL (BFS) TEMPERATURE CONTROL

Over the last 30 years, technology and process advancements have allowed manufacturers to fill-finish a wider range of sterile liquids using BFS, including many biologics and vaccines, small molecules, and other pharmaceuticals.

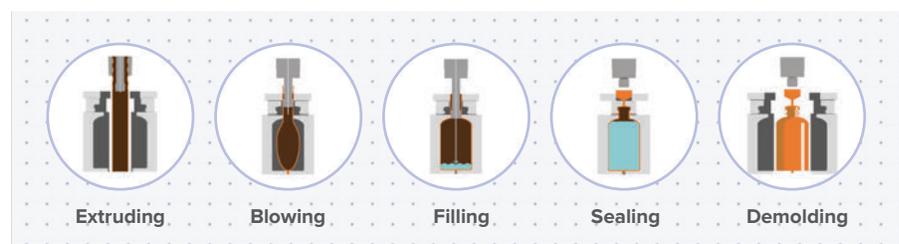
At ApiJect, our engineers have taken these filling enhancements even further by developing proprietary temperature management methods that can potentially enable many temperature sensitive biologics and vaccines that are not possible on standard BFS lines. Our experts' deep experience with fill-finish, combined with our technology, may be able to benefit your drug product development programs.

UNDERSTANDING TEMPERATURE IN BFS

The BFS process is divided into five main stages:

Extruding: Heated, liquefied resin is extruded to form a parison within the BFS mold.

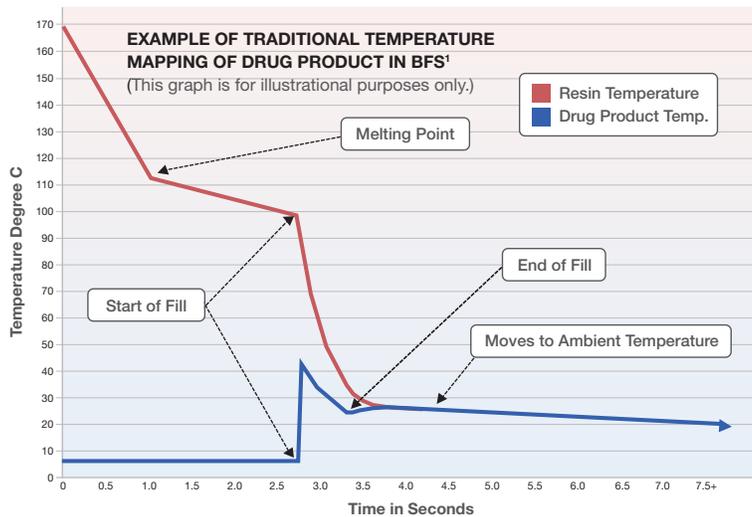
Blowing: Sterile air is flushed through the parison as the mold closes and the container is formed.



Filling: Using a time/pressure fill system, an exact amount of drug product is dispensed into the container.

Sealing: The top of the mold comes together, forming an aseptically sealed container.

Demolding: The mold is opened and the filled container(s) are released. Each BFS Container is produced in a strip, with a continuous sheet being produced that is then punched into single strips and eventually separated into cards.



IMPROVED TEMPERATURE CONTROL MECHANISMS AND PROCESSES

Our BFS manufacturing experts employ a variety of techniques to consistently manage the drug product's temperature throughout the fill-finish process, including:

Mold Design: The shape of the BFS container has a significant impact on managing the temperature of the drug product. For example, we have designed the BFS Container in our prefilled ApiJect Prefilled Injector* to minimize the surface area that the drug product contacts, which reduces the heat transfer from the container walls to the drug product.

Wall Thickness: Our engineers have designed the BFS containers to use a minimal amount of plastic in order to expedite the cooling process, while still maintaining the integrity of the vial.

Pre-Fill Cooling: We employ a variety of proprietary methods to chill the drug product and molds until the very moment the drug product is filled in the BFS container. The chart above is an abstract from a general mathematical model¹ that estimates the temperature of the container and a 0.6mL fill drug product as it goes through the BFS cycle on a Rommelag® bp434 machine. ApiJect's BFS experts have extensive experience using various methods of control to minimize high temperature exposure.

Post-Fill Cooling: After filling, container separation, and leak detection are complete, our engineers have developed processes to rapidly chill the finished units prior to packaging.

* The prefilled ApiJect Injector has not been approved by the FDA or other regulatory authorities for distribution.

¹ The chart has been abstracted from an original published report by Jeff Price (then with Vital Pharma, Inc.) in 1998, and has been updated by the author for representative purposes only.

MEET OUR EXPERTS

To learn more about how ApiJect uses the latest BFS technology to package BFS-based drug delivery systems for sterile pharmaceutical liquids, contact our experts at solutions@apiject.com.



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FOR MORE INFORMATION:

Blow-Fill-Seal:
visit <https://bit.ly/3I27Qwy>

Expert Content Library:
visit <https://bit.ly/3IZrEZm>

Intrō to BFS Video Series:
visit <https://bit.ly/3yM7aip>

Manufacturing:
visit <https://bit.ly/3YwKiOc>

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