Abstract

Film, coating, and surface treatment professionals face many obstacles collecting valuable data from their product. Traditional measuring equipment, typically designed to service other industries, has a variety of drawbacks that can hamper problem solving and research efforts. The purpose of this presentation is to address some of those challenges and present solutions afforded by emerging technology. This presentation will particularly emphasize: laser scanning confocal microscopy, surface roughness/topography, film/coating thickness, and defect analysis.

Outline/ Detailed abstract (20 min total):

1. Introduction (2 min)
   a. Who am I?
      i. Bio/ background/ experience
   b. “full disclosure”

2. Historical Challenges (5 min)
   a. Imaging
      i. SEM
         1. Pro: Amazing data and images
         2. Non-conductive samples (sputtering)
         3. High operator skill level
         4. Lots of sample prep
         
         (Images on PPT slide)

ii. Stereo/digital Scope
    1. Pro: easy to use, fast, flexible lighting options
    2. Challenging on transparent or highly reflective objects
    3. Images on PPT slide

   b. Measurement
      i. Contact
         1. Pro: Cost effective and proven
2. Tough to “line up” the sample

3. Stylus may misrepresent surface

4. Stylus may damage surface

5. ii. Non-contact
   1. Pro: No damage
   2. Traditionally (IFM) – hard time with transparent samples

   Measurement is difficult with surfaces that are not very reflective

3. Confocal – hard time with transparent or shiny samples

iii. Where does that leave you?
   1. Historically it’s been hard to see and hard to measure your samples

   c. Laser Scanning Confocal Microscope (5 min)
   i. How it works
      1. Tracking lens position with linear scale
2. Tracking returned laser intensity

3. Laser/Color based 2D and 3D

   ii. Why it matters
       1. Image any surface regardless of material (clear, shiny, etc)
       2. Measure any surface regardless of material
       3. Film thickness – you can measure it

   d. Examples and Applications (5 min)
      i. Surface roughness on independent film layers

      1. 
      2. Adhesion/delamination issues with layer 4

      ii. Film thickness
1. Coating over wire

### iii. Defect size and position inside film

#### e. Questions