LOCATING THE TRUE CENTERPOINT

The two designs and the preform shown in this issue are prime examples of the use of a precise reference point, the Temporary Center Point (TCP). It is such a fundamental principle that we tell all beginning facetors about TCP. However, we sometimes forget that some facetors do not do things the way we do and are perplexed by the use of the terminology. Many designs that we published have as an early comment "Cut to a temporary centerpoint (TCP)" without an explanation of how one might do that or why it is a good idea to do it.

TCP is a point which is used as a meetpoint for several facets. Every other facet on the design is referenced to this point. Like any other meetpoint three facets are necessary to locate (or define) the intersection. If just two facets intersect, they form an intersection line (facet edge). But when a third facet meets the intersection line the result is a meetpoint.

If one is using a drawing program such as GEMCAD a meetpoint can be located anywhere in the drawing space not necessarily at (X=0.0, Y=0.0, Z=0.0). But if we want to have a practicable facet design a "centerpoint"must be at X=0.0, Y=0.0. The reason is that in the real world of faceting machines the center line through the quill shaft (and also a stone when it is on the dop and in that quill), is determined by physical parameters of the faceting machine such as centering of the quill shaft bearings and how true the dop itself is being held. Early on Robert Long and I realized that we needed a method for locating the centerpoint, not only for our design drawings, but also in the cutting process for real stones on our faceting machines. That is why, almost without exception, designs we formulate have at least three facets that have the same CED and elevation angle. Which means that if these facets are cut together they automatically define a meetpoint that is on the true center line and at the dop center.

However, if one looks at the design S-Curve without Table (on page 1) on the entire stone not even two facets have the same CED. Facets are basically cut one at a time with unspecified height adjustments required to accommodate the different elevation angles. And although the pavilion does have a true centerpoint (to facilitate redopping when the crown is to be cut), the crown apex (or convergence center) is off center relative to the TCP. At first glance this variation of the Doris Crawford S-Curve design looks like a difficult if not impossible cutting challenge. The trick is to locate the TCP for the pavilion reference in a reproducible manner. Then once the pavilion and girdle have been cut, to use the girdle as a reference to locate the crown apex center.

How this is done is simplicity itself. Set the elevation angle to a value equal to or lower than the lowest angle in the design.Release the gear locking mechanism on the faceting machine so the dop can be freely rotated. Then lower the stone slowly onto the lap and twirl it slowly so a cone is cut. The tip of that cone will be the desired TCP. It is temporary because although it is X=0.0, Y=0.0 in the reference coordinates, the "Z" dimension depends on intangibles - - - how long is the dop shaft, how far is the quill shaft from the pivot point., how big is the rough itself etc. These are items we can never specify in a design (nor would we want too). They are and should remain part of the skill factors exhibited by the facetor. It is enough to know that, whatever the other variables, the tip of the cone we have cut is exactly in the center of the physical parameters of our faceting setup. It is "temporary" in the sense that we can cut other cones on our rough if we choose to. Once TCP has served it purpose (which is to serve as a reference for other facets) it can be cut away.

In the Dresden Green Replica the TCP generated by the preform is eventually cut off when the culet is cut. So it is truly "temporary" as far as the design is concerned, but "permanent" as far as the preform is concerned.

Even with a nice well behaved design like a Standard Round Brilliant which has eight facets that meet at the centerpoint,locating a TCP using the cone cutting technique still has some merit. It gives you a good look at the position the final facets should be cut to meet. It physically checks the equipment, all features of the dopping process itself, and at the same time defines the absolute deepest portion on the rough that can be used as the culet. Getting the cutting center off the true centerline is one of the most common mistakes the neophyte cutter makes. It is possible to cut a good stone when the centerpoint is mislocated, but the difficulty is facets cannot be cut at the same angle and constant mast height. Who needs that kind of trouble, when it can so easily be circumvented.?