Introduction to Adhesives & Sealants Foaming Technology

George Pais, Senior Product Manager
Foaming Technology
Types of Foam

Open Cell Structure
- Cell walls broken
- Soft, weak structure
- Insulation related to air
- Permeable to vapors
- Lowest density
- Absorbent properties

Closed Cell Structure
- Discrete cells (not continuous)
- Higher degree of insulation
- Lower permeability
- Higher density
- Gasketing/isolation properties

Syntactic Cell Structure
- Composite materials
- Polymer, glass or hydrocarbon balloons
- Controlled density
- No cross reactions
- Retains physical properties of base material

Choose Correct Cell Structure For Desired Application
Foaming Technology
Production Methods

Chemical Reaction

Liberate Gas via Chemical Reaction:
• Chemical compounds yield CO₂, O₂, N₂
• Multiple component/reactive/solvents/environmental impact
• Particle size of agent determines cell size
• Compatibility issues/corrosion/inflexible once compounded
• Expensive process to utilize and maintain

Gas Injection:
• Sealant materials are mixed with inert gas, producing a homogenous mixture
• The gas expands as material is dispensed, creating a closed-cell foam
• Uses no chemicals
• Foamed materials retain their basic physical properties
• Low cost to operate and maintain
• Uses conventional application equipment

Mechanical

Additives:
• Lightweight materials are mixed with base materials to reduce weight and cost
• Reduction of weight considered a “foam” process
• No other changes in physical properties of base materials
• Higher cost process than gas-injected foam
• Limited to certain materials and temperatures

Mechanical Foams Increase Material Flexibility
• Hot melt materials, typically adhesives or sealants, are mixed with inert gas, producing a homogeneous mixture.

• As the material is dispensed, the gas expands creating a closed-cell foam.
Foaming Technology
Why Foam?

**Process Drivers**

- Material/weight reduction
- Cost reduction
- Improve process capability
- Material property enhancement
- New material/process development
Foaming Technology
Why Foam?

**Benefit Drivers/Justification**

- Increased open time
- Faster set time
- Increased surface wetting and penetration
- Lower heat density
- Less force to apply
- Volumetric increase without adding material
- Reduced adhesive consumption/reduced cost
- Minimize VOC emissions with solvent-free assembly
Foaming Technology
Benefits of Foaming/Increased Volume

- Less Sagging – keep adhesive where it is wanted
- Greater Gap Filling – consistent application on “non-smooth” substrates
- Better Substrate Penetration
- Innovation Through Material Selection
- Up to 2 Times Increase in Volume
Foaming Technology
Benefits of Foaming/
Material Savings - Conservation

• Natural resource supplies will only continue to tighten
• Maximize adhesive utilization
• Make more bonds with same amount of adhesive (50% reduction in material, make 2 times the bonds)
• Ease of recycling

Maximize Available Material, Reduce Waste, Improve Quality
Foaming Technology
Benefits of Foaming/
Material Savings – Cost Reduction

Reducing the Density of Material Means:

• Lower material usage
• Less part weight/shipping cost
• Less process energy

Look Past “Simple Math” to Total Cost of Quality
Nordson has more than 30 years experience with foaming materials for a wide variety of markets and applications including:

- Appliance
- Automotive
- Filter
- Woodworking
- Building & Construction
Nordson solutions can successfully foam a wide range of materials such as:

- Silicone
- Ethylene vinyl acetate (EVA) hot melt
- Pressure sensitive (PSA) hot melt
- Reactive hot melt
- Urethane
Foaming Technology
Nordson Foaming Solutions

SureFoam™
- Compact
- Compatible with variety of melters
- Bonding applications
- Up to 44 lb/hour output

FoamMelt®
- Self-contained system
- Excellent foam quality
- Gasketing, sealing, bonding applications
- Up to 50 lb/hour output

Ultra FoamMix™
- Multiple foaming stations capability
- Excellent foam quality
- Gasketing, sealing, bonding applications
- High output, ≥ 50 lb/hour
Foaming Technology

Conclusions

**Global Market**
- Continued globalization
- Emphasis on new form/function/growth
- Innovation
- Competition

**Foaming Benefits**
- Increase properties without increasing adhesive amount
- Increase process window without changing adhesive
- Reduce process cost
- Create process alternatives
- Reduce environmental impact

Utilize Foaming to Increase Quality… and Reduce Environmental Impact
Foam Technology offers a significant opportunity to “Balance” your business model.

Global Factors:
- Material availability
- Environmental responsibility
- Sustainability
- “Green” process

Business objectives:
- Innovation
- Growth
- Cost reduction
- Competition

Global Business Challenges
For more information on Nordson Foaming Solutions, please contact Nordson Adhesives at www.nordson.com/hotmelt or 800-683-2314

George Pais
Nordson Corporation,
Senior Product Manager