



## SHORT COURSE ON ADHESION MEASUREMENT METHODS

This course presents an overview of the latest adhesion measurement techniques which are being used to evaluate the PRACTICAL ADHESION of coatings and laminate structures. Emphasis is given to methods which can be carried out in a manufacturing environment as well as in the lab and which give results that are directly relevant to the durability and performance of the structures under investigation. The effects of coating elastic properties and residual stress are considered as well as other external influences which affect durability under use conditions.

### TOPICS INCLUDE:

- **Basics of adhesion measurement:**
  - Qualitative methods
  - Semi-quantitative methods
  - Fully quantitative methods
- **Role of residual stress and material mechanical properties on adhesion:**
  - Effect of coating and substrate elastic and material properties
  - Effect of residual stress
  - Continuum theory
  - Fracture mechanics of adhesion
- **Problem of setting adhesion requirements for coating applications:**
  - What is a sufficient level of adhesion strength?
  - Avoid over-specifying adhesion requirements to the detriment of other product requirements.
  - Problem of long-term environmental degradation.
  - Method of stability maps
- **Adhesion measurement at atomic and molecular level (fundamental adhesion):**
  - Surface force apparatus
  - Atomic force microscope
  - Hamaker theory
  - Particle adhesion, JKR theory
  - Contact angle behavior
- **Applications:**
  - Setting quality control specifications
  - Determining best measurement for given application
  - Provide data base for product engineering design work
  - Support new product research and development
    - Identify and eliminate potential failure modes early in development cycle
  - Enable rapid effective response to unforeseen failure mechanisms

**Audience:** Scientists and professional staff in R&D, manufacturing, processing, quality control/reliability involved with adhesion aspects of coatings and adhesion sensitive applications.

**Level:** Beginner- Intermediate introduction/overview

**Prerequisites:** Elementary background In chemistry, physics or materials science.

**Duration:** 1 day

**Course materials:** Includes complete set of lecture notes plus optional purchase of handbook and study guide **ADHESION MEASUREMENT METHODS: THEORY AND PRACTICE, (CRC PRESS, 2006)**

### How You Will Benefit From This Course:

- ▶ Understand advantages and disadvantages of a range of adhesion measurement techniques.
- ▶ Gain broad overview of wide range of adhesion measurement methods
- ▶ Learn optimal methods for setting adhesion strength requirements for coating applications.
- ▶ Acquire basic skills for addressing adhesion failure problems
- ▶ Know where help is available in emergency situations
- ▶ Learn how to select best measurement technique for a given application.

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