

Lamination of Thin Webs for Packaging

DAY 1

Introduction

Fundamental definitions

Why do we laminate?

Packages that are laminated

Multilayer tactics

- ❖ Adhesive lamination
- ❖ Extrusion lamination
- ❖ Coating

Coextrusion

Materials

Webs that are laminated

Plastics and other polymers

Metals

- ❖ Papers
- ❖ Multilayer materials

Adhesives

Other materials that impact laminations

- ❖ Inks
- ❖ Additives

Primers

Layer functionality

- ❖ Strength/stiffness
- ❖ Print carrier
- ❖ Primer

Adhesive

Barrier

- ❖ Sealant

Science of lamination

Surface chemistry

Surface treatment

- ❖ Flame
- ❖ Corona / "plasma"
- ❖ Priming
- ❖ Adhesion
- ❖ Adhesive chemistry

Heat transfer

DAY 2

Unit operations in laminating

- ❖ Winding and web transport
- ❖ Treatment

Roll Coating

- ❖ Extrusion
- ❖ Other coating techniques
- ❖ Drying

Laminating

Curing

Heating

Cooling

Specific lamination techniques in more detail

- ❖ Solvent-based adhesive lamination
- ❖ Water-based adhesive lamination

Solvent-free adhesive lamination

Extrusion lamination

Laminating machine layouts

- ❖ Simplex (Two ply)
- ❖ Duplex / Tandem (Three ply)
- ❖ Extrusion/Adhesive combinations
- ❖ Press/laminators

Testing of laminations

- ❖ Green tack
- ❖ Curing and cured bonds
- ❖ Peelable bonds vs. destruct bonds
- ❖ Coefficient of friction
- ❖ Heat resistance
- ❖ Sealability

Tensile behavior

Barrier testing and calculations

Performance testing

Troubleshooting

- ❖ General tactics for troubleshooting

Gallery of lamination defects

What can go wrong:

Delamination

- ❖ Lamination spots/bubbles
- ❖ Heat resistance
- ❖ Chemical resistance

Discoloration

- ❖ Lack of performance
- ❖ Troubleshooting case studies