CONTOUR
FINE TOOLING

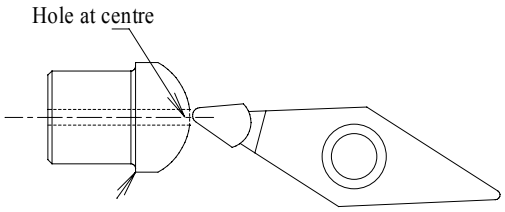
Tool Setting:

A new tool is most vulnerable and can easily be damaged when the very first cut is made. No matter how careful, the tool is in the wrong position when first set (this is inevitable otherwise there would be no need to 'set' the tool position). By making fewer cuts and reducing the time to set the tool, this will greatly improve the chances of not damaging the new tool.

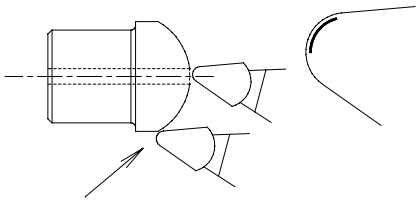
If the tool passes centre or is too high there is a risk of damage (effectively the spindle reverses direction). One method to reduce this risk is to use a 'set-up blank' with a hole in the centre, because if the tool is too high or if it passes centre there is no material at the centre to damage the tool. Also if the 'set-up blank' is the same geometry as a typical component (always a convex – never concave) the same amount of arc is used which will wear evenly over the tool edge. This can be tested for X-position using a Zygo. Once satisfied, cutting a part without the hole to make final checks for tool height and X-position is recommended.

When cutting metals or crystals, avoid using plastics as a 'set-up' pin. Plastic wears diamonds at a very high rate (this is seen in contact lens manufacture; there are several reasons e.g. when cutting plastic the heat does not disperse well). It would be preferable to use a free machining material capable of dispersing heat e.g. OHFC (oxygen free copper).

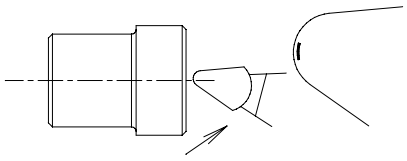
Avoid cutting a flat as this puts all the wear into the very tip of the tool. As this is the part of the tool that cuts the optical zone, it is the most important area for surface finish. Cutting a convex similar to the final product, would result in a more even wear on the tool.



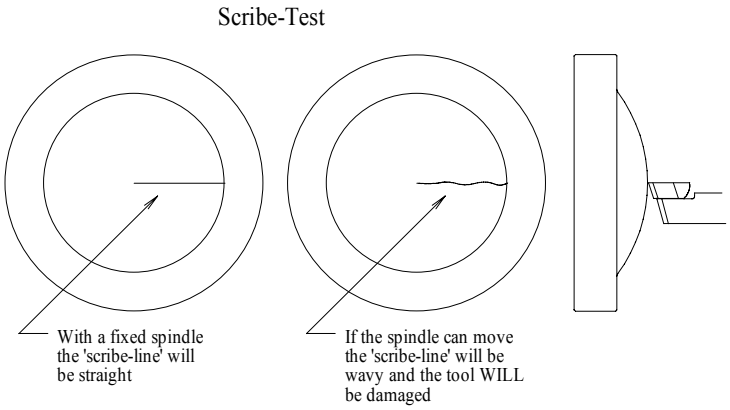
OHFC (oxygen free copper) would be a good material for the 'set-up' pin



Cutting a test piece the same dimensions as the final part will put even wear into the tool



Cutting a flat puts wear only at the centre of the tool



Scribe-Testing can damage the tool cutting edge very easily, as the tool is most vulnerable during this test. If the 'scribed line' is not straight but wavy – the tool IS already damaged.

Using an optical tool-setting system would not only reduce the time needed but would also reduce the risk of damaging the tool during the set-up procedure. With new systems now available tool setting time can be cut down to ten minutes, and avoid damaging the tool.

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