

The “bedding in” of Diamond Honing Stones

Recent developments in manufacturing processes, grade control and honing tool design, coupled with improved machine control, has led to increased use of Metal Bonded Diamond abrasives for production bore honing. The very low rate of diamond attrition in relation to stock removal does, however, pose the problem of “bedding in” new stones.

It is not possible to manufacture the individual diamond sticks with the correct radius of cutting surface to match that of the bore to be honed and, even if this were so, methods of mounting the individual stones on holders would inevitably result in further errors.

One method used is to set up the honing tooling complete with diamond stones on an external grinding machine, then grind the stones to the component bore diameter with the expansion cone locked in a pre-determined position. This method is not entirely successful in that it does not simulate the honing operating conditions and the grinding wheel contact area on the stones is very often outside the cone contact areas on the stone holders, with the resultant tendency to tip the stones.

The most successful method is as follows :-

- A) The diamond hones on their respective holders are assembled and retained in the hone body in the normal way.
- B) A dummy component is manufactured from mild steel having a bore diameter and length identical to that of the component to be honed.
- C) A lapping paste is prepared consisting Boron Carbide and honing oil. The grit size of the Boron Carbide should be similar or slightly coarser than the grit of the diamond stone (i.e. 150 grit stones use 100-150 grit Boron carbide).
- D) The paste is then applied liberally to the diamond stone surfaces. The tool is then assembled into the honing machine. If the size and weight of the dummy component is such that it can be held in the hands as on a hand operated horizontal honing machine, it should be stroked on the honing tool by hand observing normal overrun and stroking speed rules :-

If the component is large, it should be secured on the machine in place of the production component and machine stroke should be set in accordance with normal practice.

Hone rotational speed and stone pressures

As a guide the spindle speed for this “bedding in” operation should be set to between 20-30% of the normal production honing speed.

The stone pressure should be set very light but sufficient to ensure firm contact between stones and surface of bore.

The object of the exercise is to “charge” the surface of the dummy component with Boron Carbide particles which will then remove bond material from the stones until a stage is reached where the surfaces are fully bedded in on the bore. Too high stone pressure will discourage charging of the surface and generation of heat will result in loss of cutting action. The stones should be recharged with paste as necessary to maintain cutting action but particular attention should be paid to applying the paste carefully to avoid it spreading the stone holder and hone body. Inspection of the surface of the stones will indicate when they are fully bedded in. Short stroking and trial and error with speeds and pressures may be necessary to arrive at the most efficient settings.

When the operation has been completed, it is vitally important that all traces of the Boron Carbide are removed from the honing tool by a degreasing method. The dummy component should be retained for further use as necessary.

Notes :- this method can also be applied to single stone mandrel type tooling where diamond stones are used.

Multi-stone tools can very often be fitted to horizontal hand operated honing machines for bedding in purpose. The dummy component is used as with the conventional truing sleeve.