TIVAR
Fabrication & Machining

TIVAR can be efficiently machined using conventional machine tools and woodworking machinery.

Cutting tools should have high rake angles and sufficient chip clearance to prevent clogging. If the above criteria are met, cutting speeds of up to 5,000 surface feet per minute are practical. Feed rates should be high, so that minimum time is allowed for the cutting tool to heat the material by friction.

Very high surface finishes can be obtained by using proper cutting tools. Attempts to improve poor finishes by filling or sanding usually result in worsening the appearance.

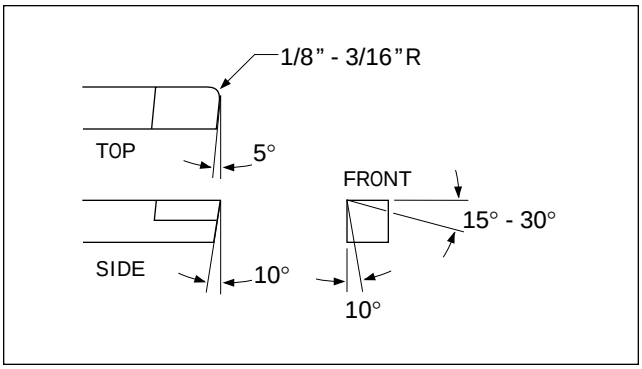
Cutting fluids should not be necessary, but a blast of compressed air will sometimes aid in chip removal.

Sawing

For circular sawing, course tooth carbide-tipped blades give the best results. An 8 diameter blade should have approximately 12 teeth with lots of clearance. A number of manufacturers make blades specifically for sawing plastics, but one designed for smooth finish cabinet work does as well as most.

For bandsawing, a blade with three teeth per inch, raker set and positive rake angle is recommended.

Power requirements are high, so heavy-duty saws are needed to allow the heavy feed rates necessary for efficiency and good finish.



Turning

Use high-speed steel tool bits with 10 front and side clearance and 15-30 rake.

There can be a chip removal problem on long continuous cuts. Chips are impossible to break up with any type of chip remover. If not removed, they quickly entangle themselves around the tool, work piece and spindle. They can affect the surface finish of the work or even stall the machine.

Turning (cont.)

It is often necessary to run at reduced RPMs to enable the operator to keep chips clear of the machine. Care must be taken: it is easy to get hands caught in the machinery and debris.

Milling

Carbide cutters designed for machining aluminum give the best results. Conventional high-speed steel end mills and cutters designed for machining steel can be used, but they do not have sufficient rake angle or chip clearance for efficient stock removal.

Router bits work well for slotting and light milling. For cutting deep slots and T-slots, it is essential that compressed air be used to blow chips away from the cutter.

Planing

Wood planers will readily reduce the thickness and true up the surface of TIVAR. A rigid machine with sharp blades will give very efficient stock removal and good surface finish.

TIVAR has internal stresses that may cause material to warp when machined. To minimize this potential, plane one-half the desired thickness from each side of the sheet.

Due to TIVAR s flexible nature, there is a problem with marring ends of thinner material when entering and exiting the machine. This situation can be helped by modifying the hold-downs so they support material as close as possible to the cutter head.

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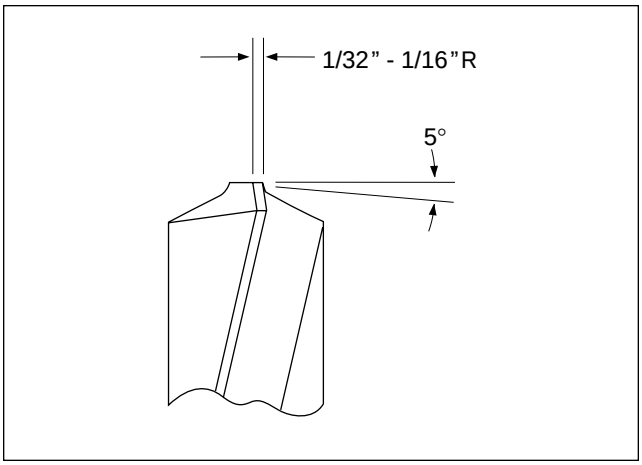
Drilling

Conventional high-speed drills are adequate for most drilling applications. For optimum performance, use special low helix drills with polished flutes.

Normally sharpened drills will tend to make a slightly undersized hole. With deep holes, frictional heat can result in a poor finish and the drill seizing in the material. A slight negative angle on the lips of the drill will result in a slightly larger hole and give much better results. (See drawing.)

Very heavy feeds will further reduce the frictional problem by cuffing drilling time. Heavy feeds will also produce a chip that throws itself free from the drill instead of wrapping around it.

The practice of drilling pilot holes prior to drilling a large hole is not recommended for TIVAR. Its properties cause the drill to grab and pull itself into the material.



Grinding and Sanding

Due to TIVAR s abrasion-resistant properties, grinding and sanding are usually ineffective. Sanding sometimes works to remove very slight surface defects. Grinding may result in melting and smearing the material, and it will clog the grinding wheel.

Thread Tapping

Many plastic parts use self-tapping screws, threaded metal inserts, molded-in threads or other fastener systems. When a machine thread must be added, standard metal cutting taps and dies may be used, provided that the same precautions regarding heat, chip removal, tool maintenance, and lubrication discussed for drilling are observed. For high volume production or with filled resins, carbide taps are recommended. Drilled or molded holes should generally be larger than those specified for steel, and threads finer than 28 threads per inch should be avoided.

TIVAR with Additives

TIVAR modified with additives such as glass or metallic oxides will result in shorter tool life. In some cases using high-speed tools is impractical. Carbide tools will add life but will require higher speeds and feeds. Some materials with very high percentages of abrasive additives are impractical to machine by any method.

CAUTION: Since TIVAR is a polyethylene, it will burn with a hot flame if ignited. Avoid contact with ignition sources such as open flames. Keep a fire extinguisher near if welding is done in the area of TIVAR. If a heat source is present, keep the area well ventilated. Use Material Safety Data Sheets to determine auto-ignition and flashpoint temperature of materials, or consult Poly Hi Solidur.

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