

Brainstorm: Innovations in Thermal Food Processing Pt. 2

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The *Food Manufacturing* Brainstorm features industry experts sharing their perspectives on issues critical to the overall food industry marketplace. In this issue, we ask:

Which innovations in thermal food processing should manufacturers be aware of and how can they benefit operations and product quality?

As we all know, different cooking processes are used to achieve different cooking results and, often times, food products must be exposed to more than one cooking process to achieve the desired sensory attributes. In this regard, studies have shown that a condensation cooking zone that uses high humidity provides the most efficient heat transfer process to deliver energy to the surface of the food items. However, there are two inherent limitations to cooking with high humidity. First, high humidity suppresses color development. Secondly, the condensation heat transfer remains in effect only when the surface temperature of the food items is below the dew point temperature of the surrounding environment.

Further, conditioning the oven atmosphere for any given application depends on the

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food item (substrate) and the quality as defined by the processor. Here it must be understood that different species behave differently when exposed to a given processing condition due to the meat structure, ingredients, formulations and fat-to-lean content. Therefore, it is important for the processor to maintain the right operating conditions and to use the proper technology for each product and process if the processor wants to optimize for product quality and yield for greater profitability.

Key innovations that take advantage of the foregoing approach to processing food items combine vertical annular airflow with dynamic airflow control (DAC). DAC means reversing the directionality of this predominantly vertical airflow as the product is being carried on a variable-weave self-stacking belt traversing upward on a helical path. Reversing the airflow in this way provides for an even top/bottom surface color development, but more importantly extends the condensation zone to produce higher product yields relative to conventional horizontal flow spiral ovens. Finally, this provides the most consistent product quality across the belt-width for lowest standard deviations of product temperatures at the oven discharge, again extending the yield advantage.

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