PU 104B: Polyurethane Elastomers and Coatings

Intro to Polyurethane Technology
- Basic polyurethane overview
- Definition of typical coatings and paints
- Definition of typical elastomers

Polyurethane Elastomers (Solid and Microcellular)
- Structure/property relationships of polyurethane elastomers
  - Basic polymer morphology fundamentals (soft and hard segments)
  - Tg and Tm, measurement and physical property effects
  - Dynamic properties - hysteresis
  - Effect of formulation components on properties
- Comparison of urethanes versus non-urethane elastomers
- Elastomer raw materials
- Types of urethane elastomers, formulation, market segments, and applications
  - Cast elastomers
  - Prepolymer and quasi prepolymer
  - One shot and RIM
  - Spray elastomers
  - Thermoplastic polyurethane
  - Millable polyurethane elastomers
  - Microcellular elastomers

Polyurethane Coatings
- Intro to Polyurethane based coatings – timeline, included technologies, basics
- Coating markets, different market segments and industry trends
  - Automotive
  - Building and Infrastructure
  - Corrosion
  - General Industrial
  - OEM
  - Textiles
- Coating Resins Review – Competitive technology comparisons
  - Acrylic
  - Epoxy
  - Polysiloxane
  - Polyurethane
- Types of Polyurethane coatings
  - One component solventborne including moisture cure
  - One component waterborne
  - Two component solventborne
- Two component waterborne
- 100% solids
- UV/E beam

Polyurethane coating raw materials and reasons for selection
- Resins – polyesters, polyethers, polyaspartics, hydroxy functional acrylics
- Isocyanates/Crosslinkers – aromatic, aliphatic, carbodiimide
- Polyurethane Dispersions (PUD)
- UV cure resins

Application Methods
- Brush, roll, spray, dip and flow, ribbon coat, deposition

Safe storage, handling, and application

Characterization of final coating film properties
- Physical testing
- Weathering – Accelerated and field testing
- Chemical testing

Case Studies
- In-use case studies in multiple market segments
- Detail on material selection, prep, application and in-use update

Summary and Questions