



**CGP EUROPE.**

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**Design Guide and Machining Instructions**  
**HYTAC—BIX**

**General**

*HYTAC-BIX* is a syntactic foam material consisting of engineering thermoplastic matrix filled with microscopic hollow glass spheres. This composition results in very good electrical and thermal insulating properties. As a plastic containing glass material, very special machining and working rules must be followed.

**NOTE: Dull or incorrect tool geometry will cause Very Poor Surface Quality.**

Starting speeds and feeds for machining should be similar to 6061 Aluminum. Tools must be very sharp to obtain high quality finish.

**Cutting**

Band saw blades should be Buttress tooth form with pitch of 6 teeth per inch for 1 in. and less thickness and 3 teeth per inch for greater than 1 in. thick material. Use saw speed of 1500 ft. per minute. Circular saw blades should be carbide tipped, combination teeth, with low teeth count (40-60), 0 deg. tooth rake and 3 to 10 deg. tooth set.

**NOTE: CMT offers sheet and rod cut to rough size for a reasonable charge.**

**Milling**

|                |   |
|----------------|---|
| Cutter type    | Cemented carbide or solid carbide (C-2 type) Non - coated |
| Cutting speeds | 400 to 1700 ft/min [120 - 520 m/min]                      |
| Feed rate      | 6 to 15 ft/min [150 - 380 mm/min]                         |
| Cut depth      | 0,20 in [6 mm] max.                                       |
| Coolant        | None or Air   |
| Protection     | Safety goggles  |



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A two flute carbide mill is recommended to allow sufficient clearance for the large chips. Do not use high speed steel cutters due to surface quality issues resulting from quickly dulled tools. Radius milling cutters for rounding off the edges should also have cemented carbide faces.

It is essential to pre-machine larger radii so as not to exceed the prescribed cutting depth. The use of climb milling will improve surface finish. When using CNC, use of approach and return circles may produce better results.

**Turning**

|                          |   |
|--------------------------|---|
| Cutter type and geometry | Carbide, non-coated positive sharp-edge insert (CPG-422) K313 (Kennametal) (see page 3) |
| Tool Holder              | CCLP(Ror L) (Kennametal) (see page 3)   |
| Clearance angle          | 5 deg   |
| Chip angle               | Neutral to 5 deg  |
| Cutting speeds           | 500 to 700 ft/min [150 bis 210 m/min]   |
| Rough Feed rate          | 0,007 in/rev [0,18 mm/rev]  |
| Finish Feed rate         | 0,005 in/rev [0,13 mm/rev] at min. nose rad. depth                                      |
| Coolant                  | None or Air   |
| Protection               | Safety goggles  |

An air stream, venturi or suction pickup should be used to direct removed material away from the part.

**Drilling and tapping**

|                 |   |
|-----------------|---|
| Cutter type     | Solid carbide                             |
| Clearance angle | 9 to 15 deg                               |
| Chip angle      | 3 deg                                     |
| Cutting speeds  | 160 ft/min [40 m/min]                     |
| Feed rate       | 0,007 to 0,020 in/rev [0,18 to 50 mm/rev] |
| Coolant         | Flood coolant suitable for plastics       |
| Protection      | Safety goggles                            |

The ends of drilled holes should normally be finished with 0,06 in. x 45° countersink. Cutting fluids or cooling lubricant should be used for either tapping or drilling. Taps and drills must be sharpened or replaced when worn. CNC tapping only at slow speeds.

**Bases**



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An aluminum base may be used; however, a base is not necessary due to the tough nature of the *HYTAC-BIX*. If using an aluminum base, use mechanical fastening and adhesive or mechanical fastening only. For mechanical fastening use coarse thread with engagement of more than two times the diameter.

**Insert Installation**

*HYTAC-BIX* is a tough syntactic foam, allowing for a variety of inserts to be used. Highest insert strength will be obtain using a coarse **OD** thread, thick walled insert, glued into place 0,000 in. to 0,015 in. below the surface to avoid pullout. Inserts are recommended to prevent stripping on multiple change-out applications.

**Bonding**

When bonding *HYTAC-BIX* to itself or other materials, it is important to properly prepare the bonding surfaces. Be sure that both mating surfaces are free of grease, cooling fluids, dust, and other materials. Use a clean cloth with alcohol to remove contaminants. After cleaning, abrade both surfaces using medium grit (120-220 grit) sandpaper. Re-clean the surface with alcohol and allow the surface to dry completely. Mix the structural adhesive per the manufacturers recommendations and apply to both surfaces. Make the two surfaces, being careful not to trap air. A “V” groove adhesive applicator works well. Maintain pressure on the surface during cure to insure proper contact. Allow the adhesive to harden at room temperature (follow manufactureres recommended cure schedule). Use suitable high temperature, room temperature cure, structural adhesives (see “Sourcing Information“ section pg. 4). Each plug assist application differs in stress and temperature cycling so call CMT or the adhesive manufacturer to discuss your specific application.

**Polishing**

High Gloss and High Clarity forming requires a highly polished plug assist. Incorrectly machined surfaces resulting in a melted surface cannot be sanded out. Smooth surfaces can be polished to a higher gloss with Nylon Mesh Silicon Carbide Pads (Very Fine, Ultra Fine, then Micro Fine) or Silicon Carbide Sandpaper (400 grit, 600 grit, 1200 grit then 1500 grit). Wash with any standard plastic cleaner (409 or Windex like cleaner).

**Repairing**

If *HYTAC-BIX* becomes damaged through abuse, repairs can be made following CMT's guide “Repairing Instructions *HYTAC-BIX*“

**Sourcing information:**



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Kennametal, Inc  
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Windsor, CT 06095-0800  
Telephone 800-446-7738  
Fax 800-847-0004

**HOLDERS**

|             |                   |
|-------------|-------------------|
| Catalogue # | CCLPR124B         |
| Mat. No.    | 1096903           |
| Description | Qualified Holders |

**INSERTS**

|             |                |
|-------------|----------------|
| Catalogue # | CPG422 K313    |
| Mat. No.    | 1183422        |
| Description | Kendex Inserts |

McMaster-Carr Supply Co.  
473 Ridge Road  
Dayton, NJ 08810-0317  
Telephone 732-329-3200  
Fax 732-329-6666

Preferred Adhesive: Devcon Plastic Welder II, 1,7 oz, p/n 66215A27

Others: Devcon High-Performance Epoxy, 1.7 oz, Nr. 66215A33  
Loctite Hysol E-120HP, 1.7 oz., Nr. 6430A24  
3M Scotchweld 1838 Green, 2.0 oz., Nr. 75065A69