



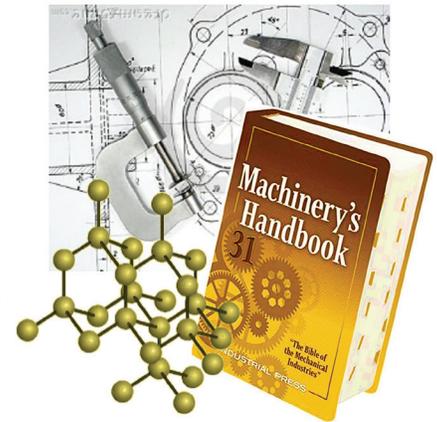
MACHINE SHOP CONFESSIONS



OEM focused, Industry focused, or a job shop they all asked this one question? **HOW DOES THIS MATERIAL MACHINE?** The truth is most machinist and machine shops have limited expertise on materials and their physical properties.

WHY: A machinist handbook does not effectively explain how to machine a part made using UHMW or PEEK precisely. There are general guidelines for feeds and speeds but more is needed. For example, these guidelines do not take into consideration the process used to create the material stock shape.

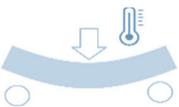
PROCESS: Injection Molded, Extruded, or Compression Molded. The different process yields contrasting properties and therefore affects a material's machinability. In addition, there needs to be more consideration as to how fillers such as glass, carbon, ceramic, and solid lubricants affect the machinability of the base polymer.



FIVE KEY MATERIAL PROPERTIES RELATED TO MACHINING PERFORMANCE



Coefficient of linear thermal expansion (CLTE) is the ratio of the change in a linear dimension to the original dimensions of the material for a unit change of temperature. *Tip: Materials that have a high CLTE can be challenging to machine when tight tolerances are required.*

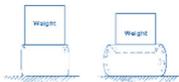


Heat Deflection Temperature (ASTM 648) (HDT) is used as a relative measure of the ability of materials to perform at elevated temperatures short term while supporting loads. *Tip: HDT is often exceeded when drilling or milling at excessive feed rates, especially when the machine tool is dull.*

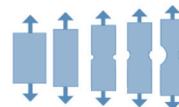
Hard, brittle Soft, rubbery



Glass transition temperature (T_g) is the temperature above which a polymer becomes soft and rubbery. *Tip: excessive tool dwell can create frictional heat resulting in localized softening.*



Compressive Strength measures a material's ability to support a compressive force. *Tip: It can be extremely difficult to maintain hole-to-hole tolerance with low compressive strength materials.*



Tensile Strength (ASTM D638) is the force required to break a material under tension. Elongation is always associated with Tensile. *Tip: Materials with high elongation tend to generate more burrs when machined*

Most suppliers of machinable plastics have limited knowledge of Machining Processes or Machining Centers. In other words, there is a knowledge gap between materials manufacturers and machinists. Finding a supplier who can bridge the gap is priceless. At Port Plastics, we bridge the gap by making it our purpose to understand material performance in application and during machining.

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