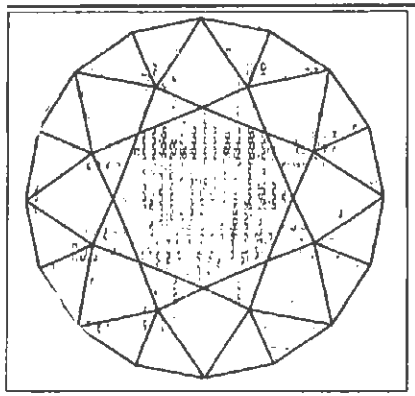

Figure 3 BRIGHTNESS PLOT for 40P/34C Diamond. Brightness Value 93

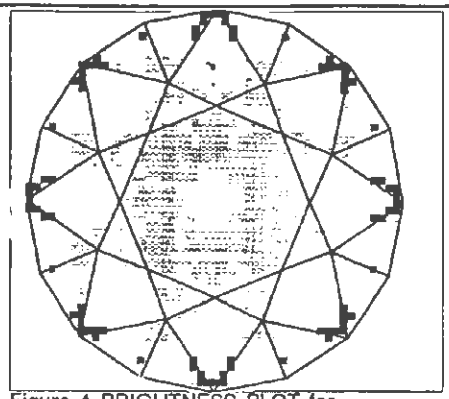

Figure 4 BRIGHTNESS PLOT for 41P/34C Diamond, Brightness value 90.

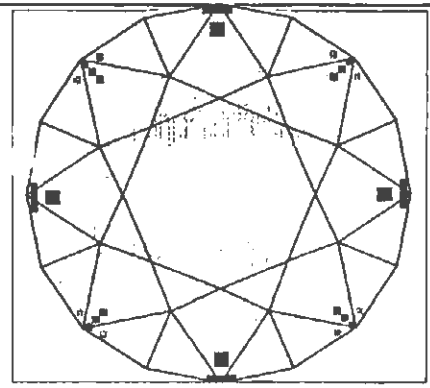

Figure 5 BRIGHTNESS PLOT for 40P/34C CZ Brightness value 91

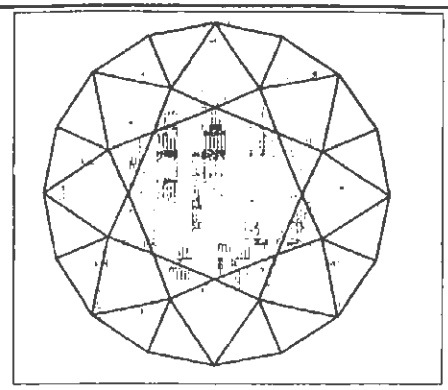

Figure 6 BRIGHTNESS PLOT for 41P/34C CZ. Brightness value 94

that might be cut by amateurs. Diamond was included because it already had the greatest amount of theoretical and practical effort applied to it thus it offered a check on the validity of our conclusions. Classic angles for diamond are 34.5 crown and 40.8 pavilion and our work with Brightness patterns does not disagree with this combination, but indicates that there are other combinations that work well also. Consider Figure 1 which is a chart summarizing the results for Diamond and Figure 2 a similar chart for Cubic Zirconia. Crown main angles are shown on the horizontal scale, pavilion main angles on the vertical scale, and corresponding Average Brightness in the form of "contour lines". The "90 contour" represents all the combinations of crown/pavilion main angles that gave at least 90 brightness value in our brightness plots. Theoretically values between 0 and 100 are possible, but practically it is never as low as 0 or much greater than about 95. As is well known Diamond is capable of very high brightness (at the expense of dispersion). The area of the chart that is to the left of the "90 contour" represents the preferred conditions for very bright stones. That the contours are far apart on both the Diamond and CZ diagrams is an indication that these materials are very forgiving. Later in this series we will consider Quartz which is a much different situation.

We are considering Diamond and Cubic Zirconia together since CZ is often used as a diamond substitute and general recommendations often advise using "diamond angles" for cutting CZ. If by "diamond angles" the 34.5 crown/40.8 pavilion is meant, Figure 1 and 2 suggest that this is true, since on both charts this particular combination falls within the "over 90 brightness" region (i.e between the 90 contours). But the acceptable region is much greater on Figure 2 (the CZ chart) which we interpret to imply that CZ is even more forgiving than diamond. The most critical factors preventing bright stones are crown main angles that are two high and/or pavilion angles that are either too high or too low.

There are many acceptable angle combinations according to Figures 1 and 2. We have used the "90 contour" as the dividing line this means that pavilion/crown combinations like 39P/34C would be acceptable on diamond but not on CZ, 40P/40C would be acceptable on CZ but not on diamond, and 41P/32C or the standard 40.8P/34.5C would be acceptable on both

Figures 3 thru 6 are reduced copies of some of the brightness plots that we produced in this experiment. Figure 3 the 40P/34C Diamond gives a brightness value 93 to be compared to Figure 5 the 40P/34C for CZ which gives a brightness value 91. A slight brightness edge for Diamond when using the same angle combinations.

On the other hand Figure 4 and 6 show a different result. Figure 4 the 41P/34C for diamond gives brightness value 90, but Figure 6 the 41P/34C for CZ gives brightness value 94. A brightness edge for CZ. The lesson to be learned is that even within the "acceptable" range we have defined as between the 90+ contours there are brightness variations due to choice of main angles. A similar experiment using a 60% Table SRB design gave similar conclusions, although there is a slight relocation of the contour lines.

Our measure of merit here was BRIGHTNESS VALUE. In general whatever increases Brightness tends to decrease DISPERSION. From other work we know that if one wants to add dispersion higher crown angles will be needed. Therefore we recommend a compromise 41P/34C for cubic zirconia.

Next month we will show the results for Corundum and Topaz.