**A Material Difference** 

# **TPE Processing: Problem Solving**

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General Introduction 🗲

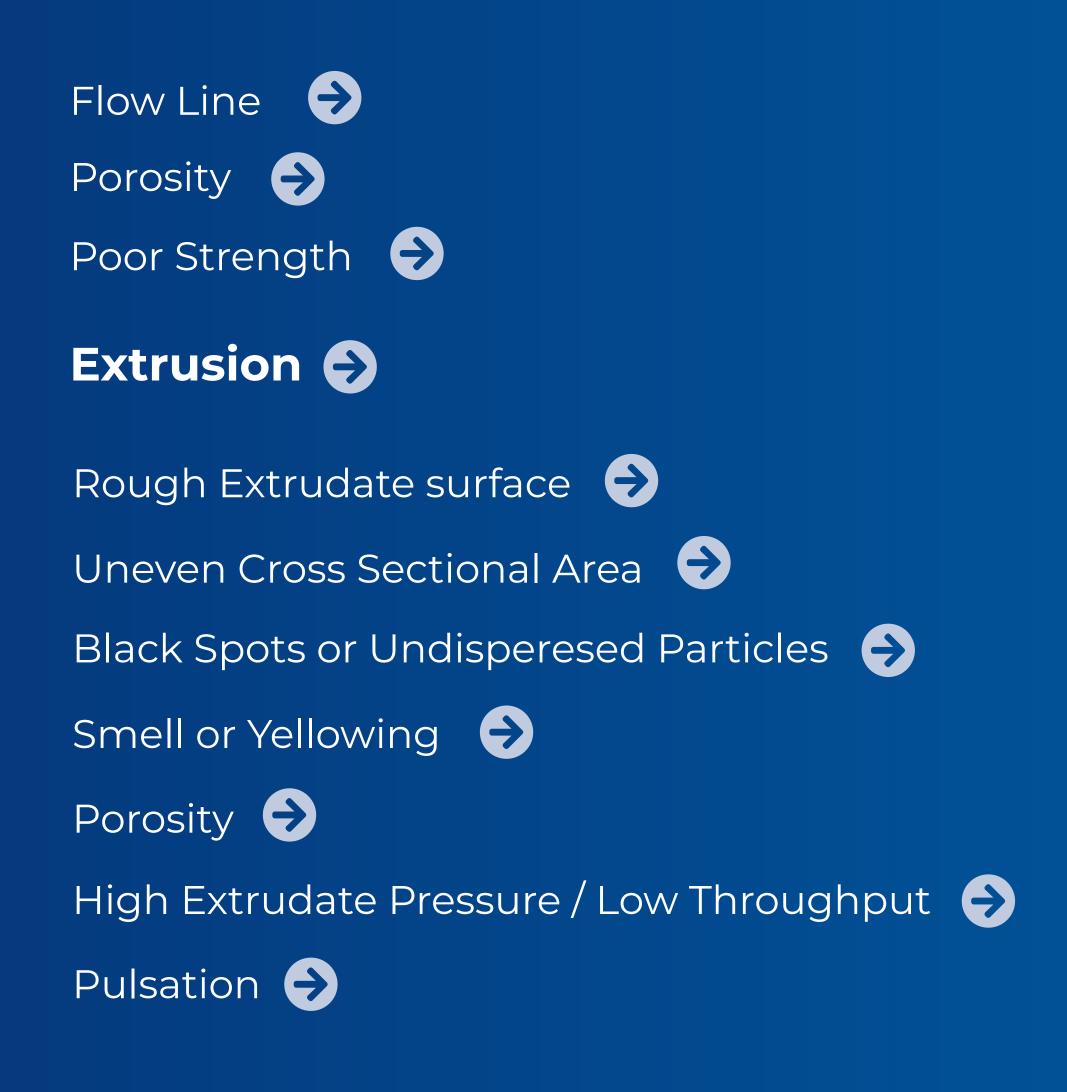
## Injection Moulding

Burn Marks 
♦

Incomplete Filling of the Mould 
♦
Sticks in the Mould 
♦
Sink Marks 
♦

Smell or Yellowing 
♦
Patchiness 
♦

Black Spots or Undispersed Particles 
♦
Surface Defects around the Injection Area



# **General Introduction**

Since the production process consists of a large number of complex operations, sometimes problems may arise. TPE is a "living" material, which ages and is affected by its environment. Your TPE compound can follow all guidelines for a long period of time, but disturbances may then suddenly occur without any obvious reason.

Not even the most competent or reliable TPE manufacturer can explain this. But there are certain points that can be checked to help eliminate problems that may occur in the processing of TPE, we have included these in this eGuide. If you are having difficulties processing your TPE, please **contact us** for further information.

# **Injection Moulding**

#### Problem

Burn Marks

#### **Possible Reason**

Melt and/or mould too hot

Material sticks in the cylinder

Heater output stuck

Mould design

TPE Processing Problem Solving Guide

#### **Possible Solution**

- 1. Lower the nozzle and cylinder temperatures
- 2. Lower the mould temperature
- 3. Lower the injection rate
- 1. Clean the cylinder
- 1. Check the thermocouple and temperature control equipment
- 1. Increase the gate
- 2. Check that the vent is not clogged
- 3. Apply vacuum for venting
- 4. Review the vent location



#### Possible Reason Possible Solution

#### Incomplete Filling of the Mould

Melt and/or mould too cold 1. Increase the nozzle and cylinder temperatures

Heater not working

Shot weight too low

Mould design

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- 2. Increase the mould temperature
- 3. Increase the injection rate
- 4. Increase the screw speed
- 1. Check the thermocouple
- 1. Increase the shot weight
- 2. Increase the mix cushion
- 1. Check that the gate is not clogged
- 2. Extend the gate
- 3. Increase the runner
- 4. Check that the vent is not clogged
- 5. Increase the venting
- 6. Check location of the vent
- 7. Apply vacuum for venting



#### **Possible Reason**

#### Sticks in the Mould

#### Too hot



Mould design

\*Electrical Discharge Machined

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#### **Possible Solution**

- 1. Lower the nozzle and cylinder temperatures
- 2. Lower the mould temperature
- 3. Increase the cooling time
- 1. Increase the cooling time
- 2. Lower the cylinder temperature
- 1. Clean the mould
- 2. Shot blast or EDM\* the surface
- 3. Increase the draft
- 4. Use release agent



#### Sink Marks

#### Odour or Yellowing

Possible Reaso

Holding pressure too

Melt and/or mould too

Part too hot when ejec

Melt and/or mould too

TPE Processing Problem Solving Guide

on	<b>Possible Solution</b>
low	1. Increase the holding pressure
oo hot	<ol> <li>Lower the nozzle and cylinder temperatures</li> <li>Lower the mould temperature</li> <li>Lower the screw speed</li> </ol>
ected	<ol> <li>Increase the cooling time</li> <li>Decrease mould temperature</li> </ol>
bo hot	<ol> <li>Lower the nozzle and cylinder temperatures</li> <li>Lower the mould temperature</li> <li>Lower the injection rate</li> <li>Lower the screw speed and back-pressure</li> <li>Check temperature in hot runner (if used)</li> <li>Add nitrogen to the hopper</li> </ol>



#### Patchiness

#### Local Defects

#### **Possible Reaso**

Injection pressure too

Melt and/or mould to

High orientation

Overfilling

Uneven mould filling

TPE Processing Problem Solving Guide

on	Possible Solution
o high	1. Lower the injection pressure
	2. Increase the clamping pressure
	3. Lower the injection rate
o hot	1. Lower the nozzle and cylinder temperatures
	2. Lower the mould temperature
	3. Lower the screw speed
	4. Check the thermocouple and temperature control
	1. Increase the mould and melt temperatures
	2. Lower the injection rate
	1. Increase the clamping pressure
	2. Adjust the injection time and the mould filling time
	1. Change the gate location
	2. Check that the mould temperature is uniform
	3. Increase the screw speed and back pressure



#### **Possible Reason**

Black Spots or Undispersed Particles

Surface Defects around the Injection Area

Flow Lines

Contamination

Moisture

Melt and/or mould too cold

Melt and/or mould too cold

Mould design

TPE Processing Problem Solving Guide

#### **Possible Solution**

1. Clean with viscous PP or LDPE

2. Check that the colour MB is based on PS (SBS) and PP or PE (SEBS) – not PVC

- 1. Dry the granules
- 2. Check that the valve is not clogged if a ventilated screw is used
- 3. Apply vacuum for venting
- 1. Increase the nozzle and cylinder temperatures
  - 1. Increase the nozzle and cylinder temperatures
    - 2. Increase the mould temperature
    - 3. Increase the injection rate
    - 4. Increase the screw speed and backpressure
    - 1. Change the gate location
    - 2. Extend the gate
    - 3. Extend the runners
    - 4. Cooling of the runners



#### Porosity

#### **Possible Reason**

Melt fixed too quickly

Moisture

Backpressure too low

#### Poor Strength

Mould design

Material stressed by turbulent mix

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#### **Possible Solution**

- 1. Increase the mould temperature
- 2. Increase the screw speed and backpressure
- 1. Dry the granules
- 2. Check that the valve is not clogged if a ventilated screw is used
- 3. Apply vacuum for venting
- 1. Increase the back-pressure
- 1. Increase the gate
- 2. Avoid wide differences in cross-sectional areas in the flow path
- 1. Adjust the injection pressure and the injection rate
- 2. Increase the cooling time
- 3. Increase the mould temperature
- 4. Increase the cylinder temperature





Rough Extrudate Surface

Melt too cold

Heater not working

Melt not mixed

Poor die design

**Uneven Cross Sectional Area** 

Pulsing

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## **Possible Reason Possible Solution**

- 1. Increase the extruder temperature
- 2. Increase the die temperature
- 1. Check the thermocouples
- 1. Use a screw with a higher compression ratio or kneading zones
- 1. Lower the parallel length of die
- 1. Lower the extrusion speed
- 2. Use a screw with a longer feed zone or dosing zone
- 3. Lower the die temperature
- 4. Use more strainers to increase the backpressure



Black Spots or Undispered Particles

#### Odour or Yellowing

Porosity

#### Possible Reason

Contamination

Melt too hot

Heater output stuck

Moisture

TPE Processing Problem Solving Guide

#### **Possible Solution**

1. Clean with viscous PP or LDPE

2. Check that the colour MB is based on PS (SBS) and PP or PE (SEBS) – not PVC

- 1. Lower the extruder cylinder temperature
- 2. Lower the die temperature
- 3. Lower the screw speed
- 4. Use fewer strainers to lower the backpressure
- 5. Use a screw with a lower compression ratio
- 6. Add nitrogen to the hopper
- 1. Check the thermocouples temperature control equipment
- 1. Dry the granules
- 2. Check that the valve is not clogged if a ventilated screw is used
- 3. Apply vacuum for venting



#### **Possible Reason**

High Extruder Pressure / Low Throughput Melt too cold

Strainers clogged

Heater not working

Pulsation

Viscous material

We provide all written and illustrated information and advice in good faith. This should only be regarded as being advisory. We retain the right to make changes without prior notice. For further information, please contact us.

#### **Possible Solution**

- 1. Increase the extruder temperature
- 2. Increase the die temperature

1. Clean

- 1. Check thermocouples
- 1. Increase the extruder speed
- 2. Increase the cylinder temperature



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