AEROSOL PRODUCTION & FILLING TECHNOLOGY

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MBC Aerosol Filling Machinery
SATA Aerosol 101 SPRING 2015
AEROSOL FILLING PROCESS
POSITIVE DISPLACEMENT PRODUCT FILLING

Product Metering Pump & Nozzle

Benefits

• Fill accuracy typically + or – ½ ml
• Capable of filling many different product types and viscosities up to 50,000 cps

Other Filling Methods:
Time over Pressure / Gravity / Mass flow / Net Weight
STANDARD 1” INTERNAL CRIMPING OF AN AEROSOL VALVE

Notes:
- Proper Gasket Compression if used
- Proper Crimp specifications from vendors
- Pedestal Height for actuator interface
THROUGH THE VALVE GASSING T.T.V.

**Gassing Through the Aerosol Valve stem**

**Method:**
- The head lowers onto the crimped can sealing on the aerosol valve stem or pedistal
- Gas is injected via a gas metering pump into the aerosol valve either by hydraulic force or mechanically opening the aerosol valve
- The head raises off the aerosol valve which allows the valve to close
- Filling through the stem only or through and around the stem are common methods

**Pros:**
- Only 1/4 to 1cc gas loss between the aerosol valve and gassing head each cycle
- On-Line gas blending past and present (Gassing the can more than once with 2-3 gasses)
- Maintenance is minimal (O-ring or a seal)
- Modern Valves Fill at 100cc per second

**Cons:**
- Some metered valve do not work
UNDER THE CUP GASSING

Gassing and Crimping with the same station

Method:

- The Head Seals on can dome
- Vacuum is pulled to evacuate moisture and atmospheric pressure that may corrode the can or contaminate the product
- The aerosol valve is lifted from the can top opening
- Gas is injected around the aerosol valve into the aerosol can from a metered injection pump
- The Aerosol valve is pushed back into the can top opening for the crimping process

Pros:

- Faster gassing than some early slow filling Through the valve gassing aerosol valves which limited production speed
- Meter dosed valves can be gassed
- Gassing button on valves is faster in some cases

Cons:

- 3-5cc of gas loss left between the can and the crimp head per cycle, requiring costly reclaim due to EPA regulations
Nitrous oxide and carbon dioxide are used as propellants to deliver food products (for example, whipped cream and cooking spray). Some industrial products like brake cleaner and penetrating oils also use CO₂.

**Method 1:**
- Gas is mixed with the product in saturation towers until blended properly. The product and CO₂ are filled into the aerosol container as one.

**Method 2:**
- Gas is injected through the aerosol valve stem using time over High pressure. Sometimes the CO₂ is heated to aid in saturation. Shaking is common during gassing.

**Method 3:**
- CO₂ is injected under the aerosol valve cup using time over pressure. Restricted valve lift helps to create turbulence for saturation.

**Pros:**
- Non Flammable
- Does not always require shaking

**Cons:**
- Will not work with all products
- Can orientation is critical to ensure gas does not empty before product is empty
EARLY AEROSOL FILLING MACHINERY
NALBACH ENGINEERING

First machines 1950's

Rotary Index
Product Fill / Crimp / T.T.V. Gas

Hand Line
Product Fill / Crimp / T.T.V. Gas / Hand Bath

Automated Indexing Line
Product Fill / Crimp / T.T.V. Gas / Water Bath
Hand Line
Product Fill / Crimp / T.T.V. Gas

Automated Inline Indexing Line
Product Fill / Crimp / T.T.V. Gas / Water Bath

First Machines 1950's
Continuous Motion Rotary Electromatic Product Filler

CMR Under the Cup Crimper

Inline Indexing
Product Fill / Valve Insert / crimp

Inline Valve Inserter

Known as JA Jones Today

First machines 1950's
THE BIRTH OF A SPRAY CAN
LAB & SEMI-AUTOMATIC AEROSOL MACHINERY
AEROSOL MANUAL CRIMPING & GASSING LAB MACHINERY

Manual External Bottle Crimp

Manual Internal 1” Crimp

Manual Burette TTV Gasser
SEMI-AUTOMATIC AEROSOL & BAG ON VALVE LAB MACHINERY

Benchtop Pneumatic Crimping / UTC

Benchtop Pneumatic TTV Gassing in vented Hood

Combination Crimper / TTV Gasser

Benchtop ISO Shave Gel Mixer / Filler
SEMI-AUTO LOW PRODUCTION
Product Fill – Crimp – TTV Gas
Cans are moved by hand from station to station

Hot Water Bath Testing
Cans are loaded into baskets and placed into the water by hand
MODERN AUTOMATED AEROSOL FILLING LINES
MODERN AEROSOL LINES 120 CPM

- Runs aluminum or tin plate cans
- Automatic valve insertion
- Automatic check weighing
- Clip style hot water bath
- Automatic actuator and over-cap placing

- External gas house w/safety controls and fire suppression
- PLC line controls w/HMI (Human Interface touch Screen)
- Quick change over
- Safety lock out tag out
- Explosion proof and anti-static
MODERN ROTARY INDEX AEROSOL LINE
MODERN AEROSOL LINES 300+ CPM

- Continuous motion high speed rotary
- Runs aluminum or tin plate cans
- Automatic valve insertion
- Automatic check weighing
- Clip style hot water bath
- Automatic actuator and over-cap placing
- External gas house w/safety controls and fire suppression
- PLC line controls
- HMI (Human interface touch screen)
- Quick change over
- Safety lock out tag out
- Explosion proof motors and antistatic
MODERN CONTINUOUS MOTION AEROSOL PUCK LINE
MODERN AEROSOL FILLING MACHINERY

Continuous Motion Rotary Mono-block
Product Fill / V.I. / Crimp

Continuous Motion Rotary
Product Filler

Quad Indexing Inline

Continuous Motion Rotary
T.T.V. Gasser

Valve Insertion

Aluminum / Tin Plate
Valve Sorting

Quad Indexing Inline
MODERN ANCILLARY EQUIPMENT

Actuator Placer

Cap Placer

Puck Inserter

De-Pucker

Tube Taper
MODERN LEAK TESTING

Clip Style Submersion Testing

Drum Style Submersion Testing

Inline Contact Pressure Testing

Gas Vapor Trail Testing

Rotary Vacuum Leak Testing
MODERN PLC CONTROL AEROSOL LINES

- The Aerosol line is completely controlled by a PLC
- Line speed changes with a press of one button
- Remote internet VPN support is available
- Quality control data retrieval is available if required
- Simplifies product change over
- Simplifies trouble shooting
- Interacts with other factory systems like the gas house and water bath heating system
MODERN UNMANNED GAS HOUSE AND TANK FARM

- Follows NFPA30B regulations for flammable gasses
- A Class 1, Div 1 rated area requires explosion proof and intrinsically safe electrical
- Antistatic materials and proper grounding is essential
The First BOV was used in the 1980's
Uses compressed air not liquid gas (rubber bladder is self propelled)
Existing aerosol lines can be converted but usually a separate production line is better suited
Line Layouts are shorter
Pressure testing replaces the hot water bath with DOT exemption
PISTON CANS

- Uses compressed air or hydrocarbon as propellant
- Existing aerosol lines can be converted but usually a separate production line is better suited
- Uses a pre-inserted rubber grommet in the can prior to gassing or the grommet is inserted after gassing
Challenges for existing Aerosol lines

- Exotic unstable shapes may require pucks or conveyors that support the bottle from the neck or shape
- Special bottle neck supports may be required for crimping and gassing
- External Crimper heads required
- Clip-style water baths may be required
- Bottles might be manufactured on site and feed directly into the aerosol line
THANK YOU FOR YOUR TIME

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