Introduction to Two Piece Aerosol Containers

SATA Aerosol 101

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Introduction & Background

Two Piece Canmaking

Select High Pressure Aerosol Innovations

DOT Requirements

Cost Considerations

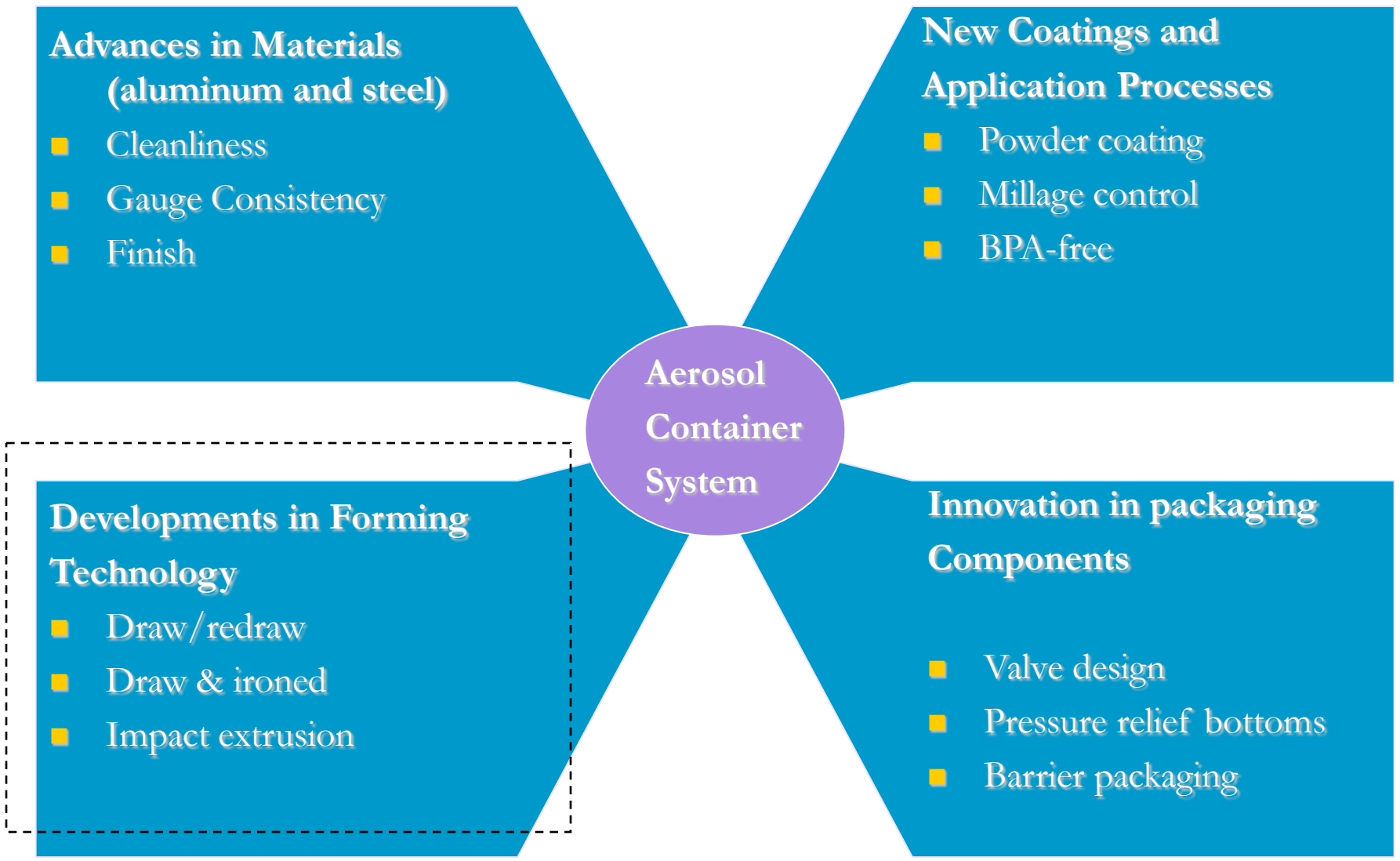
Important milestones in the history of the aerosol can

Key Innovation

- Invented in 1927 by a Norwegian chemist – Erik Rotheim
- Patented by two USDA researchers (Goodhue and Sullivan) in 1943. Manufacturing rights granted to Claire Manufacturing Co. and Chase Products Co.
- The aerosol crimp-on valve was invented by Robert Abplanalp in 1949
- Also in 1949, Edward Seymour developed a method for packaging aerosol spray paint
- Concerns over fluorocarbon emissions in the 1970's sparked a series of packaging innovations

While aerosol containers have been commercially available since the early 1950s, the current packaging *system* has taken 30+ years to develop

Presentation focus



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Two piece containers offer several benefits over three piece, especially in high pressure applications

- Continuous (no side seam) body allows for maximum container strength and reduces probability of failure or fracture
- Cost advantage of 10%+ on average
- More consistent product integrity at higher pressures due to continuous body design
- Greater flexibility in base paint and label design
- More universal compatibility with container contents

Basic Process Flow Chart - canmaking

✓ In-process inspection

Master coils

Cupper Press

Bodymakers

Trimmer ✓

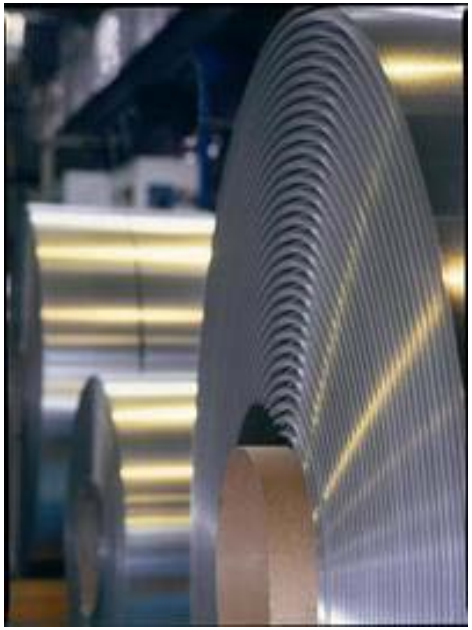
Washer (multistage)

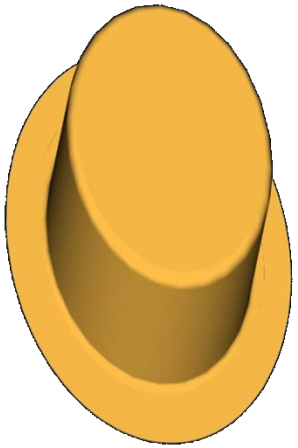
Printer/ Decorator

Inside Spray ✓

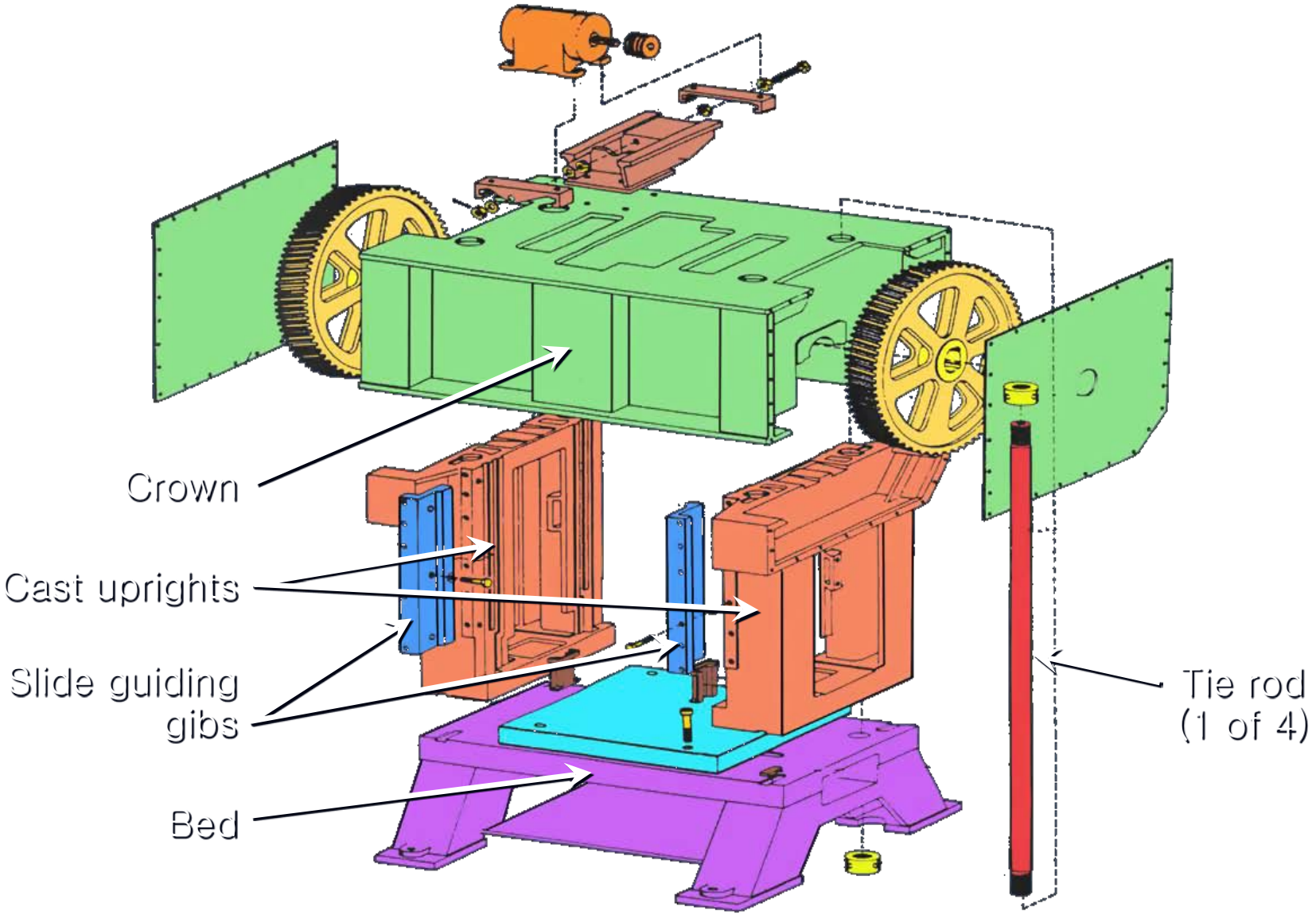
Necker

Two piece canmaking begins with a “cup” made from material in coil form

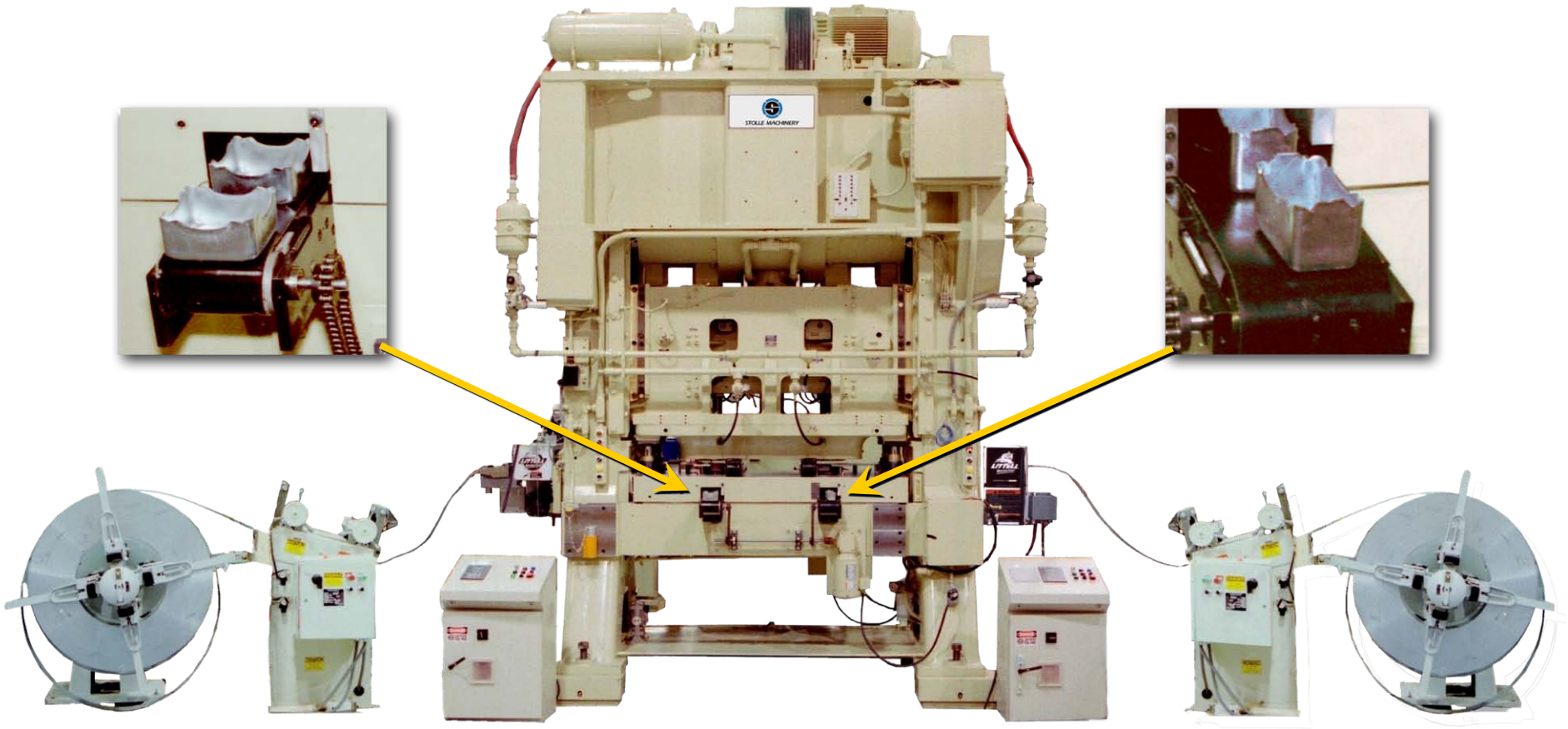




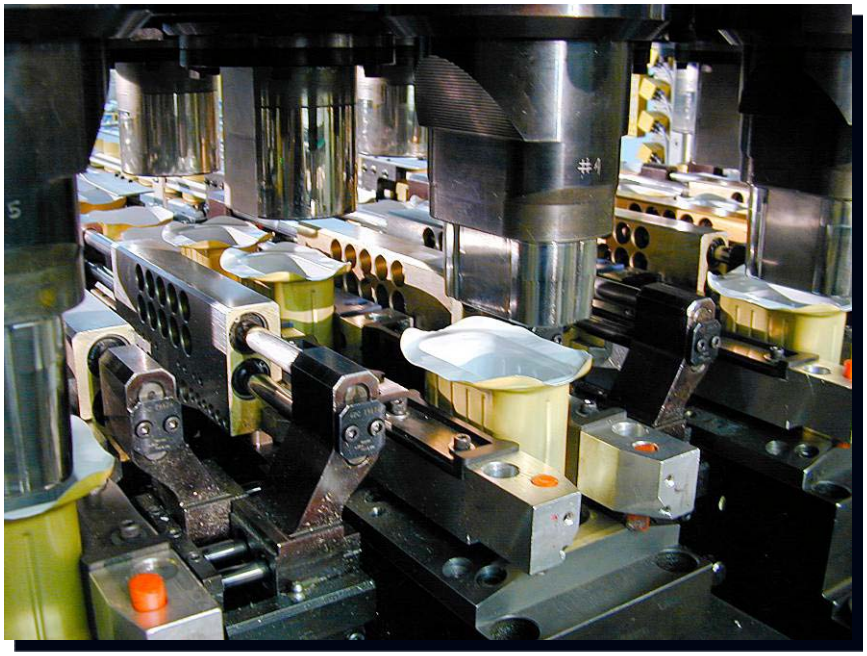
Cupping press detail

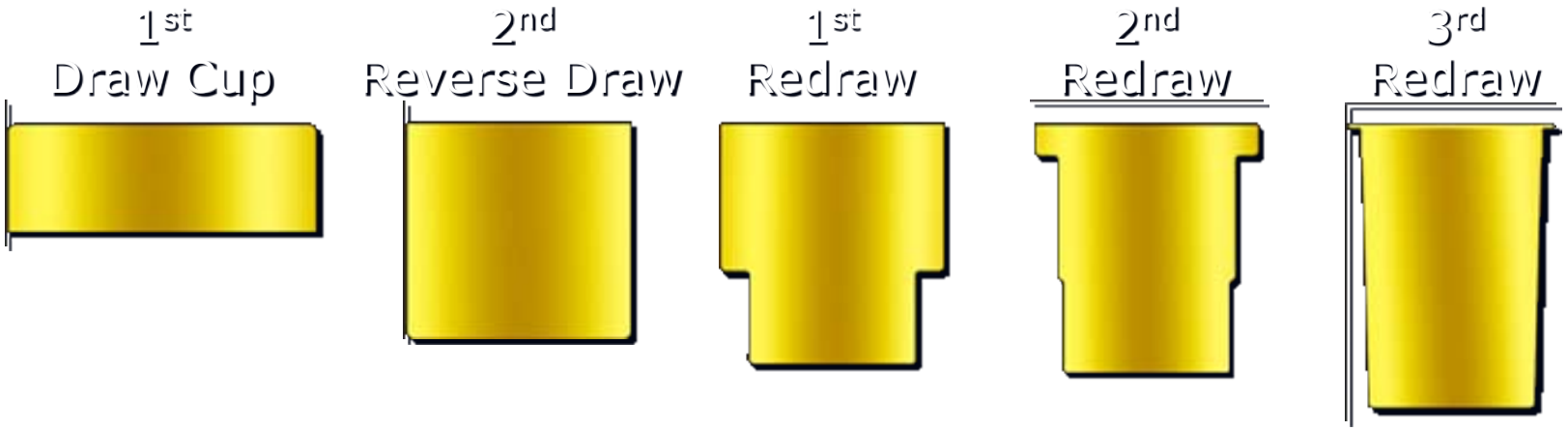


Draw/redraw presses can be equipped with progressive tooling systems to achieve specific height/diameter/wall thickness characteristics



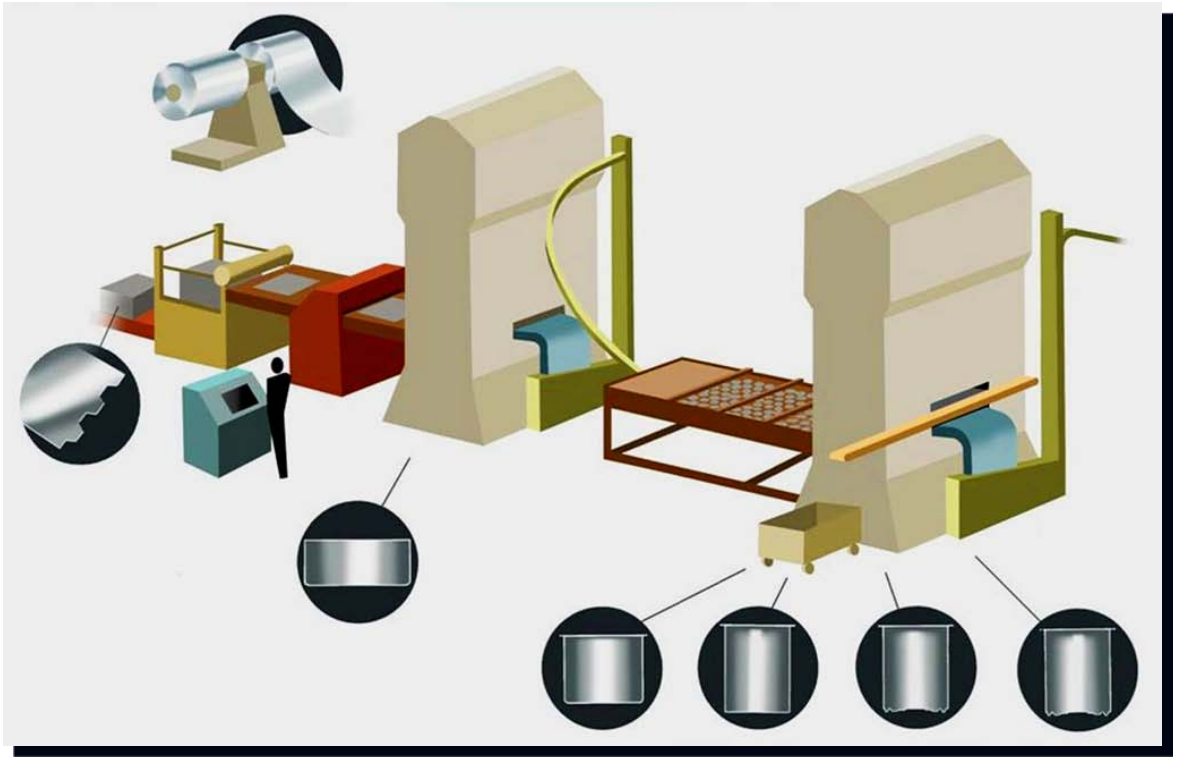
In draw/redraw canforming, a diameter reduction of 22% is possible per tooling pocket



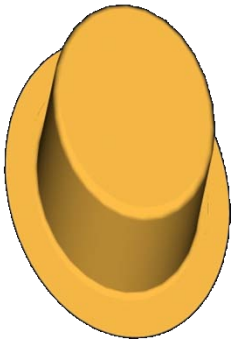


Two Press DRD System

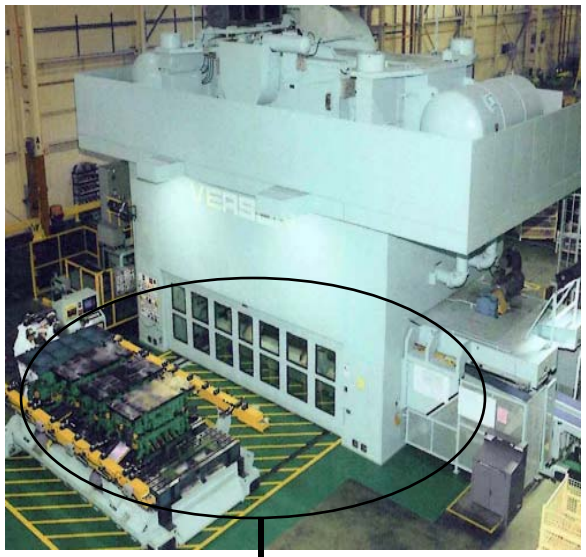
- Cupping press
- Draw–Redraw press
  - Up to four operations
    (draw, redraw, bottom panel, trim)

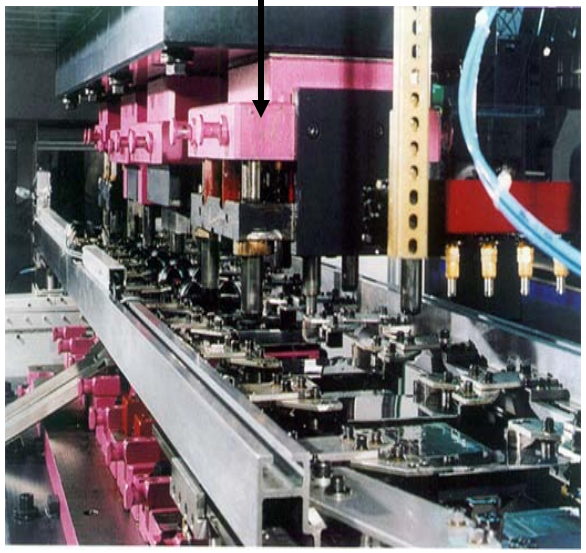


Drawn and ironed cans can be formed from a cup through a bodymaker…



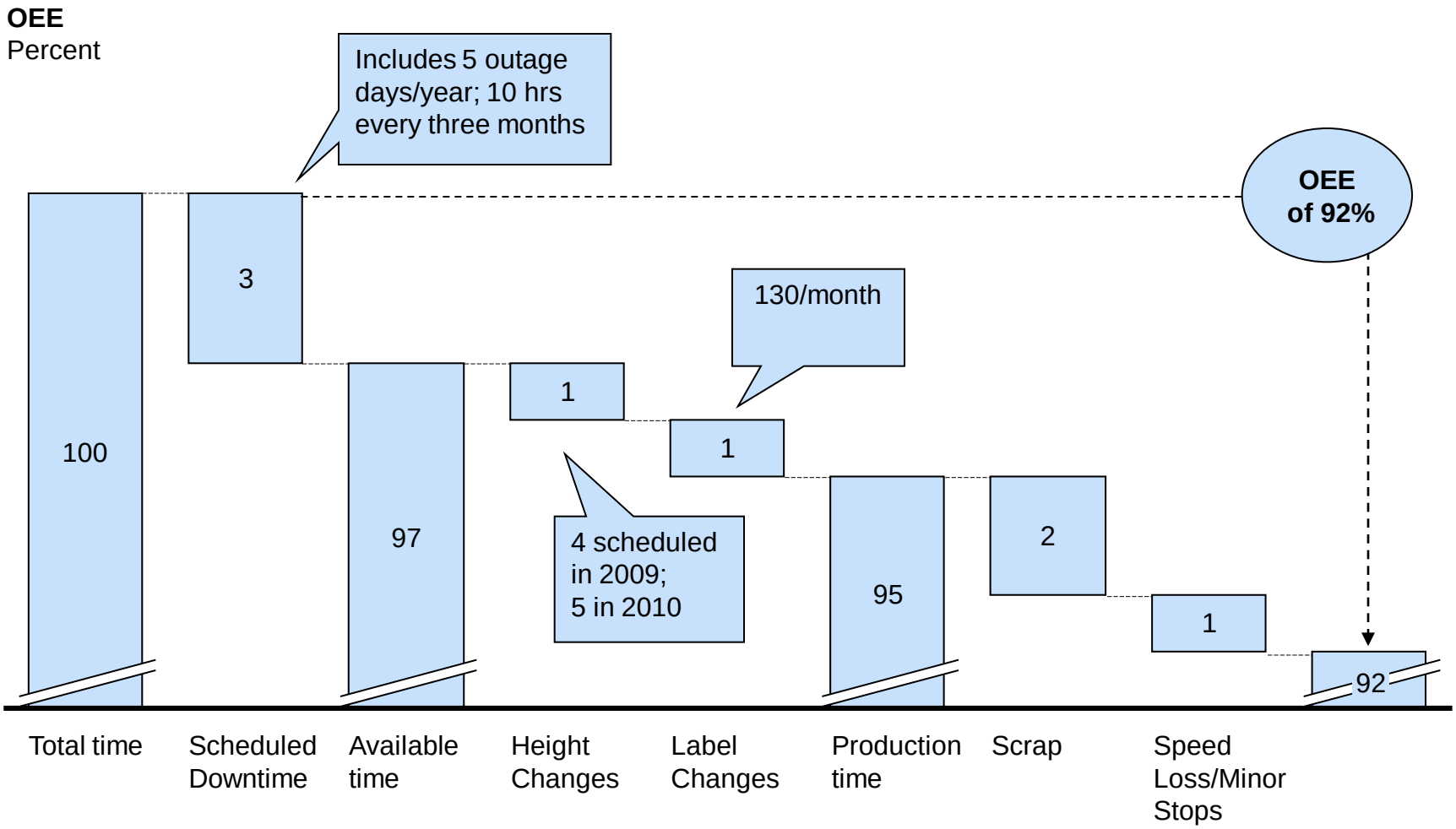
…or formed in line by a hydraulic transfer press





Typical OEE waterfall for two piece canmaking systems

EXAMPLE



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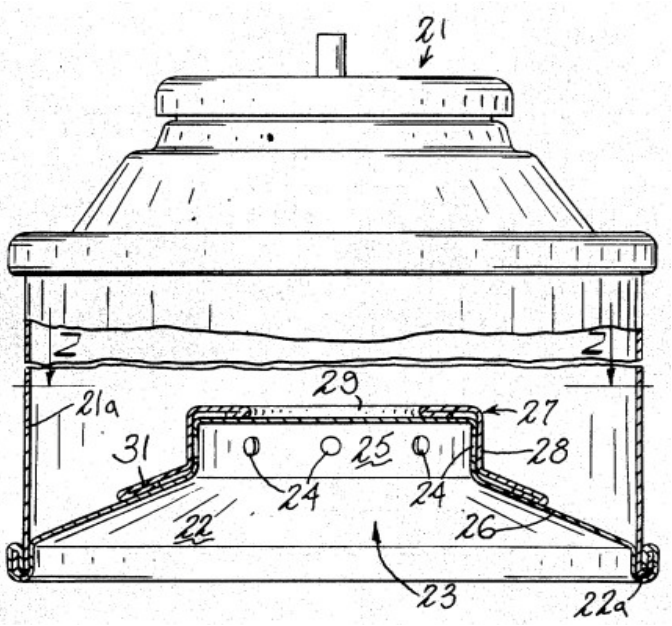
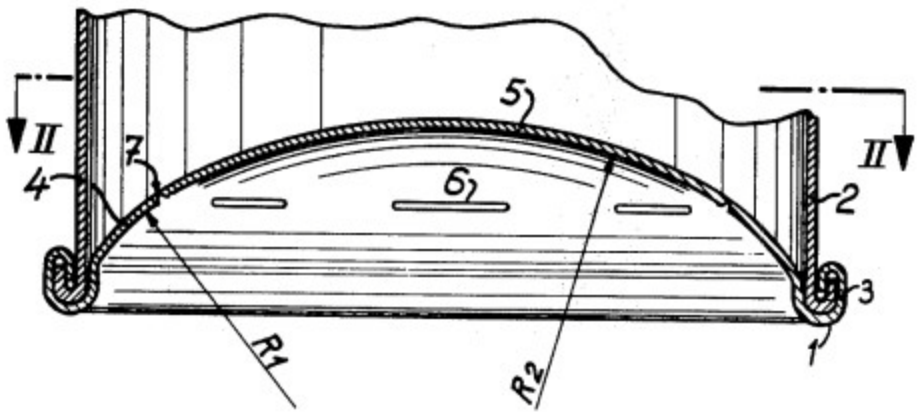


US Patent 3,759,414

Under intense pressure, wall 22 will begin to bulge outwardly in a downward direction.

The skirt portion forming leveler member is biased by shoulder portion causing disengagement of one wall from another

This disengagement lifts the closure member and allows excess built up pressure to escape through the apertures in the inverted cup-shaped closure.

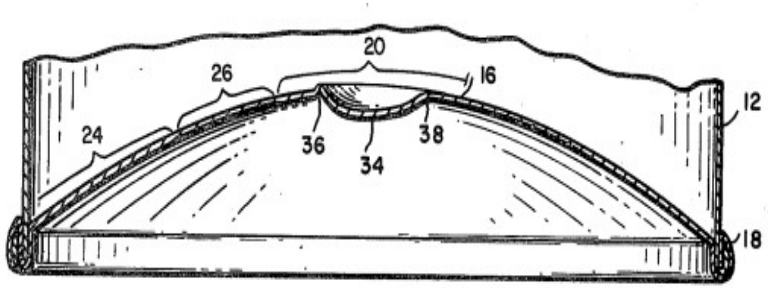


US Patent 4,003,505

Outwardly concave bottom divided into an outer annular frusto-spherical part and a central dome by a plurality of tangential scores spaced apart in circular configuration

The central part has a greater radius of curvature than the outer part

Scores weaken and the bottom deforms outwardly first while one or more of the scores gradually rip without propagation of the ripping to release the additional pressure

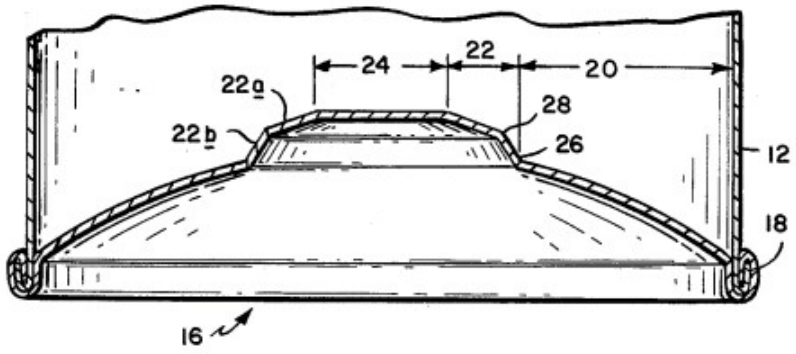


US Patent 4,433,791

Concave closure element circumferentially joined to one end of the container side wall

Deep drawing tempered steel with a convex tab member integrally formed in a central area

Structural integrity reacts to over-pressurization by undergoing a partial eversion initiating a fracture along the weakened line and an outward deflection of the tab member allowing the contents to escape through the fracture

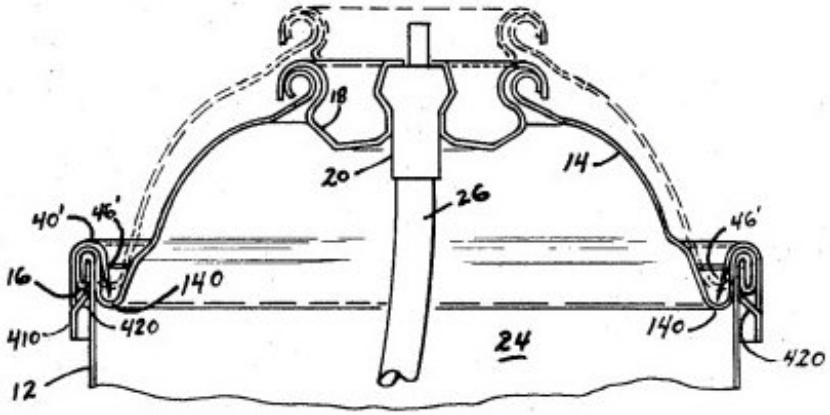


US Patent 4,580,690

Concave annular outer area integrally joined to an inwardly protruding circular central area by annular intermediate area

Juncture of annular outer and intermediate areas forms a first circular line of strain hardened material having a reduced thickness and increased hardness and strength compared to the material thickness, hardness, and strength of the annular outer area

Material along the first circular line will fracture at least one location, allowing the container contents to escape



US Patent 3,680,743

A dome venting cap, having a plurality of venting ports, is mounted exteriorly and directly located above the dimple

A fluted spike is formed by two tabs, projecting from opposite sides of the bridge and bent together such that the ends remote from the bridge to make contact and are spaced adjacent to the center of the flexing portion of the dimple

When internal pressure becomes excessive, portions of the dimple will flex with a snap action where the pointed and sharp ends defining the fluted spike will pierce an opening and allow the pressure to be released

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Purpose of the DOT In Regulating Packaging

- regulates the manufacturing and testing specifications for containers used for the transportation of hazardous materials in commerce.

- Specifications are found in in the Hazardous Materials Regulations of the Department of Transportation Bureau of Explosives 6000 Book part 178

DOT “2P”

- A DOT 2P container is used if the internal pressure is from 140 psig to 160 psig at 130° F (55° C).
- Destruction test must not burst below 240 psig. (or 1.5 times the maximum pressure of the contents at 130 ° F).
- Test one can out of each lot of 25,000 containers although many manufacturers increase their testing frequency.
- Minimum wall thickness for any container shall be 0.007 inch.
- Container print must be marked to show **DOT-2P** and name or symbol of person or company making the mark.

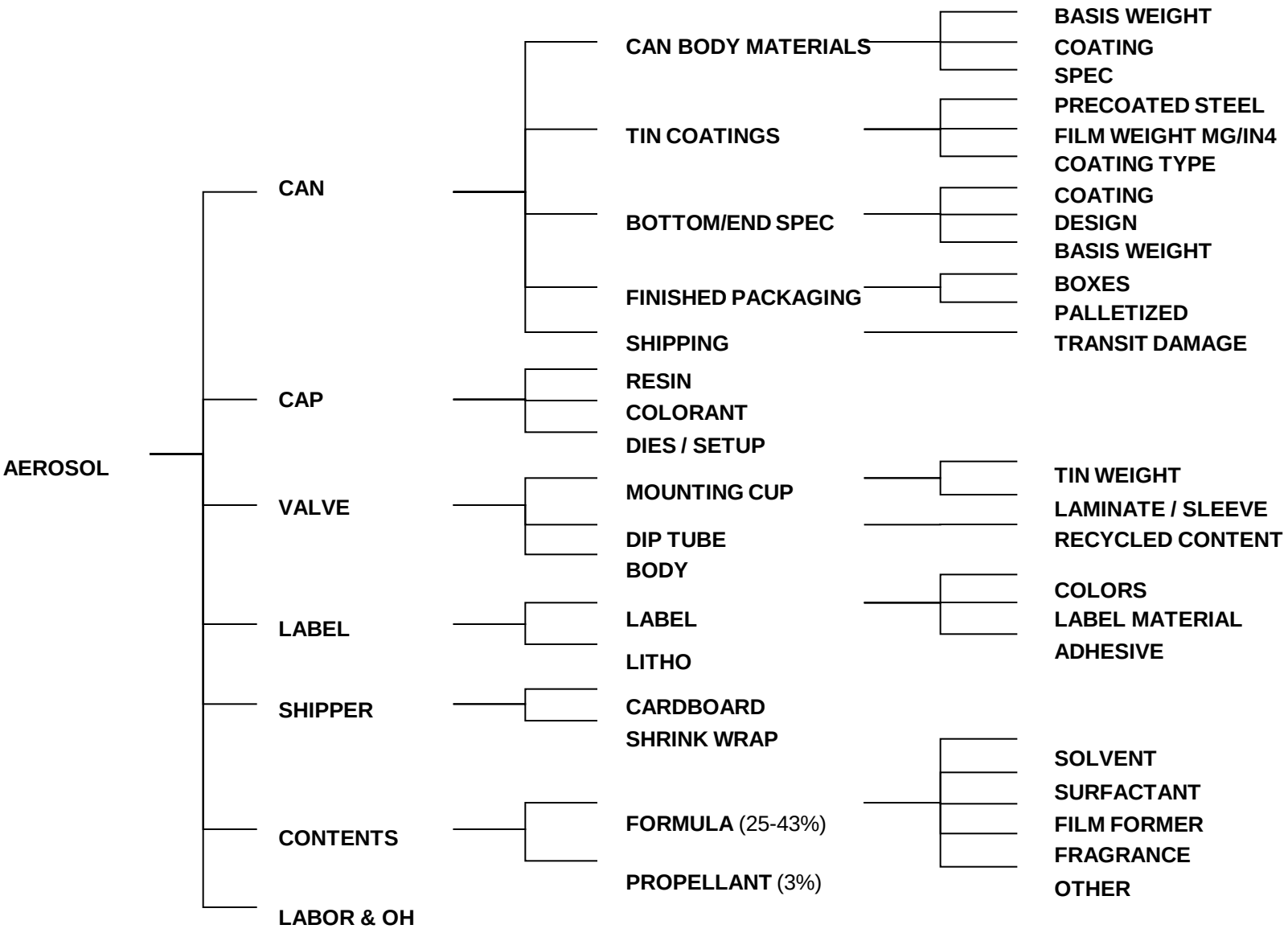
DOT “2Q”

- A DOT 2Q container is used if the pressure is from 161 psig to 180 psig at 130° F (55° C).
- Destruction test must not burst below 270 psig.)or 1.5 times the maximum pressure of the contents at 130 ° F).
- Test one can out of each lot of 25,000 containers although many manufacturers increase their testing frequency.
- Minimum wall thickness for any container shall be 0.008 inch.
- Container print must be marked to show **DOT-2Q** and name or symbol of person or company making the mark.

Special Permits

- Special permit containers must be plainly and durably marked **DOT-SP** followed by the special permit number assigned.
- In addition to the manufacturer's mark other DOT required information may be required.
- Special permits are granted by the DOT for special products or pressures that exceed the specifications of **2P**, **2Q** and **DOT-39**.
- Special Permits may also be granted for product handlers.

Opportunity tree for aerosol cans



Questions?

Thank you!!

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