Sherlock 7 Technical Resource

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Industrial Products

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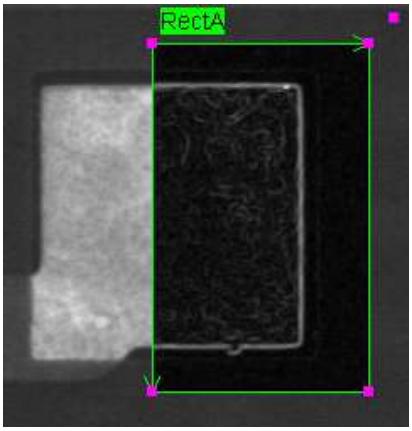
Roughness Preprocessor

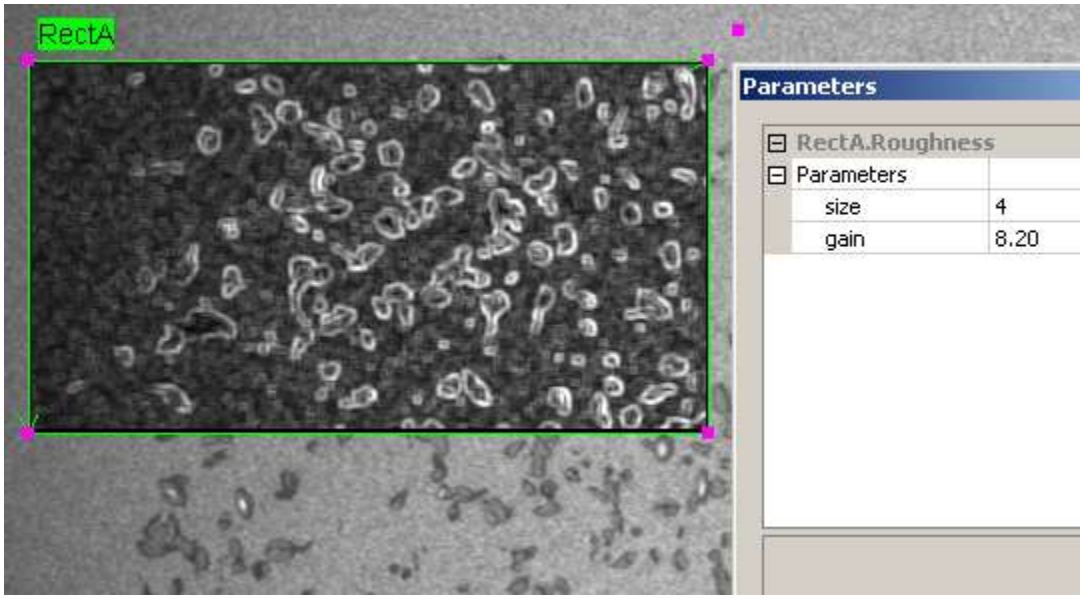


Using the Roughness preprocessor (with a **size** of 3) to bring out bonding pad edges while suppressing smaller scale (finer) textures of the solder and board.

Roughness [preprocessor]

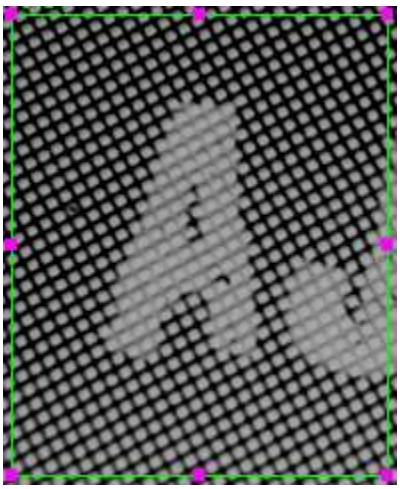
Roughness replaces each input pixel with the standard deviation of the pixel values in the neighborhood around each pixel. Standard deviation is a measure of local pixel value variability, and hence roughness or texture. Standard deviation increases at edges, so this preprocessor can amplify edges in noisy or low-contrast images.

The ***size*** of the neighborhood for computing the standard deviation can range from 3 (3x3 pixels in the neighborhood) to 64 (64x64 pixels in the neighborhood). The ***size*** parameter sets the size (scale) of the roughness passed by the filter. As filter size increases, smaller scale variations and textures are suppressed. In this image, Roughness is used to amplify the outlines of holes (voids) in plastic foam and to suppress the smaller scale (higher frequency) texture of the background (matrix) material:

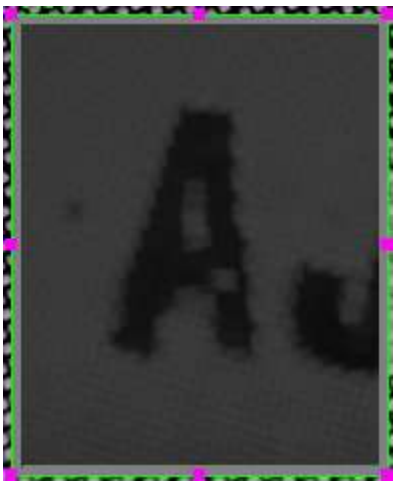


The maximum output value from the roughness calculation is 128, but it is often smaller. To make the output more visible, the **gain** parameter multiplies the roughness value. Output values over 255 are clipped to 255.

In the next example, a ***size*** value of 11 is used to separate areas of high and low roughness. The screen on the top of the letters AJ gives a nearly constant roughness value output, while the letters AJ give a lower roughness output. This gives a "negative" image of roughness, where the smoother letters are darker because they have less roughness.



Original



Repeating pattern suppressed

This kind of detection would be difficult to do by setting thresholds, linear (convolution) filtering, or using edge detectors.