Ask The Oracle

Question - to be answered in the next issue

Can the Oracle tell me how to cut part degrees on my Graves MK1, convert diagrams to different index gears, placement of 96/48 index number and different rotation directions.

Q: I am having problems with chipping at the facet edges, how do I stop this?

Answer by Mike Richardson

The options available to you are:-
1. Reduce the coarseness of the lap.
2. Reduce the cutting speed.
3. Cut into an acute angle rather than away from it.
4. Avoid cutting patterns with acute angles, e.g: Marquises on problematical materials until you have built up some experience.
5. Reduce the finger pressure.

That is the easy bit; now let us look at how these tricks work. We need to understand the concept of stress. This is simply defined as force per unit area in a solid material.

Stresses in a material under load, such as a stone being cut are complex but can be resolved into 4 types:
1. Compressive stress,
2. Tensile stress,
3. Shear stress,
4. Bending stress.

Most minerals are good at sustaining a compressive stress but not so good when subject to a tensile stress, hence No. 3 above. The friction of the lap pulling at the edge when cutting away from it generates a tensile stress in the material which pulls out chips.

Stones with acute angles have a smaller cross sectional area near the edge therefore all stresses are intensified at this point, hence No. 4 above.

You can maintain a sustainable stress level in material with a small cross sectional area by reducing the load that the area has to accommodate, hence No. 5 above.

This deals with compressive stress, good as far as chip prevention goes and tensile stress, bad as far as chip prevention goes. These two types of stresses are called The Principal Stresses.

Now let us look at shear stress. Unlike compressive and tensile stresses which act on a plane normal to the direction of loading, shear stress acts on planes which are parallel to the direction of loading. For example, a pair of scissors (shears) causes the material being cut to fail in shear. Shear stress is not a major factor in chip production but it is the type of stress which causes cleavage when cutting material like topaz inappropriately. It is also the culprit which causes a stone to fly off the dop. The dopping adhesive fails 'in shear'.

Bending stress is generally not a factor in chip production. It is a function of the second moment of area of the material and the distance from the centroid of the area and the applied bending moment. Bending stress is compressive on one side of the centroid and tensile on the other side. With maximum shear stress at the points where the bending moment changes sign, (a useful factoid but not relevant here).

Having considered stress, we can now look at material properties and how they relate to chipping. Toughness is defined as the ability to absorb energy. The opposite of toughness is brittleness.

Unfortunately, most gemstones are brittle to a greater or lesser degree. A brittle material fails to absorb kinetic energy and breaks (chips).

Do not confuse toughness with strength or hardness, they are entirely different properties.

To reduce chipping in a brittle material we can reduce the kinetic energy imparted to the material during the cutting process. Kinetic energy is a function of the mass of the diamond particles attacking the stone and the square of their velocity. We can reduce the first by changing down to a finer lap, hence No. 1 above, and we can reduce the second by slowing the cutting speed, hence No. 2 above.

Note that you can reduce cutting speed by slowing down the lap and by moving the stone nearer to the centre of the lap. You need not let the prospect of chipping deter you from using coarse laps and high cutting speeds. It is good practice to get the roughing out done quickly; you do not want to wear out your finer laps by using them to remove a lot of material. Just be aware of the chip size produced by each lap and change down points 1 to 5 accordingly as you approach finished size.

Q: Recently my desktop PC had to be replaced, I bought one with windows 7, 64 bit operating system and found it would not run my copy of the Datavue database even though GemCad for windows runs perfectly. I have tried the original copy obtained from the Librarian some years ago and a download from the web I have an old laptop that runs Datavue so I have managed so far but I would like to be prepared for the day when this fails.

So - is it possible to get Win 7 64 bit to run Datavue ? If not is it likely that some computer expert will update the database so it will run?

Answer by Steve Smith and Danny Hargreaves

To install GemcadWin onto the Windows& operating system is straightforward as it loads the same as in previous versions of Windows. The problem a lot of people have is with Dvue. To install it from your old computer, you should copy the Dvue folder (total folder not just the contents). Open the new Gemcad folder on your new machine and paste Dvue into GemcadWin folder.

Total shut down your computer, then restart.

Open Gemcad and query the database and it should work.

It will put up a box asking you to locate it (Dlist.dbe possibly).

On the drop down box find the Dvue folder in Gemcad, click open and find dlist.

Click to highlight. Close DVUE and Gemcad down, then restart your computer.

Open Gemcad and Dvue should now work.

Make a backup of your Gemcad win / DVUE folder and keep it safe.

Have you got something you want to ask the oracle?

Need help or advise?

Contact Kathryn on 0191 2362909 or email: editor@ukfcg.org