

# **VISCOSITY'S IMPACT**

## **ON FOOD FILLERS AND DEPOSITORS**

A White Paper by Unifiller Systems Inc.



## TABLE OF CONTENTS

- 01 Introduction: Understanding Viscosity in Food Depositing
- 02 Viscosity in Depositing Accuracy
- 04 Choosing the Right Nozzle
- 05 Pistons Pack the Right Amount of Punch
- 06 The Servo-driven Solution
- 06 Final Note



### INTRODUCTION: UNDERSTANDING VISCOSITY IN FOOD DEPOSITING

Unless you're a bottled water or beverage company, viscosity is an important factor to examine when it comes to accurate filling and/or depositing of food products. Viscosity can also be understood as the "thickness" of a product.

Viscous products like batter, puddings, buttercream icing, deli salads, and certain sauces typically require more effort to push through depositing machines due to the "internal friction" in their chemical makeup. This friction makes them resistant to flowing easily. Depositing viscous food products accurately and consistently can be challenging if producers don't have the right know-how and equipment. The need for small deposits or moving targets (on a conveyor) can further complicate matters.

Let's take a look at how viscosity impacts food fillers/depositors and the various options food manufacturers can pursue to optimize the depositing process of viscous foods.

#### TEMPERATURE-DEPENDENT:

According to [New Food Magazine](#), "the viscosity and the flow properties" of a food "highly depend on the adhesive properties of the starch contained in the food". One of starch's characteristics is its reaction to heat.

For example, think of melting a bar of chocolate in a pan that's placed over a stove; the longer the pan stays over heat, the runnier and more liquid-like the chocolate would turn and the easier it would be to mix the chocolate with a spoon. Using this rule, the reverse is also true: if you remove the pan from the stove (removing the effects of the heat), the chocolate would slowly thicken as it cools. Compared to the runny, melted chocolate, this thicker chocolate is more difficult to mix. Your spoon would meet more resistance. This is comparable to running thick, viscous products through a depositor.

It's pretty simple to remember:

Viscosity ↓ with the addition of the heat & Viscosity ↑ with the removal of heat.

Temperature, as an environmental factor, is important to consider when utilizing machines like fillers and depositors and when working with starchy foods. How hot or cool a food plant is would affect the viscosity of the product, regardless of whether it's chocolate pudding, white sauce, or chicken salad, thereby affecting the parameters (and likely the efficiency) of the machine.

### VISCOSITY IN BATTER DEPOSITING

Batter is perhaps the most common food product that require portioning. Whether you're depositing cake batter into large sheet cake pans or smaller-sized cupcake pans, accurate and consistent portioning is required to maintain productive throughput levels.

When it comes to batter depositing, viscosity can impact deposit accuracy. A stiffer batter impacts the machine's ability to recharge and fill up the product cylinder chamber on each cycle. In this case, Emilio Cabrera, Service Technician at Unifiller recommends doing the following:

*Slow the piston recharge speed down to allow the main air cylinder to match the product's natural response to suction. The vacuum that the machine has to create will require an excellent seal. The hopper gasket and the rest of the O-rings in the depositor have to be in good shape; in this case, inspecting and changing them more often would be necessary. Lubrication is crucial here, not only to extend the life of the O-rings but to ensure that any minor gaps in the O-rings are "plugged" by the lubricant to improve the sealing effect. The combined effect from moderating the recharge speed and efficient sealing allow for better suction and a more consistent portioning of batter.*

Deposits should be accurate and repeatable, but what happens when a previously programmed recipe is altered? Adding or removing certain ingredients could change the viscosity of the product, potentially creating new challenges for the machine. Sometimes, what's good does not need to be made better, especially in processes involved in large-scale operations. One change to part of the process can affect other processes downstream.

Sonia Bal, Director of Marketing at Unifiller, says, "Depending on the ingredients they add to or remove from formulations to achieve the results they desire, manufacturers can find themselves dealing with doughs or batters that are thicker, stickier or otherwise different from the original recipe. It's important not to change the recipe too much—especially if the product in question is a popular product. Changing the recipe can impact the product's look, feel, and taste."



## CHOOSING THE RIGHT NOZZLE

What's a practical way to reduce the difficulty in depositing viscous products? Steven Belyea, Applications Manager at Unifiller, advises adapting the right nozzle and/or attachment to deal with mixtures that don't have enough liquid to self-level. Manufacturers develop nozzles in various shapes and sizes specifically to address the issue of viscosity as it relates to their customers' products. A flat nozzle would be compatible for bakers doing top and side icing for cakes, for example, but it would not be the best option for food producers who want to fill round containers with hummus.

Depending on their application, food producers also have the option of leveraging moving nozzles like traveling heads, diving nozzles, and orbital heads. These nozzles would enable them to speed up the line and cover a larger target.



ROTARY CUTOFF NOZZLE



DIVING NOZZLE



CHOP NOZZLE



HAND HELD NOZZLE

HAND HELD NOZZLE BAKERY TIPS



PIE WAND



### PISTONS PACK THE RIGHT AMOUNT OF PUNCH

Pushing product that doesn't flow easily through depositing machine requires a stronger propulsion force. Since versatility of use is a priority in Unifiller's product portfolio, our fillers and depositors are built with single- or multi-pistons. Pistons, in the words of Pan Demetrekakes, Senior Editor at Food Processing, "combine force with precision", making them perfectly compatible for depositing those stubborn, "less-flow-able" food products.



"The core of Unifiller's product portfolio is volumetric depositors using pistons to portion the product," Belyea says. "Unifiller depositors are gentle on a wide range of products, from liquid to viscous with or without chunks, including salsas, deli salads, and sauces, where other propulsion methods tend to be damaging."

## SERVO-DRIVEN SOLUTION

A step up from using pneumatic fillers would be to leverage servo technology. Powered by servomotors, servo depositors present a more expensive solution, but they offer food producers the opportunity to deliver consistent, quality deposits at a faster pace. Why are these electronic fillers more effective? Belyea explains,

“Servo-based depositors are not affected by fluctuating air pressure from the compressed air system, thereby giving the most consistent and repeatable depositing solutions.”

Other helpful benefits of servo machines include automatic recipe recall and recipe storage for 100 recipes. Simply push a button, and the machine will adjust to the appropriate deposit parameters.



### FINAL NOTE

Food fillers and depositors prove useful in the course of large-scale food manufacturing, but they don't come without challenges. Understanding the properties of the specific product being processed is crucial to overall production efficiency, as issues during depositing can cause further problems like longer downtimes, food waste, and faulty end-products. The best way to ensure a seamless depositing process is to become equipped with proper equipment know-how, and that includes understanding product viscosity's impact on a machine's deposit cycles.



Sources:

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