**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**