Q: I am building a Rose Engine. What diameter should I make the rosettes? ..... Oh, and another thing.....?

A: - Diameter of rosettes - most full-sized rose engines have rosettes of 7" diameter as this allows greater changes in profile than a smaller size. A larger circumference of rosette will have more gradual inclines on the bumps to achieve the same pattern. For example, a sudden change from peak to valley can cause the engine to attempt to 'jump' downhill at a faster than normal speed, thus risking a rough cut. Conversely, a sudden change from valley to peak may present an insurmountable 'climb' for the rubber which may cause it to strain or even break.

Q: - Oh, and another thing.....What thickness should they be?

A: - Rosette Thickness - This is an arbitrary figure. I guess most rosettes (for rocking only) are about 1/4" thick if made of brass or bronze. This is sufficiently inflexible. They are usually held on the barrel with small spaces between so that the rubber will not touch a rosette on either side of the chosen one. However, rosettes for pumping need to have a larger space between them to allow the rubber to pass between two rosettes and follow the 'crown' (pumping) profile.

Q: - Oh, and another thing.....How thick do they need to be if they are pumping rosettes?

A: - Almost the maximum pumping depth should be added to the normal 1/4" thickness of the rosette edge; in other words, the rosette casting should be like a plate of 1/4" thickness with a rim of, say, 3/4" thick to enable the rim to be cut as deep as, say, 1/2” to 5/8" at the lowest points on its profile; thus not to reduce the thickness of the rosette to less than 1/8”.

Q: - Oh, and another thing.....What bore diameter is usual?

A: - Bore diameter is dependent on the size of the lathe spindle. Rosettes need to fit firmly onto the spindle because if there is any looseness the rosette will move under pressure of the rubber, thus distorting the pattern. For this reason most antique rose engines have a spindle of about 2" diameter with a very slight taper; and each rosette is lapped exactly to fit onto the spindle in its place; this means they can only be mounted in the correct sequence (largest hole first) with similarly bored and tapered spacers inserted between every pair of pumping rosettes. This ensures that there can be no movement of the rosettes on the barrel. For a modern rose engine an extra consideration is whether, or not, the lathe spindle is to be hollow so as to accept a collet and drawbar; like a 5C system. Incidentally, most rose engine barrels have a full-length key and the rosettes each have a key-way to ensure they cannot rotate on the barrel.

Q: - Oh, and another thing.....What is the maximum ‘throw’ or, in other words, what is the greatest distance that can be allowed between the highest bump and the lowest hollow?

A: - The overall 'throw' on a rosette is known as its 'amplitude'; it is the difference in the radius of the highest peak from that of the lowest valley. Most modern ornamental turning rose engines use rosettes with a maximum amplitude of about 1/4". With a 7" diameter

rosette this means the bumps will not be too steep for the rubber to 'climb' so long as they are not too close together. For example, a 'climb' of 1/4" over a distance of 1/2" should be possible but over a distance of 1/4" it would probably be struggling. There is no maximum amplitude; it depends on the kind of pattern you want to produce. Bear in mind that a bump of 1/4" amplitude at a radius of 3.5" is quite shallow but if the cutter is cutting at a radius of, say, 1", then the bump on the workpiece will appear to be very steep. Remember also, when designing a rosette, that a feature that is too steep cannot be climbed by the rubber; therefore such features must be reserved for the rubber to go down-hill, not up; for example a pattern like the teeth on a circular saw blade can be followed by the rubber climbing the slopes and dropping down the radials of the blade (the cutting edges), but if the rosette was to be reversed, the rubber would have to to attempt to climb the radial lines which would be impossible. However, this problem may be overcome by reversing the direction of the lathe spindle when using such a rosette in reverse. If it becomes necessary to make a rosette with radial steps in both directions the rubber must be designed to rollover the steps; i.e. a rubber with a wheel of sufficient diameter for the task. Roller rubbers do, however, distort the cut profile compared with the true profile of the rosette.

Q: - Oh, and another thing.....Could you please explain the term ‘amplitude’?

A: - As already mentioned, amplitude is the radius from centre to the highest peak less the radius from centre to the lowest valley in the rosette profile. It is easily measured by a dial-test-indicator (DTI) in place of the rubber while the headstock is locked by the rocking-stop-screw. The DTI plunger will follow the rosette profile and the amplitude will be the difference between the largest and smallest readings on the dial. Engine turning (used in the jewellery trade) requires rosettes with low amplitude because the patterns, being cut into metal, are very fine. Patterns cut by conventional ornamental rose turning, however, are generally larger and bolder and need to have rosettes with larger amplitudes. Ornamental Rose Engine Turners are advised to choose rosettes with large amplitudes as these may be easily reduced by the use of an amplitude adjuster when it is desired to cut shallower patterns; but a low amplitude rosette cannot be so easily increased because the adverse leverage is too great. To avoid the necessity of making several rosettes of similar pattern but with different amplitudes you need an 'amplitude adjuster'.

Q: - OK, so what is an Amplitude Adjuster?

A: - This is an adjustable lever, or crank, whereby the rubber is leveraged so that when it follows a bump of, say 1/4" amplitude the crank, set at a ratio of, say, 1 to 2, will cause the rose engine to rock by only 1/8" instead of 1/4". So the solution is to make your rosettes with the highest amplitude you can envisage you might need, whilst remembering that they must still have a sufficiently shallow form for the rubber to follow; then an amplitude adjuster will enable you to apply any reduction down to about 20% of the maximum (below 20% the leverage required to be exerted by the crank becomes too great for it to move).