

# Value-adding through *coatings*

Selecting the right coating for the right market can be absolutely critical when exporting, since product appearance and texture often mean success or failure depending on consumer preferences and expectations.

Food coatings are the most common way of value-adding a food item, i.e., surrounding a high-value substrate such as shrimp, with a low-value crust such as batter.

There is an almost universal acceptance of coated (fried) foods because consumers find the appearance, aroma, flavor and texture appealing. Coating food products results in a range of advantages: enhanced appearance; more appealing flavor; aids moisture retention when cooked (juicier product); allows incorporation of herbs and spices for variety; increases product weight and size; simplifies preparation by end consumer; and improves product differentiation in the market place.

These advantages are perceived by the consumer as added value and coincide with well-documented demographic trends which have resulted in rapid growth in consumption of all kinds of convenience foods.

Three categories of food coatings are used, individually or in combination, to produce battered and breaded foods.

## Predust

Predusts are usually a blend of flours, starches and other functional ingredients such as proteins, vegetable gums and seasonings or flavors. The function of predusts are generally one or a combination of the following:

*Adhesion* - to improve bonding between the substrate and subsequent coating layers.

*Texture* - by forming a moisture barrier, the substrate texture and outer coating texture can be enhanced.

*Flavor* - predusts are a convenient means of introducing flavors into a coating system, particularly when heat-sensitive or volatile flavor components would be lost during processing and cooking.

Machinery used to apply predusts should be either of the *Drum Breeding* or *Flour Breeding*

type. *Flour Breeding* machines may include a sifter conveyor with flip facility to improve evenness of coverage.

## Batters

Broadly defined, batters are blends of flours, starches, leavening agents and seasonings which, when mixed with water, forms a viscous liquid used to evenly coat a food item. Batters can serve a range of functions:

*Adhesion* - adheres the outer breeding layer to the predust or food item.

*Texture* - contributes to texture and structural integrity (cohesion) of the product.

*Product extension* - adds weight to the product.

*Appearance* - dictates appearance of finished product in the case of tempura battered products, and affects appearance to a lesser extent if product is breaded.

*Flavor* - may be seasoned to improve product flavor.

Depending on formulation and required functionality, batters may be further categorized as:

*Adhesion batters* - containing high levels of modified starch to set or dry quickly and improve adhesion on difficult-to-coat food items prior to the final breeding step.

*All-purpose batters* - generally based on wheat flour, these dry more slowly and are used on a wide range of foods before the final breeding layer.

*Tempura batters* - also known as puff batters, tempuras are usually wheat flour-based and contain a relatively high percentage of leavening to give the characteristic texture and appearance.

*Oven-ready batters* - specially formulated to produce foods which can be reheated in conventional or convection ovens, these batters contain moderate leavening level and often some shortening and emulsifier to improve crispness.

Adhesion and all-purpose batters are commonly applied to foods using curtain- or *waterfall-type* batter machines. *Tempura* and oven-ready batters are applied using a top

submerger batter machine. It is important to note that batters containing leavening are not generally suited to recirculation by pumping as the delicate leavening system will lose its functionality. Equally important is the selection of equipment to mix the dry batter with water before transfer to the batter machine. Generally, non-leavened batters require high speed/shear mixing whereas leavened batters require low speed/shear mixing.

### **Breadcrumbs**

Crumb coatings are defined as baked or otherwise thermally processed cereal-based ingredients which are applied to a moistened food item prior to cooking. Breadcrumbs form part of a broader category known as breadings which includes products based on blends of flours with other ingredients.

Crumbs functionality is related to the texture and appearance imparted to the final product. By selecting from the vast range of available crumbs and then further customizing, for example adding herbs or spices it is possible to market a product which is unique; both in appearance and in texture.

Breadcrumb categories are easily distinguished by their methods of manufacture which dictate crumb appearance and textural character:

*Traditional breadcrumbs* - produced from loaves of bread using traditional breadmaking techniques. Texture, color and particle size can be regulated to some extent by ingredient and processing adjustment. Texture is typically crunchy.

*Extruded crumbs* - not strictly breadcrumbs as they are produced using a continuous cooking extruder rather than by baking a leavened dough. Texture is quite variable from dense/hard to crunchy.

*Cracker crumbs* - Dough is blended, sheeted through rollers and baked in one continuous operation. The resulting crumb has a short, biscuit-like texture and a chunky to flaky appearance.

*Japanese-style breadcrumbs* - Oriental-style crumb is produced from a highly yeast-leavened dough using a unique electrical resistance baking method. Resulting crumb is low in density with a needle- or splinter-like shape and is completely free of crust. It is the most versatile crumb-type available, being suitable for deep

frying, oven and microwave cooking, which explains its rapidly growing popularity in all western markets. Texture is light and crisp with excellent holding qualities after cooking.

### **Production of battered and breaded foods**

There is a myriad of possible combinations of coating systems and processing layouts which would be required to supply the diverse range of coated products in today's market.

A further processing development in recent years has been the advent of continuous in-line cooking after the partial-fry step. These continuous cooking ovens utilize controlled temperature and humidity with high air velocities to cook uniformly with minimal yield loss. Fully cooked products have extended shelf life, particularly when distributed chilled, and final cooking time by the consumer is reduced as the product simply requires reheating.

### **New developments in coating**

Two recent food coating trends are the demands for more convenience (microwave coatings) and healthier eating (low fat coatings.)

*Microwave coatings.* Moisture migration during frozen storage and subsequent microwave cooking results in excessive moisture on the surface of the breaded product. This moisture cannot evaporate quickly enough in a microwave oven due to the low ambient temperature which is compounded at the product surface by the evaporative cooling effect. The result? Soggy breading which is unacceptable to the consumer. Every batter and breading supplier in the world has worked on this problem for the past decade. This is answered by a patented coating process which consists of a number of moisture barriers layered within the coating as well as a means of absorbing excess water vapor at each layer.

*Low-fat coatings.* A very real dietary concern in most western countries is the issue of the role of fats in the diet and heart disease. Consumers are now demanding lighter processed foods with reduced fat, calories and sodium. Battered and breaded foods form part of this debate because fried foods can contribute significantly to dietary fat. This coating encompasses all of the advantages of traditional battered and breaded foods such as enhanced appearance, appealing flavor, moisture retention and ease of preparation, while imparting a significant decrease in fat content.

Source: Geoff Hunter, "Coatings for seafood - some technical aspects," **INFOFISH International**, May-June 1991.