some materials commonly considered for faceting rough. Figure 1 predicts the lowest Refractive Index material capable of a "bright center" would be RI=1.414. There is only one usual faceting material, OPAL, that occurs with such a low RI. FLUORITE at RI 1.43 has less than 1 degree spread between its high and low limit, however all the other materials are more forgiving than fluorite. For example, with a 23 degree spread Cubic Zirconia is so forgiving it is unlikely one would ever have a problem getting a bright center.

Table I TYPICAL LIMITING ANGLES

		Pavilion Main Angle (degrees)		
Material	RI	Low	High	Range
Opal	1.41	Borderline nearly impossible		
Fluorite	1.43	44.3	45.2	<1
Quartz	1.54	40.5	46.5	6
Corundum	1.76	34.8	48.3	13
Zircon	1.92	30.3	49.9	20
Cubic Zirconia	2.15	27.7	50.8	23

We can also draw some conclusions about the allowable range of pavilion angles in the area outside the actual Table (e.g. under the main, break, or star facts). In this region, the allowable range of angles is shifted (downward) much like the lower limit is modified by using Apex facets. This is why a pavilion facet at 39 degrees (normally below the "critical angle" for Quartz), will not leak light around the edges even in a low refractive index material like Quartz. Special situations are easily handled by the BRIGHTNESS PLOT techniques we have presented in previous SFD issues, but the facets facing each other (acting like flat mirrors as in the Standard Round Brilliant and other flat table designs with opposing mains meeting at a PCP), is amenable to the simplified model of Figure 1.

Design 1.036 MODIFIED ZIRCON CUT
by Norman Steele

The design (on page 3) and the Brightness Contour Plot (on this page) are an outgrowth of the "Problem puzzle" in the July 1989 FACETS. All the Brightness Plot Summary Charts we have shown previously have applied to the SRB design, so for this non SRB

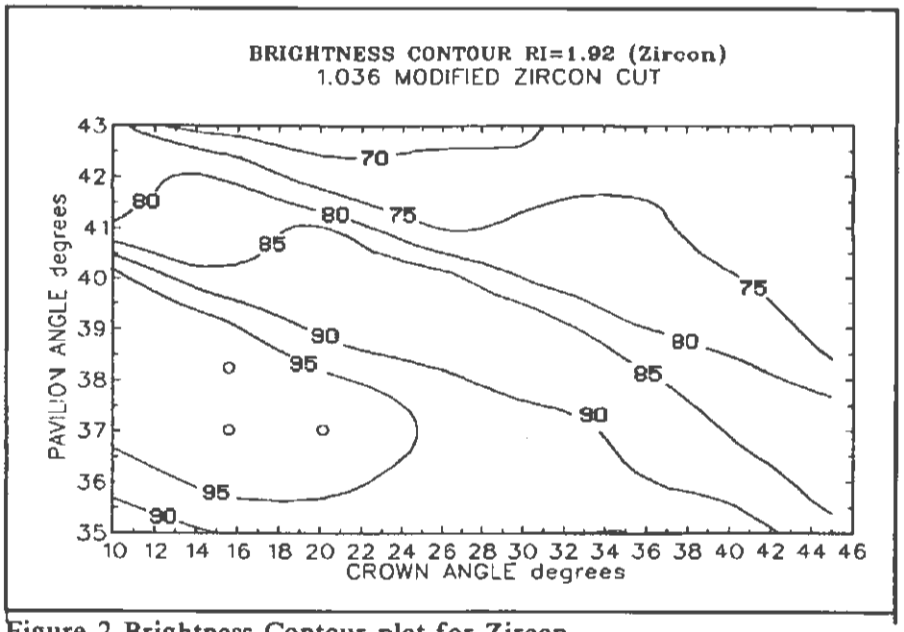

Figure 2 Brightness Contour plot for Zircon

application new data had to be generated.

As presented in *Facets*, the problem was to fill in the cutting instruction details for the Modified Zircon Cut including selecting the smallest practicable gear, given (1) the diagram and (2) that it was to be cut in "Zircon" or "Quartz". The design as shown in the diagram obviously had a rounded (not faceted) girdle with 16 break facets and 8 mains between the breaks. So choice of the gear was limited to a multiple of 16 and more than 24 teeth on the gear which implied either 32 or 64. So we selected a 64 gear because it is more common.

In the absence of other information, the drawing was scaled to find the proportions to use. Using the side view, T/W=0.623, C/W=0.169, P/W=0.494. Using the crown plan view T/W=0.558. Oops, the table size in the side view did not agree with the table size from the plan view. A choice had to be made, The CROWN PLAN was used because other useful points in addition to the Table size could be scaled in that view.

At this point the BRIGHTNESS PLOT SUMMARY for the Modified Zircon Cut had not been made, so a preliminary trial was made with