

HOW TO PACKAGE A COMPLEX FOOD PRODUCT

A master thesis on predicting fillability of viscoelastic product in Tetra Recart

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You feel hungry but you do not have a lot of time to cook so want something easy to prepare. You open your cabinet and reach for a canned meat. The canned product is very convenient and can be stored for long time at ambient temperature. But you wonder if there is a better packaging that has less environmental impact? And how do they pack this type of products?

Rise in green consumerism has been observed as more buyers are concerned with the sustainability of the food products that they are purchasing. Carton packaging, such as Tetra Recart® from the Packaging company Tetra Pak is found to have less environmental impact than metal cans. Tetra Recart has the same functionality with that of metal cans. Thus, increase in the demand to shift from metal cans to Tetra Recart has been observed among food manufacturers.

The process includes filling the food materials in a package using Tetra Pak® R2 (TPR2) filling machine and performing heat treatment to maintain food safety. Food products, specifically meat-based products, have complex compositions which dictate its behavior when they are being filled by a filling machine. Thus, it is necessary for Food manufacturers to understand how the product flows, similar to how a soft served ice cream is dispensed from the ice cream machine to the cone. This can provide them information on which filling machine configuration is more suitable to use, the TPR2 machine with standard tank for less viscous or with pressurized tank for highly viscous products.

The goal of this study includes understanding how a complex food product, specifically uncooked meat batter, flows along the pipes of TPR2 machine with standard tank. Also, the study aims to know the effect of this flow behavior to investigate the limit of this machine and when a pressurized product tank is needed to fill the product. Using the analysis from this, the study tries to propose a model or parameter that can be used to predict the product's ability to be filled (fillability) without the need to perform large scale testing.

The study was performed by producing four types of uncooked meat batter since the study focused on before heat treatment stage. These batters have different amount of added water to represent: 1. products which are highly viscous and might not be filled and 2. products that are less viscous to be filled with the TPR2 machine with the standard tank. These samples were studied in terms of flow behavior properties and fillability in the machine.

The results of the study showed that as the added water to the uncooked meat batter increased, decrease in thickness, elasticity, and its resistance to flow was observed. The filling tests in the machine revealed that the uncooked meat batter samples with lower added water behaved more like a solid. This means that the batter has more resistance to flow due to its elastic behavior, resulting to improperly filled packages. On the other hand, meat batter with higher added water behaved more like a liquid that flows rapidly with less energy needed which resulted to properly filled packages.

The correlation of the flow behavior study and filling test in the machine showed that the model used to predict the fillability of the meat batter was only applicable to the highest amount of added water. The possible reason for this is that the model assumed that the products flowed properly along the pipe. Thus, it was decided that specific parameter such as thickness and elasticity are better factors to consider in predicting the fillability of the meat batter.

The outcome of this study could be used by Food Packaging companies to predict the fillability of complex food products like meat batter without performing large scale testing. This prevents huge amount of food waste due to its inability to be filled during testing. It will also provide the company information on which filling machine configuration to recommend.

The next time you try to purchase a rectangular carton food product, you will remember how it is being packed and why is it being packed in that type of material.