

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)

- i. Structure/Property relationships of polyurethane elastomers
 - o Basic polymer morphology fundamentals (soft and hard segments)
 - o Tg and Tm, measurement and physical property effects
 - o Dynamic properties - hysteresis
 - o 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

- i. Cast elastomers
- ii. Prepolymers and quasi prepolymers
- iii. One shot and RIM
- iv. Spray elastomers
- v. Thermoplastic polyurethane
- vi. Millable polyurethane elastomers
- vii. Microcellular elastomers

Polyurethane Coatings

- i. Intro to Polyurethane based coatings – timeline, included technologies, basics
- ii. Coating markets, different market segments and industry trends
 - o Automotive
 - o Building and Infrastructure
 - o Corrosion
 - o General Industrial
 - o OEM
 - o Textiles
- iii. Coating Resins Review – Competitive technology comparisons

- Acrylic
- Epoxy
- Polysiloxane
- Polyurethane
- iv. Types of Polyurethane Coatings
 - One component solventborne including moisture cure
 - One component waterborne
 - Two component solventborne
 - Two component waterborne
 - 100% solids
 - UV/E beam
- v. 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
- vi. Application Methods
 - Brush, roll, spray, dip and flow, ribbon coat, deposition
- vii. Safe storage, handling, and application
- viii. Characterization of final coating film properties
 - Physical testing
 - Weathering – Accelerated and field testing
 - Chemical testing
- ix. Case Studies
 - In-use case studies in multiple market segments
 - Detail on material selection, prep, application and in-use update

Summary and Questions