

Saint-Gobain realizes that there exists a real need for specific information on the machining of RULON and PTFE compounds so that a customer working with these materials for the first time may save the hours usually spent experimenting with any new material.

This paper is directed to the many companies who prefer to buy our products in molded or extruded form and do their own machining.

RULON and PTFE will be treated together. Where techniques differ, each will be given its own recommendations.

Cutting

Either material in diameters up to 50 mm and sheet thicknesses up to 6 mm can be cut with a steel knife blade mounted in a kick-press. Care must be taken to see that the material is firmly held under the blade and that the blade itself is rigidly mounted with a strong frame. Without such a frame, blade deflection will cause an angular cut-off.

Sawing

Sawing is easily accomplished with these materials in any thickness. For hand saws, use a coarse-bladed hacksaw, since the fine-tooth blades tend to gum with material. Power sawing with a skip-tooth blade band saw is preferred, as the length of the blade will tend to dissipate heat.

Centerless Grinding

RULON and PTFE are both centerless ground without difficulty. Tolerances of +/- 0.025 mm are easily held, and a total of .025 mm can be held by a careful operator. The work cutter should be slightly above the center line to round up the material and on the center or slightly below for the finish cut. A set-over angle of 4° pitch is advised with 2° to 9° entrance angle on the grinding wheel. Generally, a medium all-purpose wheel is satisfactory. For rough passes, up to .3 mm can be removed, but a final pass at .1 mm will result in a superior finish. Cleanliness of wheels and coolant are important. Any metal dust will become embedded in these materials during grinding. A steel or wooden tube or "U" channel is helpful in grinding to prevent whipping in small diameters as the material is fed into the wheels. Keeping on the low side of a grinding tolerance is advisable.

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RULON[®]

RULON and PTFE Machining Information

Drilling

A high speed on PTFE and a slow speed on RULON is recommended. Drilled holes tend to become undersized after drilling or reaming and should be checked after 24 hours at room temperature (70°F). Water emulsion type coolants are helpful in maintaining dimensions.

Tapping and Threading

Regular high speed plastic type taps and dies can be used. Four flute taps have less surface friction and, therefore, cause less heat distortion. A slightly oversized tap will maintain the required size. Entrance points should be chamfered to reduce thread tearing.

Reaming

Reaming is not particularly effective with PTFE and RULON materials. Soft and springy, the work deflects under pressure. When reaming is tried at least .12 mm must be removed. Coring to size is recommended.

Turning and Machining

For lathe work a high speed is best for PTFE, but RULON must be run slower in order to prolong tool life, if using ordinary steel. For RULON, we always use K10 hardmetal tools. It is imperative to keep tools very sharp. A feed rate of .4 mm per revolution gives the best results. The final cut should be at least 0.1 mm. Use a 400 mm tool clearance, and move shavings away rapidly to avoid tangling. Coolants are not necessary but will help maintain dimensions by dissipating heat.

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Screw Machining

We use K10 hardmetal tools for all tools on RULON, and H.S.S. for PTFE and water-soluble oil for cooling. Once again, cleanliness is imperative. It is recommended to never alternate between metals and plastics on the same machine. This will, of course, be impossible for most shops, but a thorough cleaning is a must. Feed tubes are usually neglected. An iron pipe tube can cause considerable scratching to these materials. We recommend to use a fiberboard insert in the tube and be sure to change it frequently.

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SAINT-GOBAIN
PERFORMANCE PLASTICS

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RULON and PTFE Machining Information

Recommendations

SURFACE SPEED (m/s): Maximum speed of machine for PTFE; 2 for RULON

	<u>SIDE</u>	<u>FRONT</u>	<u>BACK (CUTOFF)</u>
CLEARANCE ANGLE	10°	15° to 25°	-----
RAKE ANGLE	5° to 12°	0° to 5°	3° to 7°

A feed rate of .1 to .15 mm per revolution is excellent in working with stock of .3 mm diameter or smaller; the bar will have to be supported during forming either through a center hole or on the side opposite the tool. Some very small diameter pieces have been handled successfully only by using a much larger diameter ground rod and forming the required diameter just prior to cut-off.

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