

## Machining of Polyurethanes: Knifing

Knife cutting urethane to close tolerances can be done without too much difficulty. The tool must be absolutely razor sharp and be as thin as possible. When knifing, the urethane will have the tendency to pull into the tool. This displacement of material will cause a "dish" on the finished end of the part. The thinner the tool, the less the pulling effect on the cut edge.

A good practice on thick cuts is to do a rough cut to remove the bulk of the material, then take finishing cut to remove the final .025 to .050 of an inch.

The type of fixture used to hold the part is very important. Parts with metal inserts are usually easy to hold. Solid urethane parts can deform if they are held too tightly. Again, this would make it impossible to get a flat cut.

We use 2 types of knifing tools. High speed steel is used on medium to hard urethanes – 70A to 95A. This type of tool must be very smooth and have a razor sharp point. All edges and surfaces behind the cutting point must be smooth to prevent the cut-off material from being pulled between the workpiece and the tool. High turning speeds of 600 to 1000 rpm's with rapid hand feed will yield an excellent surface finish. See Figure 3 and 4.

Carbide blanks .250" x .125" ground on a diamond wheel to a razor sharp edge and point provide excellent cuts on low durometer, hard-to-machine urethanes. Cuts as thin as .005" are possible. The tool must be as long as the cut is deep. Turning speeds of 600 to 700 rpm work well with moderate to rapid hand feeds.



Figure 3. KNIFING TOOL FOR HARDER URETHANES



Figure 4. KNIFING TOOL FOR SOFTER URETHANES