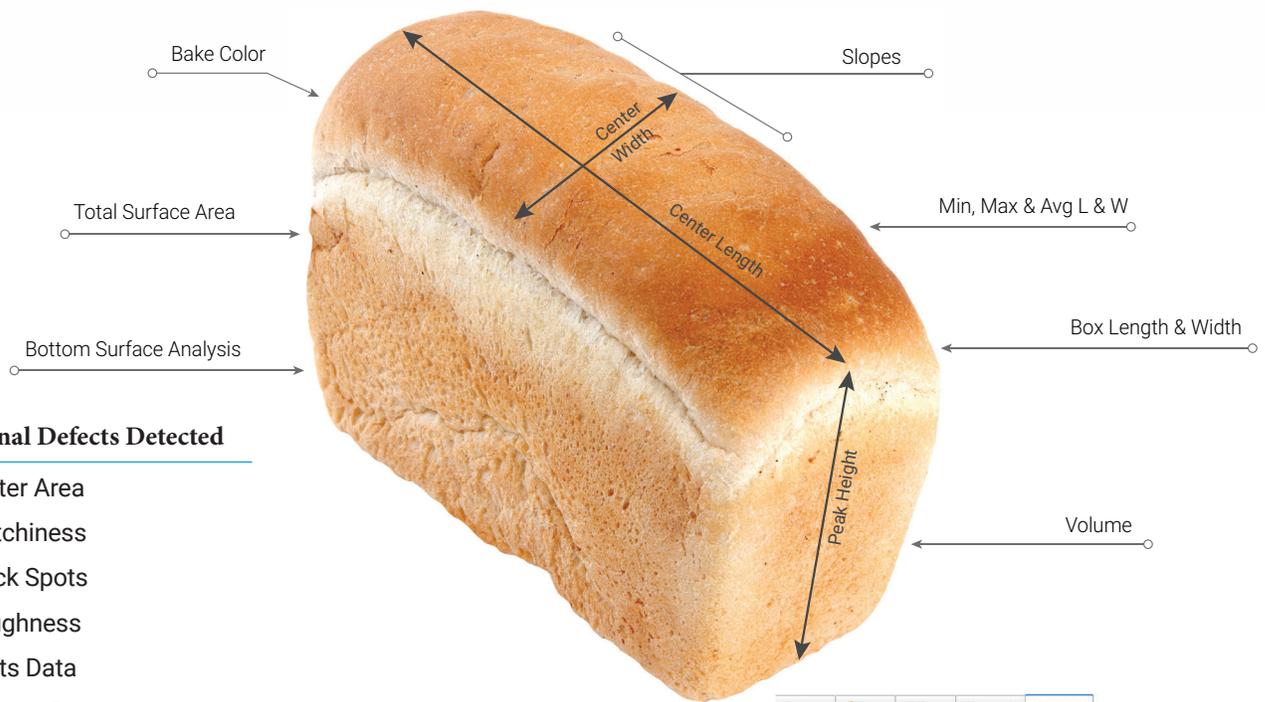




# Bread Loaves

## APPLICATION BRIEF

The manufacture of baked goods provides many challenges since there are a multitude of input variables that can affect product quality. The ability to continuously monitor key product attributes using real-time inspection software (e.g. bake color, peak height, slopes, blister area, etc.) in a quantifiable way, provides the opportunity to meet product specifications and respond to changes faster and more effectively.

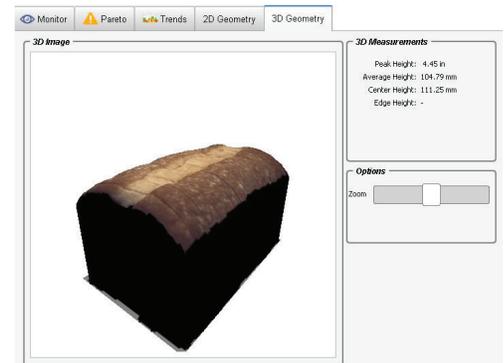


### Additional Defects Detected

- Blister Area
- Blotchiness
- Black Spots
- Roughness
- Splits Data
- Foreign Objects

## HEIGHT 3D ANALYSIS

<b>Peak Height</b>	The highest point on the object when resting on a flat surface; calculated by taking the average of the 'N' highest height points measured on the top surface (N is user-configurable).
<b>Slope</b>	The curvature of the top surface on the product; measured by calculating the vertical change between the center and a user-defined ring near the edge of the product.
<b>Clusters</b>	For products baked in clusters, measure the same data as an individual item plus the diameters of each, overall geometry; and confirm counts.



Actual 3D height values as extracted from system cameras

Virtually any food product can be measured using KPM Vision Inspection imaging technology, either directly during the production process (Over-Line/In-Line) or using a Benchtop Inspection System (Off-Line/At-Line).

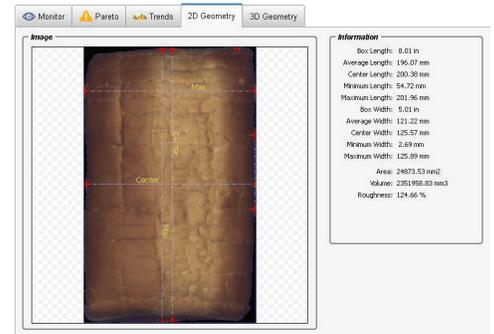
Below are some of the measurements available, particularly related to baked bread loaves.

## OVERHEAD 2D ANALYSIS

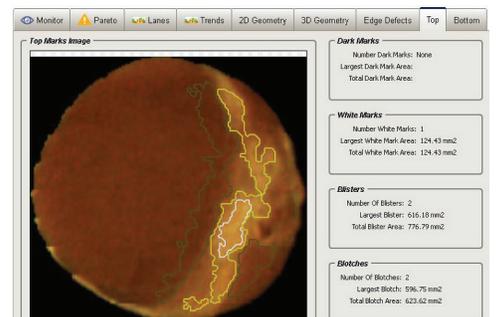
<b>Surface Area</b>	The overall area of the object. Used to find doubles and small products.
<b>Blister Area</b>	The area of any dark spots (i.e. blisters) on the top surface.
<b>Botchy Area</b>	The area of any white/blotchy regions (i.e. blotchiness) on the top surface.
<b>Product Color</b>	The average color of the product with all topping (if applicable) ignored for the calculation.
<b>Min/Max/Avg Length</b>	The minimum, maximum, and average length of the object as measured at several points across the long axis of the object.
<b>Center Length</b>	The length of the object as measured down the center of the long axis.
<b>Min/Max/Avg Width</b>	The minimum, maximum, and average width of the object as measured at several points across the short axis of the object.
<b>Center Width</b>	The width of the object as measured down the center of the short axis, perpendicular to the length measurement.
<b>Topping Coverage Percentage</b>	For topped product, the percentage of the top surface covered by topping (light, dark, or both).
<b>Splits Data</b>	The minimum and maximum length and width of the split. The area % of the surface area of the product covered by the split.

## BOTTOM SURFACE ANALYSIS

<b>Bottom Color</b>	The average color of the bottom of the product with all gas pockets ignored for the calculation.
<b>Black Spots</b>	The surface area of the dark/black regions on the bottom of the product.
<b>White Edges</b>	The surface area of the under-baked edges on the outer ring of the bottom of the product.



Overhead 2D measurements



Example of color anomaly detection and data reported as White Marks, Blisters, and Blotches (blobs)



Splits Analysis