

Table 1 Troubleshooting Guide for Extrusion

Problem	Possible Causes	Possible Solutions
High drive motor amperage	Low resin temperature	Raise the temperatures and check the electrical output of the heaters
	Resin not correct	Use resin with lower molecular weight
	Plugged screens, motor, or contamination	Change the screens
		Motor needs maintenance
		Decrease motor speed
		Pull the screw to check for any contamination
Interrupted resin output	Hopper clumping	Lower the feed zone temperature
	Bridging	Use a cram feeder or extrude the material into pellets in a separate operation
	Clogging	Look for degraded or cross-linked resin in screen pack
	Cooling jacket turned off	Check the cooling jacket not turned off in the solid sections
Uneven flow (surging)	False temperatures	Raise the temperatures in the heating zones
	Contamination	Remove the internal mixer if used
	Melt conveying problems	Lower the feed zone temperature in the case of bridging
		Clean screen pack
		Check for plugging in the hopper
		Pull the screw and check for a large contaminant
		Increase the pulling pressure on the part
		Density of resin could be too low, thus requiring a cram
		Feeder, starve feeding, or pelletization
	Change screw design	
No output	Hopper	Open slide valve of feed hopper
	Screw	Use soft rod to dislodge the bridging
	Screen pack	Put vibrating pads or use stirrer in feed hopper
	Die	Switch the terminals on the screw drive motor
		Repair broken screw or have spare made
		Dislodge blockage at feed opening
		Clean screw or use low friction screw coating
		Use an extruder with a grooved feed section
		Use lower mesh screens or replace with new ones
	Increase die temperature	
Unmelted particles in the extrudate	Screen pack	Hole in the screen pack, so replace it
	False temperatures	Raise the temperature in the compression and metering zones
	Contamination	Check for bad heater
		Lower the die temperature if the material seems crosslinked
		If particles melt on high plate, raise the temperature
Discoloured extrudate	Degraded polymer	Lower temperatures or screw speed
	Poor mixing	Add a mixing head or use concentrates to enhance pigment mixing
	Die design	Streamline the die
		Use smaller extruder or lower its speed for the output
Die pressure drop too high	Plugging	Replace screen packs or use screens with larger openings
	Unfinished melting	Raise the temperatures
Rough surface/dielines/melt fracture	Die	Decrease melt temperature
	Resin	Use material with lower molecular weight or wider molecular weight distribution
		Streamline the die flow channel
		Reduce shear stress in the land region
		Use a processing aid
		Add die-land heaters
		Operate above the critical shear stress for melt fracture (super extrusion)
	Add ultrasonic vibration	
Sharkskin (surface distortions caused by elastic surface instability)	Die	Raise die temperature or increase resin gap
	Resin	Use resin of lower modulus or wider molecular weight distribution
	Operation	Reduce extruder speed or back pressure
		Change screen packs
		Raise melt temperature
Fish eyes	Contamination	Check the screen pack for discoloured material, which would indicate contaminant with a hopper origin
	Degradation	Dry the resin
		Lower temperatures especially in die that leads to crosslinking or gels
Bubbles in the part	Humidity	Dry the resin
	Degradation	Check for an odour and if present, lower the temperatures of the melt
Warped part	Die	Spider mandrel needs adjusting to be concentric in the die
	Cooling tank	Entry angle of the die is not uniform on all sides
	Part design	Align the cooling tanks to be parallel with the extruder outlet
		Look for non-symmetries and thickness differentials in the part, which may induce internal stresses
Gel formation	Polymerisation process	Check gel level in incoming raw material
	Extrusion process	Reduce residence times in extruder
	Contamination	Reduce hangup of material in screw and die
		Use low friction coating on screw and die
		Use filter with good gel capture capability
		Thoroughly clean extruder before startup
	Avoid contamination at every point	