Revised PU 104A-

Market Overview

- Polyurethane markets (Rigid & flex foam, CASE)
- CASE market overview
- Adhesive & sealant market size and distribution based on chemistry and application type
- Advantages/Disadvantages of different chemistries (contingent upon market data availability)
- Market trends (growth rates, technology drivers, value chains)

Polyurethane Chemistry & Material Science

- Brief history of polyurethane technology
- Polyurethane components and raw materials
- Pre-polymers: Preparation and usage
- Overview of polyurethane materials science
- Polyurethane morphology & dynamics

Break – 15 min

Adhesion Science & Test Methods

- Fundamental theories of adhesion
- Surface science, surface preparation, and failure modes
- Common mechanical test methods: Shear, peel, pull-off, dynamic analysis
- Common durability test methods: UV, temperature, moisture exposure
- Hands-on demonstration

Break – 15 min

Formulation Science

1 Component

- Component selection and performance
- Cure time, NCO content, and bubbling
- Typical formulation additives

2-Component systems

- Formulation criteria
- Balancing mix ratio and viscosity
- “One-shot” vs. prepolymer systems

Structural Adhesives – 15 minutes

- Definition of structural adhesives
- Formulation considerations
- Case study : Sandwich panel adhesives

Lunch – 1 hour

Flexible Adhesives

- Definition of flexible adhesives
- Formulation considerations
- Case study : Automotive glass bonding adhesives

Sealants

- Sealants vs. caulks
- Sealant types: 1-component, 2-component, foaming sealants
- Sealant formulation
- Sealant testing: ASTM C920 standards
- Case study: Road & bridge expansion joint sealants

Break – 15 minutes

Binders

- Introduction to PU binders
- Polyurethane binders: 1-component and 2-component
- Applications : Foam rebond, rubber crumb, wood, mineral aggregate, etc

Wrap-up/Summary/Final Questions