

STONE CARVING by Peter Martin

These notes aim to give an insight into how to make relatively small carvings from gemstones, minerals or rock. Please bear in mind:

- *The carving methods described suit what I do. There may be other and better ways! I am still learning.*
- *There are few hard and fast rules. Much can be achieved by trial and error, and practice!*

Stone carving is greatly rewarding as it gives the opportunity to create something that is unique and personal. It is one of the oldest art forms with some stone carvings dating back tens of thousands of years. Carvings do not have to be large, complicated, detailed and made using the finest quality material. They can be as simple or as complex as you wish them to be, and use can be made of a wide range of materials. Furthermore, great artistic skill is not necessary. Of much more importance is an understanding of the nature of the stone and how it can be carved to best effect.

Stone carving can be quite time consuming and, like any lapidary work, taking shortcuts often leads to an unsatisfactory end product. Far better to take one's time so as to avoid having to go back and re-do something. Also there will inevitably be some hiccups along the way. Despite having carefully inspected the stone at the outset, hidden flaws or unexpected colour changes etc. may be encountered. However, unless you are really unlucky a slight modification of the design will generally overcome these problems, which should simply be regarded as a challenge!

If all goes according to plan the end result will be a stone carving that is pleasing to you and others, now and for posterity.

TYPES OF CARVING

These notes focus predominantly on carvings "in-the-round" (Figs. 1 & 2) and in "relief" (Figs. 3 & 4). Intaglio carvings and the carving of material into bowls, rings, linked chains etc. require more advanced techniques and/or additional equipment e.g. lathes.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

CHOICE OF MATERIAL

The hardness, toughness and quality of the material will often dictate what type of carving is feasible. The carving material does not have to be very hard for a detailed and highly polished carving to be created. Whilst it may be nice to aspire to carving in jade or similar classical carving material, fine carvings can be achieved using relatively soft material, for example jet or soapstone.

The other consideration regarding choice of material is the equipment available. I think there are basically two categories of material namely Category 1 which is material that can be worked simply with steel tools, and Category 2 (A & B) which is material that needs the use of silicon carbide or diamond tools.

Category 1: Materials workable with steel tools (Hardness 1 to 4) include: calcite e.g. marble and calcite onyx, gypsum e.g. alabaster, satin spar, howlite, jet, amber, marble, meerschaum, talc (soapstone) and slate.

Category 2A: Materials workable with silicon carbide tools and grit (Hardness 4 to 5) include: fluorite, lapis lazuli, malachite, obsidian, rhodochrosite and serpentine.

Category 2B: Materials that can be carved with silicon carbide tools but which are most readily carved using diamond tools (Hardness 6-7) include: feldspar, quartz including agate, carnelian, jasper, etc., nephrite, jadeite and rhodonite.

These notes focus on the methods of carving stone using silicon carbide tools and diamond tools, as stone carving using steel tools is not dissimilar from the relatively well known processes used in wood carving.

DESIGN

Unlike classical sculpture in marble or alabaster for which very large flawless blocks can be found, stone carving is often dictated by the size, colour and quality of material that is available and can be afforded! Very often it is a case of thinking what can be carved from a particular stone rather than deciding in advance to carve say, an eagle in flight with a large wingspan in tiger's eye quartz

and then spend a lot of time and possibly money finding a suitably large lump of material that can be carved into the pre-decided design.

The joy of carving is that you can decide how detailed your carving is. Very pleasing carvings can be produced without any detail. In fact some carvers only ever carve abstract designs. For example, beautiful abstract carvings can be created from large optically clear crystals e.g. quartz, where the design utilises the optical properties of the stone to maximum effect.

Stones with special properties like chatoyancy, e.g. tiger's eye quartz or satin spar can be used with great effect to make beautiful carvings.

CARVING EQUIPMENT AND TOOLS

As indicated previously, the equipment and tools required will depend on the nature of stone to be carved and the type and size of carving to be created. The basic equipment needed for carving Category 2 stones, in addition to standard lapidary equipment i.e. diamond saws and silicon carbide or diamond grinding wheels and belt sanders, is listed below:

- A spindle (or arbor) comprising a steel shaft running horizontally in sleeve bearings or ball bearings attached by a flexible belt and suitable pulley wheels to, say, a 1/4HP electric motor. Ideally 3-step pulleys should be fitted both to the motor shaft and to the spindle of say 50mm, 75mm and 100mm diameter so that spindle speeds of about 750rpm, 1750rpm and 4000rpm can be selected. The threaded end of the shaft should be fitted with a Jacobs chuck and there needs to be a means of directing a drip or spray of water on to the carving during grinding operations (*Fig. 5*). Note that the safety guard is not shown.
- A flexible shaft driven by an electric motor the speed of which can be varied by a foot-controlled rheostat. The end of the flexible drive shaft is fitted with a small collet chuck to enable grinding points to be fitted. The drive can be hung from the ceiling or bench-mounted (*Fig. 6*).



Fig. 5



Fig. 6

Use could also be made of a hand held Dremel type of tool, but this gives less control than a flexible drive shaft.

The tools required for the carving process are described below. As well as using bought tools it is sometimes necessary to use one's ingenuity and to make tools to achieve a particular outcome.

THE CARVING PROCESS

Having chosen a stone and decided on the design the stages of carving will usually be as follows:

INSPECTION Study the stone and check for flaws or any other potential problems. If there are any, decide whether to live with them or ensure that the carving will eliminate them. If you have any doubt it is better to discard the stone and find another rather than risk wasting a lot of your precious time.

SKETCHING/MODELLING It is often useful to sketch out your design. It may also help to make a full size model using modelling clay or similar material.

RECORDING Although not essential, it may be of future interest to photograph the stone and record its dimensions and weight before and after carving.

“BLOCKING-OUT” Carving can be a time-consuming process so the first step is to remove as much unwanted material as possible by using a diamond saw. For small carvings a small, thin bladed diamond trim saw is necessary rather than the type of saw usually used (*Fig. 7*). Where it is required to form a hole through a carving or to form deep cavities within it, use can be made of a diamond tube drill (*Fig. 8*).



Fig. 7



Fig. 8

GRINDING

Having removed as much of the unwanted stone as possible the next step is to develop the carving by grinding. This is the stage where you can literally see the carving taking shape. Depending on the size of the carving various shapes and sizes of silicon carbide grinding wheel can be used (*Figs.9 & 10*). These are held in the Jacobs chuck and operated with the pulley combination that gives the fastest speed. The stone should be wetted to avoid overheating and the creation of dust (which can be very hazardous to health).

FINE GRINDING AND DETAILING

If a fairly detailed or intricate carving is required it may be desirable at this stage to use diamond points (*Fig.11*). If needed, use can also be made of small diamond saws up to say 25mm dia. for slicing and grooving. All these tools can be used either in the Jacobs chuck or in the flexible drive or Dremel type tool. Again it is important to lubricate and cool the diamond tools, and to prevent dust, by dripping or spraying water on them.



Fig. 9



Fig. 10



Fig. 11

SURFACE SMOOTHING

For relatively soft materials (Category 1 or 2A) the required smoothing of marks made by the grinding operation can be done by using silicon carbide “wet and dry” paper or grits starting with 180 or 240 grit and progressing through to 600 grit, all suitably lubricated using water. Care must be taken to clean the carving thoroughly between each stage. For crevices or other places which are difficult to reach it is useful to use small pieces of hardwood e.g. cocktail sticks to get the grit or paper into these areas.

It is sometimes useful to use a diamond file to smooth the carving by hand but care must be taken not to remove any fine detail. Other tools that are useful are mini diamond sanders (*Fig.12*) and abrasive-impregnated Cratex

type rubberised wheels either mounted in the Jacobs chuck or in the flexible drive. Alternatively use can be made of mini sanding drums on a flexible or expanding mandrel or mini sanding discs (*Fig 13*). For quartz and stones of similar hardness smoothing can also be done effectively using silicon carbide paper or loose grit. For crevices and fine detail the use of small wooden sticks is again usually the best solution. For hard stones the progressive smoothing process can also be very effective using successively finer grades of diamond paste applied with hardwood sticks of suitable shape.



Fig. 12



Fig. 13

POLISHING

Polishing is done in the same way as for cabochons using a polishing agent, e.g. cerium oxide and the appropriate polishing buff, e.g. felt or leather (*Fig. 14*). For Category 2 stones the felt wheels should be as hard as possible to be effective. Considerable ingenuity is required to achieve a good overall polish on detailed carvings, but this should not be a problem if the carving has been diligently smoothed and sanded to remove all scratches resulting from the grinding and detailing processes.

Whilst most carvings benefit from being polished completely, it may be desirable, for artistic effect, to leave some surfaces with a sanded finish.



Fig. 14

Figures 15 to 22 show the progressive development of a carving of a fish from a piece of smoky quartz.

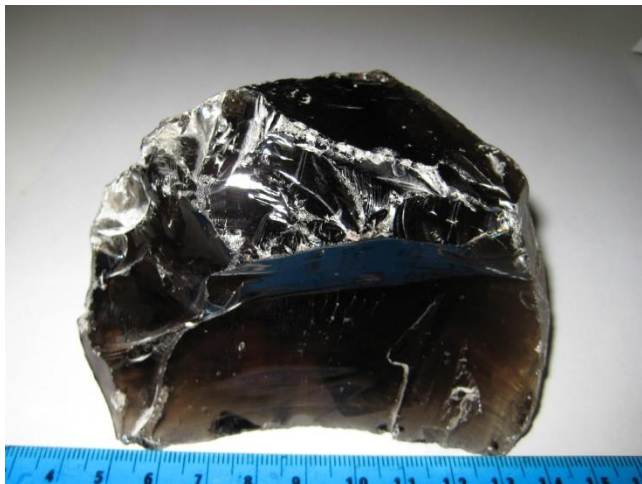


Fig. 15



Fig. 16



Fig. 17



Fig. 18



Fig. 19



Fig. 20



Fig. 21



Fig. 22

One cautionary note which should, perhaps, go without saying is that carvings generally don't like being dropped! Unlike cabochons which often seem to survive being flung off a dop stick, stone carvings are relatively heavy and are likely to suffer if dropped at any stage during the carving process. It is a good idea to put an old piece of carpet or other cushioning material on the floor to soften the impact if the worst happens! With regard to accident prevention, it is of course vital to address safety issues at each stage in the carving process in accordance with good workshop practice.

Happy carving!

SUGGESTED READING:

- Gem Cutting - A Lapidary's Manual by John Sinkankas
- Handbook of Gemstone Carving by Ed and Leola Wertz
- The Fundamentals of Gemstone Carving by Gordon S Kennedy et al.
- Lapidary Carving for Creative Jewellery by Henry Hunt
- Designing the Carved Gemstone by Henry Hunt

VIDEOS: Several videos are available on YouTube.