

SPOTLIGHT ON PROCESSING DEVELOPMENTS

Comminution head design increases uniformity

Cutting action benefits grinding and granulation in peanut butter process

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Algood Food Company, Louisville, KY, manufactures peanut butter for industrial and retail users throughout the United States. Most of that product is marketed to retail accounts under private label, and Algood is also

serving a growing base of industrial users. Currently, there are approximately 50 different peanut butter recipes in production in the three-story, 118,000 sq ft facility.

Variations in a recipe may occur at any step of manufacture, but the steps leading up to the grind-

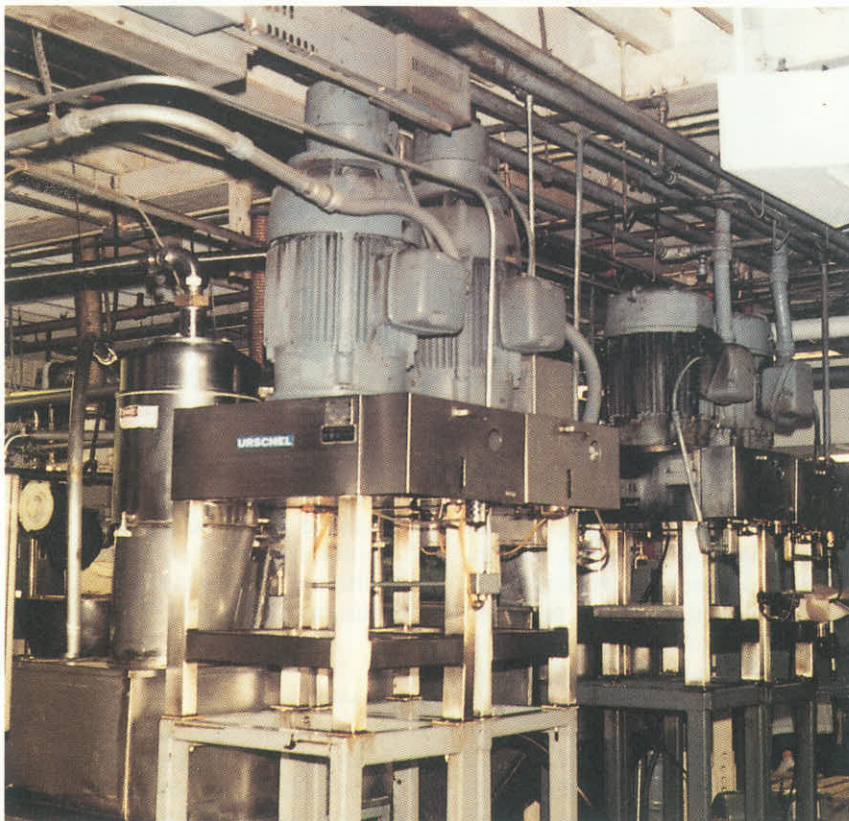
ing process are essentially the same. Peanuts are received in bulk and cleaned. They are conveyed up to the third floor for roasting in a tunnel oven at 13,000 lb/hr, and then blanched. Varieties of roasted peanuts, stabilizer, sweetener, and salt are metered together via microprocessor controlled, weight-loss feeders.

Not only do recipes vary, but control of processing equipment is also subject to the industrial or retail account's requirements. According to Algood President Barney Barnett, "depending on the particular need, we vary not only the formulation, but also the way we mill the product." For example, product viscosity and particle size are determined through coordinated adjustments to primary and secondary grinding units.

Compared to grinding, Plant Manager Dick Schulhafer sees cleaning, roasting, blanching, and ingredient metering as "pre-manufacturing" steps: "Primary grinding is where the manufacture of the product really starts. Up until this point, we're just getting ready to process the peanut butter."

Grinding stages

Combined ingredients are gravity-fed back to the second floor of the plant, and directly into the feeder head of a dedicated primary grinding mill. It is here where the



Comminution mills are belt-driven by 40 hp motors. Two current-generation units (on left) are adjacent to early 1970s models

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amalgamation of peanuts and powder-form ingredients first takes on the appearance of a liquified, coarsely textured butter. Primary grinding serves the dual function of ingredient mixing plus friction-heating to about 150 F to properly melt stabilizer.

The mixture is ground to 20-40 mil by the 2-ft-diameter plates of the primary mills. One plate is stationary and the other is adjustable, connected to a motor-driven arm. "You can put the two plates closer together for a finer grind, up to a point—if the plates are too close together, then you're generating too much heat, you're crushing the product, and you still can't grind below 12-14 mil," says Schulhafer.

Primary-ground peanut butter is pumped through sanitary piping from the primary grinder's hopper discharge into the secondary grinder. Depending upon the particular processing specs, peanut butter is comminuted by secondary milling to 3-8 mil. Here, grinding is more accurately called "cutting," which better describes the process.

The cutting head is a stationary, 6" diameter ring of closely spaced tungsten carbide blades. A high-speed impeller revolves inside the ring of cutting blades. Product fed to the impeller is forced into the spaces between the blades while the rest of the particle is cleanly sheared by the sweeping action of the impeller.

Cutting head design eliminates metal-on-metal contact, greatly reducing equipment maintenance requirements. It also prevents excessive heat buildup which can cause product degradation. Product temperature only rises to about 160 F during this process. Above all, this method of comminution yields high product uniformity.

Particle size is adjusted by changing the number of blades. Fewer blades in the fixed-diameter head result in greater space be-

tween blades to yield larger product particles. Algood uses 180, 190, and 200-blade heads to achieve the desired results. Schulhafer explains, "with 200 instead of 180, the gap between blades closes up, so the end product is finer. We use different sizes de-



Product enters comminution head from above for secondary milling

pending on the final texture we want. . . . After about 210, the blades are too close together to push much product through."

Four comminuting mills perform secondary grinding on one processing line and two are located on a second line. Both new and older units operate together, compatible because identical cutting heads are maintained. Schulhafer explains, "We've bought three of them in the last 10 years. Some of them were probably 10 years old when I got here about ten years ago. There have been parts replaced on them—bearings, belts—not a whole lot. Of course

nothing runs forever without having some attention given to it, but they're pretty much maintenance-free."

According to Barnett, the latest secondary comminution mill was installed in 1986, "and we'll probably buy one more in the near future. . . . It's not a question of shopping the market." Years of operation with the same type of mill have convinced Algood management that they are best served by staying with the equipment that has proven itself.

In the simplest of processing possibilities, smooth product can now be pumped directly to the appropriate filling line and subsequent packaging operations. Further processes integrated with grinding stages include deaeration, cooling in scraped-surface heat exchangers, controlled-temperature hopper storage, and recirculation or rerouting product through closed loops. Also, the introduction of granulated nuts for chunky peanut butter occurs before product passes to the filling lines.

A granulation unit installed in 1987 replaced a crushing-roller-based granulator. The new system uses vibratory feed of nutmeats to cutting rollers. One roller, or spindle, contains a series of circular knives to dice peanuts against a second, fluted roller. According to Schulhafer, the new granulator "is more versatile and it gives you a cleaner cut. The old unit had two serrated rolls that damaged the nuts to a certain extent. We wanted a cleaner cut, and a more uniform cut, which this (new granulator) gives us." ♦

Further information on Model 1700 Comitrol® comminuting machine and Model N Granulator is available from **Urschel Laboratories Inc.**, P.O. Box 2200, Valparaiso, IN 46384.