PROBLEMS on the FILL LINE

Filling consumer containers is one of the major operations in most food plants that process liquid and semi-solid food products. Experience oftentimes is the guiding force in deciding what will work best. Various food materials, such as peanut butter and jam, are good examples of everyday products that must have predictable flow behavior in order to work properly during the fill operation.

Figure 1: Brookfield CT3 Texture Analyzer

Now there is a way to predict flow behavior with some simple testing beforehand. An industrial instrument that is growing in popularity is the Texture Analyzer. (See Figure 1) It has the ability to simulate the extrusion process that is characteristic of fill line operations. The accessory device used with the Texture Analyzer that mimics the fill procedure is called the Extrusion Cell. (See Figure 2)

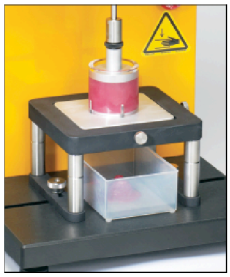

Figure 2: Extrusion Cell for use with CT3 Texture Analyzer

Figure 3 shows the test result of running two samples in the forward extrusion cell. The cell is a cylinder with internal diameter of 40mm; a baseplate was inserted with a single hole 8mm in diameter. The cell was filled with smooth peanut butter (red curve) and a 39.9mm diameter plunger was used to force the cell contents through the extrusion hole. The smooth comparatively flat plateau is indicative of a well homogenized product requiring a steady constant load to clear the cell.

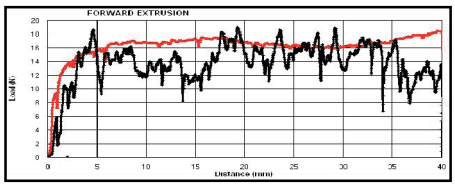

Figure 3: Extrusion Test Data on Peanut Butter and Jam

The black curve in Figure 3 results from the same test run using strawberry preserves in the cell. A much more variable force is needed to clear the cell through the 8mm hole because of the combination of gelatin and fruit solids.

Texture testing, therefore, provides a quick go/no-go picture of what will work in an extrusion process. It verifies that the material will flow within the force limits that are available with the equipment on hand. Even though it is possible for the QC Department to visually know that certain formulations are "too thick" or "too thin", testing with a Texture Analyzer confirms the flow behavior and minimizes the potential for a problem on the fill line. The added bonus is that this type of test also guarantees that the consistency of the product will meet customer expectations.

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