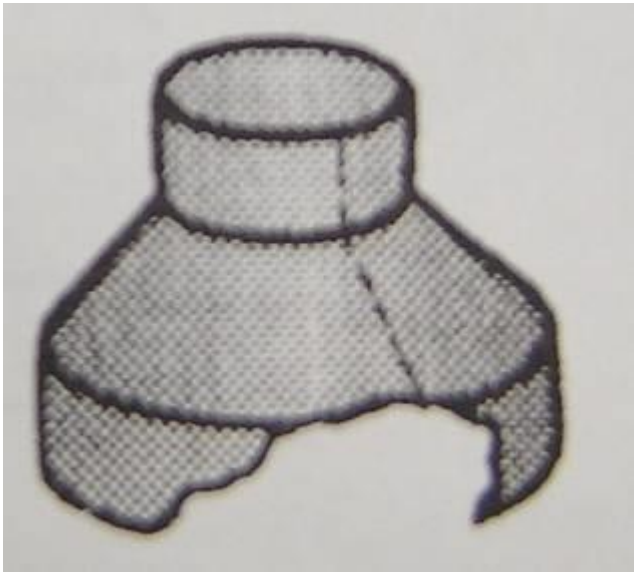
Basic Injection Moulding Trouble Shooting Guide

Contents

Common Sense On Trouble Shooting

1. Determine whether problem occurs consistently or not. (In most case, you cannot control consistency.)
2. Identify possible causes (refer to table below).
3. Take corrective actions
4. Install control measures, monitor whether new process is capable to prevent problem reoccurrence or not.
5. If non go back to step 1. If yes, finalize settings, document changes, and notify all concerning parties for the modifications.

Short shot



Possible causes:

Process- Insufficient injection pressure/ injection rate insufficient material feed

Excessive cooling of the melt

Mould- Unbalanced multi-cavity mould

Insufficient air venting blocks resins flow Runners, gates, or vents too small

Material flow length too long.

Material- Material viscosity too high

Foreign material clogging nozzle and/ or gates

Mould temperature too low

Machine- Feed hopper blocked

Barrel has no resins left

Undersized cylinder heating capacity

Material leaks/ back flow

Warpage

Possible causes:

Ejected part too hot/ in-balance cooling

Improper balance core and cavity temperature

Poor knock out mechanism balance

Over packing in gate area because of high injection pressure

Holding time too long

Moulded in strains / internal stress built up

Small undercut in mould Varied part's wall thickness

Improper balanced multiple gates

Material flow too long, insufficient gates Low rigidity on part desig

Mould Flash

<u>Possible causes</u>

Injection pressure/injection rate too high

Barrel temperature too high

Insufficient clamping pressure

Mould sliding cores clearance too large Imprecise mould alignment

Foreign material caused clearance on mould mating surface

Mould temperature too high Air venting design too large

Material over packed the mould cavity

Mould parting defects after age

Hopper temperature too high

Brittleness

Possible causes

Material thermally degraded-

- Screw speed too high
- Residence time too long
- Backpressure too high

Material not predicted

Regrind content too high

Materian contamination

Use of improper colorant

Inadequate radii at corner, notch, or thread

Voids or notch on part after moulding

Inappropriate hopper temperature

Mould temperature too low

Moisture contend too low after moulding (for PA)

Excessive Shrinkage

Possible causes:

Insufficient cooling

Injection rate too low

Packing pressure (injection, holding, back) too low

Mould temperature too high

Inappropriate hopper temperature

Runner / Gate size too small

Varied part's wall thickness

Insufficient additives (nucleator)

Sink Marks / Voids

Possible causes:

Insufficient injection pressure

Insufficient holding time

Insufficient backpressure

Insufficient material feed

Hopper and melting temperature too high

Insufficient sprue/runner/gate size

Improper gate location / material flow length too high

Material leaks / back flow

Non-uniform part's wall thickness

Mould temperature too high for sinks and too low for voids

Insufficient air venting for voids

Mould sticking

Possible causes:

Over packing, injection pressure too high

Holding pressure too high

Insufficient cooling

Regrind content too high

Insufficient tapers/draft angle on mould/sprue

Insufficient mould release/resins lubricant used

Undercuts at mold/moving slides failure

Material experiences "positive shrinkage"

Core & - Cavity	Polished surface on core
	Insufficient knockout action
	Surface irregularities in the mould
Sprue-	Nozzle and sprue bushing miss-aligned
	Sprue bushing not polished

Drooling

Possible causes:

Nozzle temperature too high

Melt temperature too high

Material too moist

Shut off valve malfunction

Silvery Streaks Splash Marks

Possible causes:

Material too moist

Overheated material

Residence time too long

Air trapped in melt

Check if excess mould release agent on mould cavity

Reduce regrind

Flow marks Jetting

Possible causes:

Material melt front too cold

Irregular injection rates

Inconsistent nozzle heating

Big variance in part’s wall thickness

Mould too cold

Gate size/design inappropriate

Odor

Possible causes:

Melt temperature too high

Material contamination

Residence time too long

Material had been overheated or even burnt at hold up spots within the machine

Low gloss

Possible causes:

Material too cold

Rough cavity surface/poor cavity polishing

Injection pressure too low

Sprue/Runner/Gate size too small

Excess mould release agent/lubricant on mould surface

Weak Weld lines

Possible causes:

Inadequate venting at weld(s)

Mould temperature too low

Melt temperature too low

Material too viscous (setting too quickly)

Injection speed too low

To small sprue, runner or gate size

Gate location(s) too far from weld

Excess mould release agent on mould surface

Un-melted Granules

Possible causes:

Material too cold

Insufficient plasticizing capacity, slow plasticizing

Melt contains granules with higher melting pressure

Insufficient backpressure

Barrel not well insulated

Screw type is inappropriate for the material plasticizing

Rough Surfaced Orange Peels Wrinkles

Possible causes:

Rough cavity surface

Material flow too slow-

Insufficient melt temperature

Insufficient mould temperature

Insufficient injection pressure

Insufficient injection speed

Screw forward time too slow

Gate size too small

Discoloration Color Fading

Possible causes:

Material suffers thermal degradation

Melt temperature too high

Colorant melt temperature too low

Brown Stains Black Streaks

Possible causes:

Material oxidized or contaminated

Screw/barrel not cleaned

Excess oil/grease on mould surface; probably from knockout pins

Screw Slippage

Possible causes:

Screw/Barrel worn out

Feed hopper blocked

Too much lubricant in material

Material too wet

Burn Marks

Possible causes:

Injection speed too high

Temperature settings too high

Not enough mould venting or venting blocked

Material too heat sensitive

Gate size/design inappropriate

Core shift causes excessive material heat up from friction when passing narrow section

Safety Inside the Injection Moulding Workshop

Injection moulding machines are powered my electricity. They are fast, power and dangerously hot. Despite the fact that they are build to fun safely, users still have to treat them with respect because the high clamping tonnage and high temperatures needed to process the plastics are just as effective as crushing or destroying the operator hands, arms, legs and fingers.

Be cautious and pay attention when operating injection moulding machines, or else accidents could happen.

Do not reach over or under protective guards when the machine is running.

Do not climb or crawl into the machine when the machine is operating.

Wear face shields, long gloves and other protective clothing when purging the barrel and when working around the injection nozzle or the mould where hot plastic may be expelled.

If a piece of plastic is caught inside the mould when the latter closes, hit the machine emergency stop button. Do not slide open the safety gate and grab for the plastic. Wait until the clamping action has stopped. Damage moulds can be replaces, but not crushed hands and fingers.

Before starting your work shift, walk around the injection moulding machine that you had been asked to operate. Make sure that all safety guards are in place, observation windows are clear and not broken or missing, and all safety interlocks are in working order and properly adjusted.

Do not fix or adjust the injection-moulding machine when its motors are running.

Stand clear when a maintenance mechanic works on your machine. Do not attempt to help unless requested specifically.

Ejector pins, ejector plates and boxes, cores and core activator are moving parts. Pinch points are created as these devices travel. Watch your hands and fingers.

Safety devices

Every injection-moulding machine has built-in electrical, hydraulic and mechanical safety devices. Find out where they are located and check to make sure that they are operational, as operator on an earlier shift may have disabled some of them.

Clothing and Safety Glasses

Your facilities will no doubt have certain rules and regulation on what you should wear on the job to safeguard your safety. Be particularly cautious about the types of shoes you wear as split hot plastic can easily burn through thin shoes and sharp plastic parts, runners or spruces can pierce soft soles. Wear safety glasses and ear protectors even if they deem to be awkward and inconvenient. Protect yourself with these gears for your own safety.

Motor stop button

If you have to reach into the mould space for some reason, stop the motor that drives the whole machine. The motor or emergency stop button is purposely located close at hand as part of the requirements under government safety regulations.

Do not reach into the material hopper or feed throat while the machine is running. The rotating screw can grind fingers off efficiently. Again, shut off the motor first.

Hot Plastic

Melted plastic is extremely hot. Do not under-estimate the temperatures and pressures that are at work in your moulding machine.

Purging

Purging is the expelling of hot plastic material from the injection barrel into the open air. Wear long gloves, long sleeves, a facemask and safety glasses. Purging of hot runner moulds is particularly hazardous.

Electrical Heaters and Wiring

The injection barrel is heated by relatively high voltage electricity (normally 220 VAC). Be very careful of the heated portion, the heater band at the nozzle is often exposed, so look out for it.

Be alert to other electrical hazards on your molding machine and around you in the shop floor. Make it a habit to watch out for electrical boxes with covers removed, open control panel doors, broken or damaged wiring conduit, frayed or spliced electrical cords. Report them accordingly

Caution: Scrap Grinders

Grinders can throw pieces out from the feeding chute back in your face, so be careful if they operate near you. If you have to clean the grinder, turn it off and disconnect the power completely. Do not just shut off the switch. Better still, pull out the power plug and hang it up where you can keep an eye on it. Avoid someone coming along and turned the machine back on while you have your hands and fingers inside the grinder.