Ultrasonic Sealing of Thin-Film Flexible Packaging Finally Reaches Commercial Maturity

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The Opportunity

- Between 5-15% of packaging used is devoted to seals
- Existing heat seals do not work very hard for you – they leak
Leak Rate Comparison

- Package should hold Nitrogen flush for months
- Heat seals typically show significant leaks after days or a few weeks
- Difference is leak rate

7-oz. chip bag, approximately 250-in\(^2\) of film, 4 liters in volume, and OTR 20-50
The Big Idea

- Could we **reduce** seals from 12.5mm (1/2 in) to 1 mm?
- Could we **demonstrate** this on a device that has run millions of bags?
- Could we **run a range** of products and materials?
- Could we **bring the technology to market** in a way that makes sense?
Peel Strength

Materials

- Potato Chip Package
  - High barrier
  - Gas flush
- Tortilla Chip Package
  - Workhorse
- Pretzel Package
  - Thick
  - Puncture Resistant
- PLA
  - Easily seals with Ultrasonics

Initial Peel Force
Maintains consumer experience
Demonstrated with retrofit kits for reciprocal bagmakers

Technology can be deployed as a retrofit kit or incorporated in new builds

Single sonotrode sealing bags up to 12” wide

No consumer complaints
Ultrasonic End Seal Cost Savings

Film Usage on a Single Bagmaker
Thermally Sealed Bag
7.5-in x 11-in = 82.5-in²
Ultrasonically Sealed Bag
6.7-in x 11-in = 73.3-in²

Cost Savings
Annual film savings on one Bagmaker
9.2-in² / 1000 x 45M = 414,000 MSI

11% Film Savings
$90,000 to $125,000
Annual Savings

Additional Assumptions
- Film Cost per MSI: $0.25 - $0.30
- Bags Sealed per Year: 40 to 45M
- 0.50” Thermal Seal
- 0.08” Ultrasonic Seal
- 7.5” Thermal
- 6.7” Ultrasonic
- Back Seal Unchanged
Your Partner for Success

- World class leader in developing, commercializing, and implementing manufacturing technologies
- Most extensive materials joining expertise in North America
- Solving your most complex challenges
- Bridging the gap between research and the shop floor
- Proven track record of delivering results
Reciprocal Technology

- 5,000,000 packages delivered to the market place
- Up to 12” wide seals
- Single Ultrasonic Transducer
- Demonstrated on potato chip, tortilla chip, and pretzel packaging
The Rotary Revolution

- Elegant, cost effective solution
- Single Ultrasonic Transducer
- Up to 8” wide seals (development underway for larger seals)
- Horn sealing surface vibrates in a direction perpendicular to the incoming ultrasonic waves
- Transducer is mounted along the axis of rotation
- Single transducer energizes two welding surfaces
How It Works

Traditional Ultrasonic Stack

Rotary Ultrasonic Stack with Patented Horn

US Patent 9,205,596  Ultrasonic sonotrode for transversely aligned transducer
### Technology Readiness Level

<table>
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<th>CPGs partner with existing suppliers to access the technology</th>
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<td><strong>Reciprocal</strong></td>
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<td><strong>Retrofit</strong></td>
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<td><em>Ready for the Market</em></td>
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<td>Partnerships with after market suppliers and OEMs to offer retrofit kits</td>
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Accessing the Technology

- EWI is forming an **ultrasonic packaging consortium** open to all members of the packaging value chain.
- Member funding will support the continued development of the technology for the benefit of the industry.
Advantages

- Obvious **quality** implications
- Huge **code date** opportunity
- Significant **film savings** opportunity
- Tremendous **distribution** advantages
- Dramatic **shelf appearance** gains

Seal films like PLA that do not normally seal easily
Ultrasonics-Driven Savings Opportunities

- **11% film savings** on a small snack package by reducing end seals from 0.50” to 0.08”
- Sealing process robustness allows for **headspace reduction**; savings of an additional 6% have been seen
- Small bags also **reduce distribution costs** and **create more shelf space** to stock new innovations
**Sustainability**

**Lower Cost**

**New Product Choices**

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**Resin Suppliers**
- Opportunity to commercialize eco-friendly resins
  - New materials and biopolymers as well as existing resins not currently used in thin films

**Film Suppliers**
- Product Differentiation
  - Simplification: no need to extrude sealant
  - New features in extruder formerly used for sealant
  - New products: biodegradable film

**Film Converters**
- More Supply Choices
  - Broader range of materials to choose from to meet customers' needs
  - Simplified processing: no heat-sensitive sealant to be damaged

**Equipment OEMs**
- Dramatic Performance Advantage over Current Equipment
  - Better seals: dramatic leak reductions
  - Faster machine start-ups: no jaws to heat up
  - Provides new market and product opportunities

**Consumers**
- Improved Product Quality and Freshness
  - Access to wider range of products
  - Products stay fresher longer
  - New packaging features

**CPGs**
- Savings, Market Access, Quality Gains
  - Smaller seals and packages=lower costs
  - More reliable operation: product in seal causes fewer defects
  - Longer shelf life and higher quality from better seals

**Retailers**
- Increased Shelf Space, Flexibility in Distribution, Market Access for New Suppliers
  - Smaller bags: more product on shelf
  - Longer code dates: fewer sales
  - Better seals: enables new products
  - Lower costs
Thank You!

Q & A

Stop by Booth E-7159
- Learn more
- Discuss partnerships
- Discuss consortium membership
- See the technology in action daily at 10:30am and 2:30pm