

Trouble Shooting Guide

R&D Center

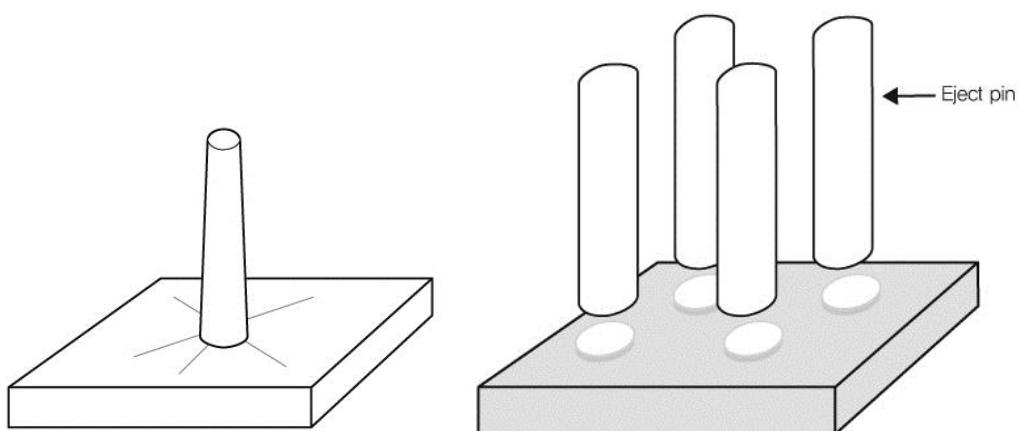
1. Total table

| Processing problem | Causes | Remedies |
|----------------------------|--|--|
| Sticking in cavity | <ul style="list-style-type: none"> Higher resistance to eject force Insufficient cooling time | <ul style="list-style-type: none"> Decrease injection pressure and check for undercut or insufficient draft Clean mold surface Increase the number of ejecting pins Lower the mold temperature and increase mold close time |
| Short shot | <ul style="list-style-type: none"> Insufficient flowability by low melt or mold temperature Improper design with small gate or narrow flow channel Unbalanced filling Insufficient metering stroke | <ul style="list-style-type: none"> Increase the cylinder temperature and mold temperature. Increase injection pressure and speed Enlarge the gate Adjust runner balance Increase metering stroke |
| Pit mark | <ul style="list-style-type: none"> Low injection speed Low holding pressure Low melt or mold temperature | <ul style="list-style-type: none"> Increase injection speed Increase injection and holding pressure Increase melt or mold temperature |
| Flow mark | <ul style="list-style-type: none"> Slow injection speed Low mold temperature | <ul style="list-style-type: none"> Increase injection speed Change the gate location or enlarge gate size Increase mold temperature |
| Silver streak | <ul style="list-style-type: none"> High moisture in granule Decomposition by over-heating Insufficient gas vent Air entrap into cylinder Contamination | <ul style="list-style-type: none"> Drying at 80-90 °C for 3-4 hours Lower the cylinder temperature or shorten residence time in cylinder Check for gas vent Increase back pressure Check for contamination with PVC |
| Discoloration or burn mark | <ul style="list-style-type: none"> Over-heating or too long residence time in cylinder Insufficient gas vent Fast injection speed | <ul style="list-style-type: none"> Lower the cylinder temperature Check for gas vent Decrease injection speed |
| Contamination | <ul style="list-style-type: none"> Contamination with other material Black specks | <ul style="list-style-type: none"> Take precautions on handling Clean the cylinder |
| Flash | <ul style="list-style-type: none"> Low clamping force Too high injection pressure or holding pressure Too fast injection speed Mold wear | <ul style="list-style-type: none"> Increase clamping force Lower injection pressure or holding pressure Lower injection speed Repair mold |
| Sink and void | <ul style="list-style-type: none"> Too low holding pressure Wear of non-return valve Improper cushion | <ul style="list-style-type: none"> Increase holding pressure and time Increase mold temperature Gating at thick wall Check for non-return valve |

2. Trouble shooting guide

(1) Cracking, whitening

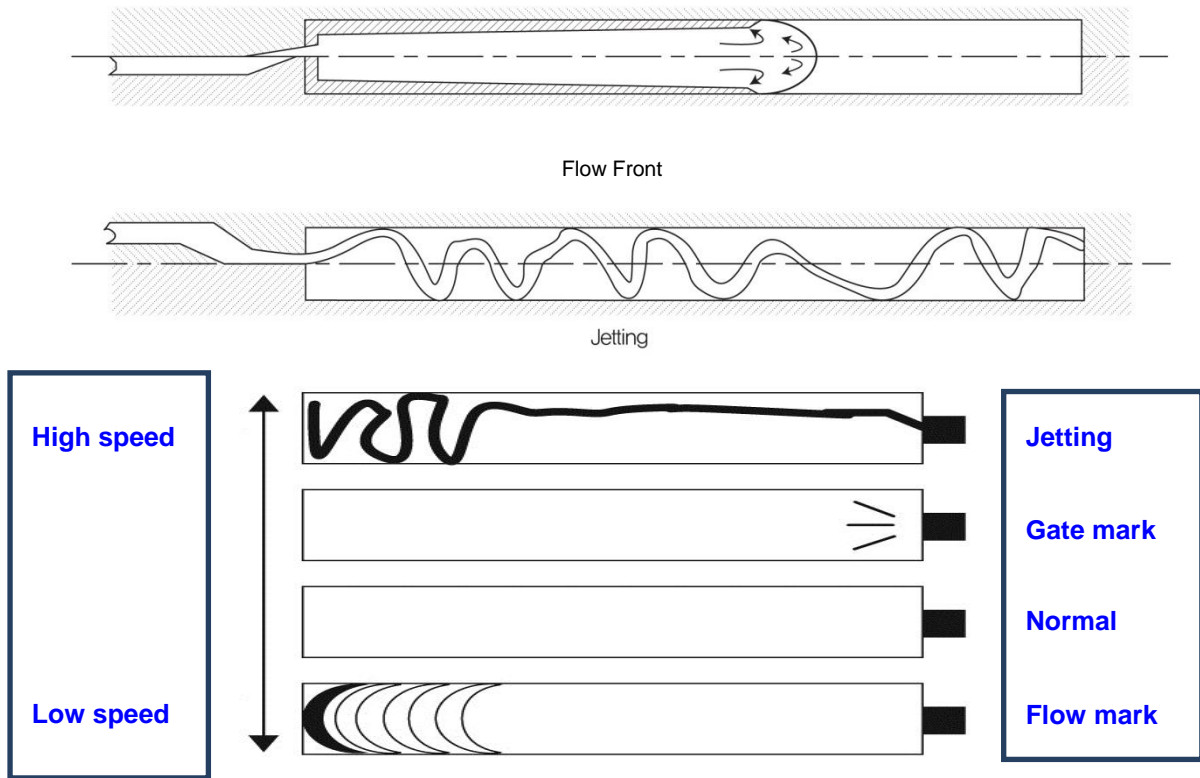
It is a partial fracture and white-colored discoloration cause by high injection pressure or over-packing in gate parts and eject pin parts of molded product.



| Classification | Causes | Suggested remedies |
|-------------------|-----------------------|---|
| Injection machine | - internal stress | - increase melt temperature |
| | | - decrease holding pressure time |
| | | - increase cooling time |
| Mold | | - increase mold temperature |
| | - fast ejection speed | - decrease ejection speed |
| | - ejection area | - add eject pins - increase eject pin diameter |
| Material | | - use crystalline plastics |

(2) Jetting

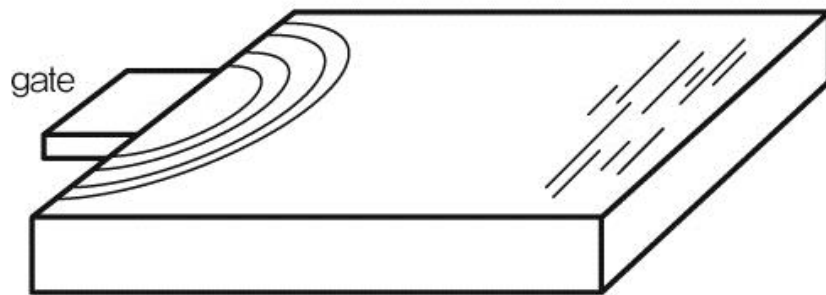
Surface defects by the turbulent flow of melt resin from an under-sized gate or thin section into a thicker mold cavity.



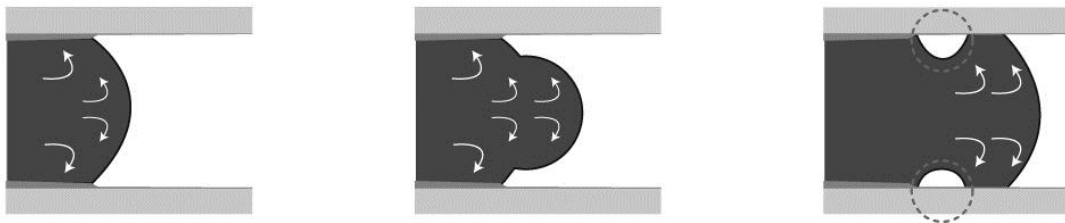
| Classification | Causes | Suggested remedies |
|--------------------------|------------------------------|---|
| Injection Machine | - low melt temperature | - increase nozzle and barrel temperature |
| | - unsuitable injection speed | - decrease injection speed in gate part (multi-step injection molding) |
| Mold | - small gate size | - enlarge gate area |
| | - unsuitable gate location | - change gate location |
| | - low mold temperature | - increase mold temperature |

(3) Flow marks

A wavy surface appearance on a molded part caused by improper injection of the melt resin.



Procedure of Flow Marks



| Classification | Causes | Suggested remedies |
|--------------------------|---------------------------------|--|
| Injection Machine | - insufficient injection speed | - determine optimum conditions with multi-step injection molding |
| | - insufficient melt temperature | - increase barrel and nozzle temperature |
| Mold | - insufficient mold temperature | - increase mold temperature |
| | - unsuitable runner balance | - modify runner balance |
| | - small gate size | - enlarge gate size |

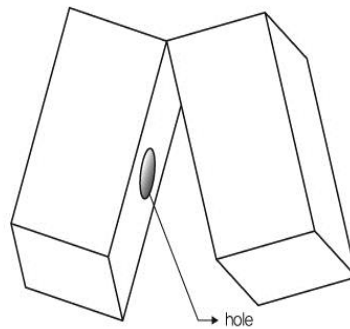
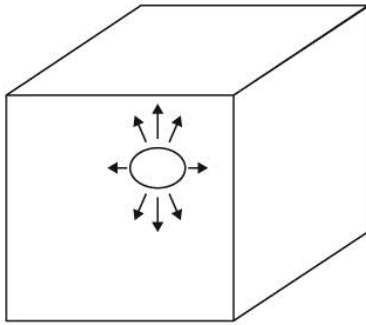
(4) Silver streaks

A surface problem due to moisture, entrapped air and decomposed products. Silver streaks are silver-white marks, spray(usually in a flow direction), or bubbles in molded parts.

| Classification | Causes | Suggested remedies |
|--------------------------|--|--|
| Injection machine | - moisture in hopper | - check temperature in hopper part - check crack in hopper part |
| | - entrapped air in screw | - use optimum screw type(L/D) |
| | | - increase back pressure |
| | | - reduce suck back and screw speed |
| Mold | - leak in cooling line | - check cooling line |
| | - mold deposit | - clean mold surface - give gas vent |
| Material | - moisture absorption | - check dryer |
| | | - increase drying temperature and time |
| | | - check packaging and storage conditions |
| | - decomposition of resin and additives | - retain optimum barrel temperature |

(5) Voids

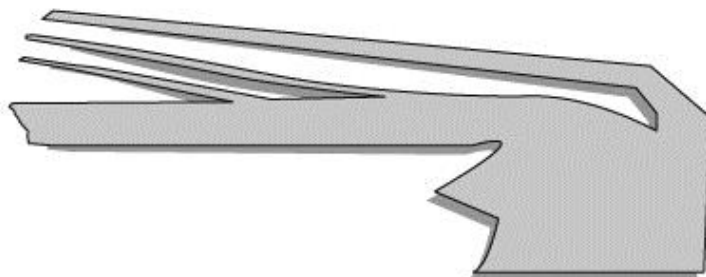
A filling problem that mainly takes place in a thick area of molded parts. It is caused by shrinkage due to freezing which is not being compensated for by maintaining pressure.



| Classification | Causes | Suggested remedies |
|--------------------------|---------------------------------|---|
| Injection machine | - too high melt temperature | - decrease melt temperature |
| | - insufficient holding pressure | - increase injection pressure - increase holding pressure and time |
| | - too high injection speed | - decrease injection speed |
| Mold Design | - too low mold temperature | - increase mold temperature |
| | - unsuitable gate location | - change gate location to thick part |
| | - too small gate size | - enlarge gate size |

(6) Delamination

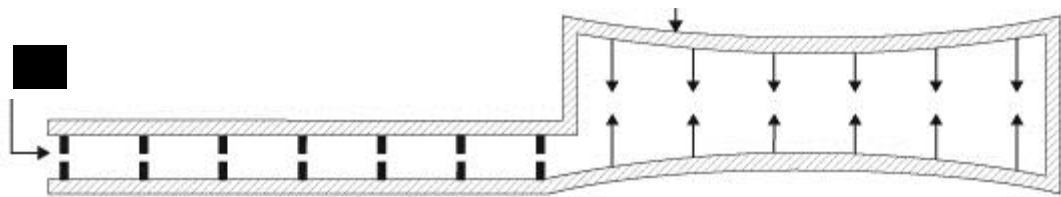
A split into layers caused by weak compatibility in skin layers.



| Classification | Causes | Suggested remedies |
|-------------------|---|---|
| Injection machine | | - decrease injection speed |
| Mold | - unsuitable polymer orientation in surface | - increase mold temperature |
| | | - check gate location |
| | - localized mold heating | - decrease mold temperature - decrease injection speed |
| Material | - contamination | - check compatibility of colorant and carrier resin |

(7) Sink marks

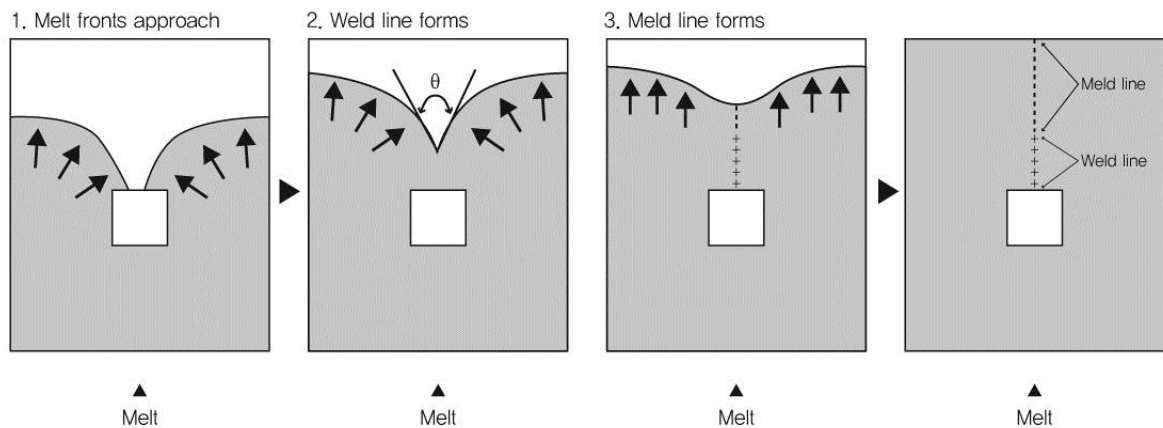
A surface problem caused by shrinkage. The main cause is a freezing which is not being compensated for by maintaining pressure. It is usually caused by the collapsing of the surface following local internal shrinkage after the gate seals, especially on the face opposite to where the section thickness increases. It is also called shrink marks or heat marks.



| Classification | Causes | Suggested remedies |
|--------------------------|--|--|
| Injection Machine | - unsuitable injection molding condition | - increase injection pressure |
| | | - increase holding pressure time |
| | | - increase cooling time |
| | | - check wear level of check ring |
| Mold | - unevenness in cooling line | - reinstall cooling line |
| | | - change gate location(thick part) |
| | | - enlarge gate and sprue-runner size |
| Design | | - reduce part thickness-correct design |

(8) Weld lines

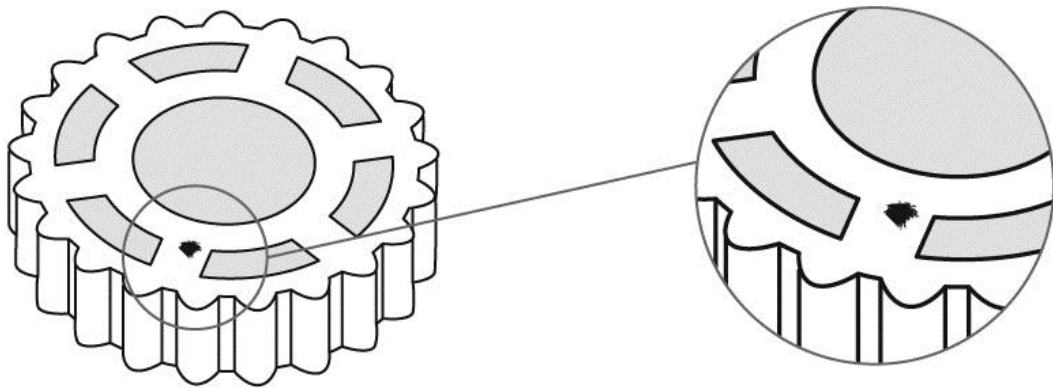
A filling problem. Melt resin is being cooled before welding. In the process of filling a cavity, the hot melt resin is obstructed by the core and by the meeting of two or more melt streams with a core splits and surrounds the core. The split stream then reunites and continues flowing until the cavity is filled. The rejoining of the split streams forms a weld line that lacks proper strength because the flowing material tends to bring air, moisture, and lubricant into the area where the joining of the stream takes place and introduces foreign substances into the welding surface.



| Classification | Causes | Suggested remedies |
|-------------------|--|-----------------------------------|
| Injection Machine | insufficient resin adhesion in weld line | - increase injection speed |
| | | - increase mold temperature |
| Mold | | - give over flow |
| | | - give gas vent in weld line part |
| | - change gate location | |

(9) Black specks or flakes in parts

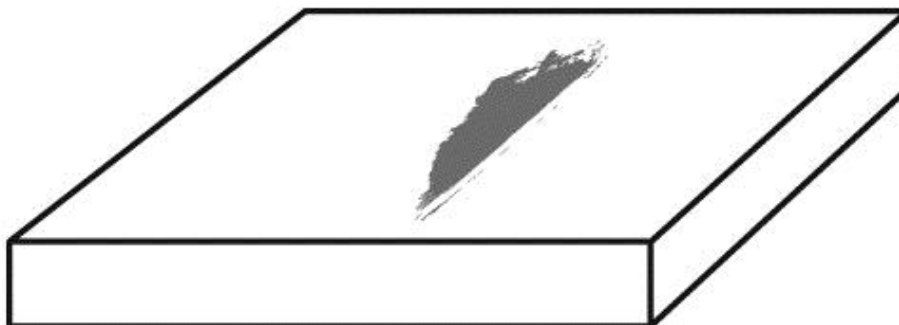
This is a surface problem mixed with decomposed or carbonized material formed in the barrel surface. A defect appears inside or on the surface of a molded part.



| Classification | Causes | Suggested remedies |
|--------------------------|--|---|
| Injection Machine | - screw contamination | - clean screw and barrel - use cleaning material |
| | | - check metering zone and feeding zone of screw |
| | - unsuitable nozzle length | - change nozzle length |
| | - too high melt temperature | - check real melt temperature |
| | - barrel capacity | - use 25 ~ 65% of barrel capacity |
| | - too high screw speed | - decrease screw speed |
| Mold | - unsuitable temperature control in hot runner | - check thermocouple of hot runner |
| Material | - material contamination | - check material |
| | - crusher contamination | - check crusher screw and crushed material |

(10) Black streaks

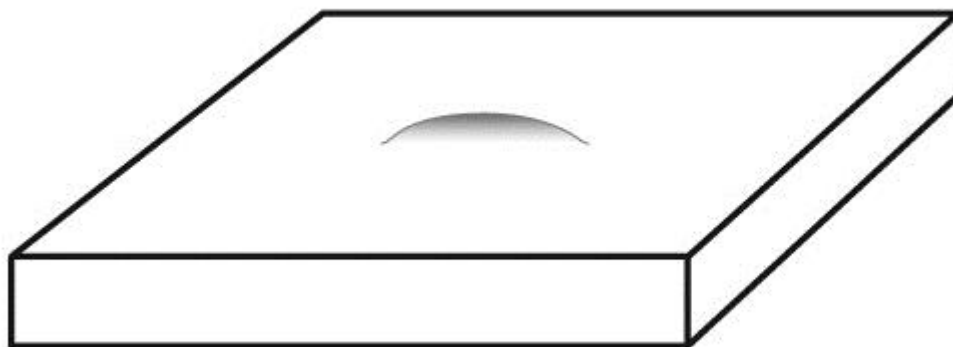
A surface problem caused by decomposition of resin.



| Classification | Causes | Suggested remedies |
|--------------------------|--|---|
| Injection machine | - screw contamination | - clean screw and barrel - use cleaning material |
| | | - check metering zone and feeding zone of screw |
| | - unsuitable nozzle length | - change nozzle length |
| | - too high melt temperature | - check real melt temperature |
| | - barrel capacity | - use 25 ~ 65% of barrel capacity |
| | - too high screw speed | - decrease screw speed |
| Mold | - unsuitable temperature control in hot runner | - check thermocouple of hot runner |
| Material | - material contamination | - check material |
| | - crusher contamination | - check crusher screw and crushed material |

(11) Blisters

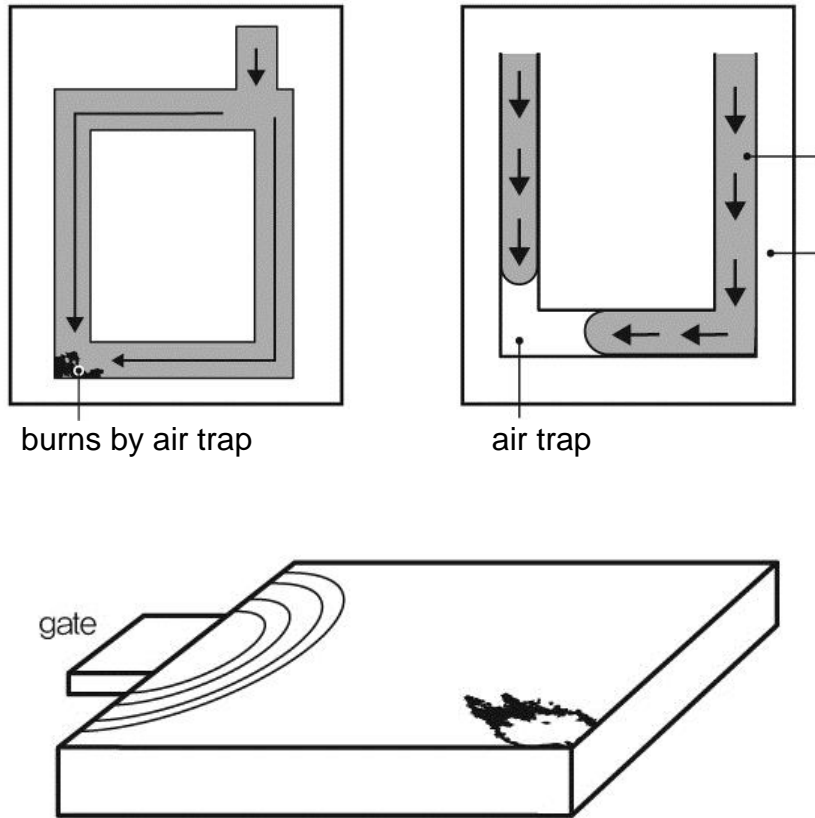
A small pocket of fluid within the upper layers of a molded product.



| Classification | Causes | Suggested remedies |
|--------------------------|---------------------------------------|--|
| Injection machine | - gas in barrel | - reduce decompression length |
| | | - check barrel temperature |
| | | - reduce retention time |
| Mold | - blocking of air vent | - check moisture absorption of resin |
| | | - check air vent number and depth |
| Material | - decomposition of resin or additives | - clean parting line and core pin vent |
| | | - check barrel temperature |
| | | - reduce retention time in cylinder |

(12) Burns

A surface problem due to compression by remaining gas and air in the mold.

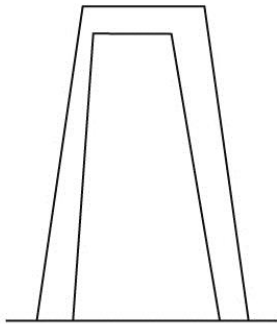


| Classification | Causes | Suggested remedies |
|--------------------------|-------------------------------|--|
| Injection machine | - entrapped gas in barrel | - increase back pressure |
| | - too high melt temperature | - decrease injection temperature |
| | - too high injection pressure | - decrease injection pressure |
| Mold | - entrapped gas and air | - check gas vent - enlarge gas vent |
| Material | - too much volatile material | - decrease injection temperature |
| | | - reduce content of mold release agent and lubricant |

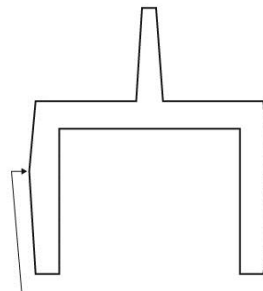
(13) Burrs(flashes) and over-packing

Burr : It is a thin surplus web of plastics attached to molded parts along the parting lines' fins at holes. It is objectionable and must be removed before use.

Over-packing : When extra material is compressed in one flow path while other flow paths are still filling.



Over-packing by partial disposition in core

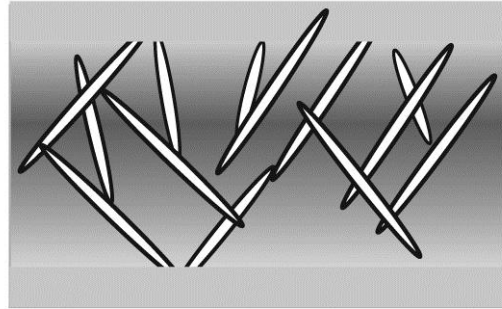
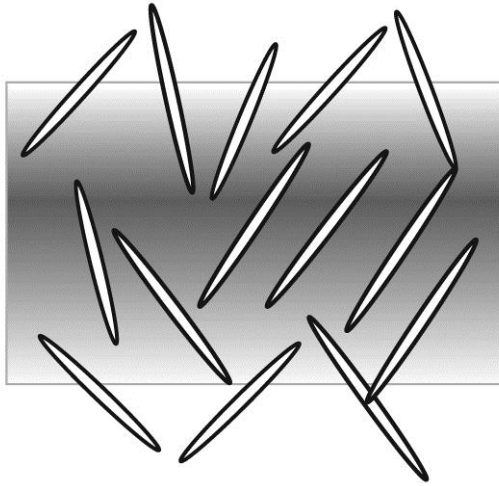


Over-packing by weak strength of mold

| Classification | Causes | Suggested remedies |
|--------------------------|-----------------------------|---|
| Injection machine | - too high melt temperature | - check real melt temperature |
| | | - reduce retention time |
| | - too low clamping force | - change injection machine with higher clamping force |
| Mold | - unsuitable parting line | - decrease holding pressure |
| | | - modify mold |
| Material | - too low melt viscosity | - check moisture content |
| | | - compare other lot numbers |

(14) Glass fiber streaks

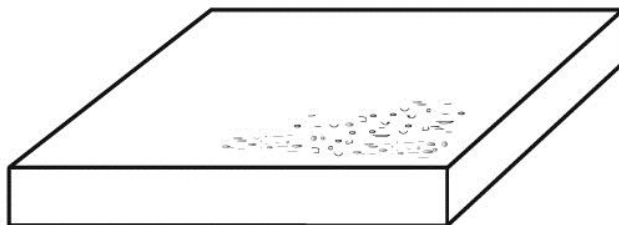
A surface problem on molded parts using glass fiber-reinforced products.



| Classification | Causes | Suggested remedies |
|--------------------------|-----------------------------|---|
| Injection Machine | - too high melt temperature | - check real melt temperature |
| | | - reduce retention time |
| | - too low clamping force | - change injection machine with higher clamping force |
| Mold | - unsuitable parting line | - decrease holding pressure |
| | | - modify mold |
| Material | - too low melt viscosity | - check moisture content |
| | | - compare other lot numbers |

(15) Pits

A small-sized regular or irregular crater on the surface of molding parts.



| Classification | Causes | Suggested remedies |
|-------------------|--------------------------|--|
| Injection machine | - entrapped gas | - decrease injection temperature |
| | | - increase back pressure |
| | - too slow packing speed | - increase injection speed |
| | - insufficient packing | - increase holding pressure and time |
| | | - retain optimum melt temperature |
| | | |
| Mold | | - increase mold temperature |
| | - wear and corrosion | - protect from over-packing |
| | | - change gate location |
| | | - cavity coating |
| | - mold deposit | - change gate location |
| | - cavity coating | |
| Material | - corrosion by additives | - check compatibility between resin and mold |
| | | - change material of mold |
| | | - mold surface coating |

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