



Cycletime Tips – Automotive

Volume 17: Measuring Melt Temperature

We know as thermoplastic part fabricators that the process requires a finite amount of energy to be infused within the polymer in order to get it to melt. The manufacturing public also is aware that a set amount of time is required in order to remove that heat, within the mold, in order to remove the part from it. The same holds true whether you are an extruder, blow-molder, or injection molder. The device used to handle the molten polymer varies from area to area, but the end result is a set exposure time that the final part has during cooling.

The concern is that machines are set-up with what is known as "cooling time". This is also known as "allowable plastication time" and is constant (if the process is setup properly) from cycle to cycle. If the melt temperature is higher or lower than what was originally prescribed for the certified process, then we have introduced variation. We work hard to measure part temperature and melt temperature while originally centering a process so we can look back at the data if issues occur. It should be a shop procedure to measure melt temperature during the machine startup. Part temperature is also a good SPC tool that can be precisely measured with the correct procedures in place.

Generally speaking, processors do not like to measure melt temperature. One truly can't blame them. Most people aren't comfortable approaching a substance that could be in excess of 600°F. For this reason, many sources have attempted to allow us to measure melt temperature as we are operating the equipment in production. The big selling point that these types of tools bring is convenience. Provided the in-line sensor selected doesn't provide a hang-up for material to reside and degrade – we have an answer to this issue. Infrared measuring of all materials really isn't the answer. Perhaps we can look at long immersion probes to avoid accidental contact with heaters or molten polymer. Many sources provide these probes that can be customized to your length specs to battle this fear.

It may sound unusual, but the few processors out there who take melt temperature all perform it differently. This requires a streamlined procedure to avoid variation and faulty decision making. One method used in the past is known as the "30-30 method". We preheat the probe to 30°F above the front barrel zone setting and immerse it into a fresh purge for 30 seconds and document the reading. This is a good technique. Preheating the probe is what can be tedious. It can be effectively addressed by building a device with a small piece of aluminum rod stock, a heater band, a thermocouple, an energy source, and a PID controller. The portable pre-heater has a small hole drilled into the heated rod stock slightly larger than the immersion probe diameter. The beauty of it is that the processor can manipulate the machine while the probe is preheating, thus preventing mistakes and insuring a rapid temperature read-out. Insulating the melt pool with a piece of cardboard also promotes accuracy.

Often times, an age-old necessity requires a new approach to successfully implement it. Please feel free to contact Jim Cardinal or myself should you require more information.

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