

# Moisture Control in Tortilla & Corn Chip Production

## APPLICATION BRIEF

Snack chips are enjoyed by billions of people every day. Tortilla and corn chips are the most popular masa-based products worldwide. Tortilla and corn chips are available in a variety of diverse types and flavors.

Tortilla and corn chips and other snack foods are often cooked in fryers where hot cooking oil removes free moisture in the chips as they cook. Corn chips are fried directly from masa and contain more oil than tortilla chips. Tortilla chips are baked and then fried, making them absorb less oil and have a firmer texture and stronger alkaline flavor than corn chips. The finished product moisture is critical to the texture and shelf life for both tortilla and corn chips products.

### SUMMARY OF THE PROCESS

#### **Masa Preparation & Extrusion:**

The first major process in tortilla and corn chip manufacturing is the production of coarse masa or dough. A wet corn milling process is used to create the masa or dry masa is purchased and mixed with water to create the masa dough. The coarse masa is mixed and kneaded into an elastic masa which is extruded and fed through a sheeter prior to being cut.

#### **Baking & Cooling Operation (for tortilla chips only):**

The extruded masa sheet is die cut and baked for about 30 seconds. Baking imparts alkaline taste characteristics and also serves to reduce moisture and oil absorption during the frying process of tortilla chips. Following baking, the tortilla chips are cooled to allow equilibration which leads to less blistering in the rapid frying process and less oil pockets in the tortilla chips.

**Frying Operation:** The corn and tortilla chips are fried in an externally heated continuous oil circulation fryer. Each manufacturer has their preferred oil(s) for desired taste and temperature including corn, peanut, cottonseed, soy bean and canola oils.

**Seasoning & Packaging:** Chips can be seasoned with a wide variety of flavors using oil and emulsion sprays, solid coatings or other processes. The seasoning operation uses a rotating drum or vibrating conveyor process to ensure consistent coating of the seasoning. The chips are then packaged by weight for shipment.



## QUALITY PARAMETERS AND MEASURING POINTS

**Moisture Measurements:** Tortilla and Corn Chip moisture is usually between 1 and 2.5% moisture depending on the quality specifications of the manufacturer. An online NIR sensor at the fryer exit is used to measure both moisture and oil, the moisture measurement is used for both quality and process control. Chip moisture could also be measured at the seasoning drum exit prior to final packaging to insure flavor, freshness and shelf life.

**Fat Measurements:** Fat (oil) content is measured using the same NIR sensor that measures moisture at the fryer exit. Fat content is usually between 25 and 35% and impacts product flavor.

A food grade **MCT466-SF Online NIR Sensor** is typically mounted within 6 to 16" of the product and a few meters after the fryer exit to allow steam oil emulsion volatiles to dissipate. The stainless-steel housing of the sensor ensures reliable online operation and washdown compatibility.

A **QuikCheck Benchtop NIR Analyzer** is used either in the laboratory or at-line for quick, accurate and reliable samples testing.

## VALUE AND QUALITY

Incoming raw ingredients vary significantly in moisture content and composition. Measurement of moisture and oil at the fryer exit allows fryer temperature and or belt speed to be adjusted automatically to remove the proper amount of moisture producing high quality, consistent chips. This also minimizes the cooking oil and energy used, reducing manufacturing costs.

Further analysis of the product after seasoning ensures a consistent product quality before packaging. This will ensure shelf life and ensure that the final product meets specifications.

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The QuikCheck Moisture & Fat Analyzer is a benchtop NIR instrument ideally suited for analyzing product samples at-line.

## QUICKCHECK MOISTURE & FAT NIR ANALYZER

- Easy setup, calibration, and operation.
- Results are returned to the operator in 5-to-10 seconds.
- Space-saving, ruggedized design fits smoothly into most at-line or lab settings.
- Little-to-no sample preparation required.



The MCT460 Series Online NIR Sensor (MCT466-SF shown here) helps operators control moisture to meet product specifications.

## MCT460 SERIES ONLINE NIR SENSORS

- Monitor raw ingredients and in-line processes to maintain consistent product quality, increase yield, and minimize waste.
- Simple to operate, integrate, and standardize across multiple lines or locations.
- Rugged enclosure withstands harsh conditions. Washdown unit is also available.
- Proprietary temperature-controlled detector ensures measurement stability.

