

Analysis of the Flow Behaviors of Corn Meal during Extrusion

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ABSTRACT

Food extrusion can be used to make many products we consume today, including pasta, cereals and more. The ability to predict the characteristics of the final product from an extruder using raw material characteristics and operating conditions is vital to the extrusion process. In order to answer this need, the flow behavior of corn meal was measured in a lab viscometer (off-line) and compared to the flow behaviors from an extruder (in-line) at three different moisture contents (32.5%, 35%, 37.5% wet basis). The extruder and product are heated through the friction of the corn meal passing through the barrel not external heaters. Feed rate, RPM, and moisture content are the inputs considered to compare the die temperatures, shear rates, and shear stresses. Behaviors of extruder outputs based on RPMs, moisture contents, and feed rates have been recorded and compared. A method called super-positioning was used to compare the off-line and in-line data. Previous results have been not conclusive. Our methodology can be used to take lab results and predict extruder flow behaviors. The results can also be used in predicting operating conditions for various sizes of extruders. The super-positioning methodology will be able to be applied to other extruders and advance a flow model for the current extruder.

KEYWORDS

Corn, Extrusion, Modeling, Rheology.