Machining Of Vibrathane® Elastomers

Urethane Prepolymers

MACHINING OF VIBRATHANE ELASTOMERS

High Durometer Elastomers (80 Shore A and Higher)

Vibrathane elastomers having a hardness of 80 Shore A and higher can be successfully machined with cutting tools. The cutting speed, feed and depth of cut are varied to get the required finish. Owing to the heat development resulting from friction, a flood of coolant is recommended. For elastomers below 80 Shore A, cutting tools are often not satisfactory and grinding may be required.

TURNING

Feed and depth of cut depend on hardness and desired tolerance. Normal turning conditions are as follows:

Durometer Hardness	Cutting Speed Ft./Min.	Feed In/Rev.	Shape of Tool			Surface Roughness Micro inches
83 ± 5A	1000-1650	0.004 – 0.008	12	53	25	50
91 ± 2A	330-500	0.004 – 0.008	12	53	25	20
55 ± 5D	330-500	0.004 – 0.008	12	53	25	10

FACING

The conditions for facing broad parts are the same as for turning. When thin discs are to be cut, it is advisable to use a cutting tool with a very acute blade (approximately 15° included angle) and hence can be regarded as a knife. Owing to the heat development resulting from friction, cooling should be incorporated.

TREAD CUTTING

Because of the relative softness of urethane, it is advisable to cut only coarse threads.

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MILLING

Surface qualities typical of those shown above are obtained with a cutter made of high speed cutting steel working at a peripheral speed of 600-1300 ft./min. with a clearance of ? = 10 ? = 25°. In order to facilitate the removal of millings, the cutter should have a maximum of four flutes.

BORING

Normal tools are used at cutting speeds of 130 to 170 ft./min. and as slow a feed as possible (approximately 0.0004 – 0.00012 in./min.). A faster speed can be employed with harder materials. Holes of depths up to one inch can normally be made without the use of coolant. Hole diameter will be up to 4% less than the diameter of the drill for materials less than 80 Shore A.

GRINDING

Smooth surfaces are obtained with grinding wheels of carborundum with a fine grain size, medium hardness and coarse texture. A 6" x ¾" Simonds Wheel C60-J-7B-3 has been used very successfully. Grinding speeds are high (6000 – 10,000 ft./min. approximately 3500 rpm). Cooling is recommended to avoid overheating.

BAND SAWING

A hook type tool blade approximately ½" wide by 0.030" thick having four teeth per inch has given good results. Surface speeds of 200 ft./min. have been most satisfactory.

Low Durometer Elastomers

Recent experience in grinding this material is as follows:

Material:	Polyurethane Roll 1-3/4" O.D. x 20" long – Durometer 17-20
Machine Used:	Cylindrical Grinder – Center Type
Wheel Size:	14: x 1-1/2" x 5"
Wheel Speed:	1680 RPM – 6158 SFPM
Traverse Speed:	Various
Work Speed:	170 SFPM
Grinding Fluid:	Emulsifying Oil – One Part oil to ten parts water
Dressing:	Diamond dress using a very open dressing technique

With this set up and our wheel, GC60-H11-VR we were able to remove .030" from the diameter of the roll at a traverse speed of 2 inches per minute. The wheel stayed clean, no lead was produced and the polyurethane roll looked excellent.

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The important factors as we see them are:

1. Good grinding wheel selection – GC60-H11-VR did a good job. This wheel specification may need to be altered depending upon the size and share of the part being ground.

Carborundum, Bonded Abrasives Division, Niagara Falls, New York can provide you with alternations to this wheel specification.

2. Grinding Fluid – we tried using tap water but could not get a good grind. Water-soluble oil appears to be necessary.

3. A wheel large enough in diameter and width to be able to grind efficiently. A tool post grinder using a 6" diameter wheel was not able to do the above job.

4. A very open dress on the grinding wheel was necessary. This can be done by using a diamond and traversing across the wheel face with a fast traverse.

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