CRYSTEX COMPOSITES LLC
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MACHINING GUIDELINES OF GLASS-MICA COMPOSITE MATERIALS

Standard machine shop equipment can be used in machining glass-mica composite materials. For best results, tools must be sharp and checked frequently. Despite its machinability, the material is still abrasive, causing some wear of cutting edges. Clamp work firmly; however, avoid point loading.

LUBRICANT

Plenty of water is the most satisfactory lubricant. Keep a continuous stream pouring on the work and cutting tools to keep it cool – insufficient cooling can result in chipping and rapid tool wear. Add water-soluble oil to the water to reduce tooling rust.

CUTTING

Wheel cutting is the most satisfactory method of cutting glass-mica composites. Use a bonded silicon-carbide type abrasive cut-off wheel. If available, bonded diamond wheels are preferred. Cut across the grain whenever possible. Work slowly and steadily, do not force the tools, and keep tool speed to suggested levels. Cut down into the work – never up from the bottom. Keep the speed between 2000 and 2500 rpm and advance the work by "feel". The wheel should cut steadily without dragging.

SAWING

Silicon carbide or diamond cut off wheels work best
An economic alternative is a carbide grit blade i.e. band saw

TURNING

Carbide tools are recommended. Use tool bits of Carboloy 883 or silicon carbide wheels with a tool post grinder.

CUTTING SPEED	70-85 surface feet per minute
FEEDING RATE	.002-.005 inches per revolution
DEPTH OF CUT	.125-.200 inches/cut depending on conditions

DRILLING

Carbide drills, preferably Carboloy 883, will give the best results. Run at 1100 rpm up to ¼" diameter; 900 rpm up to ½" diameter; proportionately slower for larger sizes. To avoid chipping, do not drill hole all the way through. Work from one side, then turn the piece over and work from the other side. Accurately made two-sided hardened bushed drill jigs will assure the most accurate work. One side template drilling is also satisfactory, but it is difficult to maintain accurate hole sizes because of tool wear. Drills must be touched-up when they dull. Use pecking motion when drilling, no more than .125" deep per peck.

DRILL SIZE	SPINDLE SPEED	FEEDING RATE
Up to ¼" diameter	≈ 1100 RPM	.003 inches per revolution
¼" diameter	≈ 1100 RPM	.004 inches per revolution
½" diameter	≈ 900 RPM	.005 inches per revolution
¾" diameter	≈ 600 RPM	.006 inches per revolution
1.0" diameter	≈ 400 RPM	.010 inches per revolution

NOTES: Allow 1/16" of extra material on drill break through side for grinding cleanup after drilling.
For best results use a pecking motion while drilling.
Drill "sharpness" will affect the above rates.

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MILLING

Carbide tools are recommended. Use tool bits of Carboloy 883 or silicon carbide wheels with a tool post grinder

CUTTING SPEED	70-85 surface feet per minute
DEPTH OF CUT	.150-.200 inches/cut depending on conditions

THREADING

Use a tungsten carbide tool bit and chase threads as with metals. Keep tools sharp.
For internal threads, make clearance holes slightly larger than standard tap drill recommendations. Chamfer both sides of hole prior to tapping to minimize chipping and fracture. Turn up in the direction of threads only, a back and forth motion will create chipping on the minimum thread diameter. You must use plenty of water for flushing chips away from the lead cutting edge.

FLYCUTTING

Use tungsten carbide tools at slow speed. Cut halfway through, then reverse the work and complete the cut from the opposite side. Use a pilot hole at least ¼" in diameter.

SLOTTING

Slotting may be done in one of two ways: use a metal bonded diamond wheel or silicon carbide wheel of proper width on a cutter or milling machine; alternatively, use a milling cutter, preferably with tungsten carbide tip. Take small cuts – not more than .025" and plenty of water.

GRINDING

To grind flat surfaces on any surface grinder, use silicon carbide resin bonded wheels at speeds recommended by the manufacturer of the equipment. For heavy grinding, use a soft, coarse-grained wheel; for polishing, use hard, fine-grained wheels. To prolong the life of grinding wheels, it is advisable to use 1% of soluble oil in the lubricant (50 gallons of oil to 5,000 gallons of water).

FINISHING THE EDGES OF DISCS

There are three suggested methods: use a resin-bonded silicon carbide wheel with a tool-post grinder on the lathe; use a tungsten carbide tool bit on the lathe; or use a wet sanding belt with suitable holder. Sanding must be done individually, but several discs can be placed on a mandrel, if desired, for turning operations. Run at slow speed, and use plenty of water.