



Suzhou PTC Optical Instrument Co., Ltd
<http://en.ptcstress.com/>

Specialized Polariscopes for Plastic preforms (Ref: PSV-801)

Principle : Polarization interference

Specifications :

Viewing field: 200* 200 mm
Overall size: 300*335*330 mm
Main voltage: 220 V AC
Measuring space height : 234.5 mm
Light source: LED (White and Sodium light)
Gross Weight : 10KG
Packed in 1 carton : 45*45*32cm

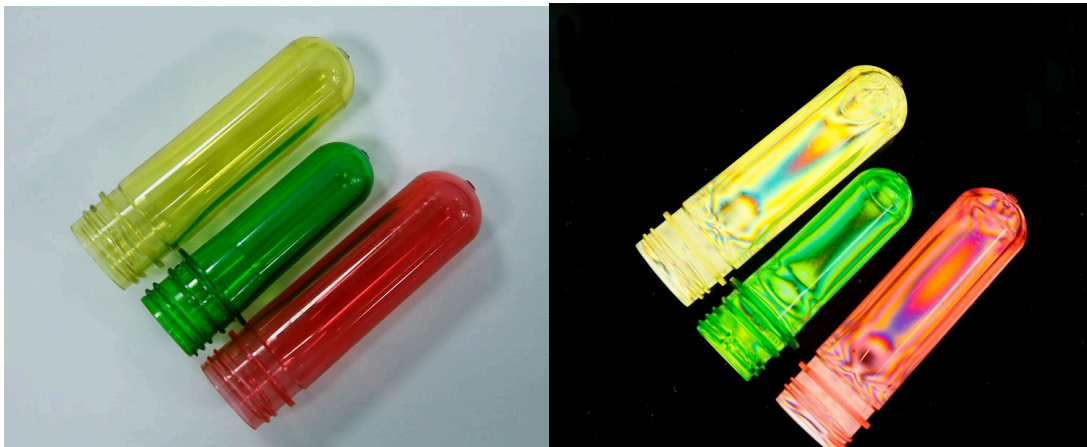


Application area

This Polariscopes is designed to observe and analyze the distribution of internal strain in transparent plastic preforms. It has been widely used in the quality control of various plastic rough processing products and finished bottles.

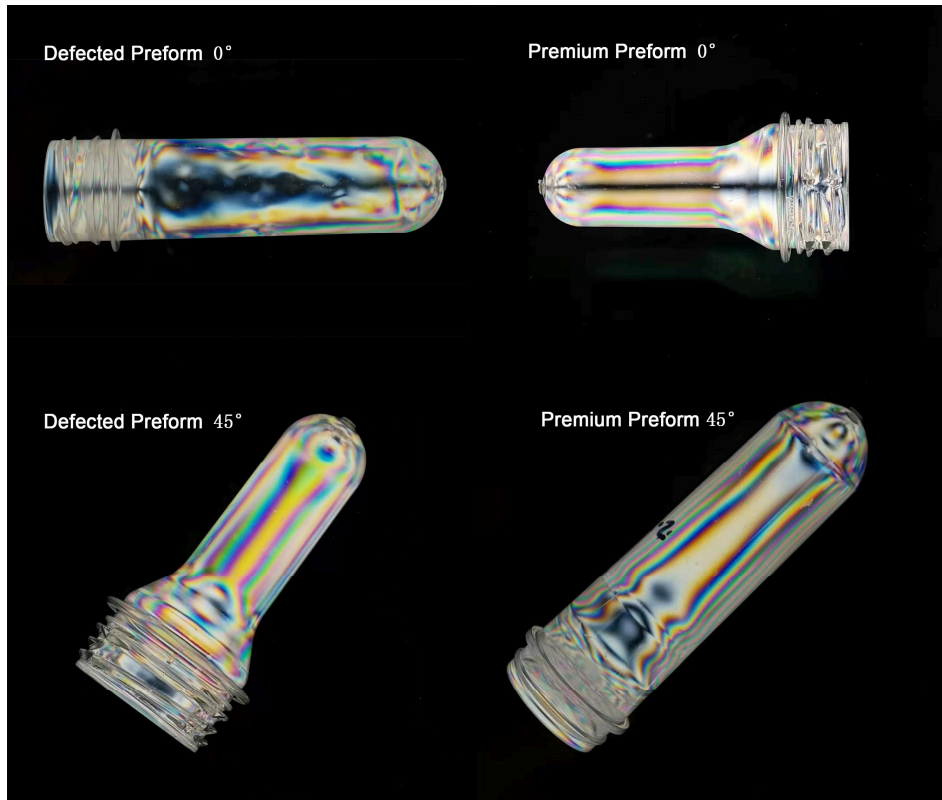
Features

1. Defects invisible to the naked eyes such as crystallization or other common defects become visible ;
2. When the plastic preform is placed on the Polarizer at a 45° angle, the colored birefringent stripes at the edge of the preform can be observed;
3. When the plastic preform is placed on the polarizer at a 0° or 90° angle, black birefringence stripes in the central part of the preform will be displayed;
4. In addition to white light, Sodium light is also used to test colored preforms or finished bottles;
5. Besides , this Strain Viewer provides 12 kinds of defect analysis functions. 12 kinds of colored defect comparison pictures will be attached to instruct related improvements in preform production process.



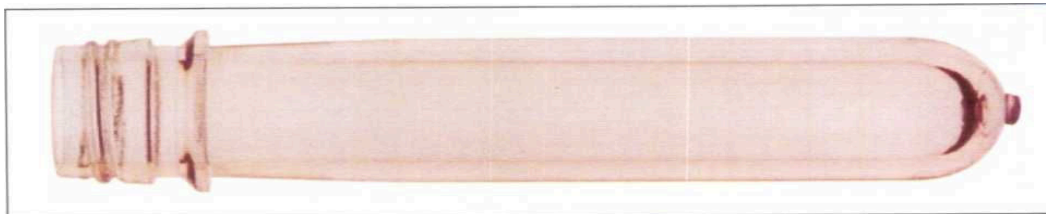


Suzhou PTC Optical Instrument Co., Ltd
<http://en.ptcstress.com/>

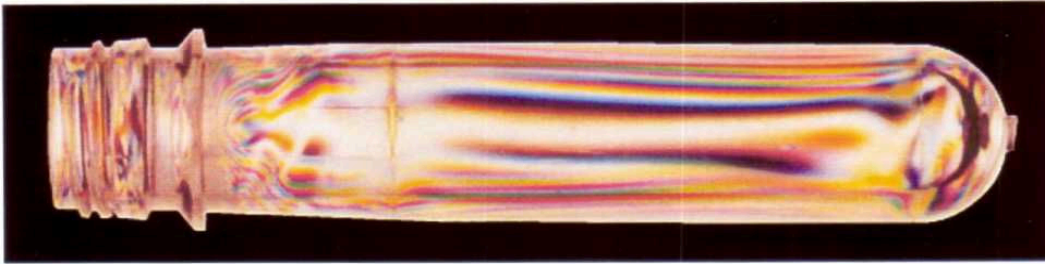


12 kinds of colored defect comparison pictures

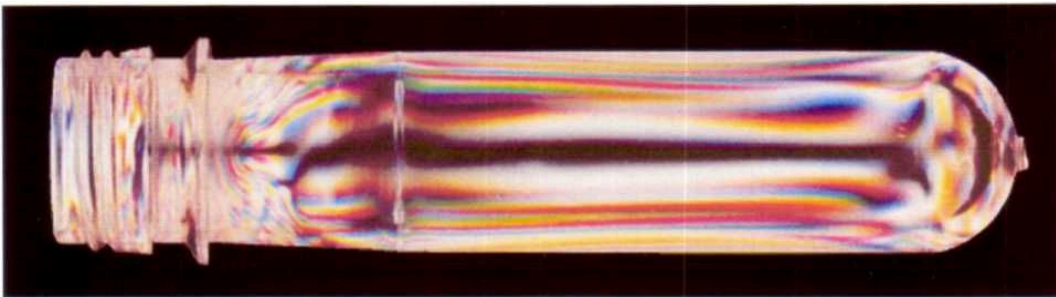
1. Optimum PET Preform



PET preform viewed under natural light



PET preform viewed under polarised light with preform held at 45° to polarising axis



PET preform viewed under polarised light with preform held parallel to polarising axis

PET preforms viewed under parallel polarised light display coloured birefringence pattern produced by the polymer flow lines (molecular orientation strain).

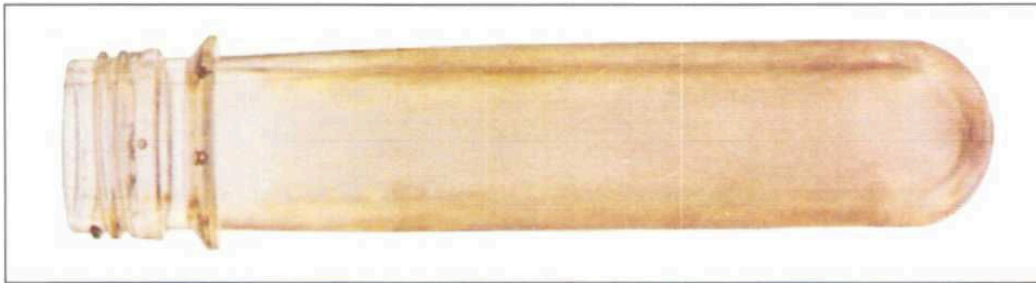
The coloured pattern observed when a preform is held at 45° to the polarising axis is known as an isochromatic fringe.

When a preform is held parallel to the polarising axis, a black fringe can be seen. These are known as an isoclinic fringe which indicate the direction of the molecular orientation strain.

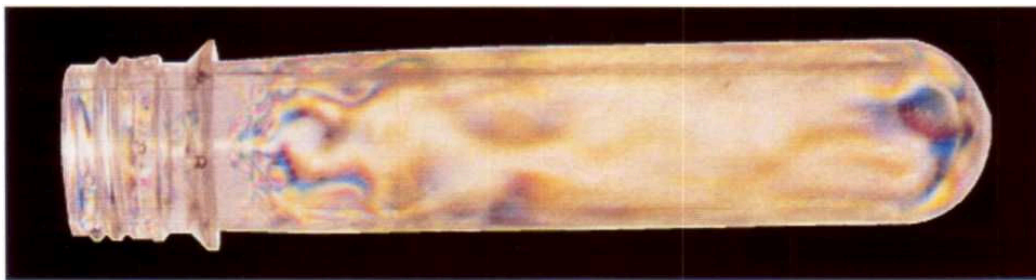
A premium preform should be transparent under natural light and have a regular parallel flow line and a black isoclinic fringe in the center.



2. Yellow Tint



PET preform viewed under natural light



PET preform viewed under polarised light with preform held at 45° to the polarising axis



PET preform viewed under polarised light with preform held parallel to the polarising axis

Yellow tint is an indication of the presence of degraded polymer known as oxidative degradation .

This can be a result of:

- excessive polymer drying time or polymer temperature
- excessive stay time or temperature in the screw barrel.



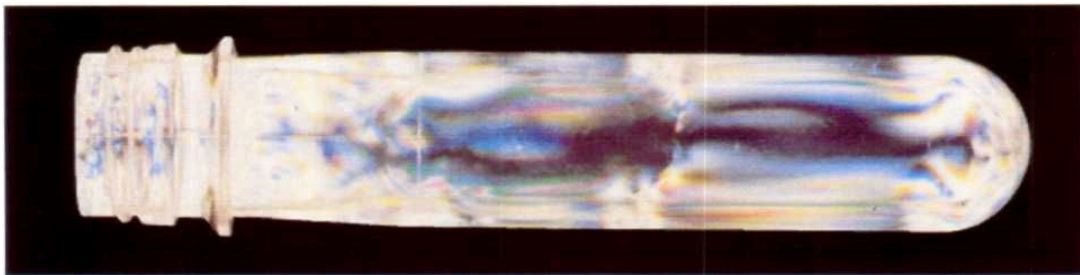
3. Condensation



PET preform viewed under natural light



PET preform viewed under polarised light with preform held at 45° to the polarising axis



PET preform viewed under polarised light with preform held parallel to the polarising axis

Condensation marks are caused by water condensing on the interior surface of the mould and partial hydrolysis melt during injection.

When the preform is viewed under polarised light, condensation marks appear as radial marks around the preform body.

These are known as water rings and can be eliminated by:

- Increasing the cooling water temperature inside the mould
- Reducing the humidity of the air surrounding the mould.



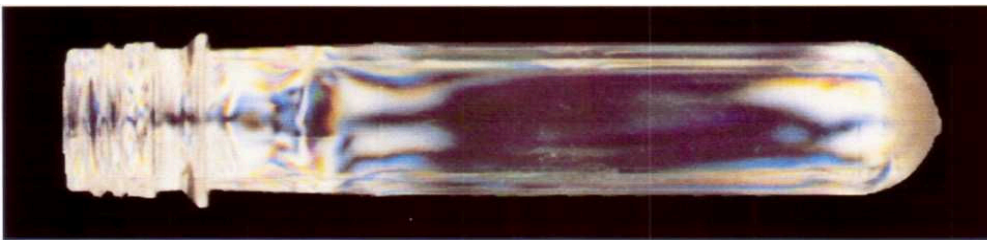
4. Splash Marks



PET preform viewed under natural light



PET preform viewed under polarised light with preform held at 45° to the polarising axis



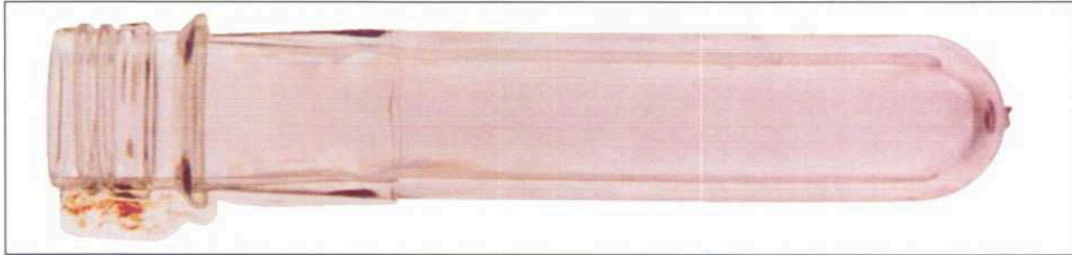
PET preform viewed under polarised light with preform held parallel to the polarising axis

Splash marks on preforms can appear on the inner and outer surfaces .
This problem can be caused by:

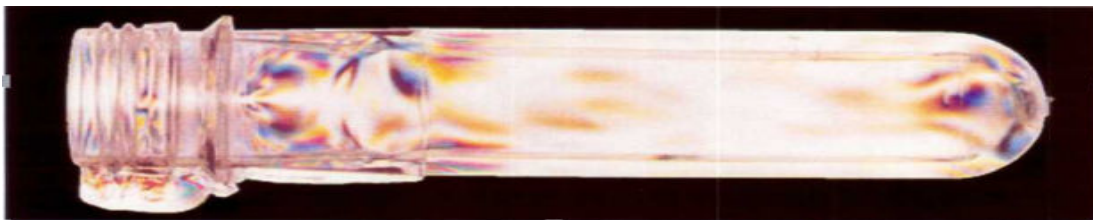
- Too low mould cooling water temperature
- Too slow filling in the of the mold cavity , causing partial condensation during the injection process
- Uneven cooling in the injection mold, such as cold spots



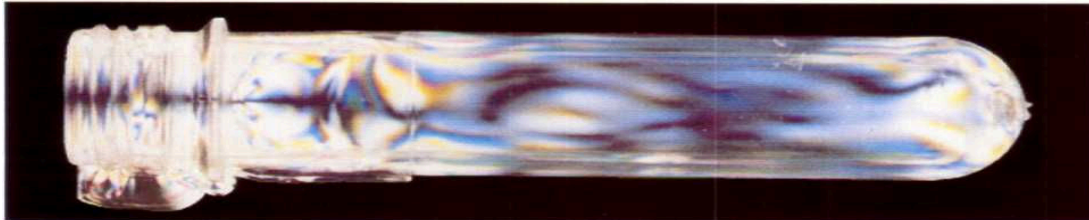
5 .Flashing



PET preform viewed under natural light



PET preform viewed under polarised light with preform held at 45°to the polarising axis



PET preform viewed under polarised light with preform held parallel to the polarising axis

Flashing of injected material at the mould parting lines can be caused by:

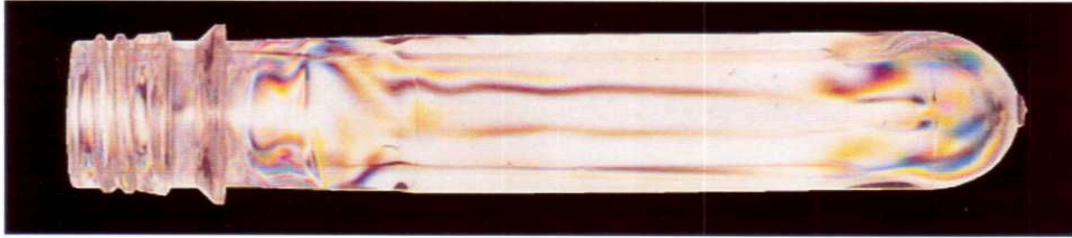
- incomplete closing of the mould caused by contamination on the mould closing surface
- Injection or holding pressure is too high.
- Mould clamping pressure is too low.

6.Sinking

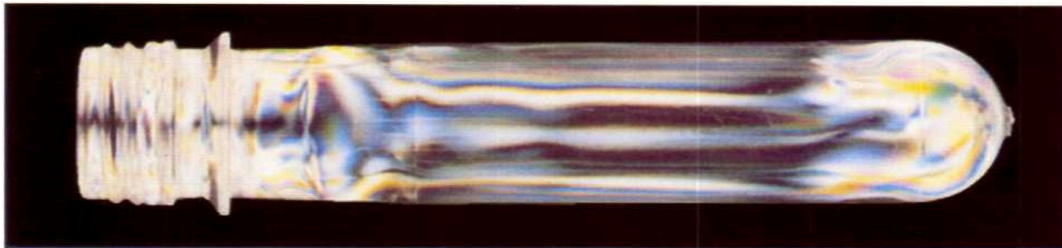




PET preform viewed under natural light



PET preform viewed under polarised light with preform held at 45° to the polarising axis



PET preform viewed under polarised light with preform held parallel to the polarising axis

This can be caused by:

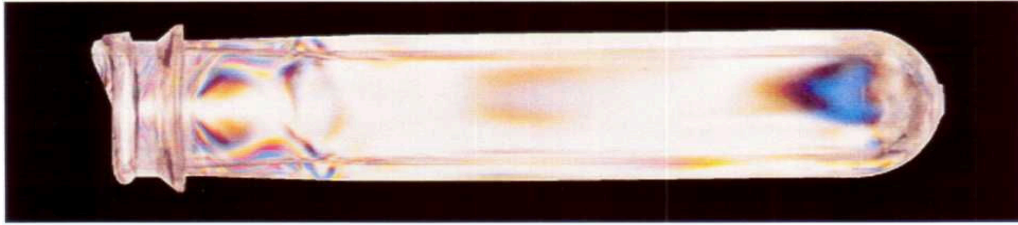
Insufficient filling inside the mould cavity.

- Too high cooling temperature within the mould
- Insufficient cooling time within the mould.
- Uneven cooling within the mould.
- Too low holding pressure while the preform are cooled in the mould.

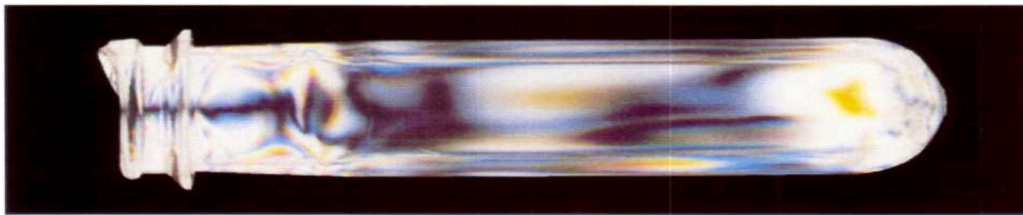
7. Short shot



PET preform viewed under natural light



PET preform viewed under polarised light with preform held at 45° to the polarising axis

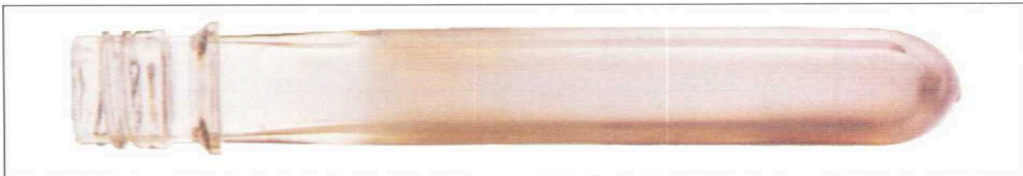


PET preform viewed under polarised light with preform held parallel to the polarising axis

Short Shot is usually caused by:

- Low injection speed or pressure causing the material to freeze within the mould before it is filled completely.
- Low setting of spiral stroke length during injection
- Inadequate mould ventilation.

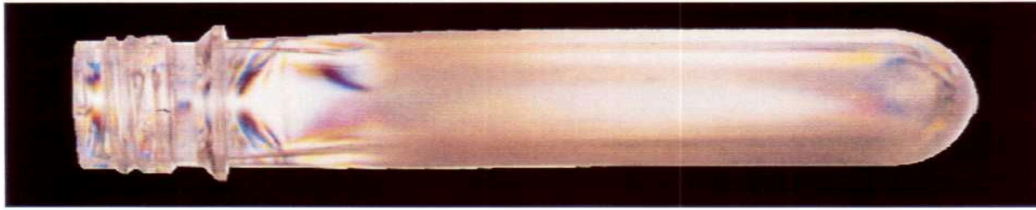
8. Excessive Crystallization



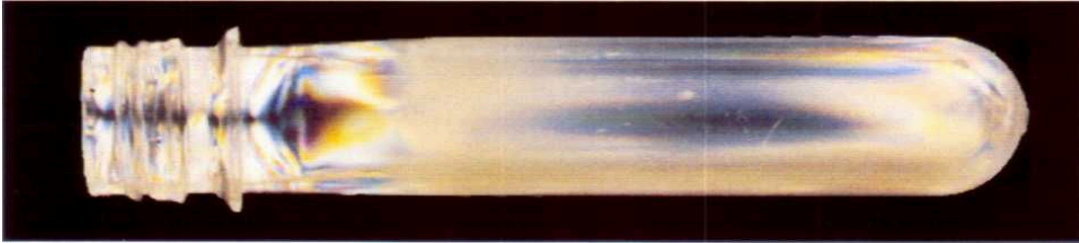
PET preform viewed under natural light



Suzhou PTC Optical Instrument Co., Ltd
<http://en.ptcstress.com/>



PET preform viewed under polarised light with preform held at 45° to the polarising axis



PET preform viewed under polarised light with preform held parallel to the polarising axis

Haziness found within the thick areas of the preform is usually caused by premature ejection from the mould.

In this situation, the slow cooling causes the polymer to crystallize in the thickest sections of the preform.

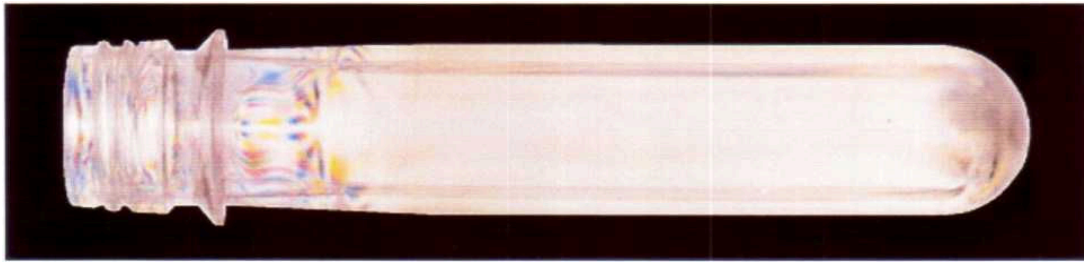
9. Side Haziness



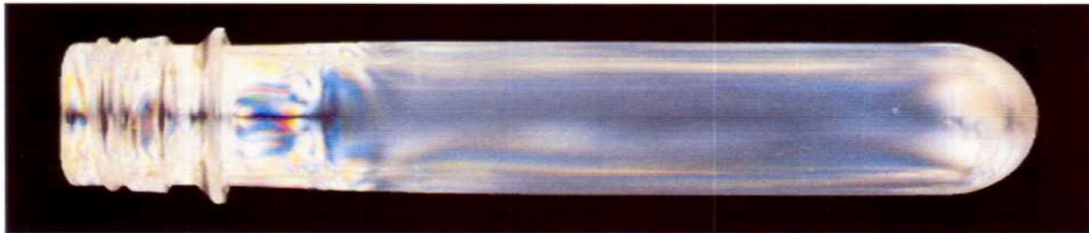
PET preform viewed under natural light



Suzhou PTC Optical Instrument Co., Ltd
<http://en.ptcstress.com/>



PET preform viewed under polarised light with preform held at 45° to the polarising axis



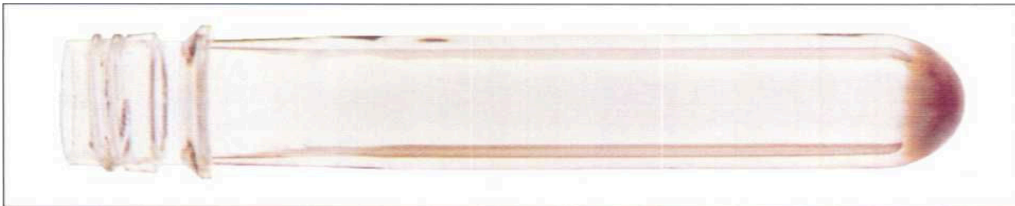
PET preform viewed under polarised light with preform held parallel to the polarising axis

Haziness within the preform can be caused by insufficient drying of the polymer.

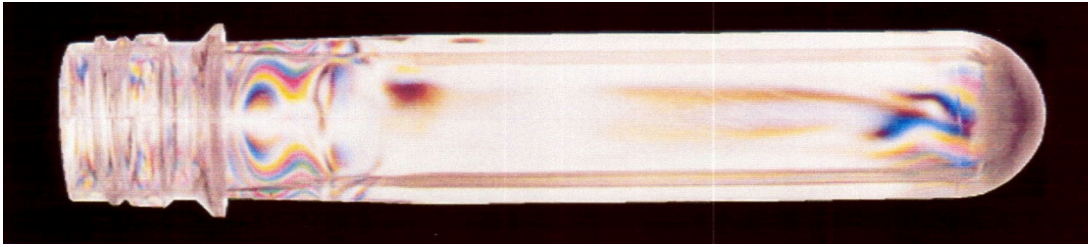
For example, residual moisture in the dried PET chips is more than 35 parts per million. The recommended Polymer chip drying conditions are :

1. minimum of 4 hours residence time at temperature of 175°
2. dew point of the drying gas should be no higher than -40°

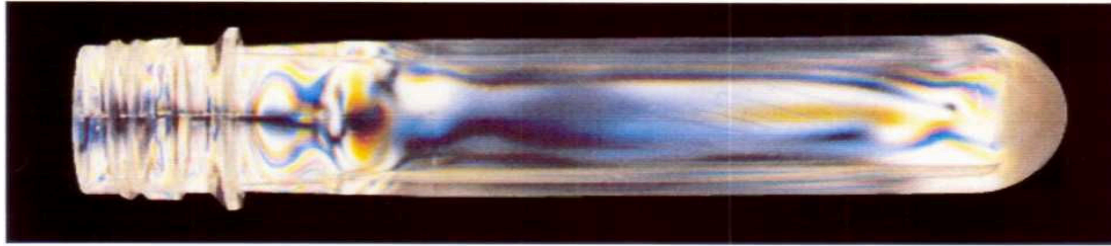
10 . Crystallization



PET preform viewed under natural light



PET preform viewed under polarised light with preform held at 45° to the polarising axis



PET preform viewed under polarised light with preform held parallel to the polarising axis

The tip of the preform appears haziness as a result of crystallinity. This effect can be caused by:

- The injection speed or pressure settings too high.
 - The hot runner system at excessive temperature
- Insufficient cooling of the mould near the cavity gate area .

11. Bubbles



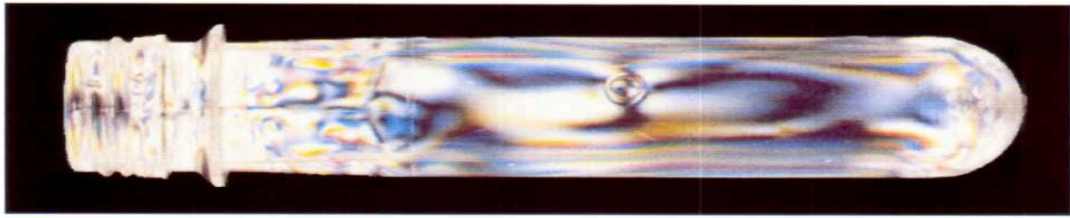
PET preform viewed under natural light





Suzhou PTC Optical Instrument Co., Ltd
<http://en.ptcstress.com/>

PET preform viewed under polarised light with preform held at 45° to the polarising axis



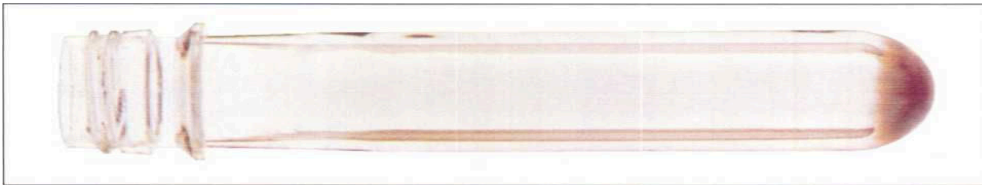
PET preform viewed under polarised light with preform held parallel to the polarising axis

Bubbles found within the walls of the PET preform can be caused by trapped gas in the screw barrel.

This problem can be eliminated by :

- Increasing the temperature of the barrel
- Ensuring the polymer chip temperature is 175 deg. C at exit of the dryer.
- Increasing the screwback pressure .
- Reducing the decompression time

12. Turbulence



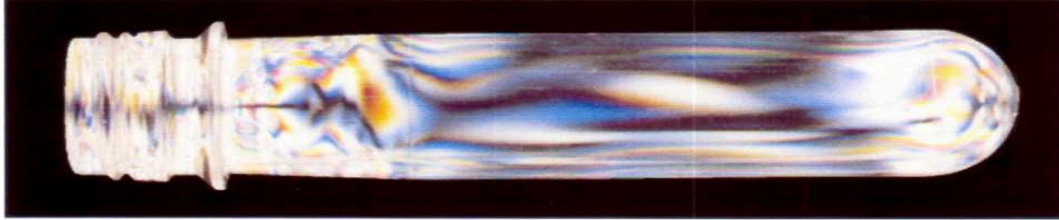
PET preform viewed in natural light



PET preform viewed in polarised light with preform held at 45 deg. to polarising axis .



Suzhou PTC Optical Instrument Co., Ltd
www.ptcstress.com



PET preform viewed in polarised light with preform held parallel to polarising axis

In this example no defects can be detected when examined in natural light

However when the preform is viewed under polarised light , considerable polymer flow line turbulence can be observed .

This can cause deformation during the stretch and blow moulding operation.