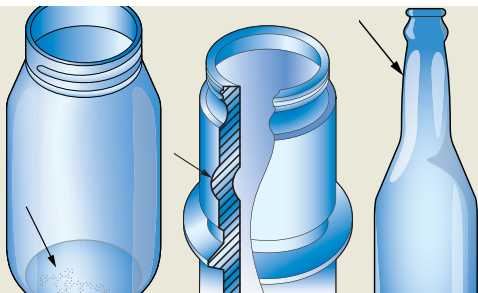


**BUCHER**  
emhart glass



**Glass container defects**  
Causes & remedies

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## **The examination of a container**

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A good container is a container that will go through the customer's filling line without causing any difficulty and will carry his product to the consumer.

Therefore, it is essential that before a container is released for sale from the glass plant, it successfully passes an inspection with standards set to meet the customer's needs.

There are approximately one hundred defects which can develop in the container during the production process, some beyond the control of the operator, for example stones; but by far the largest number occur either in the feeder or machine operation.

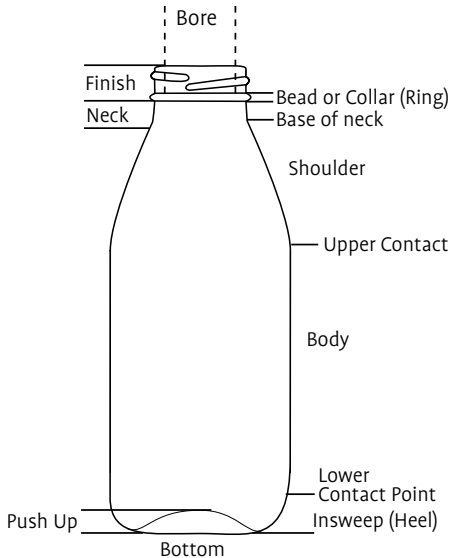
It is important that all production personnel learn to recognize the defects and understand what remedies to use in order to eliminate them.

When a glass container fails on the customer's filling line because of a manufacturing defect, the reputation of glass suffers, which results in a loss of customer goodwill.

Remedies offered hopefully give you a basic understanding of defects and their causes. In some instances, several remedies may be needed to correct the causes.

## The various parts of a container

---



**Finish** This is the top of the container above the neck ring parting line.

It includes:

- Sealing surface
- Bore
- Bead or collar (ring)

The sealing device is in the finish (see next section), also the bore or mouth for filling and emptying. The bead or collar is used to assist in transferring the parison into the blow mold.

**Neck** The part which extends from the parting line to the curve at the base of the neck.

**Shoulder** This extends from the base of the neck to the straight part of the body.

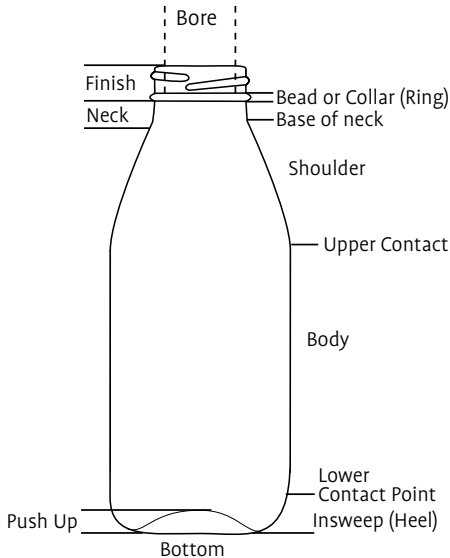
**Body** The main part of the container which holds the product.

**Bottom** The part of the container on which it stands when upright.

**Insweep (Heel)** The curve between body and bottom which helps to improve glass distribution and thus strength.

**Push-Up** The center of the bottom which is raised up to provide a flat surface on the outer edge of the bottom and thus provide a firm seating.

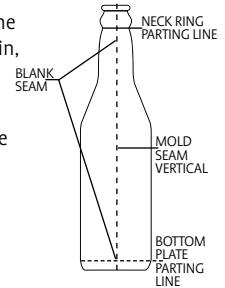
## The various parts of a container (cont'd)



When producing a glass container, various mold equipment items are used: blank mold, baffle, plunger, neck ring, blow mold and bottom plate. Where these items join, seams are produced in the container. If the seams do not meet the standard specified, the container is rejected. It is, therefore, essential that all mold equipment be examined in the mold shop and again in the production department. It must be stored correctly and handled with care at all times.

**Neck ring parting line** Where the neck ring and the blank mold join, there is a seam.

**Blank seam** The blank mold is in two parts. It closes around the neck ring and then receives the hot gob of glass. Where the two halves of the blank mold join, there is a seam that may appear as a wavy line on the container.



**Baffle mark** The baffle sits on top of the blank when counterblow takes place to form the parison. If there is a bad match between blank mold and baffle, then a baffle mark or seam may be seen in the container bottom.

**Mold seam** The blow mold action is the same as the blank except that it closes around the bottom plate. Where the two halves join, there is a mold seam, which runs vertically on the whole length of the container.

**Bottom plate parting line** Where the blow mold and bottom plate join there is a seam.

## Types of containers

To identify defects in a container, it is useful to know the various types and parts.

Note: the illustrations below are representative of a small sample of containers. Bucher Emhart Glass machines make and inspect a complete range of glass containers.

Bottle narrow neck



Jar wide mouth



Round



Non-round



## How to read a container

Punt marks are used by glass manufacturers to identify their containers. You can learn about containers by reading these punt marks.

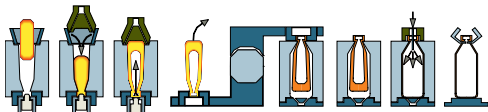
The term, punt mark, originated in the days of hand processing when the bottom (or punt) of a bottle was held by a metal rod while the operator completed the bottle making process.



- 1 Cavity Identification** The bumps on the heel and/or rings on the bottom enable inspection equipment to read the bottle information
- 2 Manufacturer's mark**
- 3 Additional information** may include plant identification, year manufactured, mold number, container capacity and fill level

## Forming processes

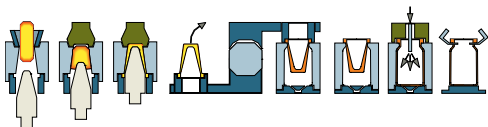
### Blow and blow



Blank side

Blow side

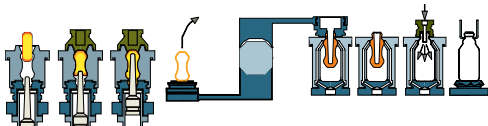
### Wide mouth press and blow



Blank side

Blow side

### Narrow neck press and blow



Blank side

Blow side

## Main types of sealing systems

The finish is one of the most vital parts of the container. It must be free of all serious defects to guarantee complete sealing on the filling line. Some defects, such as crizzles on the top sealing surface, may cause a container to leak slowly; which will only be discovered when opened and the contents found to be stale or to have spoiled.

### 1. Top Sealing

Crown Cork - The sealing surface is on the top of the finish and used for narrow neck containers being filled under pressure.



Thread or Lug - The sealing surface on the top of the finish is closed by a screw type cap. Used for wide mouth jars and narrow neck bottles.



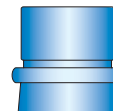
### 2. Side Sealing

The sealing surface is on the side of the finish and the cap is pressed on to seal the contents. It is used for wide mouth jars in the food industry.



### 3. Cork Sealing

The seal is made on the inside of the finish. It is used with narrow neck bottles.





## Suggestions for remedying container defects

It is essential that the machine operator be able to identify defects quickly and accurately, and to know how to remedy them. In this handbook all the major defects have been listed with an accurate description and sketch indicating the appearance of the defect and the position in the container where it is most commonly found.

On the left page, the causes of the defect have been listed and in a corresponding position on the right hand page are the remedies.

The operator should frequently examine the containers passing along the conveyor from machine to stacker. Approximately once every 20 minutes, but depending on production speed, one container from each mold should be set out and allowed to cool so it can be handled and thus examined more closely for defects.

### Before correcting a defect, always consider:

1. How many of the particular defects are rejects?
2. If corrected, what other types of defects may be produced as a result of the adjustment made?
3. Only make adjustments when certain it will produce a better container. For example:

If a few checks were appearing in the finish, do not immediately reduce settle blow pressure or time, if it is known that the finish or bore will then be outside specification.

## Definition of terms used

Incorrect	Too high or too low Too much or too little Too long or too short
Blank	Blank mold
Mold	Blow mold
Parison	The shape of the hot glass as it comes from the blank mold

Alphabetical listing within sections-  
Causes and remedies:

- A. Feeder
- B. Machine setup and operation
- C. Mold equipment
- D. Conveyor
- E. Stacking equipment
- F. Inspection equipment
- G. Lehr equipment
- H. Vertiflow

## Section 1 Finish Defects

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## Bent or Crooked Finish

---

### Definition

A finish which has a bent or crooked appearance.



### Causes

#### A. Feeder

1. Glass is too hot

#### B. Machine setup and operation

1. Finish equipment is running too hot
2. Neck ring closing too soon on invert
3. Blowhead not set correctly
4. Blowhead equalizing holes blocked
5. Neck ring pulling to one side
6. Take out tongs not set properly or not in line
7. Machine speed too high
8. Insufficient cooling of mold equipment
9. Badly cushioned invert action
10. Take out action too fast and badly cushioned
11. Missing neck ring holder springs
12. Check for missing NR holder springs

#### C. Mold equipment

1. Blow mold neck diameter too large so that the parison cannot settle properly in blow mold
2. Blow mold neck diameter too small, causing the parison to be held up and allowing distortion by the blowhead
3. Blowhead too deep
4. Neck ring incorrectly manufactured - finish and outside dimensions not concentric

### Remedies

#### A. Feeder

- Adjust gob temperature

#### B. Machine setup and operation

- Use finish cooling nozzle
- Adjust neck ring closing
- Adjust blowhead setting
- Change blowheads
- Change neck ring and when possible check the neck ring mechanism setting
- Adjust take out tong setting over mold
- Reduce the machine speed
- Increase the cooling wind to the molds
- Cushion invert action
- Slow down take out operation

#### C. Mold equipment

- Check dimensions in accordance with mold design
- Depth of blowhead to be in accordance with mold design book
- Ensure finish dimensions are concentric with outside dimensions

## Blisters

---

### Definition

Large bubbles in the glass.  
May appear on the finish, sidewall, or base.



### Causes

1. Furnace glass level is too low

#### A. Feeder

1. Foreign matter or contamination in the forehearth channel
2. Cold glass on the feeder plunger or channel walls
3. Not enough heat around the plunger
4. Plunger too low or too high over the orifice ring
5. Plunger rubbing on the sides of the orifice ring
6. Shears cutting too close to the plunger
7. Orifice ring too large for the gob weight
8. Point of the plunger is worn

#### B. Machine setup and operation

1. Hot blanks and plungers



### Remedies

#### A. Feeder

- Drain the forehearth channel
- Increase the fire in the spout
- Raise or lower plunger height and correct gob weight and shape (may need to change orifice ring)
- Centralize the plunger
- Lower the shear height
- Change orifice ring to a smaller one
- Change the feeder plunger

#### B. Machine setup and operation

- Increase blank cooling and plunger cooling

## Broken Finish

---

### Definition

A finish which has cracks or actual pieces of glass broken out of it.



### Causes

#### A. Feeder

1. Glass too cold

#### B. Machine setup and operation

1. Plunger contact time too long
2. Finish equipment running too cold
3. Incorrect adjustment of plunger mechanism height (too low - too high)
4. Mold is closing too late
5. Bad end of stroke cushioning of invert mechanism on blow mold side
6. Take out tongs are out of line
7. Take out tongs are set too high
8. Take out tongs are closing too hard
9. Blowhead or internal cooling nozzle out of line
10. Neck ring is opening too fast

#### C. Mold equipment

1. Bad match between blank and ring

#### E. Stacking equipment

1. Careless handling of cold ware

#### F. Inspection equipment

1. Faulty gauging heads
2. Incorrectly set gauging heads

### Remedies

#### A. Feeder

- Adjust the glass temperature

#### B. Machine setup and operation

- Shorten plunger contact time
- Use a smaller neck ring
- Adjust plunger mechanism height
- Adjust mold to close earlier
- Improve cushioning of transfer on blow mold side
- Realign take out tongs
- Lower take out tongs
- Slow down the action of take out tongs
- Realign blowhead and cooling tube
- Reduce speed of neck ring opening

#### C. Mold equipment

- Check the blank mold and neck ring match with the mold gauge

#### E. Stacking equipment

- Check the setting and operation of push bar and tong heads on the stacker

#### F. Inspection equipment

- Change the gauging heads
- Reset the gauging heads

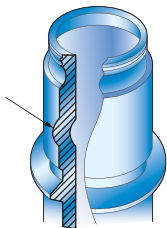
## Bulged Finish

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### Definition

A finish which is bulged out of shape, either by blowing or mechanical action.

Note: It may prevent good capping of the container, which will spoil the product.



### Causes

#### A. Feeder

1. Glass too hot
2. Incorrect gob shape

#### B. Machine setup and operation

1. Finish is not set hard enough, caused by insufficient time and/or pressure of settle blow, or a dry blank, reducing the contact between glass and finish mold equipment
2. Plunger contact time is too short
3. Neck ring is too hot
4. Internal cooling tube too large, or too small exhaust hole
5. Blowhead out of alignment
6. Not enough counterblow

#### C. Mold equipment

1. Blowhead is too shallow, causing contact
2. Equalizing holes blocked in blowhead
3. Neck of mold too small for parison, causing contact between blowhead and finish

### Remedies

#### A. Feeder

- Adjust gob temperature
- Reshape the gob

#### B. Machine setup and operation

- Increase settle blow time and swab the blank
- Increase the plunger contact time
- Use the neck ring cooling nozzle
- Use a smaller final blow tube and/or a larger exhaust hole
- Realign the blowhead over the mold
- Increase the counterblow

#### C. Mold equipment

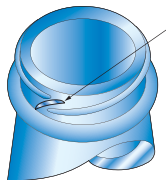
- Increase the depth of blowhead
- Clear vent holes in blowhead
- Check neck of mold for correct size

## Checked Finish or Finish Tear

---

### Definition

A finish which has a light surface crack in the threads or in the middle of the finish.



### Detection

A check can usually be seen by turning the bottle in order to catch the reflection of the light.

### Causes

#### A. Feeder

1. Glass too cold
2. Bad shear mark
3. Gob too pointed

#### B. Machine setup and operation

1. Neck ring set too low; rubbing on the top of the mold causing the ring to be lifted in the neck ring arm
2. Neck ring arms not set at the same height causing a strain when the blank opens
3. Neck ring arm not square
4. Too much settle blow, pressure and/or time of application
5. Neck ring or plunger too cold
6. Improper invert mechanism end of stroke cushioning

(Continued on next page)

### Remedies

#### A. Feeder

- Adjust gob temperature
- Change shears
- Adjust gob shape

#### B. Machine setup and operation

- Set neck ring arms to neck ring setting gauge
- Check invert mechanism with neck ring mechanism aligning fixture
- Change the neck ring arms
- Reduce settle blow time and/or pressure
- Reduce plunger cooling time and/or pressure
- Check cushioning of invert mechanism
- Reduce cooling wind
- Fit drip pan to deflector
- Reduce oil spray
- Adjust neck ring opening

(Continued on next page)

## Checked Finish or Finish Tear (cont'd)

---

### Causes

#### B. Machine setup and operation

7. Too much cooling wind from finish cooling nozzle, mainly on press and blow
8. Too much oil and water running down from deflector into the neck ring
9. Too much oil spray
10. Neck ring not releasing properly (too dry or opening too fast or too slow)
11. Incorrect height adjustment of plunger mechanism
12. Baffle down too hard causing additional deflection of mold holder
13. Interlock between blank and ring dirty, causing neck to open when blank opens
14. Too long vacuum time, resulting in cooling the finish mold equipment

#### C. Mold equipment

1. Neck ring radius too sharp, thread not relieved
2. Neck ring cavity not polished
3. Improper fitting between blank and ring
4. No relief at blank and neck ring match
5. Neck ring size too large

### Remedies

#### B. Machine setup and operation

- Adjust height of plunger mechanism
- Adjust the speed of baffle mechanism
- Change blank mold
- Reduce the vacuum time

#### C. Mold equipment

- Relieve threads in neck ring
- Polish neck ring cavity
- Check against mold gauges
- Proper relief of blank and neck ring
- Use a smaller neck ring mold

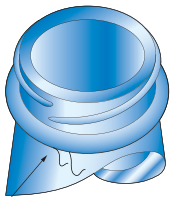


## Checks under Finish

---

### Definition

Surface cracks which occur on or near the parting line between the neck and the finish.



### Detection

It can usually be detected by turning the container and catching the light as it is reflected.

### Causes

#### A. Feeder

1. Gob temperature incorrect

#### B. Machine setup and operation

1. Mold closes too soon or too fast
2. Mold holders are badly worn
3. Neck ring holders bent
4. Neck ring arms not square
5. Take out tongs close too fast
6. Take out tongs are wet with oil
7. Take out tongs are out of line
8. Parison is not setting down in mold so that blowhead pushes finish downward

(Continued on next page)

### Remedies

#### A. Feeder

- Check setting of gob temperature. Adjust if necessary.

#### B. Machine setup and operation

- Adjust mold closing action
- Check mold holder for dimensions according to repair data
- Check neck ring holders to repair drawing dimensions
- Check Invert mechanism with neck ring aligning fixture
- Retard closing of take out tongs
- Take out tongs should be checked to remove any oil

(Continued on next page)

## Checks under Finish (cont'd)

---

### Causes

#### B. Machine setup and operation

9. Worn blank linkage causes one side of blank to go past the center, setting up a strain as blank opens
10. Neck ring holders set too low on blow mold causing strain on neck ring during blank opens
11. Neck ring opening too fast
12. Plunger mechanism too high or too low. If plunger is too high, it pushes up the neck ring and causes it to slide against the blank when opening. If too low, the blank will lift the neck ring when closing or opening.
13. Bottom plate too high or too low
14. Too much cooling wind on the nozzles
15. Poor and Irregular mold swabbing
16. Offset mold in top plate
17. Invert to slow-transfer on the fly
18. Invert bouncing over mold
19. Blowhead exhaust, too much finish cooling down before takeover picks up
20. Check deflection bracket on mold side

#### C. Mold equipment

1. Neck diameter of blank is larger than neck diameter of mold
2. Take out tongs are faulty, wrong design or material
3. Take out tong diameter too small
4. Take out tongs are not relieved correctly
5. Neck ring worn on the parting line

(Continued on next page)

### Remedies

#### B. Machine setup and operation

- Take out tongs should be checked for alignment
- Mold neck to be checked for correct size and shape
- Mold opening and closing linkage should be renewed
- Check neck ring, adjust using neck ring setting gauge if necessary
- Adjust neck ring opening for smoother action
- Check for relief on mold shoulder radius
- Adjust the setting of the bottom plate mechanism for correct height
- Reduce the cooling wind on the molds and check the cooling wind setup
- Swab regularly with a clean and dry swab of correct shape

#### C. Mold equipment

- Ensure neck diameter of mold is larger than neck diameter of blank
- Ensure take out tongs have correct clearance
- Relieve take out tongs
- Use new neck ring

(Continued on next page)

## Checks under Finish (cont'd)

---

### Causes

#### C. Mold equipment

6. Shoulder radius too sharp (high shoulder bottles)
7. Bottom plate too tight in mold recess
8. No radius on top of mold cavity
9. Radius of neck ring bead is too sharp

#### E. Stacking equipment

1. Incorrect setting of tong head or gripping fingers at stacker pick-up point
2. Wrong material or lack of insulation on tong head or gripping fingers

### Remedies

#### C. Mold equipment

- Check for relief on mold shoulder radius
- Use mold gauges to check mold equipment
- Ensure radius on top of mold cavity
- Relieve radius on neck ring head

#### E. Stacking equipment

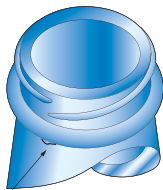
- Check for correct setting of tong head or gripper fingers

## Chipped Finish

---

### Definition

A finish from which a small section is broken on the top or side.



### Causes

#### A. Feeder

1. Glass too cold

#### B. Machine setup and operation

1. Neck ring closing too soon when reverting, pinching the finish
2. Insufficient or unequal neck ring opening
3. Incorrect cushioning of invert mechanism on the blow mold side
4. Neck ring opening too hard
5. Incorrect setting of blowhead (out of center)
6. End of outstroke cushioning on take out incorrect
7. Take out tongs are out of line or closing too hard
8. Incorrect setting of neck ring over the mold
9. Bottom plate too high

#### C. Mold equipment

1. Bottom plate too tight in mold recess (resulting in mold opening too hard)
2. Shoulder radius too sharp (for odd shape bottles) causing bottles to rock on bottom plate, resulting in damage from take out fingers

(Continued on next page)

### Remedies

#### A. Feeder

- Adjust the feeder temperature

#### B. Machine setup and operation

- Retard neck ring closing
- Increase neck ring opening
- Adjust cushioning of invert mechanism
- Adjust neck ring opening for smoother action
- Adjust blowhead over blow mold
- Adjust outstroke cushioning on take out mechanism
- Adjust take out tongs, allowing them to close slower
- Set neck ring over blow mold to neck ring setting gauge
- Correct the bottom plate mechanism setting

#### C. Mold equipment

- Check equipment against mold gauges
- Ensure shoulder radius has some relief

(Continued on next page)

## Chipped Finish (cont'd)

---

### Causes

#### E. Stacking equipment

1. Incorrect setting of stacker bar (pushbar stacker)
2. Incorrect timing or setting of tong stacker head
3. Incorrect positioning of ware on cross conveyor (gang stacker or push bar stacker)

#### F. Inspection equipment

1. Incorrect operation of gauging equipment

### Remedies

#### E. Stacking equipment

- Correct setting of stacker bar
- Correct setting and/or timing of stacker tong head
- Correct positioning of ware on cross conveyor

#### F. Inspection equipment

- Correct timing of gauging equipment (cold end inspection)

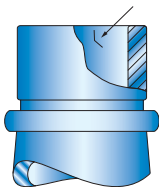
## Corkage Check or Tear

---

### Definition

A vertical surface check located in the inside of the finish.

Note: It may cause leakage and thus spoil the product.



### Causes

#### A. Feeder

1. Glass is too cold

#### B. Machine setup and operation

1. Too much settle blow, pressure, and/or time of application
2. Plunger is too cold
3. Plunger contact time is not correct. If contact time is too long, the interior of the finish is cooled. If it is too short, the plunger may run cold, thus causing checks.
4. Internal cooling nozzle loose or bent or not properly set, causing it to rub the inside of finish (by contact)
5. Drops of oil on the plunger

#### C. Mold equipment

1. Plunger dirty, sticking in thimble guide ring
2. Incorrect plunger design
3. Incorrect plunger and cooling tube design (press and blow)

### Remedies

#### A. Feeder

- Adjust the glass temperature

#### B. Machine setup and operation

- Reduce settle blow pressure
- Adjust the plunger cooling
- Adjust plunger contact time
- Check internal cooling nozzle - correctly fitted and straight
- Fit drip to deflector

#### C. Mold equipment

- Change plunger and thimble
- Adjust plunger design
- Adjust plunger and cooling tube design

## Crizzled Finish

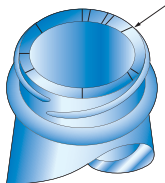
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### Definition

A finish with many fine surface fractures, mainly across the top.

### Detection

It is difficult to detect these crizzles, as they do not reflect light very well. Extra care must be taken to detect them.



### Causes

#### A. Feeder

1. Glass too cold

#### B. Machine setup and operation

1. Plunger is too cold
2. Water in final blow air
3. Excessive off spray on plunger and neck ring doping or blank doping
4. Final blow air chilling the top of the finish when no internal cooling nozzle is used, or when orifice in blowhead is too large
5. Vacuum applied for too long
6. Take out tongs cold

#### C. Mold equipment

1. Blowhead too shallow or too deep
2. Take out tongs too tight
3. Neck ring radius too sharp and form not polished

### Remedies

#### A. Feeder

- Adjust gob temperature

#### B. Machine setup and operation

- Reduce plunger cooling air
- Blow out the final blow air line
- Reduce doping oil
- Use final blow tube with smaller hole
- Reduce the vacuum time
- Insulate take out tongs

#### C. Mold equipment

- Correct the depth of blowhead
- Check take out tongs for clearance
- Polish and relieve neck ring form

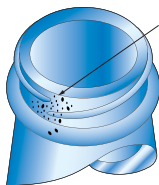
## Dirty or Rough Finish

---

### Definition

A finish which has a scaly appearance and which may even have black spots on it.

Note: If it is badly pitted, it will cause sealing problems on the filling line.



### Causes

#### A. Feeder

1. Shears not cutting correctly

#### B. Machine setup and operation

1. Neck ring and plunger are being swabbed too much
2. Excessive sulphur powder on the neck ring
3. Swab is dirty or made of incorrect material
4. Excessive oil spray on finish equipment
5. Wrong grade of lubricant on delivery equipment
6. Neck ring running too hot, causing scaling of the material
7. Plunger running too cold

#### C. Mold equipment

1. Wrong grade of mold material used
2. Poor surface on the finish equipment
3. Neck ring size too small (running too hot)

### Remedies

#### A. Feeder

- Correct the shear cut

#### B. Machine setup and operation

- Change plunger and neck ring
- Change neck ring
- Use a clean swab of correct shape
- Reduce the oil spray
- Use the correct grade of lubricating oil on delivery equipment
- Use neck ring cooling nozzle

#### C. Mold equipment

- Use better grade mold material
- Improve polishing of mold and neck ring
- Use a larger size neck ring

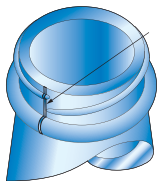


## Neck Ring Seam

---

### Definition

A fin or seam of glass lying across the top or side of the finish.



### Causes

#### A. Feeder

1. Glass is too hot

#### B. Machine setup and operation

1. Neck ring not closing properly because of carbon accumulation or glass in ring
2. Finish and locking thimble not engaging correctly in the guide ring
3. Plunger up pressure too high (press and blow)
4. Blank closing pressure too low (press and blow)
5. Blank supporting mechanism worn
6. Wear on mold opening and closing mechanism linkage
7. Improper timing of the machine

#### C. Mold equipment

1. Blank mold recess for neck ring too large or neck ring diameter too small
2. Neck ring, finish guide ring, or finish thimble worn, dirty, or out of dimension
3. Interference between tongue and groove of neck ring
4. Blank volume too small for glass weight and plunger size (press and blow process)

### Remedies

#### A. Feeder

- Adjust feeder temperature

#### B. Machine setup and operation

- Change neck ring
- Change thimble and/or adjust height of plunger mechanism
- Reduce pressing pressure
- Check blank closing pressure
- Change blank supporting mechanism linkage
- Change linkage on blank closing mechanism
- Check loading position and timing

#### C. Mold equipment

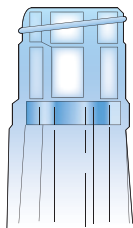
- Check against gauges
- Renew neck ring
- Check clearance between tongue and groove, neck ring and blank
- Check blank/plunger volume (press and blow process)

## Offset Finish

---

### Definition

A finish formed out of alignment, either vertically or horizontally.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Neck ring out of alignment over top of mold
2. Neck ring arms not square
3. Improper cushioning of transfer action
4. Incorrect or insufficient cooling wind setting - neck rings too hot
5. Loss of tension in neck ring spring
6. Improper timing relationship between transfer and mold closing

#### C. Mold equipment

Poor match between neck ring and blank mold

1. Ring dovetail is too small
2. Recess in blank is too large
3. Mold neck is too large
4. Guide ring worn
5. Blowhead out of alignment

### Remedies

#### A. Feeder

- Adjust the temperature of the glass

#### B. Machine setup and operation

- Realign neck ring arm using neck ring setting gauge
- Check invert mechanism with neck ring aligning fixture
- Improve cushioning of transfer action
- Correct cooling wind setting
- Reset neck ring opening
- Correct timing between transfer and mold close

#### C. Mold equipment

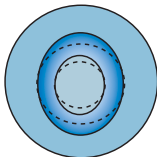
- Check with the mold gauge
- Check dimensions against mold designs
- Replace the blow mold
- Change the neck ring
- Realign the blowhead correctly over the mold

## Out-of-Round and Off-Gauge Finishes

---

### Definition

Finish which is oval-shaped and which may be pinched or flattened.



### Detection

Gauges are usually supplied to check for this defect.

### Causes

#### A. Feeder

1. Glass is too hot

#### B. Machine setup and operation

1. Neck ring is running too hot
2. Insufficient settle blow time or pressure
3. Too high production speed
4. Excessive final blow pressure
5. Take out tongs not in line, or incorrect timing
6. Insufficient finish cooling
7. Plunger contact time too short (press and blow)
8. Plunger up pressure too low (press and blow)
9. Blowhead not central

#### C. Mold equipment

1. Neck ring out-of-round due to poor cleaning
2. Blowhead improperly vented
3. Take out tongs too small
4. Equalizing vents not correct or plugged in blowhead
5. Take out tongs not square
6. Neck ring spring weak

### Remedies

#### A. Feeder

- Adjust gob temperature

#### B. Machine setup and operation

- Use neck ring cooling nozzle
- Increase settle blow time and/or pressure
- Reduce the machine speed
- Reduce the final blow pressure
- Realign take out tongs and check the timing
- Increase cooling wind
- Increase plunger contact time
- Increase plunger up pressure
- Centralize the blowhead over the blow mold

#### C. Mold equipment

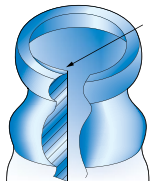
- Change neck ring
- Correct venting of blowhead
- Check take out tongs for dimensions
- Realign take out tongs for dimensions
- Check mold neck for oval. Correct if necessary.
- Change the neck ring holders

## Overpress or Wire Edge

---

### Definition

A finish which has excessive glass projecting upward from the inside edge of the finish.



### Causes

#### A. Feeder

1. Gob weight too high

#### B. Machine setup and operation

1. Plunger too late in loading position allowing glass to flow between plunger and neck ring
2. Dirty thimble or guide ring preventing plunger from making complete stroke
3. Plunger mechanism is set too low (blow and blow)
4. Plunger loading screw too long (press and blow)
5. Dirt on top of plunger cylinder
6. Glass under invert barrel at the stop blocks

#### C. Mold equipment

1. Plunger diameter is too small
2. Plunger body too short (press and blow)
3. Parison volume too small
4. Plunger match with neck ring too loose

### Remedies

#### A. Feeder

- Reduce gob weight

#### B. Machine setup and operation

- Correct timing between feeder and machine for correct loading position
- Change thimble, guide ring and neck ring
- Adjust plunger mechanism height
- Use correct loading screw length
- Clean the top of the plunger cylinder

#### C. Mold equipment

- Check for correct clearance between plunger and guide ring
- Check for correct design of plunger
- Redesign parison

## Seeds

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### Definition

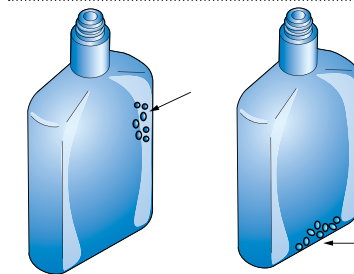
Very small bubbles in the glass.  
May appear on the finish, sidewall, or base.

Note: This defect cannot always be remedied by the production personnel.



### Causes

1. Furnace pull is too high
2. Furnace temperatures too low
3. Glass composition out of control
4. The atmosphere in the rear of the furnace contains carbon monoxide (CO)



### Remedies

#### A. Feeder

- Adjust air/gas mixture in the forehearth to give “flameless” combustion

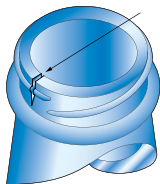
## Split Finish

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### Definition

A finish which has a crack across the top surface extending from the top of the finish down towards the neck.

Note: It causes leakage on vacuum-packed or processed foods and must be corrected at once.



### Detection

It can be seen by catching the reflection of the light while turning the bottle

### Causes

#### A. Feeder

1. Glass too cold
2. Poor shear cut or too much water on shears, resulting in cold gob tip
3. Gob weight variation

#### B. Machine setup and operation

1. Plunger contact time too long resulting in cooling the finish too much
2. Too much settle blow, either pressure or time of application
3. Plunger or neck ring too cold (neck ring applies to press and blow)

(Continued on next page)

### Remedies

#### A. Feeder

- Adjust the gob temperature
- Change shear blades and/or reduce water on shears
- Examine the feeder to find out reason for the weight variation
- Check for line on finish

#### B. Machine setup and operation

- Shorten plunger contact time
- Reduce the settle blow pressure and/or time
- Reduce the plunger or neck ring cooling
- Reduce the air pressure on plunger down
- Check alignment of neck ring
- Tighten the plunger adaptor

(Continued on next page)

## Split Finish (cont'd)

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### Causes

#### B. Machine setup and operation

4. Too much air on plunger down, for press and blow (mechanical action)
5. The two neck ring halves not aligned (mechanical action)
6. Plunger and/or plunger adaptor loose (if quick change Is used)
7. Plunger locking plate loose (if plunger mech. 191-5084 Is used)
8. Blowhead arm Incorrectly set (not aligned with mold)
9. Final blow air too early, before blowhead Is down
10. Internal cooling nozzle bent, touching the finish
11. Excessive plunger pressure and/or time of application, press and blow operation
12. Incorrect and excessive plunger cooling
13. Misalignment of plunger mechanism
14. Take out tongs too cold - cover with suitable material
15. Too much finish cooling on the blow mold side
16. Baffle arm coming down too hard
17. Invert bouncing over mold during transfer
18. Plunger/thimble speed (blow and blow)
19. Candelabra could have broken spring(s) (blow and blow)

(Continued on next page)

### Remedies

#### B. Machine setup and operation

- Change plunger locking plate
- Realign blowhead arm
- Delay final blow
- Change internal cooling tube
- Reduce the plunger pressing time or pressure
- Adjust the plunger cooling
- Realign plunger mechanism
- Cover take out tongs with a suitable material
- Reduce the finish cooling over the blow mold
- Check cushioning and speed of baffle arm
- Check for spring and tension In neck ring holder

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## Split Finish (cont'd)

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### Causes

#### C. Mold equipment

1. Neck ring joints worn, allowing counterblow to blow on outside of finish.
2. Blowhead too shallow causing contact
3. Blowhead too deep, causing part to bounce and hit the blowhead
4. Neck ring size is too large
5. Insufficient blank volume
6. Improper blank shape causing higher pressing pressure to be used (press and blow)
7. Pressing gate too small
8. Plunger tip too long

### Remedies

#### C. Mold equipment

- Change neck ring
- Check for correct blowhead depth
- Change to a smaller neck ring
- Increase blank volume
- Correct the blank shape for easier pressing
- Increase size of pressing gate
- Shorten plunger tip



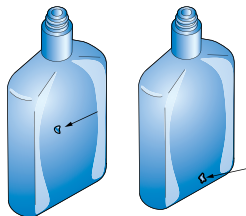
## Stones

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### Definition

Small pieces of refractory or unmelted batch materials. May appear on the finish, sidewall, or base.

Note: The production personnel cannot cure this defect, but it must be reported immediately as it is symptomatic of more serious trouble.



### Some Possible Causes

1. Refractories from the furnace or forehearth are falling into the molten glass
2. Batch materials are contaminated or Incorrectly melted
3. Furnace pull may be too high
4. Flames impinging on furnace refractories
5. Contaminated cullet

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## Tear under Finish

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### Definition

A finish which has a small surface section of glass torn from under it.



### Causes

#### A. Feeder

1. Cold glass
2. Gob too pointed

#### B. Machine setup and operation

1. Neck ring holder too loose or too tight or not set at the proper height. If too tight, they may close on the neck ring past the center of the blank pulling out glass. If too loose, they may shake the neck ring causing pull out of glass. Not very common and more usual on blow and blow than on press and blow. The problem is more acute if the glass is cold.
2. Blank opens too fast
3. Plunger mechanism incorrectly set; too high or too low
4. Baffle coming off late
5. Thimble down and blank open

#### C. Mold equipment

1. Poor blank and neck ring match

### Remedies

#### A. Feeder

- Adjust gob temperature
- Correct the gob shape - remove the point

#### B. Machine setup and operation

- Check with neck ring setting gauge
- Slow down blank opening action
- Check setting of plunger mechanism relative to neck ring and blank

#### C. Mold equipment

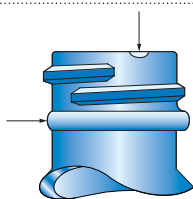
- Check against mold gauges

## Unfilled Finish

---

### Definition

A finish which is incompletely filled in the top, the bead, or the thread.



### Causes

#### A. Feeder

1. Glass too cold
2. Gob weight is low (press and blow)
3. Incorrect gob shape

#### B. Machine setup and operation

1. Insufficient settle blow time or pressure
2. Baffle holds plugged with glass
3. Improper loading, gob hanging up in delivery
4. Poor deflector alignment
5. Too low pressing pressure (press and blow)
6. Neck ring or plunger or guide ring too dirty (only press and blow)
7. Counter blow too early (blow finish away)
8. Insufficient blank swabbing and/or plunger or neck ring doping
9. Gas formation inside of the blank which does not allow the gob to enter the neck ring
10. Insufficient vacuum application time

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### Remedies

#### A. Feeder

- Adjust temperature of the glass
- Increase weight
- Reshape the gob

#### B. Machine setup and operation

- Increase settle blow
- Change baffle
- Improve loading by use of better grade of spray oil or smaller deflector
- Align deflector with center of blank mold
- Increase pressing time and/or pressure
- Change neck ring and plunger
- Retard counterblow
- Swab blanks more frequently, adjust doping spray
- Improve venting of finish equipment
- Increase vacuum time
- Readjust baffle and funnel timing
- Use neck ring cooling nozzle

(Continued on next page)

## Unfilled Finish (cont'd)

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### Causes

#### B. Machine setup and operation

11. Incorrect setting of baffle and funnel and respective operating arms
12. Neck ring running too hot
13. Plunger too low (press and blow operation)
14. Hot blanks - hang ups
15. New neck ring and old plungers
16. Guide ring vacuum holes filled with glass

Note: After blanks get worn, the neck ring radius will vary. You may need to switch equipment around to find match.

#### C. Mold equipment

1. Insufficient venting of finish equipment
2. Dirty neck ring equipment
3. Unsuitable finish equipment (blow and blow)
4. Design of parison is unsuitable (press and blow)
5. Funnel size too small

### Remedies

#### B. Machine setup and operation

- Check if correct loading position is used
- Reduce blank mold temperature - correct cooling and swab
- Switch blanks around front to back

#### C. Mold equipment

- Improve venting of neck ring equipment
- Change neck ring
- Change size of neck ring
- Use proper blank and plunger design
- Check funnel size

## Section 2 Neck Defects

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## Bent Necks

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### Definition

A neck where the finish is tilted to one side.

Note: It can cause trouble on the filling line and should be corrected at once.



### Causes

#### A. Feeder

1. Gob temperature too high

#### B. Machine setup and operation

1. Mold is running too hot, causing the container to be pulled to one side
2. Machine speed too high
3. Blowhead not setting properly over the molds
4. Take out operating too fast and swinging bottle
5. Incorrect counterblow pressure and time of application
6. Incorrect blank and/or blow mold cycle
7. Plunger contact time too long
8. Blank contact time too short
9. Insufficient reheat and mold contact time
10. Blowhead exhaust holes too small
11. Take out set too low
12. Neck rings not relieving correctly
13. Bottle blowing time too short
14. Take out tongs are out of line

(Continued on next page)

### Remedies

#### A. Feeder

- Adjust gob temperature

#### B. Machine setup and operation

- Increase the cooling wind
- Reduce the machine speed
- Adjust blowhead setting on the mold
- Adjust the take out height and adjust the cushioning
- Increase the counterblow time and/or pressure
- Adjust blank and mold cycle
- Shorten plunger contact time
- Increase blank contact time
- Increase reheat and mold contact time
- Change to a larger exhaust hole on blowhead
- Adjust the take out setting
- Correct the opening of the neck ring
- Increase the bottle blowing time
- Realign the take out tongs
- Increase the cooling to the neck ring

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## Bent Necks (cont'd)

---

### Causes

#### B. Machine setup and operation

15. Neck ring is running hot

#### C. Mold Equipment

1. Incorrect plunger design (blow and blow)
2. Blowhead not deep enough
3. Take out tongs out of shape

### Remedies

#### C. Mold Equipment

- Correct plunger design
- Check the depth of the blowhead cavity and correct if necessary
- Replace the take out tongs

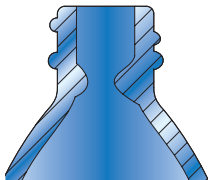
## Choked Neck or Bore

### Narrow Neck Containers

#### Definition

A construction in the bore of the neck.

Note: Bottles are usually filled using filling tubes. If the bore of the neck is too small the filling tube will jam and either break itself or the bottle. This will jam the filling line and cause loss of production.



#### Detection

All narrow neck containers should be gauged with the correct plug gauge.

#### Causes

##### A. Feeder

1. Temperature of the glass is uneven and usually too hot
2. Gob is too pointed

##### B. Machine setup and operation

1. Counterblow air on too soon (insufficient plunger reheat time)
2. Counterblow air on too late (too much plunger reheat time and glass too hot)
3. Too much cooling on the plunger (blow and blow)
4. Plunger contact time too long, chilling the glass

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#### Remedies

##### A. Feeder

- Set temperature of forehearth so that the gob does not curl
- Adjust gob shape

##### B. Machine setup and operation

- Retard the counterblow
- Advance counterblow and cool the glass
- Reduce plunger cooling air
- Reduce plunger contact time
- Fit drip pan to the deflector
- Balance the cooling air on the two mold halves

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## Choked Neck or Bore (cont'd)

---

### Causes

#### **B. Machine setup and operation**

5. Too much oil or dope on the neck ring
6. Uneven blank cooling (blow and blow)
7. Blanks hot and dry
8. Dirty plunger or neck ring
9. Plunger receiver too high - trapping gas
10. Counter blow valve sticking
11. Vacuum not coming on
12. Funnel too large. Drop hanging up on foot of blank.

#### **C. Mold Equipment**

1. Incorrect plunger design
2. Take out tongs too small

### Remedies

#### **B. Machine setup and operation**

- Increase blank cooling and swab as required
- Change plunger and/or neck ring

#### **C. Mold Equipment**

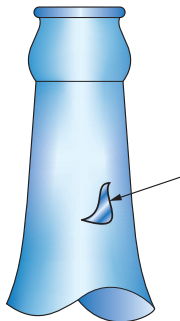
- Adjust plunger design
- Correct size of take out tongs
- Take .002 increments from nose of plunger

## Danny Neck or Tear on Neck

---

### Definition

A small surface section of glass torn from the neck of the bottle.



### Causes

#### A. Feeder

1. Glass too cold
2. Incorrect gob shape
3. Bad shear cut

#### B. Machine setup and operation

1. Incorrect parison transfer
2. Plunger cylinder incorrectly set
3. Excessive settle blow time
4. Bad loading - poor deflector adjustment
5. Dirty blank

#### C. Mold equipment

1. Incorrect blank mold and neck ring match
2. Offset blank mold holder

### Remedies

#### A. Feeder

- Adjust the feeder temperature
- Correct the gob shape
- Reset the shears

#### B. Machine setup and operation

- Check neck ring setting
- Check plunger cylinder setting
- Reduce the settle blow time
- Reset deflectors and check the gob loading

#### C. Mold equipment

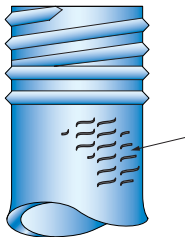
- Check with mold gauges
- Change the blank mold holder

## Dirty Neck

---

### Definition

A neck which has a dirty or scaly appearance.



### Causes

#### B. Machine setup and operation

1. Too much cooling on the blank mold
2. Buildup of carbon on neck of the blank due to excessive swabbing
3. Dirty swab
4. Swabbing compound too thick
5. Swab made of incorrect material and wrong shape
6. Wrong grade of mold lubricant
7. Excessive oil on the delivery equipment

#### C. Mold equipment

1. Poor surface of blank cavity

### Remedies

#### B. Machine setup and operation

- Reduce the blank cooling
- Change blank
- Use a new clean swab of correct shape
- Use a correct grade swabbing compound
- Use a swab made from cotton
- Use correct grade of mold lubricant
- Fit drip pan to deflector

#### C. Mold equipment

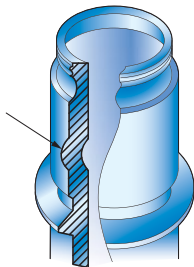
- Improve polish on mold equipment surfaces

## Hollow Finish or Neck

---

### Definition

A finish or a neck in which the glass has blown away.



### Causes

#### A. Feeder

1. Gob temperature is too high

#### B. Machine setup and operation

1. Parison is too soft
2. Plunger contact time too short
3. Counterblow too soon
4. Counterblow pressure too high
5. Plunger too hot
6. Final blow too late

#### C. Mold equipment

1. Plunger tip too short
2. Incorrect plunger design

### Remedies

#### A. Feeder

- Adjust gob temperature

#### B. Machine setup and operation

- Advance counterblow and increase blank contact time
- Increase plunger contact time
- Retard counterblow timing
- Reduce counterblow pressure
- Increase plunger cooling time
- Advance the final blow time

#### C. Mold equipment

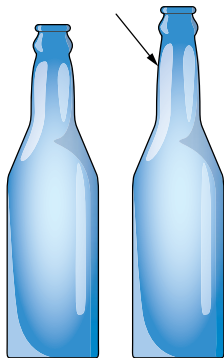
- Lengthen plunger tip
- Correct the plunger design

## Long Neck

---

### Definition

A neck that has been stretched longer than specified.



### Causes

#### A. Feeder

#### B. Machine setup and operation

1. Blow mold contact time too short
2. Insufficient cooling wind application - especially on the deadplate
3. Bottle stretching in take out due to insufficient final blow pressure and/or time of application
4. Bottle held in the take out too long

#### C. Mold equipment

1. Mold size too small (mold running too hot)
2. Insufficient venting of the blow mold

### Remedies

#### A. Feeder

- Adjust feeder temperature

#### B. Machine setup and operation

- Increase blow mold contact time
- Increase cooling wind
- Increase final blow time and/or pressure
- Check blank time. May need to take heat out of glass on blank side (heat the glass backup).

#### C. Mold equipment

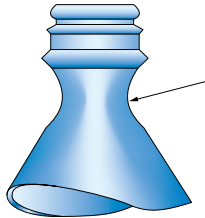
- Use a larger sized mold and holder
- Correct venting of blow mold

## Pinched Neck

---

### Definition

A neck which has been pushed or pinched.



### Causes

#### B. Machine setup and operation

1. Neck ring arms set too high over the mold
2. Parison swings too much on invert
3. Mold closes too soon
4. Worn or poorly aligned mold linkage
5. Badly made take out tongs
6. Glass in blowhead
7. Bent blow tube
8. Vacuum not coming on
9. Tab broken on invert arm lock

#### C. Mold equipment

1. Diameter of parison neck larger than diameter of blow mold neck
2. Incorrect transfer clearance in mold design
3. Blank mold worn at the joints
4. Take out tongs too small

### Remedies

#### B. Machine setup and operation

- Use neck ring setting gauge
- Adjust cushioning of transfer action
- Delay mold closing action
- Change mold close linkage and align with mold and blank linkage-aligning fixture
- Check take out tongs and realign

#### C. Mold equipment

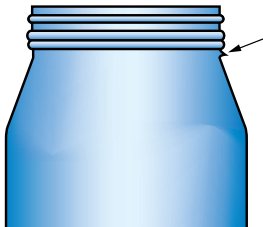
- Check parison neck is smaller than mold neck
- Check correct transfer clearance (mold design)
- Change blank mold and have worn blank repaired or replaced
- Check take out tongs and fit correct size

## Seam on Neck Ring Parting Line

---

### Definition

A seam which has a fin of glass around the parting line between the finish and the neck of the container.



### Causes

#### B. Machine setup and operation

1. Dirt prevents the blank mold from completely closing
2. Neck ring and plungers are dirty

#### C. Mold equipment

1. Neck ring diameter is too small for the blank mold
2. Blank mold dovetail too large for the neck ring
3. Neck rings are not correctly matched

### Remedies

#### B. Machine setup and operation

- Change the dirty mold equipment
- Change all dirty neck rings and plungers

#### C. Mold equipment

- Increase the neck ring diameter
- Check blank mold dovetail with the mold gauge
- Change neck rings for a correctly matched pair

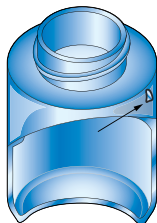
## Stuck Glass Particles

---

### Definition

Small glass particles stuck to the inside of the container. Most common in wide mouth ware. May appear on the neck, sidewall, or base.

Note: It is a serious fault and must be corrected at once.



### Detection

It can be seen as the container is rolled around and the particle catches the light.

### Causes

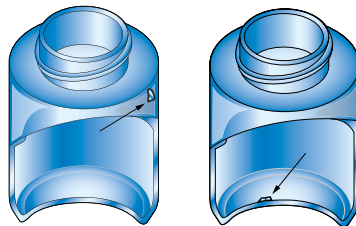
#### A. Feeder

1. Shears not cutting properly

#### B. Machine setup and operation

1. Glass loading too deep into the ring equipment
2. Take out not correctly adjusted
3. Excessive swabbing
4. Blowing out glass particles when changing mold equipment
5. Machine speed too high
6. Mold equipment incorrectly adjusted on the machine
7. Internal fused or stuck glass particles

(Continued on next page)



### Remedies

#### A. Feeder

- Reset shears or change to new blades

#### B. Machine setup and operation

- Check loading and machine differential setting
- Reset take out tongs
- Reduce swabbing and use a dry, clean swab
- Always practice good housekeeping
- Reduce machine speed
- Check mold equipment setup

(Continued on next page)



## Stuck Glass Particles (cont'd)

---

### Causes

#### **B. Machine setup and operation**

8. Vacuum on too soon (blow and blow)
9. Plunger too late
10. Glass in blowhead

#### **C. Mold Equipment**

1. Bad baffle match
2. Incorrectly matched mold equipment

### Remedies

#### **C. Mold Equipment**

- Check baffle match when hot
- Check all mold equipment with gauge and fixtures

### Section 3 Shoulder Defects

---

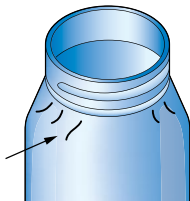


## Shoulder Checks or Tears

---

### Definition

Surface cracks on the shoulder of the containers. They are usually wavy in appearance.



### Causes

#### A. Feeder

1. Incorrect glass temperature - can be either too hot or too cold

#### B. Machine setup and operation

1. Bottom plate is set too high or too low, causing drag on bottle shoulder when mold is opening
2. Mold is running too hot, causing the bottle to stick to the mold
3. Mold holders are worn, causing the mold to drag on the bottom plate when opening
4. Too much final blow pressure blowing the bottle up too hard against the mold. (Final blow pressure should be regulated to be sufficient to keep the bottle in shape.)
5. Incorrect cooling wind application - mold too hot
6. Blowhead timing incorrect - comes off before mold cracks
7. Take out tongs set too low - hitting the shoulder
8. Mold opening too fast

(Continued on next page)

### Remedies

#### A. Feeder

- Set feeder at correct temperature

#### B. Machine setup and operation

- Lower or raise bottom plate mechanism
- Apply more cooling wind to mold
- Change mold holders. Check the old mold holders against repair dimensions.
- Reduce final blow pressure
- Adjust cooling wind application
- Check and adjust blowhead timing
- Raise the height of take out tongs

(Continued on next page)

## Shoulder Checks or Tears (cont'd)

---

### Causes

#### C. Mold Equipment

1. Mold not sufficiently relieved on bottom plate, causing bottle to drag on mold when mold is opened
2. Flat shoulder container with insufficient relief on shoulder
3. Incorrect positioning of parting line (odd-shaped containers)

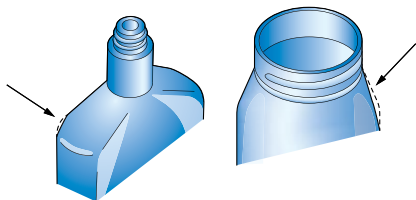
### Remedies

#### C. Mold Equipment

- Improve relief on bottom plate
- Ensure relief on mold shoulder
- Ensure correct positioning of parting line in mold

## Sunken Shoulders

---



### Definition

A shoulder which is not fully blown up.

Note: Gives a bad appearance to the container and may cause problems on the filling line. It can also cause under-capacity.

### Causes

#### A. Feeder

1. Gob temperature is too low
2. Incorrect gob shape

#### B. Machine setup and operation

1. Excessive counterblow time or excessive blank contact time - parison too hard
2. Insufficient reheat time on mold side prior to final blow
3. Insufficient pressure, or application of final blow too soon
4. Dirty shoulder vents

(Continued on next page)

### Remedies

#### A. Feeder

- Increase gob temperature
- Improve shape of gob

#### B. Machine setup and operation

- Shorten counterblow time and blank contact time
- Allow more reheat time before final blow
- Increase the final blow pressure and delay start of final blow
- Change mold
- Reduce cooling wind application
- Change the blow molds

(Continued on next page)

## Sunken Shoulders (cont'd)

---

### Causes

#### B. Machine setup and operation

5. Incorrect cooling wind application - blanks or blow molds too cool
6. Dirty mold
7. Blowhead not seated correctly on mold

#### C. Mold Equipment

1. Mold not properly vented
2. Top of mold damaged so that final blow enters the mold
3. Blowhead too deep
4. Unsuitable blowhead seat venting

### Remedies

#### B. Machine setup and operation

- Adjust blowhead on mold

#### C. Mold Equipment

- Vent mold correctly
- Change mold and have old mold repaired
- Change blowhead and have old blowhead cleaned
- Ensure venting of blow heat seat is correct

## Thin Shoulders

---

### Definition

A shoulder which has a thin section.



### Detection

It can be seen by the difference in color between thick and thin glass, or by the appearance of a wave above and below the thin section.

### Causes

#### A. Feeder

1. Uneven gob temperature
2. Gob too long

#### B. Machine setup and operation

1. Glass is improperly loaded (off center)
2. Blank mold is not properly swabbed
3. Final blow takes place too late, allowing excessive run of parison
4. Blank mold too hot

#### C. Mold equipment

1. Incorrect blank design
2. Funnel size incorrect

### Remedies

#### A. Feeder

- Adjust forehearth temperature so that the gob does not curl
- Shorten the gob

#### B. Machine setup and operation

- Adjust deflector to center of blank - check size of deflector
- Swab blanks more frequently
- Advance final blow
- Adjust blank cooling

#### C. Mold equipment

- Check for correct blank design
- Check funnel size

## Section 4 Sidewall Defects





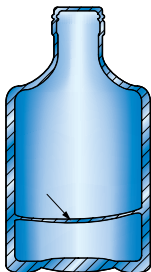
## Bird Cage or Bird Swing

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### Definition

A string of glass extending across inside of the container.

A bird swing from side-to-side comes from the back side (blanks). From seam to seam front side.



### Causes

#### B. Machine setup and operation

1. Too much cooling wind used blowing sides of glass together before final blow starts - incorrect cooling nozzles provided
2. Parison too soft - blank contact time too short
3. Insufficient counterblow used
4. Insufficient cooling wind applied on blank
5. Wind gate may be too high

#### C. Mold equipment

1. Insufficient venting of blank (increase depth of hollow scraping or slotting)

(Continued on next page)

### Remedies

#### B. Machine setup and operation

- Ensure parison is not blown by cooling air before invert takes place - use cooling nozzles with larger slots
- Increase blank contact time
- Increase counterblow
- Increase blank mold cooling wind - check cooling setup
- Check deflector
- Check for dirty blank

#### C. Mold equipment

- Increase hollow scraping and venting of blank and mold faces

(Continued on next page)

## Bird Cage or Bird Swing (cont'd)

---

### Causes

#### H. Vertiflow

1. Caused by air leakage into mold cavity

### Remedies

#### H. Vertiflow

- Check mold venting - recut and increase if necessary
- Check mold fits
- Adjust height of bottom plate mechanism
- Check seals under distributor plate
- Check cooling air - is not connected to vents or vacuum
- Check vacuum system - is adequately vented
- Check vacuum passages - are clear in mechanism
- Check vacuum holes/vent holes - are clear in bottom plate
- Check cooling on time - is not on too early
- Vertiflow on before revert on

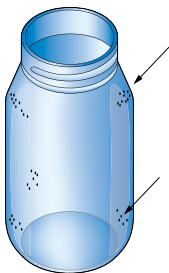
## Black Spots

---

### Definition

Small black specs in the container.  
May appear on the sidewall or base.

Note: They may come from oil, rust, graphite, or even furnace droppings.



### Causes

#### A. Feeder

1. Foreign matter in glass
2. Bad combustion - air/gas ratio too low
3. Oil or dirty shear blades
4. Foreign matter in the forehearth generally
5. Buildup of deposit on spout casing from the shear sprays

#### B. Machine setup and operation

1. Dirty delivery equipment
2. Insufficient cooling wind on all mold equipment
3. Excessive use of oil doper

(Continued on next page)



Note: Check for contamination of the batch materials.

### Remedies

#### A. Feeder

- Skim the glass
- Adjust inspirators for flameless combustion
- Change shears
- Check for oil/scale/carbon foreign matter, etc. in forehearth
- Clean the underside of the spout casing and adjust shear spray

#### B. Machine setup and operation

- Clean delivery equipment
- Increase the cooling wind
- Cut down on oil doper
- Reduce amount of swabbing

(Continued on next page)

## Black Spots (cont'd)

---

### Causes

#### B. Machine setup and operation

4. Excessive swabbing
5. Plunger too hot and scaling
6. Dirty mold equipment
7. Check final blow

#### C. Mold equipment

1. Insufficient cleaning of mold equipment
2. Poor grade of plunger material

#### D. Conveyor

1. Oil blowing up through deadplate
2. Flight conveyor may have air blowing up from internal manifold

### Remedies

#### B. Machine setup and operation

- Improve application of plunger cooling - metal spray the plunger
- Change mold
- Ensure that there is no dirt in final blow air - fit a filter

#### C. Mold equipment

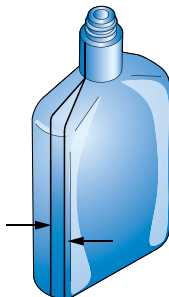
- Clean the mold
- Use better grade of castings

## Blank and Blow Mold Seam

---

### Definition

Seams which are relatively large, extending from the shoulder to the bottom of the container. Blank seams tend to veer off from the mold seam.



### Causes

#### A. Feeder

1. Glass too cold, causing difficult pressing on '62' operation when producing lightweight ware or tall jobs like milk bottles
2. Glass too hot
3. Gob weight too heavy (62 process)

#### B. Machine setup and operation

1. Wear on blank and mold holders
2. Wear on blank and mold linkage
3. Incorrect blank and blow mold linkage alignment
4. Incomplete stroke of blank and blow mold piston in cylinder
5. Misalignment of plunger mechanism
6. Carbon deposit on blank and blow mold halves
7. Glass in interlocking fit or blank or blow mold
8. Interference between blank and/or blow mold with block lock at operational temperature

(Continued on next page)

### Remedies

#### A. Feeder

- Adjust feeder temperature
- Check gob weight

#### B. Machine setup and operation

- Change mold holders and check the old ones against repair dimensions
- Check blank and mold supporting for wear
- Check with mold and blank linkage aligning fixture
- Realign the plunger mechanism
- Change mold and blank
- Clean the mold and blow out the glass
- Check block lock fitting at operating temperature for tightness

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## Blank and Blow Mold Seam (cont'd)

---

### Causes

#### B. Machine setup and operation

9. Plunger mechanism too high
10. Excessive plunger and counterblow pressure
11. Neck ring incorrectly set
12. Bottom plate running too hot
13. Blank mold too hot
14. Baffle too hot

#### C. Mold equipment

1. Recess on blank and mold for either plunger or block lock location incorrectly made or too tight fit
2. Interference between neck ring and blank mold neck ring diameter too large
3. Unsuitable pressing gate on parison design (press and blow)
4. Blank and molds insufficiently hollow scraped  
- insufficient relief for interlocking fits and for tongue and groove fits
5. Blank and mold warped and/or worn out
6. Bottom plate holding blow mold open
7. Incorrect selection of bottom plate size

### Remedies

#### B. Machine setup and operation

- Adjust plunger mechanism height
- Reduce counterblow pressure
- Check invert mechanism with neck ring mechanism aligning fixture
- Apply cooling to bottom plate
- Increase the cooling on blank
- Apply cooling to baffle

#### C. Mold equipment

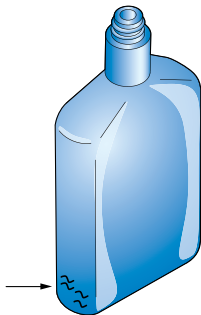
- Check fit for plunger lock or blank lock
- Check the neck ring and blank mold with mold gauges
- Redesign parison with improper pressing gate
- Make sure that hollow face scraping is sufficient
- Check volume of blank and plunger for gob weight
- Check bottom plate with gauges for faulty manufacture, buildup of carbon, or glass in bottom plate dovetail
- Check selection of bottom plate size

## Bruise Checks

---

### Definition

Fine and shallow checks which appear on the body of the container.



### Causes

#### B. Machine setup and operation

1. If more than single cavity machine, take out may be coming out over the deadplate too fast causing bottles to swing and collide at contact area

#### D. Conveyor

1. Improper setting of pusher cams
2. Worn pusher arms resulting in inconsistent pushing
3. Bottles hitting each other at transfer or stacker pickup point
4. Improper pusher shape
5. Pusher arm material unsuitable
6. Ware hitting metal guides on stacker or conveyor

(Continued on next page)

### Remedies

#### D. Conveyor

- Correct setting of pusher cams
- Worn pusher arms should be replaced
- Correct spacing of bottles on conveyor
- Correct pusher shape
- Use non-ferrous material or, if using steel, cover with a carbon-based material for ware pushers
- Adjust and improve transfer from machine conveyor to stacker conveyor

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## Bruise Checks (cont'd)

---

### Causes

#### D. Conveyor

7. Incorrect transfer from machine conveyor to stacker conveyor
8. Conveyor belt slipping

#### E. Stacking equipment

1. Incorrect setting of bottle cam (tong stacker)
2. Incorrect setting of pusher bar (push bar stacker)
3. Push bar - bare metal at incorrect temperature
4. Push bar speed too great

### Remedies

#### D. Conveyor

- Check operation of conveyor belt

#### E. Stacking equipment

- Correct setting of bottle cam
- Correct setting of pusher bar
- Cover pusher bar with insulating material
- Reduce speed of pusher bar to reduce bottle impact

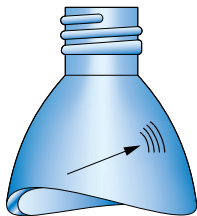


## Brush Marks

---

### Definition

Fine vertical lines in the side or neck of a container.



### Causes

#### A. Feeder

1. Glass temperature too low
2. Point of gob chilled
3. Wrong gob shape - usually too long
4. Excessive shear spray

#### B. Machine setup and operation

1. Poor delivery
2. Excessive scoop cooling
3. Inadequate lubrication of delivery equipment
4. Misalignment of delivery equipment

#### C. Mold equipment

1. Funnel diameter too small - gob hangs up
2. Incorrect blank design

### Remedies

#### A. Feeder

- Adjust temperature of the glass
- Increase lifting action of plunger
- Correct gob shape
- Reduce shear spray

#### B. Machine setup and operation

- Improve delivery of gob
- Reduce scoop cooling air
- Improve lubricating of delivery equipment
- Realign delivery equipment

#### C. Mold equipment

- Increase funnel diameter
- Correct blank design

## Bulged Sides

---

### Definition

The sides of a container (usually panel shape) which are pushed out.

Note: This may cause trouble on the filling line, by jamming up in the bottle guides. It may also be difficult to label and it will be overcapacity.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Excessive swabbing of molds
2. Blow mold opening before final blow finished
3. Container not hanging in the take out long enough
4. Blow mold too hot

#### C. Mold equipment

1. Incorrect blow mold dimensions

### Remedies

#### A. Feeder

- Adjust glass temperature

#### B. Machine setup and operation

- Reduce the mold swabbing and use a clean “dry” swab
- Check timing of final blow off and blow mold open
- Increase time in take out
- Increase blow mold cooling wind

#### C. Mold equipment

- Check blow mold dimensions against the specifications

## Cold Molds

---

### Definition

Dappled or wavy appearance in the body of the container.



### Causes

#### A. Feeder

1. Glass too cold
2. Uneven gob temperature

#### B. Machine setup and operation

1. Machine speed too low
2. Blanks running too cold
3. Incorrect blank cycle
4. Excessive cooling wind on mold
5. Excessive final blow pressure
6. Excessive plunger cooling (press and blow)
7. Counter blow incorrect
8. Dirty mold equipment
9. Blowhead not seating properly
10. Blowhead vents stopped up
11. Excessive settle blow
12. Plunger contact time too long

#### C. Mold equipment

1. Incorrect mold design - molds too heavy
2. Insufficient venting of mold
3. Incorrect venting of blowhead

### Remedies

#### A. Feeder

- Adjust the temperature of the glass
- Balance the temperature of forehearth so gob does not curl

#### B. Machine setup and operation

- Increase the machine speed
- Reduce cooling air on blank
- Adjust blank cycle
- Reduce cooling wind on mold
- Reduce final blow pressure
- Reduce the plunger cooling (press and blow)
- Correct counterblow time and pressure
- Change the mold equipment
- Readjust the blowhead seating
- Change the blowhead
- Reduce the settle blow time
- Reduce plunger contact time

#### C. Mold equipment

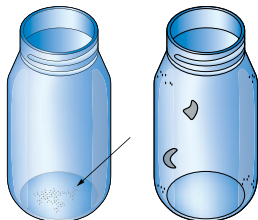
- Correct mold design - reduce mold weight
- Increase venting of mold
- Check venting of blowhead

## Dirty Ware

---

### Definition

Ware which has carbon or dirty deposits on it. May appear on the sidewall or base.



### Causes

#### A. Feeder

1. Excessive oil on the shears

#### B. Machine setup and operation

1. Excessive swabbing or oil spray
2. Blank and/or blow mold dirty
3. Excessive sulphur
4. Dirty delivery equipment
5. Insufficient cooling wind
6. Dirt or scale on the delivery equipment

#### C. Mold equipment

1. Poor quality mold castings

### Remedies

#### A. Feeder

- Check oil in shear spray

#### B. Machine setup and operation

- Reduce frequency of swabbing - use correct type and shape of swab
- Change blank and/or mold
- Use less sulphur
- Keep all delivery equipment clean
- Adjust mold cooling wind
- Clean or change the delivery equipment

#### C. Mold equipment

- Check quality of mold castings - change as required

## Drag Marks

---

### Definition

A series of fine vertical laps near the shoulder or neck of the container.



### Causes

#### A. Feeder

1. Gob too long and too small in diameter
2. Glass too cold

#### B. Machine setup and operation

1. Insufficient swabbing
2. Blank molds too cold
3. Delivery equipment dirty
4. Blank molds dirty
5. Excessive spray in the scoop and trough
6. Blank overworked

#### C. Mold equipment

1. Incorrect blank mold shape
2. Funnel too small

### Remedies

#### A. Feeder

- Reduce length of gob and increase its diameter
- Increase feeder temperature

#### B. Machine setup and operation

- Swab correctly
- Reduce blank mold cooling wind
- Change or clean the delivery equipment
- Change the blank molds
- Reduce the spray on the delivery equipment

#### C. Mold equipment

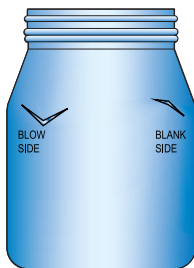
- Check for correct blank mold design
- Check the funnel size and increase opening as necessary

## Hot or Panel Checks

---

### Definition

Cracks in the container body on the edge or side, deep V-shaped, going through the wall.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Machine speed too high
2. Improper cooling wind setup or insufficient cooling wind applied
3. Final blow pressure on after mold opens
4. Air off 'mold close' too early
5. Excessive final blow pressure
6. Exhaust hole on internal cooling blowhead arm too small
7. Dirty blow molds

#### C. Mold equipment

1. Mold size too small
2. Mold not properly vented
3. Rough mold seams

### Remedies

#### A. Feeder

- Adjust the glass temperature

#### B. Machine setup and operation

- Reduce the machine speed
- Correct the cooling wind application
- Remove final blow before the mold open
- Air off 'mold close' later
- Reduce final blow pressure
- Use larger exhaust hole on blowhead arm
- Change blow molds

#### C. Mold equipment

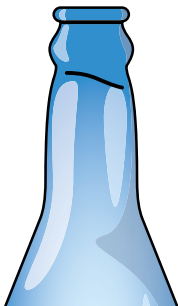
- Use larger size mold holder
- Improve venting of blow mold
- Change molds and repair faulty seams

## Lap Marks or Wrinkles

---

### Definition

A lap or fold on the outside of the bottle (can also be found in the finish).



### Causes

#### A. Feeder

1. Glass temperature too low
2. Incorrect setting of shears
3. Incorrect gob shape - too long and too small diameter
4. Inconsistent gob drop
5. Cords near the glass surface

#### B. Machine setup and operation

1. Poor delivery - incorrect loading
2. Settle blow on too long
3. Blank too hot and dry
4. Uneven blank temperature
5. Dirty mold equipment
6. Gob hanging up in the funnel

#### C. Mold equipment

1. Incorrect funnel design
2. Incorrect blank design

### Remedies

#### A. Feeder

- Adjust the gob temperature
- Adjust setting of shears
- Adjust gob shape
- Check shear mechanism. It may be worn or plunger may be loose in the holder.
- Check for cordy condition and correct if possible

#### B. Machine setup and operation

- Use a good grade of spray oil - adjust the deflector
- Reduce settle blow time and/or pressure
- Increase cooling wind on blank and swab
- Apply the cooling to the two blank mold halves evenly
- Change blank
- Swab funnel and check for correct size

#### C. Mold equipment

- Check for correct funnel design and size
- Check the blank design

## Letter Checks

---

### Definition

Small cracks or fissures which occur from any lettering or embossing.



### Causes

#### B. Machine setup and operation

1. Incorrect mold temperature
2. Too much final blow pressure
3. Bottom plate setting too high or too low - bottle dropping or lifting when mold opens
4. Vent holes blocked

#### C. Mold equipment

1. Check relief in lettering
2. Engraving should be relieved
3. Shape of engraving does not correspond to clearance requirement for mold opening
4. Poor mold material
5. Letters are dirty or too deep

### Remedies

#### B. Machine setup and operation

- Adjust mold cooling
- Reduce final blow pressure
- Adjust the bottom plates so that bottle stays steady when mold opens
- Clean vent holes
- Swab letters lightly

#### C. Mold equipment

- Letters should be relieved correctly
- Engraving should be relieved
- Engraving should have clearance for mold opening
- Use best grade cast iron
- Ensure letters are clean and not too deep

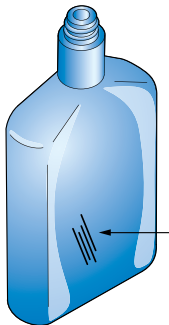


## Loading Marks

---

### Definition

Vertical laps on the surface of the container. May be in the body or neck or both.



### Causes

#### A. Feeder

1. Glass too cold
2. Gob improperly shaped - usually too blunt or insufficiently pointed - mainly at the tip, and too thin at the shear end
3. Plunger not pulling the glass into the orifice - insufficient reheat of the tip of the gob

#### B. Machine setup and operation

1. Delivery equipment incorrect - mainly the deflector
2. Delivery equipment not properly lubricated
3. Dirty delivery equipment - reducing speed of the gob
4. Too much wind cooling on blank
5. Incorrect swabbing

#### C. Mold equipment

1. Blank size too large - blank remains too cold
2. Blank improperly shaped - loading condition was not considered
3. Funnel too small or too large

### Remedies

#### A. Feeder

- Adjust gob temperature
- Adjust gob shape
- Change the plunger cam and adjust the differential

#### B. Machine setup and operation

- Use correct size delivery equipment
- Lubricate with a good grade of spray oil
- Clean delivery equipment
- Reduce cooling wind on blank
- Swab correctly with a clean dry swab and correct swabbing compound

#### C. Mold equipment

- Use a smaller size blank
- Alter the blank shape to give easier loading
- Check for correct size of funnel

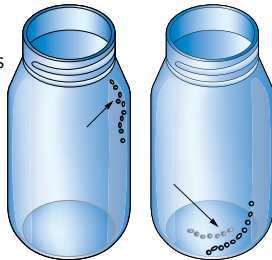
## Oil Marks

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### Definition

Strings of small bubbles in the container.

May appear on the sidewall or base.



### Causes

#### B. Machine setup and operation

1. Oil accumulation on shears, delivery equipment and mold equipment
2. Oil accumulation on take out

### Remedies

#### B. Machine setup and operation

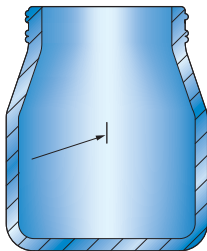
- Clean shears, delivery equipment and mold equipment

## Pressure Checks

---

### Definition

Checks characterized by thin, vertical cracks appearing at the seam.



### Causes

#### A. Feeder

1. Glass too cold

#### B. Machine setup and operation

1. Blank contact time too long
2. Counterblow time too long
3. Excessive final blow pressure
4. Insufficient parison reheat time
5. Molds too hot
6. Excessive machine cooling
7. Blowhead exhaust holes (equalizer) plugged

#### C. Mold equipment

1. Molds not correctly vented
2. Rough mold seams

### Remedies

#### A. Feeder

- Adjust gob temperature

#### B. Machine setup and operation

- Shorten blank contact time
- Shorten counterblow time
- Reduce final blow pressure
- Increase reheat time
- Adjust mold cooling

#### C. Mold equipment

- Correct the mold venting
- Change molds and repair the seams

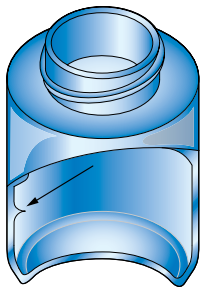
## Spikes

---

### Definition

A small projection of glass in the body of the container.

Note: The effect of a spike can be produced by a glass particle falling or being blown into a hot container and sticking to the bottom. Good housekeeping is required to remove all possible particles from the machine.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Plunger is too hot (press and blow operation)
2. Plunger dirty (press and blow process)
3. Plunger adaptor has become loose
4. Restriction of the cooling and/or exhaust air (plunger cooling)
5. Partially formed birdswing

#### C. Mold equipment

1. Incorrectly designed plunger cooling tube and adaptor
2. Poor type of plunger material

### Remedies

#### A. Feeder

- Reduce the glass temperature

#### B. Machine setup and operation

- Correct cooling air to plunger for timing and pressure
- Change the plunger
- Plunger adaptor must be tight on the piston rod
- Use larger exhaust hole

#### C. Mold equipment

- Check design of plunger cooling adaptor and tube
- Change plunger material

## Stringy Glass

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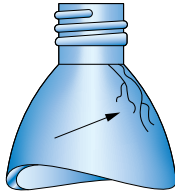
### Definition

Usually runs from top to bottom.  
Size of stringy glass varies.

### Causes

#### C. Mold equipment

1. Overlap on shear is problem area
2. Maybe 1 or 2 clicks need to be added to overlap
3. If defects occur occasionally, you may need to observe shear operation for 10 to 15 minutes
4. Overlap could be starting to wear out and mechanism will need to be checked during next shutdown or job change
5. Inspect cam follower for excessive play



### Remedies

#### C. Mold equipment

- Usually, 1 or 2 clicks will remedy occasional stringing

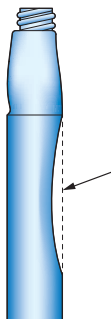
## Sunken Sides

---

### Definition

The side of a container (usually panel shape) that is not fully blown up or may have sunk after release from the blow mold.

Note: This may make the container under capacity, difficult to fill and label.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Insufficient blow mold cooling wind
2. Too long in take out tongs
3. Too little time in the blow mold
4. Too low final blow pressure
5. Blowhead vents blocked with glass

#### C. Mold equipment

1. Insufficient or incorrect blow mold venting
2. Faulty blow mold dimensions

#### D. Conveyor

1. Too much wind on the deadplate
2. Container rubbing against the pushout or a guide wire

### Remedies

#### A. Feeder

- Reduce the glass temperature

#### B. Machine setup and operation

- Increase blow mold cooling wind
- Reduce the time in the take out
- Increase the time in the blow mold
- Increase final blow pressure - decrease rate of internal cooling
- Change the blowhead

#### C. Mold equipment

- Check and correct blow mold venting
- Check the blow mold dimensions against the specification

#### D. Conveyor

- Reduce deadplate cooling and redrill deadplate cooling vents so the air blows up the side of the container rather than directly onto it
- Adjust or redesign pushout - check all guide wires

## Thin Ware

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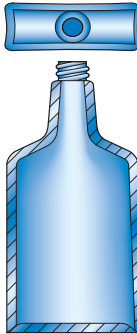
### Definition

Thin spots in the container which are below the minimum acceptable level.

### Detection

They can be detected by one of the following:

1. Heavy bottom
2. Blank seams out of line
3. Heavy ware
4. Swung baffle mark
5. Difference in color of the glass, e.g., dark amber and light amber



### Causes

#### A. Feeder

1. Glass too hot
2. Uneven glass temperature
3. Incorrect gob shape - usually too long

#### B. Machine setup and operation

1. Gob not loading correctly
2. Uneven mold cooling wind setting
3. Dirty mold equipment
4. Parison too soft

(Continued on next page)

### Remedies

#### A. Feeder

- Adjust the feeder temperature
- Adjust forehearth temperature until the gob does not curl
- Adjust the gob shape

#### B. Machine setup and operation

- Adjust deflector for correct delivery
- Reset mold cooling wind correctly
- Change all dirty mold equipment
- Increase counterblow time or pressure

(Continued on next page)

## Thin Ware (cont'd)

---

### Causes

#### B. Machine setup and operation

5. Counterblow time or pressure insufficient
6. Final blow too late
7. Blank contact time too short
8. Parison reheat time too long
9. Scoop returning too early
10. Too long settle blow time - bad settle wave

#### C. Mold equipment

1. Shoulder of blank mold too small (high shouldered blanks)

### Remedies

#### B. Machine setup and operation

- Advance the final blow
- Increase the blank contact time
- Reduce parison reheat time - this also reduces parison stretch
- Check and adjust the scoop timing and cushioning
- Reduce settle blow time and advance timing if possible
- Check settle blow air pressure at machine

#### C. Mold equipment

- Increase diameter of blank mold shoulder

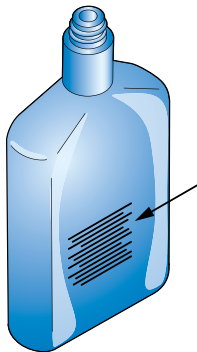


## Wash Boards

---

### Definition

A series of horizontal waves or folds on the side of the container.



### Causes

#### A. Feeder

1. Uneven gob temperature arising from improper temperature condition of forehearth
2. Gob improperly shaped - too long or too large in diameter
3. Inconsistent setting of dropguide
4. Cordy glass

#### B. Machine setup and operation

1. Gob hanging up in delivery equipment
2. Incorrect size delivery equipment, causing gob to slow down, or vary in loading
3. Inadequate lubrication of delivery equipment
4. Deterioration of delivery equipment surface
5. Deflector not centralized - bad loading
6. Trailing or lower end of trough too low - gob not using full curve of the deflector

(Continued on next page)

### Remedies

#### A. Feeder

- Adjust forehearth temperature so gob does not curl
- Check shape of gob
- Check setting of drop guide
- Locate source of cords and correct if possible.

#### B. Machine setup and operation

- Use good grade of spray oil
- Use correct size delivery equipment
- Make sure that spray nozzles are spraying correctly on deflectors
- Use clean deflectors, troughs and scoops
- Centralize deflectors of center of blank
- Raise end of trough by the trough adjusting screw
- Lower end of trough

(Continued on next page)

## Wash Boards (cont'd)

---

### Causes

#### B. Machine setup and operation

7. Lower end of trough too high
8. Spray nozzle loose
9. Incorrect funnel setting
10. Uneven blank temperature
11. Blank too hot
12. Dirty blanks
13. Dirty funnel

#### C. Mold equipment

1. Improper blank design
2. Incorrect funnel diameter

### Remedies

#### B. Machine setup and operation

- Tighten spray nozzles
- Check funnel setting is correct
- Apply cooling blank evenly
- Increase cooling to blank
- Change blank
- Change funnel

#### C. Mold equipment

- Check blank design
- Correct funnel diameter

## Section 5 Base and Bottom Defects

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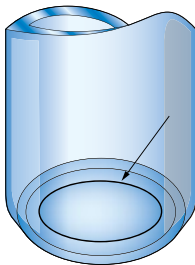


## Baffle Marks

---

### Definition

A seam occurring between the baffle and the blank mold.



### Causes

#### A. Feeder

1. Gob too heavy

#### B. Machine setup and operation

1. Parison is too cold
2. Reheat time insufficient so that the skin on parison is too cold to blow out completely
3. Pressing pressure too high
4. Glass under baffle
5. Incorrect setting of baffle
6. Distorted baffle arm
7. Badly fitted lock ring
8. Incorrect timing of baffle mechanism
9. Counter blow too early (blow and blow)
10. Plunger up time too early (press and blow)
11. Incorrect machine differential
12. Revert height
13. Bad baffle cup on baffle arm

#### C. Mold equipment

1. Incorrect match between baffle and blank
2. Oval or misshaped blank at baffle match
3. Baffle is incorrectly designed

### Remedies

#### A. Feeder

- Check gob weight

#### B. Machine setup and operation

- Reduce counter blow
- Increase reheat time
- Reduce pressing pressure
- Check baffle for glass embedded in it
- Check the setting of baffle
- Check the baffle arm for squareness
- Check fit of lock ring
- Adjust timing of baffle mechanism
- Retard counter blow time (blow and blow)
- Retard plunger up time (press and blow) or advance baffle on time
- Advance machine differential, if possible, and advance baffle on time

#### C. Mold equipment

- Check blank and baffle match when blank is cold and hot
- Check fit between baffle and blank
- Check size of baffle cavity with regard to baffle and size of blank

## Base Leaner or Rocker Bottom

---

### Definition

A bottom which has sagged so that the container is unstable when placed on a flat surface.

Note: The center of the bottom is lower than the outside rim of the bottle.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Too long in take out with insufficient cooling
2. Machine speed too fast
3. Heavy baffle seam across the bearing surface of the bottom
4. Dirty equipment - blank side

#### C. Mold equipment

1. Incorrect design of bottom plate pushup

#### D. Conveyor

1. Insufficient deadplate cooling
2. Incorrect deadplate timing
3. Badly worn deadplates

### Remedies

#### A. Feeder

- Adjust feeder temperature

#### B. Machine setup and operation

- Shorten time in take out with tongs
- Reduce machine speed
- Check for badly seating baffle or bad blank and baffle match
- Check take out in - not picking up bottles

#### C. Mold equipment

- Check bottom plate pushup design

#### D. Conveyor

- Increase the deadplate cooling wind
- Reset the deadplate cooling time
- Change the worn deadplates

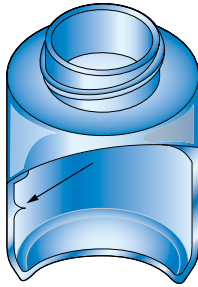
## Base Spikes

---

### Definition

A small projection of glass in the bottom of the container.

Note: The effect of a spike can be produced by a glass particle falling or being blown into a hot container and sticking to the bottom. Good housekeeping is required to remove all possible particles from the machine.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Plunger is too hot (press and blow operation)
2. Plunger dirty (press and blow process)
3. Plunger adaptor has become loose
4. Restriction of the cooling and/or exhaust air (plunger cooling)
5. Partially formed birdswing

#### C. Mold equipment

1. Incorrectly designed plunger cooling tube and adaptor
2. Poor type of plunger material

### Remedies

#### A. Feeder

- Reduce the glass temperature

#### B. Machine setup and operation

- Correct cooling air to plunger for timing and pressure
- Change the plunger
- Plunger adaptor must be tight on the piston rod
- Use larger exhaust hole

#### C. Mold equipment

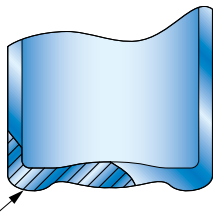
- Check design of plunger cooling adaptor and tube
- Change plunger material

## Bottom or Base Check

---

### Definition

Small checks that occur on or near the rounded port of the bottom contact surface.



Note: A bottom check can cause the bottom to break, especially if the container is filled with a hot liquid or is subject to heat during processing the contents.

### Detection

It can be detected by catching the reflection of light as the bottle is rotated.

### Causes

#### A. Feeder

1. Glass too cold

#### B. Machine setup and operation

1. Bottom plate incorrectly set
2. Worn mold holders
3. Bottom plates running too hot
4. Bottom plate is too cold
5. Final blow pressure is too high
6. Blowhead off before mold cracks open

(Continued on next page)

### Remedies

#### A. Feeder

- Correct the feeder temperature

#### B. Machine setup and operation

- Set bottom plate correctly
- Check dimensions of mold holders against repair dimensions
- Apply cooling to bottom plate
- Reduce cooling to bottom plate
- Reduce final blow pressure
- Retime the blowhead off

(Continued on next page)

## Bottom or Base Check (cont'd)

---

### Causes

#### B. Machine setup and operation

7. Oil on dead plate
8. Take out going in as it picks up the bottle. Bottle will rock ever so slightly to area that has bottom parting line.

#### C. Mold equipment

1. Incorrect relief of bottom plates
2. Mold not relieved correctly

#### D. Conveyor

1. Dirty or worn conveyor belt
2. Conveyor too long
3. Ware pusher set too low
4. Excessive use of guide wire on the conveyor
5. Incorrect insulation of transfer plates
6. Too long time on the deadplates

#### E. Stacking equipment

1. Incorrect timing at stacking pick-up points

### Remedies

#### B. Machine setup and operation

- Clear or replace the deadplates
- Adjust the take out arm. If check is towards the front, move take out arm towards back.

#### C. Mold equipment

- Ensure bottom plate is properly relieved
- Relieve mold correctly

#### D. Conveyor

- Change the conveyor belt
- Warm the conveyor belt or change to a machine with a shorter conveyor
- Raise the ware pushers
- Remove unnecessary guide wires from the conveyor, or insulate
- Reduce surface area of transfer plates or insulate with suitable material
- Shorten time on the deadplates

#### E. Stacking equipment

- Adjust timing of stacker



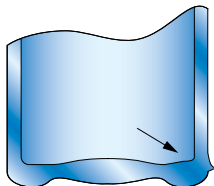
## Flanged Bottom

---

### Definition

A fin or rim of glass around the bottom of the container at the mold parting line.

Note: They can easily be chipped or may even cause the bottom to break.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Glass in fitting between mold and bottom plate
2. Parison not blown up in the blank mold
3. Bottom plate height incorrect

#### C. Mold equipment

1. Bottom plate and blow mold are not matched due to incorrect manufacture
2. Bottom plate locating pin worn or missing
3. Bottom plate and blow mold not matched due to wear
4. Blank mold and baffle do not fit properly

### Remedies

#### A. Feeder

- Adjust the feeder temperature

#### B. Machine setup and operation

- Clean recess of mold and bottom plates
- Increase counter blow pressure and/or counter blow time
- Correct the bottom plate height

#### C. Mold equipment

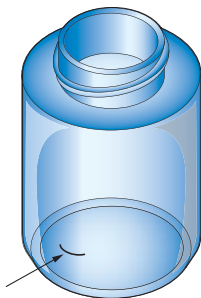
- Use mold gauges to check mold and bottom plate fit
- Check locating pin for fit or missing
- Check for wear with the mold gauges
- Check blank and baffle match

## Shear Marks

---

### Definition

A C-shaped mark in the glass, attributable to the action of the shears.



### Causes

#### A. Feeder

1. Defective shear blades
2. Worn shear arms
3. Incorrect shear blade tension
4. Defective shear mechanism
5. Wrong shear cam - too slow
6. Incorrectly adjusted shear arm - not cutting centrally
7. Inefficient shear spray operation
8. Dirty shear blades - accumulation of carbon or oil
9. Improper gob shape
10. Glass too cold
11. There is not enough or too much shear overlap
12. Shear blades loose
13. Shears cutting too low

### Remedies

#### A. Feeder

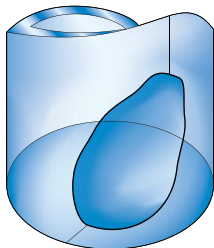
- Change shear blades
- Change shear arm gear sectors
- Correct tension of shear blades
- Change shear mechanism
- Change shear cam
- Centralize shear arm properly
- Adjust shear spray heads
- Reshape the gob
- Adjust the feeder temperature
- Adjust for correct overlap
- Tighten shear blades in the holder
- Raise the shear mechanism

## Swung Baffle

---

### Definition

The baffle mark has swung to one side and is not central in the bottom of the container.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Speed of invert too great
2. Insufficient parison stretch in blow mold before final blow
3. Neck ring opening too quickly and too wide at transfer
4. Parison not hanging straight in blow mold
5. Parison too soft
6. One neck ring arm set higher than the other

#### C. Mold equipment

1. Neck of parison diameter too large for blow mold neck diameter
2. Baffle running too hot

### Remedies

#### A. Feeder

- Adjust the feeder temperature

#### B. Machine setup and operation

- Correct speed of invert and final cushioning
- Delay time of final blow or advance invert
- Adjust neck ring opening for speed and distance
- Check parison transferring cleanly into the blow mold
- Increase counter blow time and/or pressure
- Increase blank mold contact time and/or blank cooling wind
- Correct neck ring setting

#### C. Mold equipment

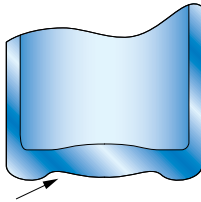
- Check design of parison neck diameter and blow mold neck diameter
- Check thickness of the baffle

## Thick or Heavy Bottom

### Definition

A bottom thicker than specified.

Note: Mainly an appearance defect. May cause thin spots in other parts of the bottle.



### Causes

#### A. Feeder

1. Glass is too hot
2. Gob is over weight

#### B. Machine setup and operation

1. Too much reheat time
2. Final blow is too late
3. Parison is too soft
4. Baffle end of blank dirty
5. Plunger too cold (press and blow)
6. Baffle too cold
7. Bottom plate too cold
8. Excessive swabbing of the blank

#### C. Mold equipment

1. Insufficient blank overcapacity
2. Baffle too large and heavy
3. Bottom plate too large and heavy

### Remedies

#### A. Feeder

- Adjust the temperature
- Reduce the weight

#### B. Machine setup and operation

- Reduce reheat time
- Advance final blow
- Increase counter blow
- Change blank
- Reduce cooling on plunger
- Check cooling wind setup, reduce weight or baffle
- Reduce cooling wind
- Reduce the amount of swabbing on blank or baffle

#### C. Mold equipment

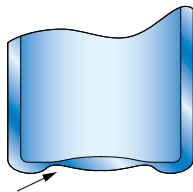
- Increase blank overcapacity
- Baffle too large and heavy
- Bottom plate too large and heavy

## Thin Bottom

---

### Definition

A bottom thinner than specified.



### Causes

#### A. Feeder

1. Gob temperature is too low
2. Gob is under weight
3. Uneven gob temperature

#### B. Machine setup and operation

1. Plunger contact time too long
2. Parison reheat time is too short, not allowing the glass to stretch
3. Counterblow takes place too early, not allowing the neck of the bottle to reheat enough
4. Final blow too early
5. Machine speed too low
6. Bottom plate running too hot
7. Speed of invert too fast or too slow
8. Dirty blank and baffle

#### C. Mold equipment

1. Blank size is too large
2. Incorrect plunger design
3. Excessive overcapacity
4. Incorrect parison design (press and blow)

### Remedies

#### A. Feeder

- Adjust gob temperature
- Increase weight
- Adjust forehearth temperature so that gob is not curling

#### B. Machine setup and operation

- Shorten the plunger contact time
- Increase reheat time in blow mold
- Delay counter blow
- Delay final blow
- Increase the machine speed
- Apply cooling wind to bottom plate
- Adjust speed of invert
- Decrease blank time

#### C. Mold equipment

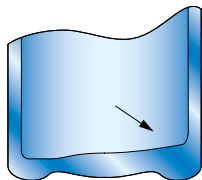
- Use a smaller size blank
- Correct plunger design
- Reduce overcapacity
- Correct parison design

## Wedge or Slug Bottom or Heel Tap

---

### Definition

A localized thick area at one side of the bottom.



### Causes

#### A. Feeder

1. Forehearth glass temperature is uneven

#### B. Machine setup and operation

1. Incorrect speed of invert
2. Parison not hanging straight in blow mold
3. Wear between rack and 48-tooth gear on neck ring
4. Incorrect setting of cooling wind mold side
5. Excessive reheat time
6. Blank temperature is uneven
7. Parison blown too soft
8. One neck ring arm set higher than the other
9. Bad loading blank mold - not central
10. Baffle with excessive oil

#### C. Mold equipment

1. Blank design too short
2. Neck of blow mold smaller than blank, causing bad transfer

### Remedies

#### A. Feeder

- Adjust forehearth temperature so that gob does not curl

#### B. Machine setup and operation

- Invert should be cushioned so that parison does not swing when transferred to blow mold
- Ensure neck rings are set correctly to neck ring gauge
- Check 48-tooth gear on neck ring mechanism for wear. Change if necessary. Change piston and rod on invert mechanism if worn.
- Adjust setting of cooling wind nozzle
- Reduce reheat time
- Adjust settings of blank mold cooling
- Increase counter blow pressure and/or time
- Check neck ring setting
- Adjust deflector to give central gob loading
- Raise or lower down trough
- Check for dirty blank and baffle

#### C. Mold equipment

- Check blank design and decrease run-down
- Check dimensions of blank mold neck and blow mold opening



## Broken Ware

---

### Definition

Ware which is cracked or broken into pieces.

### Causes

#### A. Feeder

1. Cold glass

#### B. Machine setup and operation

1. Machine speed too low
2. Improper timing setup for forming cycle
3. Too much final blow pressure
4. Ware too cold
5. Excessive swabbing
6. Blank and blow mold are too cold

#### C. Mold equipment

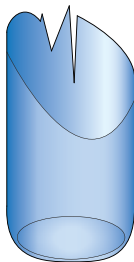
1. Incorrect mold design
2. Blanks and baffles not correctly matched

#### D. Conveyor

1. Containers on the conveyor too long

#### G. Lehr operation

1. Poor lehr loading
2. Incorrect lehr temperature - unstable
3. Unsuitable lehr belt
4. Excessive draughts or wind due to position of lehr and prevailing winds



### Remedies

#### A. Feeder

- Adjust feeder temperature

#### B. Machine setup and operation

- Increase the machine speed
- Check timing setup for forming cycle
- Reduce final blow
- Reduce cooling wind
- Reduce swabbing and use a clean, dry swab
- Adjust cooling wind setup

#### C. Mold equipment

- Check for correct mold design.
- Check blank and baffle match when the equipment is hot

#### D. Conveyor

- Increase the conveyor speed - that is increase the spacing

#### G. Lehr operation

- Improve lehr loading
- Adjust lehr temperature and/or speed
- Use a more suitable lehr belt
- Protect from draughts, wind, etc.



## Cords

---

### Definition

Streaks of glass having a composition different from the main body of glass.



### Causes

1. Batch is incorrectly proportioned
2. Batch scales are faulty
3. Batch segregation is occurring
4. Faulty batch charging into the furnace
5. Foreign cullet is being used

### Remedies

- This defect cannot be remedied by the production personnel but it must be reported as soon as it is observed. It is a serious defect and can cause trouble in the customer's plant.

## Out-Of-Shape Ware or Leaner

---

### Definition

Containers which are tilted to one side due to bottom not being level.

Note: They must be corrected at once, as they may cause trouble on the customer's filling line, when washing, filling or labeling.

### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Insufficient final blow time and/or pressure
2. Incorrect application of cooling wind - mold too hot
3. Machine speed is too high
4. Blow mold cycle too short
5. Unsuitable ware pusher design
6. Container not hanging in the take out long enough

#### C. Mold equipment

1. Incorrect blow mold shape
2. Incorrect blank design

#### D. Conveyor

1. Incorrect cooling over the deadplate
2. Pushout moving bottle onto the conveyor too soon
3. Container rubbing against the pushout arm or guide wire



### Remedies

#### A. Feeder

- Adjust feeder temperature

#### B. Machine setup and operation

- Increase final blow time and/or pressure
- Adjust mold cooling wind
- Adjust machine speed
- Increase blow mold cycle
- Improve ware pushers design
- Reduce time in the take out position
- Increase run time

#### C. Mold equipment

- Change the blow mold
- Correct blank design

#### D. Conveyor

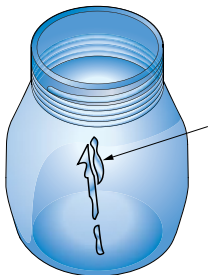
- Adjust cooling over the deadplate
- Delay bottle moving onto the conveyor
- Check movement of container on the conveyor

## Stuck Ware

---

### Definition

A rough piece of glass on the outside of the container.



### Causes

#### A. Feeder

1. Glass too hot

#### B. Machine setup and operation

1. Machine speed too high

#### D. Conveyor

1. Containers pushed onto conveyor too soon
2. Incorrect conveyor spacing
3. Conveyor belt slipping
4. Transfer to stacker conveyor incorrectly timed

#### D. Lehr Operation

1. Containers too hot when placed in the Lehr
2. Lehr too hot

### Remedies

#### A. Feeder

- Adjust the glass temperature

#### B. Machine setup and operation

- Reduce machine speed

#### D. Conveyor

- Increase differential on the conveyor wipe-out
- Check conveyor spacing
- Increase conveyor belt tension
- Adjust the transfer to the stacker conveyor

#### D. Lehr Operation

- Increase deadplate cooling or reduce conveyor speed
- Adjust the Lehr temperature

## Uneven or Bad Distribution

---

### Definition

Uneven wall thickness.



### Causes

#### A. Feeder

1. Incorrect glass temperature
2. Uneven gob temperature

#### B. Machine setup and operation

1. Uneven cooling of blank molds
2. Incorrect drum setting
3. Excessive blank cooling
4. Settle blow time too long - corkage reheat too short
5. Counter blow time too short
6. Machine speed too low
7. Incorrect timing of gob delivery

#### C. Mold equipment

1. Blank design unsuitable - incorrect blank shape
2. Incorrect plunger design

### Remedies

#### A. Feeder

- Adjust the glass temperature
- Adjust the forehearth temperature so that the gob does not curl

#### B. Machine setup and operation

- Apply cooling air evenly on the blank molds
- Adjust drum setting
- Adjust blank cooling
- Reduce settle blow
- Increase counter blow time
- Increase machine speed
- Check loading position and gob delivery

#### C. Mold equipment

- Adjust blank design
- Adjust plunger design

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