TPU Injection Mold Processing Guide: The Short Version

Chiral has developed a lengthy instruction guide covering a wide range of factors affecting the processing of TPUs, but if you just want to get up and running quickly, this shorter version of our TPU Injection Molding Processing Guide is probably for you.

Begin by drying the TPU in a desiccant dryer for 2-4 hours @ 160° to 170°F for soft grades and 195°-205°F for the hard grades. Moisture level of the TPU at the time of molding should be at or below 0.003%. Closely monitor the first drying process, and then schedule additional TPU to the dryer to support the entire molding run with properly dried resin.

Check cleanliness of barrel and screw of the machine running your TPU job. Make sure that neither one contains stuck-on TPU, which happens when the machine is shut down without purging. TPU will stick "really well" to the barrel and screw.

After you have powered up the molding machine, and have set all of the heater bands for recommended initial temperature profile, check the machine for cleanliness and purge well.

Recommended Processing Temperatures for Injection Molded TPUs

TPU INJECTION MOLDING		Feed Zone	Compression Zone	Metering Zone	Nozzle	Melt
Softer, 60 Shore A to 75 Shore A	**C**	155 to 170	170 to 185	180 to 195	185 to 200	185 to 200
	F	315 to	340 to 365	360 to 385	365 to	365 to 390

		340			390	
Medium, 80 Shore A to 90 Shore A	**C**	175 to 190	185 to 200	190 to 205	195 to 410	200 to 215
	F	345 to 370	365 to 390	375 to 400	380 to 405	390 to 415
Harder, 95 Shore A to 72 Shore D	**C**	190 to 205	195 to 210	200 to 215	205 to 220	210 to 225
	F	375 to 400	385 to 410	395 to 420	405 to 430	410 to 435

In the remaining minutes until heats reach their targets, begin to set other machine parameters. Injection pressure should begin near the lower end of machine range; an initial setting of 25% would be a good starting point. Similarly set towards the low end of each operation range, set back pressure to 50-75psi., and screw speed @ 40-75 RPM.

When desired melt temperatures have been achieved and the TPU is at or below 0.003% moisture content, transfer the dried TPU to the molding machine hopper and commence taking an air shot to test actual melt temperature. If actual melt temperature varies significantly from the targeted melt, revise barrel and nozzle heating bands, as well as screw RPM, to modify actual melt temperature closer to target, and toward a consistent, homogeneous melt flowing into the cavity of the tool. If melted TPU exiting the nozzle has a shiny, smooth surface, the melt is likely good. Lower melt temperature and non-homogeneity in the melt will cause the surface to be matte and bumpy. Many times a simple change to the nozzle temperature can significantly impact molded part appearance.

Shot size should be calibrated before introducing secondary injection pressure, or holding pressure, into the machine parameters. Adjust injection

screw forward distance for a shot size that just fills the mold cavity, and then add holding pressure. TPU elastomers use a higher level of holding pressure than most other TPEs, normally about 50% to 80% of machine capacity. Holding time will also be longer, up to half of entire molding cycle. Hold time should be the same amount of time required for the gate to "freeze" after injection speed and pressure have forced molten TPU into the mold cavity.

If the mold has no built-in surface lubricating characteristics, the mold cavity and sprue bushing can be sprayed with mold release. Roughing texture on the mold cavity surface, as well as throughout the gate and runners system, enable TPU parts to eject much easier from molds. We recommend that you use a rough style texture, with a depth of 0.002" to 0.003".

If you'd like to explore TPU injection molding in greater depth, Chiral has produced a detailed guide, which offers suggestions ranging from part and mold construction through the post curing of TPU molded parts. Despite its greater length, this reference is designed to be easily understood by novice, as well as the experienced molding professional. Please contact us to request your complementary copy of this valuable resource.

We at Chiral are eager to hear from you regarding your real life mold processing challenge, or your story of how you were able to solve a TPU molding issue. Please send all correspondence to info@chiralusa.com. Alternately, you may contact:

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