Continued from Page 2

Average BRIGHTNESS VALUES for all of the designs are shown in Table 1. Note in every case the modified corner design is slightly brighter than the corresponding "standard" design. However, the differences although consistent are too small to make an obvious difference in a commercial cut. In contrast the effect of varying the CROWN DESIGN Angle was nearly three times as great as varying the corner bearing.

These designs are not "meetpoint" although there are a number of meetpoints to cut to. The CROWN being a pure step cut is indeterminate both in the relative size of the facets and in their location. On the pavilion the P4 facets are linked a meetpont, but the meetpoint itself is not located precisely until P5 is cut.

The uncertainties make the exact visual effect difficult to predict. All of the BRIGHTNESS PLOTS shown here strictly apply only to the particular shape shown in the drawings. However, these same uncertainties in the cutting procedure also make the designs very flexible especially when depth is a consideration. Tangent Ratio adjustment on the crown angles will vary the CROWN Height *without* changing the CROWN plan view. However, as Figure 2-1 shows there is a brightness penalty for crowns that are too steep. And shifting pavilion facets P4 (and/or P5) closer to the center (e.g. by overcutting) will reduce the pavilion depth together with some variation in the PAVILION plan view. These changes would impact the brightness pattern .

All four designs have bright centers with most of the dark areas located out near the periphery where it is least noticeable.

Figure 2-2 and 2-3 are BRIGHTNESS PLOTS that were generated when different step crowns were tried on the Design 4.106D pavilion. They represent the extreme angles that were used to generate the data in Figure 2-1. All of the other designs gave similar results but there is not space enough to put them all in this SFD issue. The general conclusion to be made is that improved brightness correlates with *low crown height* (i.e. low crown design angles).

CAM PREFORM PROBLEM

Purpose of a "preform" is to use faceting machine controls to generate the periphery of a stone instead of direct measurement. Usually by "preform" we mean a CAM (Centerpoint Angle Method) preform in which a series of facets are cut to a common centerpoint in such a way that a level false girdle line is formed when 90 degrees facets are cut at the same bearings as specified in the preform. This makes a prism topped by the CAM preform itself. Often this is the most efficient way to form a complex outline.

Ideally the preform itself is temporary and should not interfere with cutting any final facets of the design. If the rough material has limited thickness (the usual situation), it should be possible to use the TCP (Temporary Center Point) as the PCP (Permanent Center Point). Thus there would be no material wasted.

In terms of angles used for the CAM preform, the steepest angle on the preform cannot be greater than the shallowest angle on the design itself. Normally the critical angle is one of the facets that reach the culet area. The designs featured in this SFD issue have a particular problem in that one of the directions needed for the middle facet on the end in the preform coincides with an edge (intersection) of two facets with a wide index spread between them. Although the P5 facets are 40 degrees, they are indexed at (4-44-52-92) which gives one of their prinicpal intersections indexed at 24-72 at an elevation angle much lower than 40 degrees. This can be seen (slightly distorted by the tip) in the tipped side view on page 4. In fact the angle is 12.25 degrees. So the preform facet at 24 (and/or 72) has to be less than 12.25 degrees. For Design 4.106D this is put at 12.0 degrees. For many faceting machines this is an extremely difficult operation to perform without resorting to the messy 45-degree adapter.

This is why for these designs you may want to skip the preform steps and begin with cutting the 90-degree G1 facets at 24-72 to get the length, then cut the corner ends at the same mast height at bearings (12-36-60-84), and finally calculate the width for the G2 facets which are cut at (96-48) until the proper "width" is reached. The "good news" is these designs are flexible so if we miss the width slightly it may not be objectionable. However, if the dimensions are missed very far the angles may have to be changed and Brightness Pattern may give some suprises.