ALUMINUM IMPACT EXTRUSION CAN MAKING

Fred Spohr

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Slug Blanking

- Blanking Press
- To-Melt Furnace
  - Recycle
  - Perforated
  - Strip
- Annealing Oven
- Vibratory Tumbler
- Slugs
  - Slugs
Impact Extrusion

 Slug inserted into die under Punch Mandrel
Impact Extrusion

250 Tons of Force Applied through a Mandrel

Aluminum Flows Up the Wall of the Mandrel

Completed Cylinder
Wall Ironing
Wall Ironing
Washing Machine
Remove Extrusion Lube

- Caustic Solution
- City Water Rinse
- Deionized Water Rinse
- Blow Dry
Internal Spray Coating
<table>
<thead>
<tr>
<th>Enamel</th>
<th>Use</th>
<th>FDA Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy Phenolic Resins</td>
<td>Can Interior</td>
<td>Yes</td>
</tr>
<tr>
<td>Vinyl Resins</td>
<td>Can Interior</td>
<td>Yes</td>
</tr>
<tr>
<td>Alkyd Resins (Polyester)</td>
<td>Can Exterior</td>
<td>No</td>
</tr>
<tr>
<td>Amino Resins</td>
<td>Can Interior and Exterior</td>
<td>No</td>
</tr>
<tr>
<td>Acrylic Resins</td>
<td>Can Exterior</td>
<td>No</td>
</tr>
<tr>
<td>Polyamide Inside Resins</td>
<td>Can Interiors</td>
<td>Certain Times</td>
</tr>
</tbody>
</table>
Aluminum Alloy 1070 Assay

- Aluminum = 99.7% Min
- Silicone = .25% Max
- Iron = .30% Max
- Copper = .05% Max
- Manganese = .05% Max
- Zinc = .05% Max
- Titanium = .03% Max
7-Color Lithography Station
Neck Down Illustration

Area of tooling contact during neck down operation
Process Sequence Overview
1 Piece Aluminum Containers

- Slug Lube Application
- Cylinder Extrusion
- Cylinder Trimming
- Cylinder Washing
- Cylinder Drying
- Inside Liner Spray Application
- Inside Liner Curing
Process Sequence Overview
1 Piece Aluminum Containers

- Lithography Application (3 Separate Films)
- Neck-Down, Trimming & Curl Roll
- Curl Milling (As Required)
- Bundling
- Palletization
- Ship To Filler
North American Producers of Aluminum Aerosols

- CCL Container -- Hermitage, PA
- Exal Corp. -- Youngstown, OH
- Montebello Pkg. – Hawkesbury, ON
Aluminum Aerosols/Advantages
(Aluminum vs. Steel)

- 360 Degree Wrap-Around, Seven-Color Printing
- Superior Point-of-Purchase Appeal
- Infinite Number of Sizes Available
- Totally Integrated 1-Site Manufacturing
- Lighter in Weight
Aluminum Aerosols/Advantages (Aluminum vs. Steel)

- 1-piece, No Seams, Juncture or Weld
- Sprayed Interior Enamel, Less Metal Exposure
- Inherently Stronger
- Abrasive Substrate, Better Enamel Adhesion
- No Rust Ring
Piston Barrier System
Piston Barrier Pack
Dispensing Advantages

- Maintains Product / Propellant Separation
- Provides Smooth, Controlled Discharge
- Maximizes Product Evacuation
- Meets FDA Requirements For Food Products
- Seamless Construction, Reduces Bi-Pass
- Precision Engineered Gassing Hole
- 360 Degree Operation
# Piston Barrier Pack
## Commercial Size Options

<table>
<thead>
<tr>
<th>Diameters (mm)</th>
<th>Height Range (mm)</th>
<th>Approximate Capacity (US FL OZ)</th>
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<tbody>
<tr>
<td>35</td>
<td>70 – 140</td>
<td>1.5 – 3.5</td>
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<tr>
<td>53</td>
<td>120 – 210</td>
<td>5.0 – 11.5</td>
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<tr>
<td>55</td>
<td>110 – 220</td>
<td>5.0 – 13.0</td>
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</table>

Capacity Values Are Approximations. Actual Product Fill-To-Container Ratios Must Be Determined On A Case-By-Case Basis.
## Piston Barrier Pack Options

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Mold Cavities</th>
<th>Piston Type</th>
<th>Plastic Chemistry</th>
<th>Application</th>
<th>FDA Clearance</th>
<th>Propellant</th>
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<tbody>
<tr>
<td>35mm</td>
<td>4</td>
<td>Free-Float</td>
<td>ABS</td>
<td>Personal Care</td>
<td>No</td>
<td>LPG or Nitrogen</td>
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<tr>
<td>38mm</td>
<td>1</td>
<td>Free-Float</td>
<td>ABS</td>
<td>Personal Care</td>
<td>No</td>
<td>LPG or Nitrogen</td>
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<tr>
<td>45mm</td>
<td>2</td>
<td>Free-Float</td>
<td>ABS</td>
<td>Personal Care</td>
<td>No</td>
<td>LPG or Nitrogen</td>
</tr>
<tr>
<td>50mm</td>
<td>1</td>
<td>Free-Float</td>
<td>ABS</td>
<td>Personal Care</td>
<td>No</td>
<td>LPG or Nitrogen</td>
</tr>
<tr>
<td>53mm</td>
<td>8 Cavity</td>
<td>Free-Float</td>
<td>ABS</td>
<td>Personal Care</td>
<td>No</td>
<td>LPG or Nitrogen</td>
</tr>
<tr>
<td></td>
<td>4 Cavity</td>
<td>Free-Float</td>
<td>PP</td>
<td>Personal Care</td>
<td>Yes</td>
<td>Nitrogen Only</td>
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<tr>
<td>55mm</td>
<td>2-18 cavity tools</td>
<td>Wall-Wipe</td>
<td>PP</td>
<td>Food</td>
<td>Yes</td>
<td>Nitrogen Only</td>
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<tr>
<td>66mm</td>
<td>1 Cavity</td>
<td>Free-Float</td>
<td>PP</td>
<td>Food</td>
<td>Yes</td>
<td>Nitrogen Only</td>
</tr>
</tbody>
</table>
Bag on Valve Systems

Rolled Pouch

Pouch Inserted

1 Bar of Pressure Injected

As Bag is Filled it Compresses Gasses
Bag on Valve Barrier System

Bag-In-Can

- Bag on Valve Advantages
  - Maintains Product Integrity & Freshness
  - Excellent For Concentrated Products
  - Meets FDA Requirements For Food
  - Offers Quiet, Non-Chilling Discharge For Pets
  - 360 Deg. All Attitude Dispense
  - Excellent Evacuation Rates
  - Uses Existing TTV Filling Technique
Components of Typical Aluminum Aerosol Cans

- **Valve Cup**: 36,935,338 lbs. (96.45%)
- **Gasketry**: 655,879 lbs. (1.70%)
- **Actuators, etc.**: 309,200 lbs. (0.81%)
- **Total Weight of all Components**: 38,293,944 lbs. (1.01%)

Total Weight of all Components: 38,293,944 lbs.
Components of a Typical Aluminum Aerosol Can/Used Beverage Can Mix

- **Total Aluminum Weight**: 2,236,935,388 lbs. (99.94%)
- **Valve Cup Weight**: 655,879 lbs. (0.03%)
- **Gasketry Weight**: 309,200 lbs. (0.01%)
- **Actuators, etc. Weight**: 393,527 lbs. (0.02%)

**Total Weight of all Components**: 2,238,293,944 lbs.
Life Expectancy of Waste Products

- Banana Peel -- 1 week to 6 months
- Cotton Rag -- 2 to 4 weeks
- Paper -- 2 to 4 weeks
- Wax Paper Cup -- Up to 5 years
- Styro Cup -- 10 to 20 years
- Cigarette Filter -- 15 years
- Plastic Containers -- 50 to 70 years
- 3 Piece Steel Containers -- 100 years
- Aluminum Containers -- 100 to 500 years
- Glass Containers -- Theoretically, they never break down
Packaging Principles 101

MS = MD (Monkey See = Monkey Do)
MNS = MNKWTO (Monkey Not See = Monkey Not Know What To Do)
MDI = 1 / F (Marketing Director’s Interest Will Always Be Reciprocal To Feasibility)
PrMaC < LL (Product Manager’s Career Will Always Be Less Than or Equal to Label Life)
PaMaC < PL (Packaging Manager’s Career Will Always Be Less Than or Equal to Package Life)
MT < DTR (Marketing Timetable is Always Less Than Development Time Required)
PAB = 1000PDB (Product Advertising Budget Will Always be 1000x Product Development Budget)
IA > / < IR (Inventory Available is Always Less Than or Greater Than Inventory Required)
S = S (Sales Will Always Be Sales)
100R < 1W (100 Rights is Always Outweighed by 1 Wrong)
PS = 1/TMI (Product Success is Always Reciprocal to Top Management Involvement)
Aluminum Recycling

- Aluminum has value. American consumers earn about $2.5 million a day recycling used aluminum cans.

- The aluminum industry operates a large coast-to-coast recycling network with an estimated 10,000 buy-back locations.
Aluminum Recycling

- Recycling diverted 12-billion pounds of aluminum from the solid waste stream during the 1980’s.

- The aluminum industry pays cash for used products such as automotive parts, cans, empty aerosols, tubes, frozen food trays, pie plates, window and storm doors, frames and siding, etc.
Aluminum Recycling

- Aluminum aerosols and tubes are made of 99.7% pure aluminum. No other containers have greater recycling value.

- Industry goal is to add 40% of all consumer-spent aluminum aerosols, squeeze tubes, and other packages to the recycle stream. Plant producers already recycle all of their scrap.
Aluminum Recycling

- Aluminum is recycled and reused over and over in a never-ending process of resource recovery and energy conservation.

- Scrap aluminum is an invaluable supply source for aluminum producers and fabricators.

- Recycling aluminum saves 95% of the energy needed to produce new metal from bauxite.