Food Industry

Ensure Quality and Consistency in Food Manufacturing

Snack foods are an important sector of the food industry with annual sales of more than $25 billion. Dry seasoning is applied to many of these products after they are either fried or baked to enhance the flavour and taste before they are sent to packaging. The texture, color, seasoning, taste, shape, and general appearance are the significant quality parameters for these products. Batch to batch uniformity of these quality parameters is extremely important. These products are regularly subject to rigorous quality checks as quality inconsistency will cause the customer to lose faith in the product and the company brand. If the manufacturing process is not robust enough to support the stringent quality demand, the result is often huge losses in terms of product and material wastage.

When new processes for chips are developed, much of the product manufactured cannot be sold and must be scrapped due to the quality issue. One of the important quality parameters for the chip industry which impacted raw material cost and wastage cost is an incorrect level of seasoning on chips. Even distribution is essential to providing a uniform appearance and taste of the product.

The level of seasoning depends on the multiple factors like oil content of chip, viscosity, and surface tension of the oil, the particle size of seasoning, feeding condition, machine geometry, spraying condition, etc. Understanding the impact of each of these parameters by plant scale trial-and-error can be a very expensive proposition. The bench-scale experimentation for such studies can be useful, to some extent, but parameters such as chip breakage; the interaction between chips and machine geometry can be hard to study.

Particle simulation is a valuable tool for studying such systems as it can provide insights into the process while accounting for all the variables.

	Real world concave shape	Physical Simulation in Rocky DEM Simulation
Snack chip		

DEM based computer simulations were used to evaluate the performance of the chips seasoning and the device. The effects of various process parameters on the seasoning performance were determined. The study helped in reducing variability by over 50%

The developed model further helps as,

Model for Prediction and Finding Root Cause of the deviation: A mechanistic model is developed to predict the seasoning uniformity and to give some insight into the batch that has failed the quality check and assist in assigning the root cause of the quality deviation.

Model for Troubleshooting: The model can be used as a design and troubleshoot tool as well as determine operating conditions; alternatively, a filing tool to demonstrate an understanding of major sources of variation and their impacts on product quality.

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