

To achieve a quality appearance of any work carried out on an Engraving Machine it is essential that the cutter is correctly ground and the sharpness maintained. The diagrams below show the basic geometry that make up a correctly ground cutter. Therefore when experiencing problems on a job or material type the cutter geometry and sharpness should be the first point of investigation. The cutters geometry (cutting angle, clearance angle and rake angle) can be altered to improve its performance on different material types, these aspects will be covered in the following paragraphs.

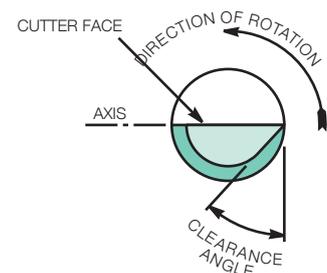
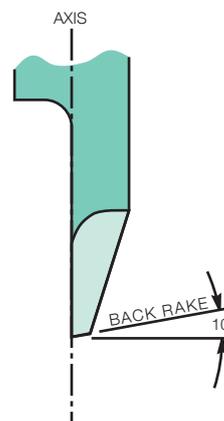
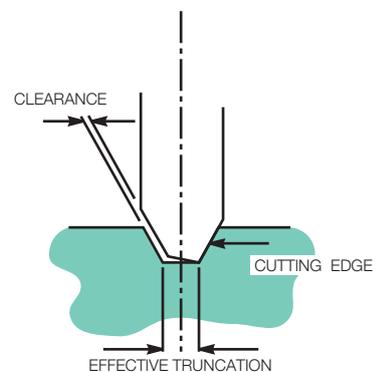
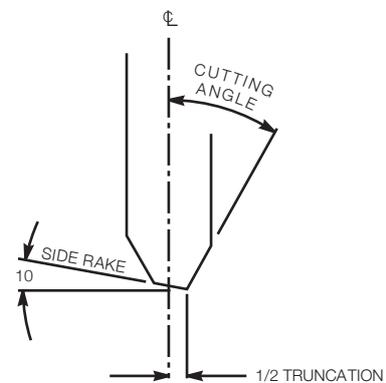
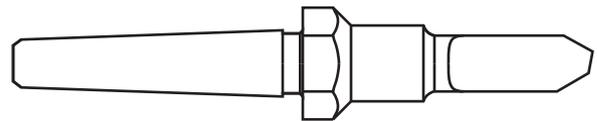
## ABC on Cutter Grinding

The following points are intended as guide lines within areas associated with cutter grinding

- A.** All Engraving Cutter Grinders use a method called the stopping off technique to produce the cutter's clearance angle. The only drawback with this technique is that the cutting angle will be greater than that set on the grinder, and will increase as the clearance angle increases. Therefore to achieve an exact cutting angle the crutch setting on the grinder must be less than the angle required. The only way of accurately checking this angle is by using a microscope. However for most applications the setting on the cutter grinder is adequate.
- B.** Always ensure that the cutter shank is clean and free from burrs before setting in to the cutter grinders holder or collet.
- C.** After grinding H.S.S. cutters, all grinding burrs should be removed by gently rubbing the face of the cutter on a smooth oil stone
- D.** When GRINDING H.S.S. CUTTERS using a white grit grinding wheel a slicing technique is employed for rough grinding. This involves moving the cutter backwards and forwards across the face of the wheel, whilst indexing in a rotary direction making sure the cutter leaves the face of the wheel at both the front and back with each slicing action. This technique is used to ensure that the cutter does not over-heat and lose it's hardness. If stock removal is high, cooling the cutter in water may be necessary from time to time, this will also help to ensure no over-heating takes place. Finally the cutter is slowly rotated on the wheel face to remove any facets produced in the rough grinding stage.
- E.** When GRINDING CARBIDE CUTTERS using a diamond wheel it is better not to use the slicing technique used for white grit grinding wheels. Instead, the technique to be adopted is to leave the cutter in constant contact with the wheel face and just rock the crutch backward and forwards so that the cutter covers the whole width of the wheel face. This method ensures constant wheel wear over the entire surface and will help eliminate the breaking down of the leading edge.

This procedure cannot, of course, be used when grinding parallel cutters. However the cutter should be left in contact with the wheel at all times, and by reducing the rate at which the carbide is removed, the form of the grinding wheel will be maintained. Diamond wheels can be opened-out (sharpened) by using a dressing stick.

## Standard 'D' Bit Cutters - tapered & straight shank



**Cont...**

- F.** Spark-out or Dwell-time is a technique used to improve surface finish and ensure the correct form has been produced. When the correct size has been reached this technique is simply achieved by continually rotating the cutter back and forth until no further grinding action is taking place. This technique is often overlooked and is the cause of 90% of all cutter related problems.
- G.** When letter filling is required either by paint or wax, cutting angles greater than 60° should be avoided, 45° is the most common. The best results are achieved by using a parallel cutter but this may produce burrs in poor quality materials, a good quality cutting oil can be used to help alleviate this problem.
- H.** For the production of consistent, accurately ground cutters the use of a cutter grinding microscope or as a less expensive alternative the beck magnifier (does have limitations) is recommended. It is virtually impossible to grind one cutter the same as another without one.
- I. SLOTTING CUTTERS.** The regrinding of slotting cutters is much the same as normal cutters, except that the cutter face has to be lined up parallel to the setting gauge by eye. There is also an additional clearance angle required (FRONT CLEARANCE) this is to allow for greater swarf removal. See diagram on page 2
- J. CUTTER CLEARANCE ANGLES.** Although the optimum clearance angle varies from material to material it is generally accepted that a 32° clearance is suitable for most materials and applications. The table along-side shows the optimum clearance angles and spindle speeds for different materials.

**Hints on Cutter Selection**

Material Type	Cutter Type	Spindle Speed RPM	Clearance Angle	Lubricant Type
Aluminium	H.S.S.	18,000	32 -40°	Cutting Oil
	Carbide Orange Grade	18,000	32 -40°	Cutting Oil
Anodised Aluminium	Carbide Orange Grade	18,000	32°	Cutting Oil
Engraving	H.S.S.	18,000	32 -40°	Dry
Brass	Carbide Orange Grade	18,000	32 -40°	Dry
Hard Laminate	Carbide Brown Grade	18,000	32°	Dry
Gravoply	H.S.S.	18,000	40°	Dry
Metallex	Carbide Brown Grade	18,000	40°	Dry
Tool Steel	H.S.S.	10,000	20- 32°	Cutting Oil
	Carbide Orange Grade	18,000	20- 32°	Cutting Oil
Stainless Steel	Carbide Orange Grade	18,000	20- 32°	Cutting Oil
Vinalast Cobex	H.S.S.	6,000	40°	Dry
Darvic	Carbide Brown Grade	10,000	40°	Dry

**Slotting Cutters - tapered & straight shank**

