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Machining Ryton® PPS Compounds

Ryton® PPS compounds can be readily machined using conventional metal working tools. A high degree of precision can be obtained using moderate cutting speeds and fast feed rates. The rate of travel should be relatively fast because a slow feed rate results in excess abrasion by the tool and tends to give a poor surface appearance. Although fairly deep cuts of up to 3.2 mm (0.125 inch) can be made, finish cuts should take off no more than 0.13 mm (0.005 inch) of material. The glass and mineral fillers used in Ryton® PPS compounds can cause severe wear of machining tools, so carbide or diamond tipped tools should be used. If a coolant is desired, ethylene glycol (antifreeze) works well. It should be noted that machined surfaces are more prone to abrasion, crack formation, and fluid penetration than “resin rich” molded surfaces.

Table 1: Turning operations

Property	Value
Cutting speed	90–210 m/min (300–700 fpm)
Feed rate	0.05–0.13 mm/rev (0.002–0.005 inch/rev)
Turning geometry	
Back rake	5°–10°
Side rake front	10°
Front clearance	5°–10°
Side clearance	5°–10°
Cut-off tool geometry	
Back clearance	1°–2°
Side clearance	1°–3°
Front clearance	15°–20°
End cutting	35°
Back rake	0°–5°
The use of single point tooling is highly recommended, however, “form type” cutting tools can be used.	
Tool material	
Conventional, premium grade, tungsten carbide tip tools. (For good finish, keep all tooling sharp.) For continuous machining of PPS filled with glass and/or minerals, diamond tip tools are highly recommended for durability. Use small radius at the front of the tool for better finish.	

Table 2: Milling operations

Property	Value
Cutting speed	30–60 m/min (100–200 fpm)
Feed rate	0.13–0.38 mm/rev (0.005–0.015 inch/rev)
Chip load	0.08–0.13 mm/tooth (0.003–0.005 inch/tooth)
Cutter	9.5–12.7 mm (0.375–0.500 inch)
Tool material	
Multi-fluted C-2 tungsten carbide cutters, for best surface finish and lower cutter wear.	

Table 3: Drilling operations

Property	Value
Drill speed	60–100 m/min (200–350 fpm)
Feed rate	0.08–0.13 mm/rev (0.003–0.005 inch/rev)
When drilling through holes, the feed should be reduced near the end to prevent the drill from pulling at the exit side, and to prevent chipping or breaking-out.	
Tool geometry	
Rake angle	Positive 0°–5°
Point angle	118°
Lip relief angle	10°–15°
Tool material	
Tungsten carbide inserts	

Table 4: Reaming

Property	Value
Reamer speed	60–90 m/min (200–300 fpm)
Feed rate	0.25–0.51 mm/rev (0.010–0.020 inch/rev)

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