MONTROSE TECHNOLOGIES INC.

Automated Inspection & Intelligent Material Handling for Donuts

Montrose inspection and handling systems provide a complete inspection, rejection, and handling solution created just for donut manufacturing lines. Receive comprehensive statistical analysis of variability while removing human involvement from inspection and rejection.

A high speed, turnkey system that allows you to:

1. Assure quality on a 100% monitoring basis.
2. Remove individual defective and non-conforming product from the line, previous to enrobing.
3. Monitor process statistics to pinpoint causes of waste.
4. Rapidly recognize a positive ROI by improving quality, reducing waste, and automating production - in previously labor-intensive areas.

Solution Components	SnapQC	FocalPoint	MT Series
3D & True Color Inspection	✓	✓	✓
Bottom Color Inspection	✓		✓
Automated Rejection			✓
Weight	✓		
Statistical Analysis and Reporting	✓	✓	✓
NEMA 4X		✓	✓
Sanitary Design	✓	✓	✓

> *Isolate and Eliminate Sources of Waste*

Automated inspection provides real-time and historical information on fault, and out-of-spec conditions, allowing you to isolate the issues causing the most waste by shift, product, line, and plant. The measurement results will also make it easier to reach consistent quality when developing new products or when formulation changes are made.

Analysis Type	Example Faults	Impact on Customer or Plant	Rejection Capability	Statistical Analysis
Geometrical Analysis	Too large or small Too tall or short Ovality Doubles Dome Top Hole Filled Misshaped Extra Dough	Product rejection Customer complaints Handling problems, such as jamming at packaging	0 - 100% fully under plant control	Worst Fault Pareto Reporting Dashboard
Color Analysis (Top and Bottom)	Under- or over-baked Visible debris White Cap White Cap Down Foreign material	Consumer complaints Product rejection Reject faulty product before enrobing and save on coating ingredients	0 - 100% fully under plant control	Worst Fault Pareto Reporting Dashboard

> *Measure, Reject, Analyze*

The **MT Series inspection system** uses 3-D vision to identify a wide range of donut defects and may be installed immediately after the fryer or after cooling. Some donuts, particularly yeast donuts, are quite fragile and must be handled gently to avoid a change of shape. Montrose has a unique reject mechanism that maintains a smooth transfer for donuts at the exit of the vision system.

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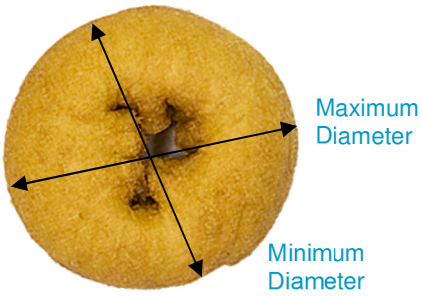
> Common Height Analysis

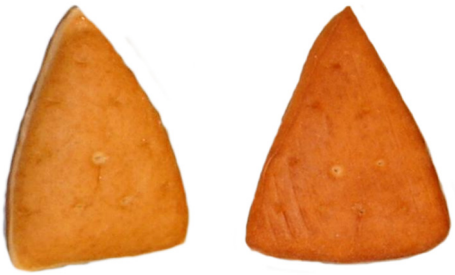
Profile height calculations are based on hundreds of individual height values gathered on every product, which leads to a measurement accuracy of ±0.5mm. Mean Height, Height Symmetry, and Center Height are other common measurements applied to donuts.

> Common 2-D Analysis



Two dimensional calculations are based on an accurately defined perimeter, which is imaged by both overhead cameras. 2-D measurement accuracy is ±0.5mm. Mean Diameter, Roundness, Surface Area, and Volume are other common measurements applied to donuts.

> Common Color Analysis



True color calculations are measured in various units such as L*a*b* and BCU, which quantify small variations of bake color.

> Common Fault Analysis

Only common examples have been pictured. There are many standard measurements that can be used, individually or combined within formulae, to qualify your product. **All visible product characteristics and faults can be quantified.**