

## **MACHINING PROCESSES for UHMW**

**Sawing:** For circular sawing, carbide-tipped blades give the best results. A 12-14" diameter blade should have approximately 24 teeth. Feed speeds can range from 10 to 40 feet per minute. For band sawing, a blade with three teeth per inch, raker set and positive rake angle are recommended. Feed speeds range from 10 to 40 feet per minute.

**Turning:** Use high-speed steel tool bits with 10° front and side clearance and 15-30° rake. Lower cutting speeds of between 600 and 1,000 feet per minute are required. However, it is often necessary to run at a higher rpm to keep chips clear of the machine. Cutting fluids should not necessary, but a blast of compressed air will sometimes aid in chip removal. When trying to achieve close tolerances or a very thin walled part in UHMW-PE, machine in passes. Remove most of the material on the first pass, then let the piece sit and rest overnight.

**Milling:** Cutters designed for machining aluminum give the best results. Cutting speeds of 600 to 1,800 feet per minute are suggested, with a feed rate of approximately .01 inches per revolution. Router bits work well for slotting and light milling.

**Planing:** Wood planers readily reduce the thickness and true-up the surface of UHMW-PE. A rigid machine with sharp blades will give very efficient stock removal and good surface finish. To minimize the potential to warp when machining UHMW-PE, plan on half the desired thickness from each side of the sheet.

**Drilling:** Conventional high-speed drills are adequate form most drilling applications. For optimum performance, use special low helix drills with polished flutes. Drilling pilot holes prior to drilling a large hole is not recommended for UHMW-PE because its properties cause the drill to grab and pull itself into the material.

**Grinding/Sanding:** Due to UHMW-PE's abrasion resistant properties, grinding and sanding are usually ineffective. In fact, grinding may cause the material to melt and smearing, resulting in a clogged grinding wheel.

UHMW-PE modified with additives such as glass or metallic oxides will result in shorter tool life. Although carbide tools will add life to the tool, it requires higher speeds and feeds and some materials, with a very high percentage of abrasive additives, are impractical to machining by any method.