L&W Autoline Emveco Roughness detects, evaluates and analyzes surface characteristics that affect printing quality by using a vertical moving stylus. Surface roughness according to Emveco is the dominant test method of linerboard in the North American market.

**Why measure roughness?**
Good print quality and color reproduction requires a smooth surface. The requirement for the surface roughness differs depending on the print method used. Surface roughness also affects the results of surface treatments, such as lamination.

The property measured is called microdeviation and uses a stylus to determine the topography of the surface. Microdeviation correlates well with the end product’s printability and print uniformity. High values of microdeviation indicate that the sample has steep vertical changes and that it will not print well, since the ink will have trouble reaching the actual surface of the board. Hence, the lower the value of microdeviation, the smoother the surface and the better it will print.

**Overview**
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**Measurement results**
L&W Autoline Emveco Roughness measurements are easy to understand without any further processing. The reported measurement values, microdeviation and microaverage, are presented in [mil] or [µm]. Based on the L&W Stylus Roughness Tester Emveco, stylus measurement has proven to be an excellent predictor of how well a flexo printed surface will print with minimum ink consumption, as well as overall print uniformity.

**Features**
- Based on the proven L&W Stylus Roughness Tester Emveco
- Automatic measuring process provides superior precision and repeatability

**Benefits**
- Reliable and reproducible measurement
- Reduces rejects due to poor print uniformity, poor print gloss and missing dots, while also decreasing ink consumption
- Fast test sequence

Surface roughness helps determine the print uniformity of a product. The smoother the surface, the better the paper or board will print. L&W Autoline Emveco Roughness automates the measurement of surface topography for linerboard.
**Testing procedure**

The reference head is lowered against the paper sample so that it rests on the sample’s surface. The reference head then starts to move at a constant speed relative to the paper sample and the stylus follows the contours of the surface. After a defined measuring distance, the reference head is lifted and moved back to the start position.

**Measurement principle**

The stylus roughness method is used for scanning a paper product and measuring its microsurface characteristics. A lightly weighted stylus is mounted in the center of a reference head, which rests on the surface of the test piece. The reference head moves at a constant speed relative to the test piece while the stylus follows the contours of the surface (i.e. moves up and down relative to the reference head). This vertical movement is sampled at constant spacing distances and the obtained, discrete values are then used to calculate the microdeviation. Microdeviation – the difference between two successive test points, squared. Mean of the sum squared multiplied by 1000.

\[
\text{Microdeviation} = \frac{1000}{n-1} \sum_{i=2}^{n} (x_i - x_{i-1})^2
\]

Where:
- \(x\) = vertical displacement of stylus in mils or µm
- \(n\) = number of samples

An alternative presentation of the surface characteristics is microaverage which is the average deviation from point-to-point readings.

**Technical specifications**

- **L&W Autoline Emveco Roughness Tester, code 648**

  **Measurement**
  - Stylus: spherical tip with diameter 25 µm (0.001 in)
  - Measuring length: 76 mm (3 in)
  - Distance between measurement points: 0.25 mm (0.010 in)

  **Results**
  - Measurement values: - microdeviation (in mil² or µm²)
  - microaverage (in mil or µm)

  **Installation requirements**
  - Power: 5 W (average), 15 W (maximum)
  - Dimensions: 0.3 × 0.3 × 0.4 m (12 × 12 × 16 in)
  - Volume: 0.12 m³ (4.3 ft³)
  - Net weight: 14 kg (30 lb)
  - Related standard: TAPPI 575