BRILLIANCE IN TILT

by Robert Long and Norman Steele

Reference: Love, Eugene S, "Brilliance in *Tilt*", Lapidary J, Dec 89, p90-93

In the reference article Eugene Love gives results of his analysis to give optimum proportions for the Standard Round Brilliant (SRB) cut. Details of his assumptions and calculations are not included, but he says the analysis is based upon three-dimensional solutions and the concept that ". . . an SRB optimized for combined face-up brilliance and tilt brilliance is to be preferred over an SRB optimized for face-up brilliance solely, provided that the face-up brilliance is not significantly compromised.". He gives results for several refractive indices, with variable crown angle and pavilion angle as well as recommended Table size.

We thought it would be interesting to compare our "BRIGHTNESS VALUE" data with the "optimum" shown in the reference. For RI=1.55 Love's recommendation is 43.23 degree pavilion main angle and 40.75 degree crown angle (with Table=0.622 Width). Our work indicates a 41.0 degree pavilion angle and 26.0 crown angle is a near maximum face-up brightness combination and 41.0 pavilion with a 34.0 crown is a reasonable compromise. (There are also girdle thickness calculations and comments in the reference which we consider valid, but which will not be repeated or discussed here.)

Figure 3 is the result of a comparison of average brightness vs tilt angle over the range 0 to 50 degrees for an SRB with the proportions listed in the reference assuming RI=1.55. Three curves are plotted on the same graph. One is based on the Love's data and the others are based on BRIGHTNESS PLOTS.

We leave it to our readers to draw their own conclusions about whether the stated objective of not *significantly compromising* the face-up brilliance as the stone is tilted is accomplished. The reference conditions do result in less variability in brilliance as the stone is tipped, but unfortunately this near constant value is on the side of low values instead of high values.

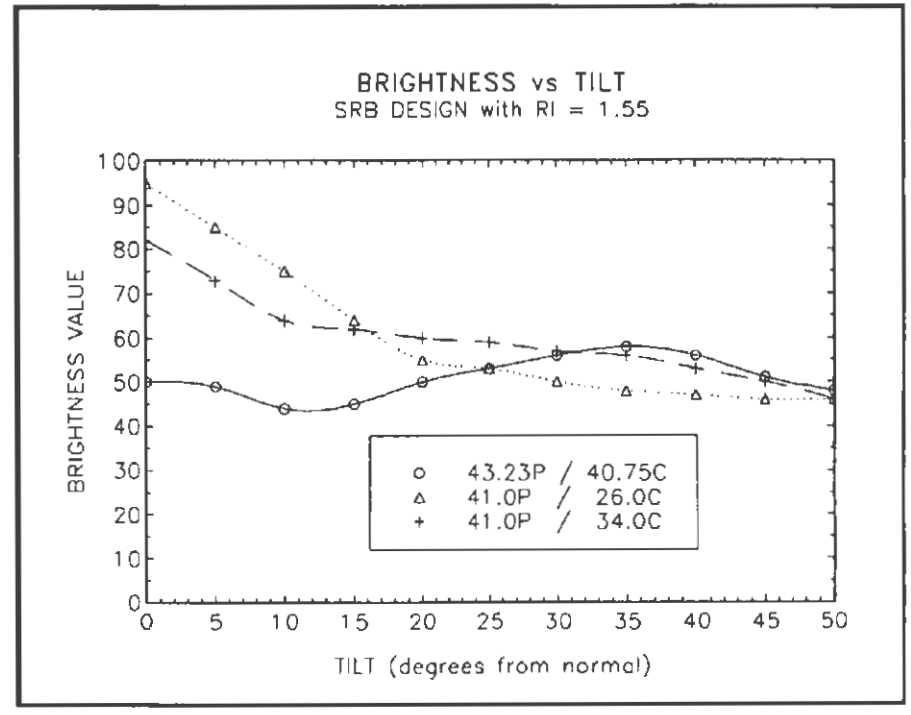

Figure 3 BRIGHTNESS vs TILT for selected SRB RI=1.55 designs

If one severely tilts the stone, as much as 25 to 50 degrees, there is little to choose between the three designs. In fact design (41P/34C) gives much greater brightness values over part of the range and design (41P/26C) is only slightly lower. At amounts of tilt under 25 degrees both of our designs exceed Love's recommended angle combination.

We have also checked the recommended angles for diamond and other high RI materials and do not disagree with Love's findings, except for the implied criticality of the angles. (Angles given to two decimal places whereas our work indicates a broad range of angles will give similar results and at least in our experience we have not met any facetor that can cut accurately to an angle like 43.23 degrees).

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