Value Factors, Design, and Cut Quality of Colored Gemstones (Non-Diamond)

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In this comprehensive article, the author discusses the value factors of colored gems in five parts. This article looks at the first two parts. Future issues of the Gem Market News will continue the discussion, looking at other factors.

Part 1: Value Factors of Colored Gemstones

For our purposes, the word "cut" means more than just the shape of a gem; it also encompasses the elements of "cut quality." Cut quality refers to how well the gem was manufactured, or how well various facets were placed. Combined with the proportions, symmetry, and polish, a well-cut gem should have a beauty that not only comes from its color and clarity, but from how the facets interact with light. This series should illustrate how to assess the elements of cutting, and how to better understand the impact of cut quality on the value of various gems. Part of that will include understanding the choices a cutter makes and why. While our focus is on forms of faceted gems, we will briefly touch on non-faceted gems.

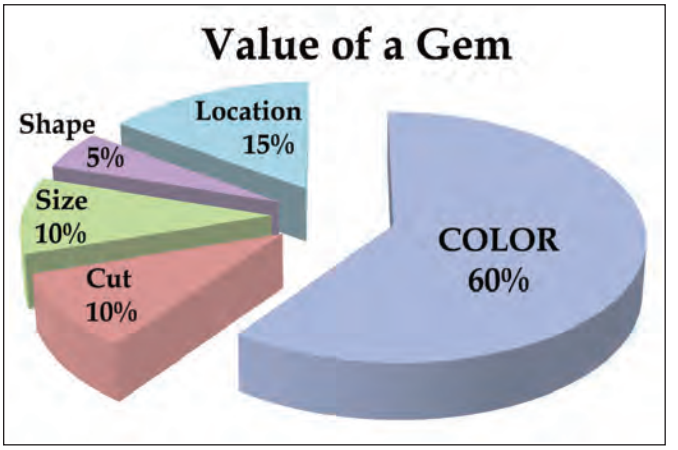

Fig. 1-1. Illustration by Al Gilbertson, © GIA.

The quality of the rough material limits the gemstone's final appearance. Therefore cutters prefer rough that is transparent and without many inclusions. Some gems are rarely eye-clean, so some inclusions become acceptable in those materials. Since color is the highest priority for colored gems, how a cutter manages the light as it enters and exits a gem becomes an exercise in artistry. Ruby rough with a deeply saturated red color and free from even minor inclusions under 10X will produce gems of noteworthy face-up color and appearance, even if the fashioning is poor. But if the faceting washes out the color or muddies its color by mixing dichroic colors, the cutter has failed miserably.

Josh Hall (Vice President, Pala International, Inc.) helps us put cut in perspective to a gem's value (from Hall's personal comments—see Fig. 1-1). He states that color is about 60% of the gem's value, followed by the location it comes from which can influence 15% of the value (this can be much more for certain origins, such as Kashmir sapphire). After that, cut and size each represent around 10% of the value followed by the shape (outline) of the gem. I'm going to add clarity and color zoning to the discussion below. Each of these can be quite variable.

Before we go through each of the value factors in Figure 1-1, it is important to note that the relative value percentages represent Josh's experience, but there are always exceptions. For example, in some local retail markets, size and cut can embody more than 10% of the gem's value. Certain size ranges and cut qualities can be perceived as more saleable, so a premium can be added. All of these factors are discussed on a basic level. In reality, many are more complicated for each particular gem material.

Color is King!

In color science, there are three dimensions to color: *hue* (red, green, blue, etc.), *saturation* (intensity or richness of a color), and *tone* (lightness or darkness). There is a fourth color factor for gemstones: *uniformity of color*.

Our eyes see color as seven colors of the rainbow: red, orange, yellow, green, blue, indigo, and violet. Each of these colors is made of rays of light, each traveling at different speeds with different wavelengths. When all of the above colors combine, we see it as white light. When

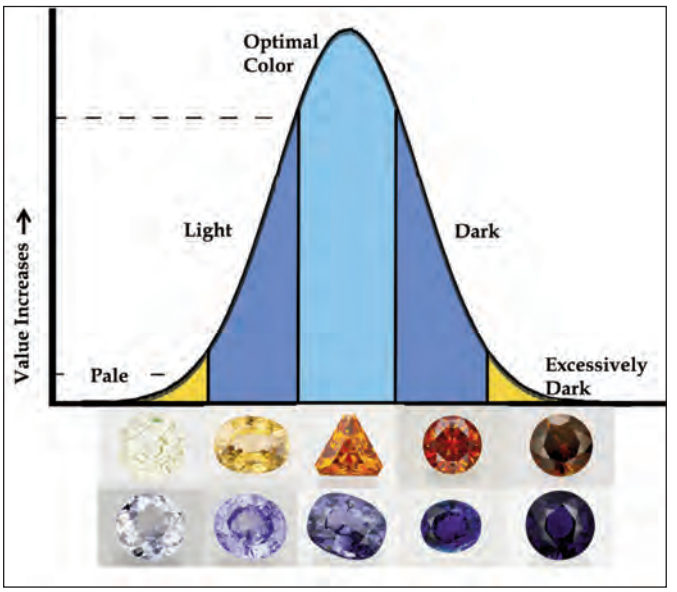

Fig. 1-2. Illustration by Al Gilbertson, © GIA. *Row 1: spodumene, sapphire, scheelite, sphalerite, tourmaline. Row 2: sapphire, sapphire, spinel, euclase, spinel.* Photos by Robert Weldon, © GIA.

white light enters a colored gem, part of the light can be absorbed. For instance, if a gemstone absorbs all of the colors except blue, only the blue will be visible, and we see the gemstone as blue.

The optimal color range (combination of hue, saturation, and tone) for each gem is different, and for many gems, availability in the optimal color can be scarcer (see Fig. 1-2). Pale colors usually have a relatively low value. However, pale blue-green (or mint) tourmaline from Afghanistan/Pakistan commands high prices, much higher than their more saturated counterparts from the same source.

Wayne Emery (*The Gem Cutter*) points out that some retailers have learned that there are customers who prefer less saturated stones because they appear to be brighter and have more sparkle. Thus, less saturated gems might sell more quickly than the more saturated (and expensive) ones. From the jeweler's point of view, inventory turnover is very important and can result in much more profit over time. For this reason, some retailers prefer to use gems of lesser saturation in their designs to cater to this customer base.

Gems that are so dark that it is difficult to see through them are more difficult to sell and thus their cost usually drops significantly. The optimal color can cause values to significantly spike. In most cases (except bi-colored gems), the color uniformity or evenness is also part of this value equation. Gems that face-up with multiple hues are usually less valuable than gems that show a single pure hue. For example, evenly blue sapphires have more value than those with secondary green hues. For a colored stone (non-diamond), color is the most important factor in determining quality.

Country of Origin

For many colored gems, the *country of origin*, or the mining location, greatly affects the value (see Fig. 1-3). For example, this is truer and more extreme for an untreated sapphire of intense blue color from Kashmir which is worth far more than a similar sapphire mined elsewhere. A few of the major grading labs have the equipment and expertise to determine geographic origin. An origin report from one of these labs is required in validating the gem's value when highly regarded locations can significantly increase the stone's price (more than the 15% in a couple of cases).

Be cautious and read the report from a lab thoroughly. A standard report usually identifies the gem material, but not the geographic origin. Language used in a standard GIA Identification Report for a copper-bearing tourmaline will state, "This copper and manganese bearing tourmaline may be called 'paraíba' tourmaline in the trade. The trade term 'paraíba' comes from the Brazilian locality where this gem was first mined, however, today it may come from several localities." The trade calls these Paraíba tourmalines even though the location is not from Brazil. Only if the gem was sent in for a country of origin report, will it indicate the country, such as Brazil. In that case the price will be impacted by the Brazil origin.

Ruby, sapphire, red spinel, emerald, and Paraíba tourmaline all qualify for a GIA Colored Stone Identification & Origin Report. However, that does not mean GIA will be able to determine a country of origin in every instance. GIA determines geographic origin by collecting chemistry and spectroscopic data, and identifying types of inclusions on the sample of unknown origin. That data set is compared to sets of data from reference gems of known origins, looking

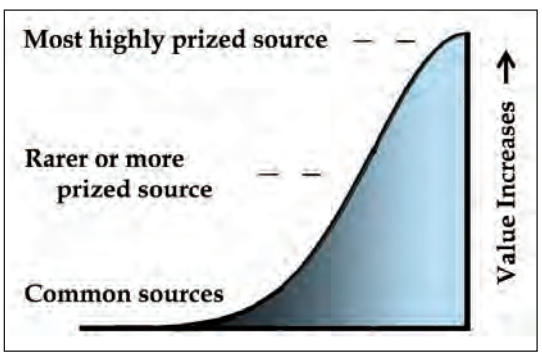

Fig. 1-3. Illustration by Al Gilbertson, © GIA.

for compelling evidence that indicates that the unknown is from a certain location. If the data overlaps with gems from two locations or more, and GIA cannot reach a definitive relationship to one location, the report has the result of "inconclusive."

For collectors of crystals, "Herkimer" Diamond is a generic name for a double-terminated quartz crystal discovered in and around Herkimer County and the Mohawk River Valley in New York. In the high-end gem market, trade names have been used widely in the jewelry industry to denote particular gemstone colors or face-up appearances from specific geographic locations. The names were just as unlikely and profuse: "Paraíba" tourmaline, "Biwa" pearl, "Sandawana" emerald, "Australian" sapphire, "Burma" and "Mogok" ruby. Significant locations come and go. There is still strong consternation amongst many in the trade when a location is used as a name and the gem material isn't really from that location. That doesn't stop some dealers from calling a gem a "Kashmir" sapphire when its color mimics material from that location, and charging a false premium. This is why a country of origin report from a major lab becomes important, indicating that the gemstone has been tested and has the features associated with that specific country.

Finally, it should be mentioned that there is a great deal of poor material from highly prized locations, and in those cases knowing the country of origin shouldn't provide added value.

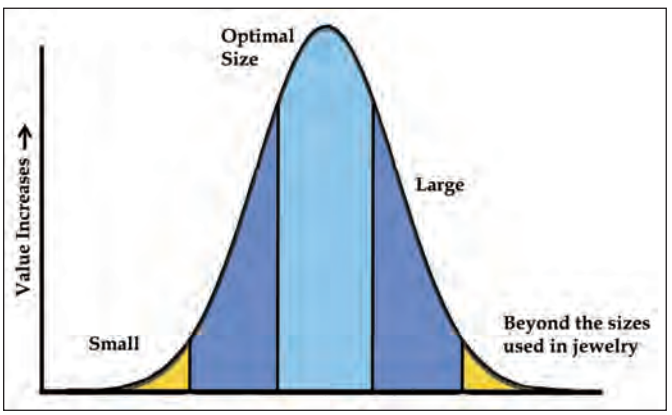

Fig. 1-4. Illustration by Al Gilbertson, © GIA.

Size

The size, which includes the weight and face-up diameter, of each type of gem material is also directly related to value (see Fig. 1-4). As the size increases to that of high demand, the price per carat goes up. Some gems are rarely seen above a couple of carats (e.g., benitoite), while others can weigh thousands of carats (e.g., quartz and topaz). Once gems get beyond a size that is common for jewelry, the number of interested buyers decreases significantly, and the relative value per carat diminishes. However, note that exceptionally large gems from those locations with exceptional color (gems that aren't too dark) are so exceptional that they can be very expensive since they are rarely available from those locations except as near-black gems.

Subject to various issues with the rough material, the yield—the final carat weight of the gem compared to the initial weight of the rough—can be as high as 50% (very rarely) or as low as a few percent; cutters evaluate the various pros and cons when planning to cut the gem. Sometimes the best saturated colors only appear in larger sizes (e.g. kunzite or aquamarine), so that small ones of saturated color are rare and surprisingly expensive.

Conversely, if a deeply saturated rough is cut into a larger gem, it can be too dark and not as valuable. A uniformly colored piece of rough yields gems of different color intensity as the sizes and proportions vary. For example, a gem cut from light colored rough is considered attractive if it reaches a certain size to produce enough color saturation. In this case, a cutter might cut one large, deep gem rather than several lightly colored, well-cut gems. In the case of dark rough, some cutters use the "white paper test" to determine the best yield from the piece of rough. A piece of rough is placed on white paper, and viewed under incandescent and then fluorescent light, each time staying away from any bright sources of light. The color seen through the rough is from light that is reflected from the white paper underneath. By using both light sources you see the colors the gem will have under both types of lighting. If the rough is too dark to see much color, it should be cut into smaller gems to optimize the color. Obviously one could use a very bright light source to see through rough that would be black in many other situations. Wayne Emery suggests

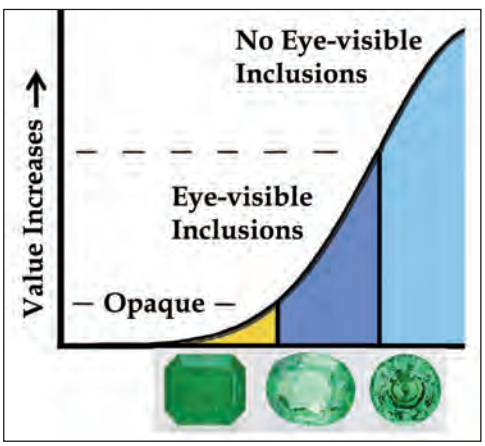

Fig. 1-5. Illustration by Al Gilbertson, © GIA. *Kornerupine, demantoid, tsavorite.* Photos by Robert Weldon, © GIA.

using a standard 100 watt incandescent bulb, one foot above a white paper in a dimly lit room.

Clarity

Gems are cut to sparkle and show off their color in interesting ways. If there are flaws that interrupt that sparkle, the gem is less interesting. Hence there is a value curve related to clarity that is also true for each type of gem (see Fig. 1-5). Some gem materials are almost always found with inclusions, while others are commonly eye-clean (inclusions cannot be seen without magnification). There are some inclusions that actually help the value of specific gems; microscopic light-scattering inclusions enhance the color uniformity in Kashmir sapphire by deflecting light into areas it would not normally go. The resulting velvety appearance of Kashmir sapphires adds value. Sunstone is also aided by light amounts of schiller (extremely tiny copper inclusions that create a cloud-like appearance), which in the right locations can add value.

Uniformity of Color

Any uneven distribution of color within a gemstone is called *color zoning*. Face-up color zoning, like clarity, has a value curve (see Fig. 1-6). An increase in face-up color zoning is usually regarded negatively, since uniformity of color is a mark of most fine gems. To better observe color zoning, turn the gem upside down on a white piece of paper and look for uneven coloration. You probably won't see this in some gems, such as peridot or topaz. Now turn it face-up. Can you see the same color zones or splotches of darker or lighter color that you saw when the gem was upside down? Placing the stone in a clear jar with water (or vegetable oil or baby oil—do not use oil with amber), set on a white background can help you see color zoning in a gem.

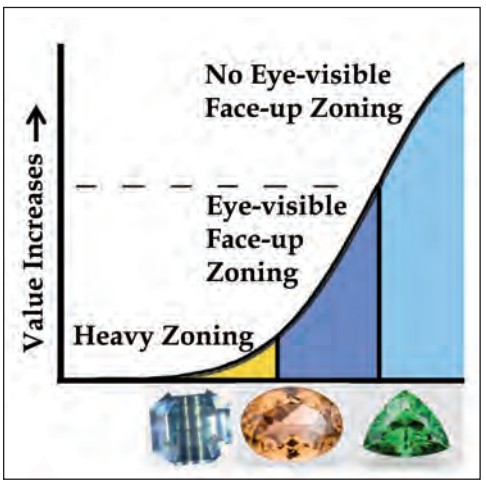

Fig. 1-6. Illustration by Al Gilbertson, © GIA. *Sapphire.* Photo by Tino Hammid, © GIA & Tino Hammid. *Tourmaline, zircon.* Photos by Robert Weldon, © GIA.

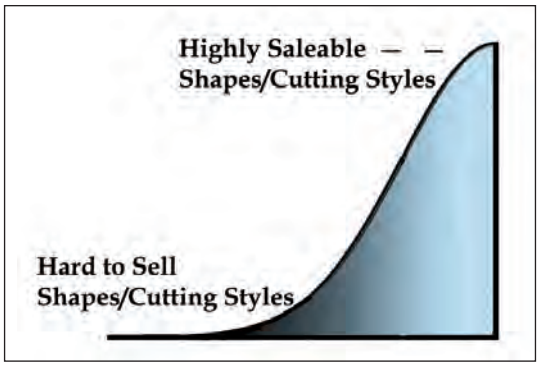

Fig. 1-7. Illustration by Al Gilbertson, © GIA.

Shape

Demands for shape (outline—see Fig. 1-7) and certain cutting styles have evolved and changed over the years. Certain shapes, often coupled with certain cutting styles, are more popular now because they work better with current jewelry designs. Other shapes are hard to sell as few people desire them, or they only work in a few designs. For instance, pear shapes are rarely sold for anything other than pendants and earrings, limiting their market. The creativity of the designer can help sell certain shapes by creating a unique appeal for a shape that is commonly avoided.

Some gem materials, such as tourmaline, are rarely cut as round shapes. Tsavorite garnet is not often fashioned as an emerald cut. Yet these shapes in these materials sell for more when available. Other materials are almost exclusively seen as round (Montana sapphire) or emerald cut (emeralds). The curve that reflects the current popularity of certain shapes and cutting styles, and their position on the curve, will change over time as demand shifts with fashion trends. Richard Hughes (of *Lotus Gemology*) pointed out that fine jewelry is often purchased by older people (young people have less money), and they often have conservative taste; thus the classics will sell better.

Quality of Cutting

Let's stop for a minute and state the obvious: Jewelry and gems are personal, and are a reflection of the person who wears them. Therefore, why would we want to have choices that are not great looking?

Why do jewelers sell poorly cut "gems," those that only sparkle around the outside with a dull area in the middle? When center (or main) pavilion facets are cut too shallow for that gem material, light passes through so that we see what is behind the gem. This is called windowing. (See Fig. 1-8: The wireframe depicts the facet arrangement of that peridot to illustrate certain aspects of gem cutting.) If we can see the girdle reflect-

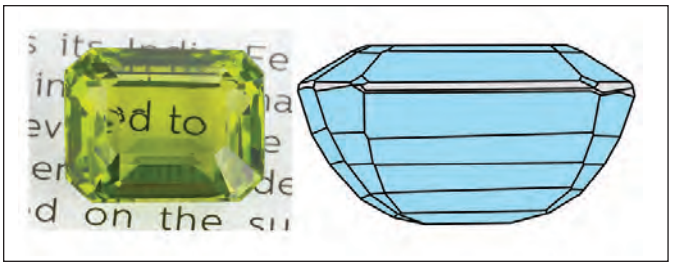

Fig. 1-8. Illustration by Al Gilbertson, © GIA. *Peridot.* Photo by Orasa Weldon, © GIA.

ing under the table, it is called a fisheye. As dirt accumulates around the edge of the mounting, that girdle reflection will be the color of the built-up dirt (often grey or brown). These cutting styles are rarely attractive.

Gemstone artist John Dyer (http://johndyergems.com/facts1.html) puts it this way: "Poor cutting belongs to a bygone era when customers were not educated or picky enough to care about the quality of their gem. A simple 'colored stone' becomes a real GEM with good cutting." Too many jewelers think poorly-cut gemstones are "good enough."

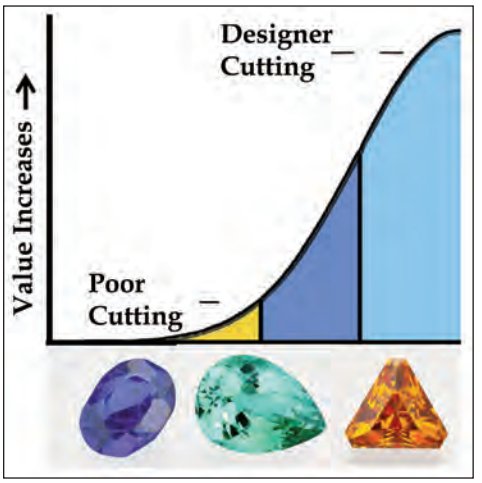

Fig. 1-9. Illustration by Al Gilbertson, © GIA. *Spinel, elbaite, scheelite.* Photos by Robert Weldon, © GIA.

Josh Hall's last element of value (see Fig. 1-9) was Quality of Cutting. An exceptionally well-cut gem can add more than Josh's estimated 15% to a gem's value. In today's market, a number of gem cutters are known as "artists." Gems from named artists can have significant additional value due to the artist's popularity. Even local cutters who are not recognized on a national level can get up to 40% added value for their work with some jewelers.

If the gem were uncut, its value would be significantly less. The impact of cutting on a gem's value is proportionate to its rarity. An extremely rare piece of rough sapphire that sells for tens of thousands of dollars does not necessarily double in price when cut. It has added

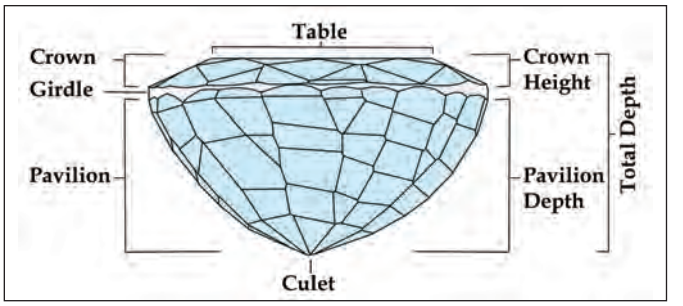

Fig. 2-1. Illustration by Al Gilbertson, © GIA.

value, due to the cutting, but the cutting adds only a small percentage to its value compared to the value added to a piece of ametrine rough that sold for a few hundred dollars that is cut by a named artist.

Part 2: Definitions

We now need to define aspects of cutting styles to establish some common language, with a focus on basic faceting styles, and a short discussion on cabochons and beads.

Wireframes or depictions of facet arrangements (such as Figs. 2-1 and 2-16) are from scans of real gems so as to illustrate aspects of gem cutting. Face-up patterns (such as Fig. 2-14) were made using the program DiamCalc; adjustments were made to the refractive index to represent the gem material being demonstrated. DiamCalc cannot show double refraction.

Parts of the Faceted Gem

Generally speaking, most faceted gems have common features, like a crown, girdle, and pavilion (see Fig. 2-1). However, many gems cut in certain parts of the world have such irregular facets, (see the pavilion of Fig. 2-1) that the facets themselves defy normal naming conventions.

Usually gems are fashioned so that the observer is looking through the *table*, the flat top facet on the *crown* (top portion) of the gem, to see how light has been collected and returned back to them to view. The *girdle* is the outer edge of the gem, where metal grips the stone to hold it in place in jewelry or art. The *pavilion* is the bot-

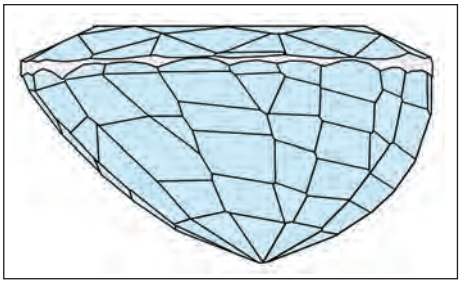

Fig. 2-2. Illustration by Al Gilbertson, © GIA.

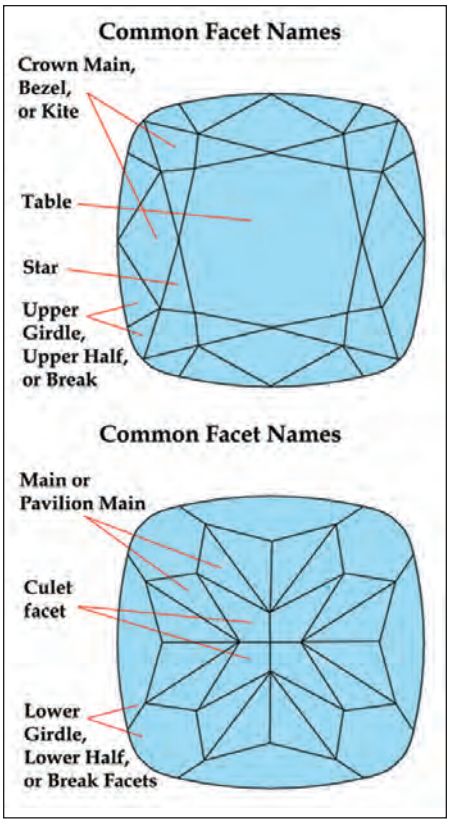

Fig. 2-3. Illustration by Al Gilbertson, © GIA.

tom portion of the gem. If the pavilion facets come to a point at the bottom, that point is called a *culet*. Sometimes there is a small facet at the culet that is parallel to the table. This is called a culet facet.

The *total depth* of the gem is the total thickness of the gem from the table to the culet. A gemstone's *crown height* (listed as a percentage of the diameter) can vary from deep to shallow, depending on the cutting style. *Pavilion depth* (expressed as a percentage of the diameter) can also vary. If a pavilion depth is too shallow, you will see through the gem, called windowing, and if it is too deep, the gem will appear dark overall.

A lot of what has been referred to as "native cut" can be exemplified by Figures 2-1 and 2-2. The facets are often very irregular on the pavilion. The crown can be somewhat more orderly, but can be as irregular as the pavilion. The culet can be considerably off center in native-cut gems (see Fig. 2-2). These gems were cut intentionally with the culet skewed to one side. Re-cutting these to improve cut quality will usually sacrifice the color, substantially decreasing its value.

Brilliant Styles and Facet Names

There are two important segments of the trade that sell colored gemstones—those whose focus is diamond and those whose focus is colored gemstones—and sometimes these two groups have different names for certain parts of the gem. Listed on Figure 2-3 are the most common names used for those facets.

The *table* is often the largest central facet on the crown. *Crown mains* (*bezels* in the diamond trade) are usually kite shaped, and refer to a position between the *stars* (triangular facets bordering the table) and the *break* or *upper girdle facets* (bordering the girdle). Crown mains usually touch the edge of the table and the edge of the girdle. Colored stone cutters refer to pavilion facets that touch the culet area as *culet facets*, even though the facets are not parallel to the table (this type of labeling is common in diagrams generated by software used by colored gem faceters called GemCad). In this diagram (see Fig. 2-3), the kite-shaped culet facets may also be referred to as *kite facets*. When there is more than one row of either triangular or kite-shaped facets between the lower girdle facets and the culet (or culet facets), the facets of the intermediate rows are called *mains* or *pavilion mains*. Often adding confusion, there can be several rows of facets in this region and all of them can be referred to as *mains*. The names *lower girdle* or *lower half facet* are used in the diamond trade to describe facets at the girdle on the pavilion side, but colored stone cutters usually refer to these as *break facets*.

As shapes become less symmetrical, facet arrangements become less standardized. In Figure 2-4 the faceting style is still brilliant, but there can be some confusion on what to call some of the pavilion facets, since they don't assume the common shapes for brilliant styles.

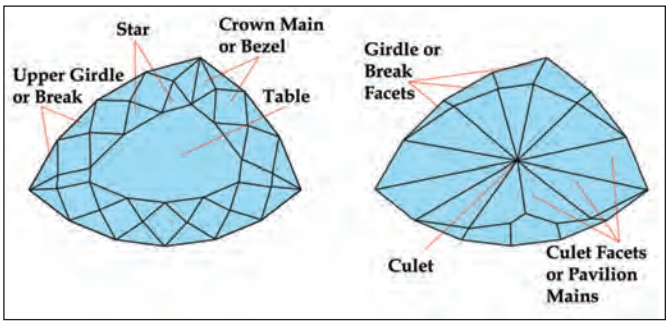

Fig. 2-4. Illustration by Al Gilbertson, © GIA.

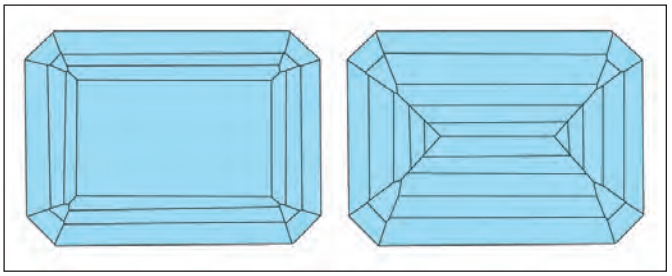

Fig. 2-5. Illustration by Al Gilbertson, © GIA.

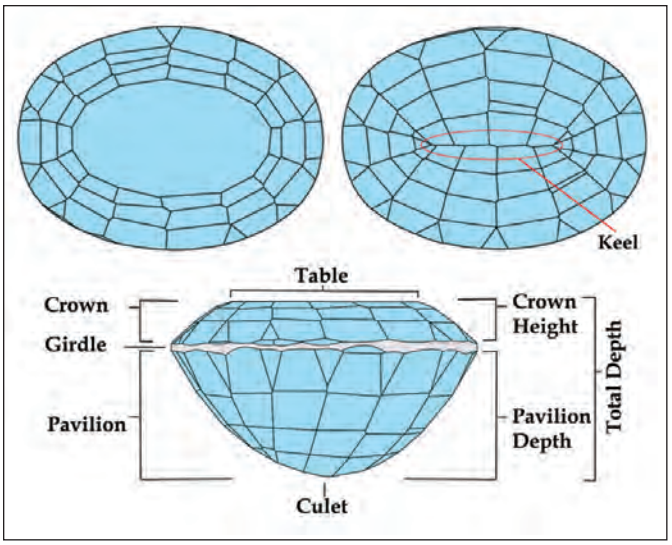

Fig. 2-6. Illustration by Al Gilbertson, © GIA.

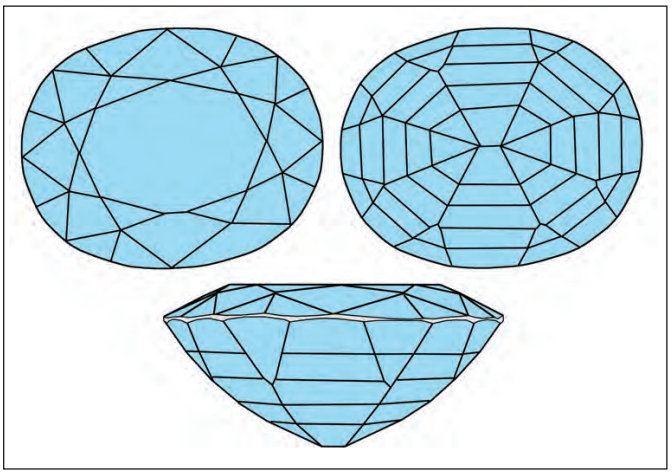

Fig. 2-7. Illustration by Al Gilbertson, © GIA.

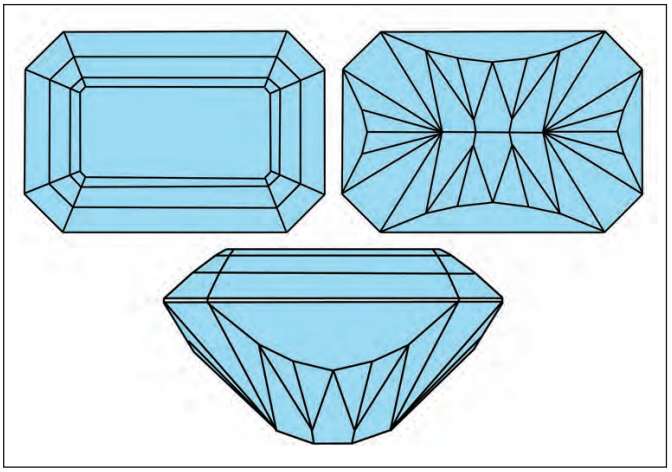

Fig. 2-8. Illustration by Al Gilbertson, © GIA.

Step Cut Styles

Many facet arrangements consist primarily of step cuts, the most classic being the emerald cut (see Fig. 2-5). Any shape can be cut with step cuts. Figure 2-6 illustrates an oval step cut. Note that the facets don't meet carefully, and many are not parallel. This is usually the case in most commercially-cut gems. The higher the precision of cutting, the better those facets will meet. Note that there is a line that forms along the bottom of this facet arrangement, not a single point for a culet. While the bottom is still referred to as a culet, this line is often called a keel or keel line. Step cuts usually have keels.

Step-cut facets are four-sided, with the upper and lower edges being nearly parallel. For crown facets, the upper edge is parallel (or nearly so) to the table edge and the bottom edge is parallel (or nearly so) to the girdle. In most commercial cutting there are triangular facets that are left over from where the steps don't meet well. Sometimes these can be five-sided (like the corners on the crown of the emerald cut; see Fig. 2-5).

Mixed Cut Styles

Mixed cut means that the cutter used both brilliant and step-cut styles in the facet arrangement. Ovals and cushions are often cut with step-cut pavilions, but brilliant style crowns (see Fig. 2-7). This breaks up the light into yet a different pattern. Remember that uniformity of color is important for the value of a colored gem. Mixing the styles of cutting will also assist in evening out the color and minimizes the effect of a small window at the culet.

For more uncommon cuts such as the Barion cut (see Fig. 2-8), facet names can vary with different cutters.

Rose Cuts

The rose cut features a flat bottom with a dome-shaped crown reaching an apex (see Fig. 2-9) formed by 3 facets or more. Rose cuts, so named because they resemble the shape of a rose bud, were originally cut in diamond in

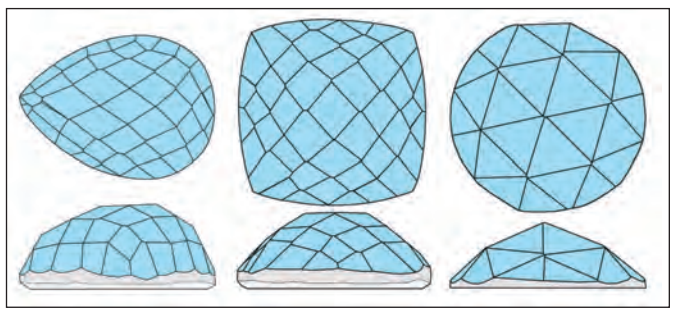

Fig. 2-9. Illustration by Al Gilbertson, © GIA.

the 1500s. By the 1800s this cutting style had moved over to a few colored gems such as marcasite and garnet. Recently, it has found fashion in a number of other colored gems.

Non-faceted Styles

The non-faceted styles of gem cutting predate faceted styles, with the earliest form being either the bead or cabochon (or *cab*). A gemstone bead is fashioned in a variety of shapes and sizes, and is pierced for threading or stringing. The material can be transparent to opaque.

The simple cab has a rounded top and flat bottom (see Fig. 2-10), and the double cab has both a rounded top and bottom (see Fig. 2-11). The usual traditional shape

Fig. 2-10. Illustration by Al Gilbertson, © GIA.

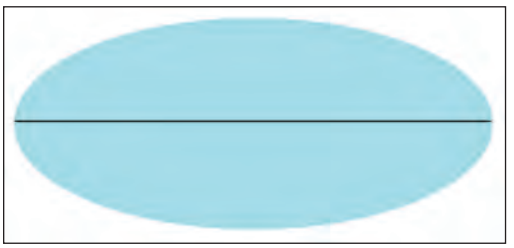

Fig. 2-11. Illustration by Al Gilbertson, © GIA.

for cutting cabs has been an ellipse (oval). This is probably because the eye is less sensitive to small asymmetries in an ellipse, as opposed to a uniformly round shape, such as a circle. The elliptical shape, combined with the dome, is also attractive. More recently many shapes, including freeform, are used for cabs. The term 'cabochon' is often used to describe any gemstone shape that is not a bead, carved or faceted.

In the case of asteriated gems such as star rubies, and chatoyant gems such as cat's-eye chrysoberyl or tourmaline, a high domed oval or round cab cut is necessary to show the star or eye, which would not be visible in a faceted cut. For those better quality star or cat's-eye gems that are often translucent to near-transparent, the quality of how the back has been finished will be more important. The back should be unpolished (see the first two gems of Fig. 2-12). Josh Hall points out that if the back is polished for a highly transparent gem, the star or cat's-eye effects will appear diminished if not almost gone (the third gem of Fig. 2-12). For finer translucent and transparent gems with an eye or star that is not quite sharp, sometimes a coarser finish on the back will sharpen the line. The backs of star and cat's-eye gems can

Fig. 2-12. Star sapphires. Photos by Orasa Weldon, © GIA. *Star garnet top and side view.* Photos by Kevin Schumacher. © GIA.

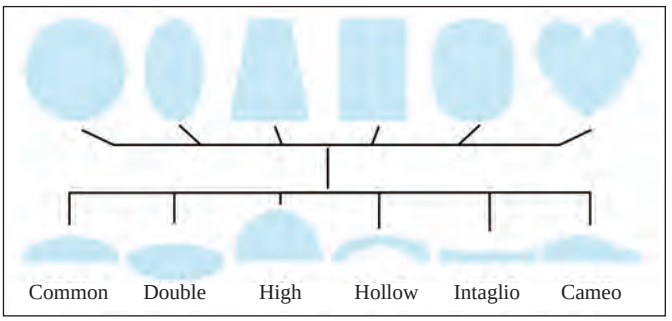

Fig. 2-13. Illustration by Al Gilbertson, © GIA.

sometimes be very deep, adding unnecessary weight.

Any outline can be cut in any of these cabochon variations (see Fig. 2-13). Early forms of cabs were sometimes carved (seals, scarabs, cameos, etc.), and today there are certain common variations of the cab: double, high, and hollow. Hollow gems can have one of two purposes: 1) They are used to deceive by putting colored glue behind a thin translucent wall of the gem to intensify a certain color; or 2) Exceptionally dark gems can have their apparent color lightened.

Cameos and intaglios are the most common form of carved cabs today. Cameos are made by cutting away material; the design remains above the level of the base. With intaglios, the reverse of the cameo, a design is cut into the gem below the highest part of the surface. The most common subject matters were historic or religious figures, and frequently used materials have different colored layers (like banded agate) which can be revealed in forming or embellishing the image (the face will be one color, while the background is another color). Shell and agate are two of the most commonly used materials, but others include amber, coral, jet, and lava. Carved gems can take any form, from freeform and geometric to carved flowers, animals, or mythical beasts and more recently modern carved gems can replicate a photo of a family member. In recent decades, the hand-carving of these types of gems has been modernized by ultrasonic machines. Gems with higher levels of intricacy cut by ultrasonic methods are not as valuable as those cut by hand.

While most commonly seen in cabochon form, composite gemstones are also found with faceted gems when two or more gem materials are bonded to form a single gem. Common forms include opal doublets (two parts) and triplets (three parts). Sometimes faceted gems are cemented together with the intention to deceive; a natural gem material is used on the crown and glass or some synthetic is used on the pavilion. A colored cement layer can even change the apparent color. Intarsia is a composite art form of inlaying that fits pieces of gems together to form a picture or mosaic.

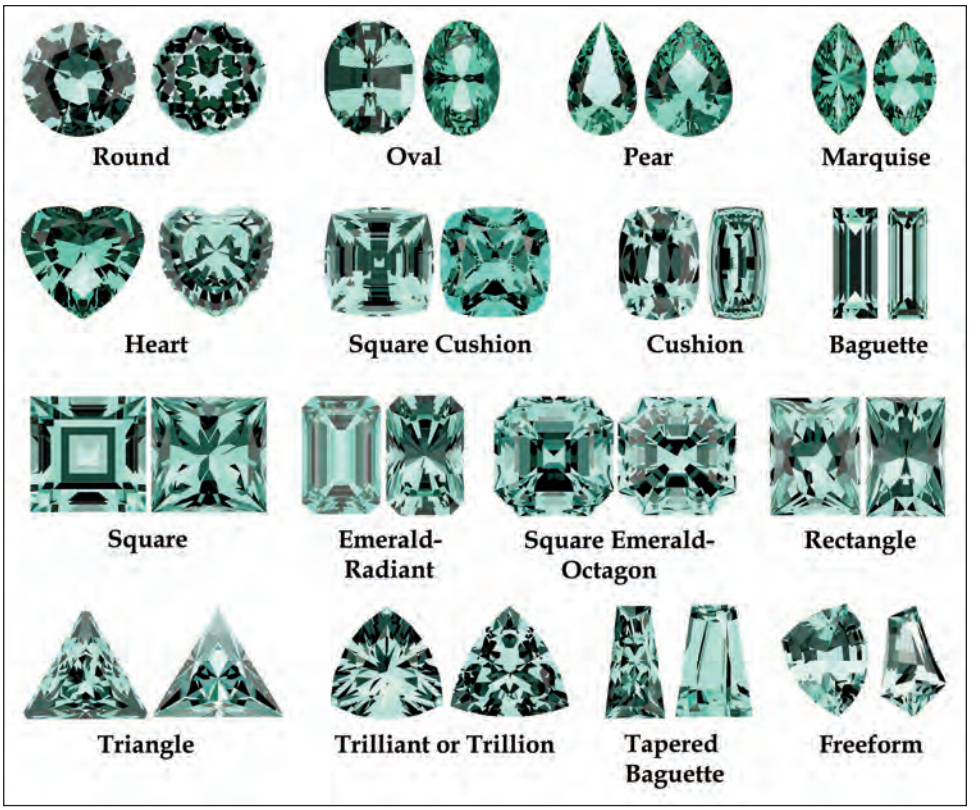

Fig. 2-14. Illustration by Al Gilbertson, © GIA.

Shape and Sometimes Cutting Style

As mentioned in the introduction, the shape or outline of the gem and sometimes the cutting style is a value factor. Certain shapes are in higher demand and make the gem more saleable. The outline of a gem can be a variety of shapes and with each there is an almost unlimited variety of facet arrangements. Figure 2-14 shows some of the most common shapes used in the trade, each with more than one facet arrangement. A few of these names can be confusing. Emerald can refer to the outline, or to a specific facet arrangement or cutting style with that outline. For instance, a radiant has a brilliant cutting style with an emerald outline. The square emerald (a debated moniker) is the same as an octagon. A triangle, trillion, and trilliant can have flat sides (sometimes with cut corners), or curved sides. Other outline shape names not shown include briolette, hexagonal, keystone, kite, lozenge, pentagon, rhomboid, s-curve, seven-sided, shield, and trapezoid.

Quality of Cutting

Note that naming these following quality styles is more

for convenience and is arbitrarily chosen by the author. There are exceptions as styles blend into each other, and styles are not always easy to classify.

"Native cut" often indicates a cruder style, referring more to an almost outdated method of cutting and thus an assumed lack of accuracy. There are very few native-cut gems in the market today.

Native-cut gems are usually cut with jamb-peg machines (see Fig. 2-15). The rotating lap (C) provides the grinding and polishing surface. The wooden "dop" stick (D) to which the rough gem is cemented, holds the gem in position as flat facets are placed. The angle of each facet is controlled by placing the dop stick in a particular hole (E), but the faceter controls how much is cut away by the amount of pressure and time the gem stays in contact with the lap. The radial placement of the facets around the gem is done by lifting the dop away from the machine, slightly rotating and reinserting the dop in the same hole (for a certain row of facets) as each different facet is placed. This is doubly difficult since facets are first placed with a coarser grit on the lap, and then the process is repeated by polishing each facet on a polishing lap. There are many gems produced this way (see Fig. 2-16). Note that the outlines are often asymmetrical and facets are not well placed. Typically the crowns are cut more carefully with facets meeting fairly well, while the pavilions have extra facets, uneven rows, poor meeting of facets, and off-center culets.

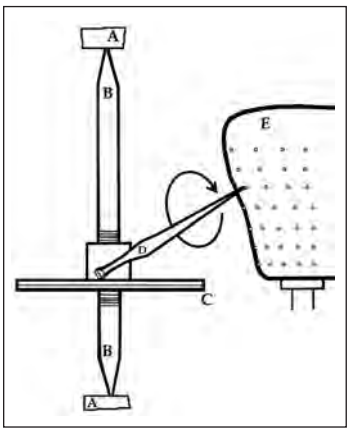

Fig. 2-15. Illustration by Al Gilbertson, © GIA.

Gems by jamb-peg are, as mentioned above, assumed to be a cruder style of cutting, and assumptions are that this style of cutting is poorly executed and less accurate. That is not always the case. In fact, the faceting arrangements that evolved through this method enhance and spread out the color very consistently (remember that uniformity of color is very important), making gems cut in this style with somewhat better uniformity and symmetry very highly prized for some of the most expensive gem materials (ruby, sapphire, and alexandrite). There are cutting firms that excel at carefully placing facets in those old style arrangements by both the jamb-peg method and using modern faceting machines.

Fig. 2-16. Illustration by Al Gilbertson, © GIA. *Ruby, sapphire, ruby.* Photos by Robert Weldon, © GIA.

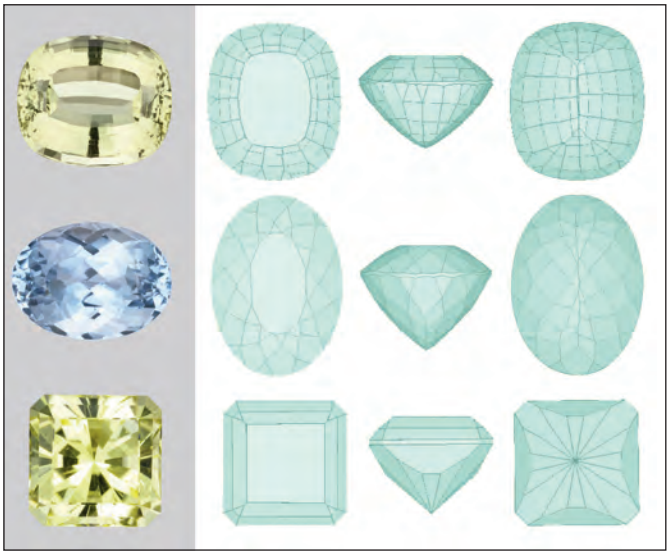

Fig. 2-17. Illustration by Al Gilbertson, © GIA. *Orthoclase, topaz, scapolite.* Photos by Robert Weldon, © GIA.

"Commercial cut" includes many native styles, but the cutting quality is better (see Fig. 2-17). In particular the outlines are even and symmetrical, and there is much better facet symmetry. For this article, *commercial* refers only to a general quality of cutting, not to a general quality of the gem material. In cutting centers that used to be known for native-cut gems, a "master" may still preform the gem using the old cutting style

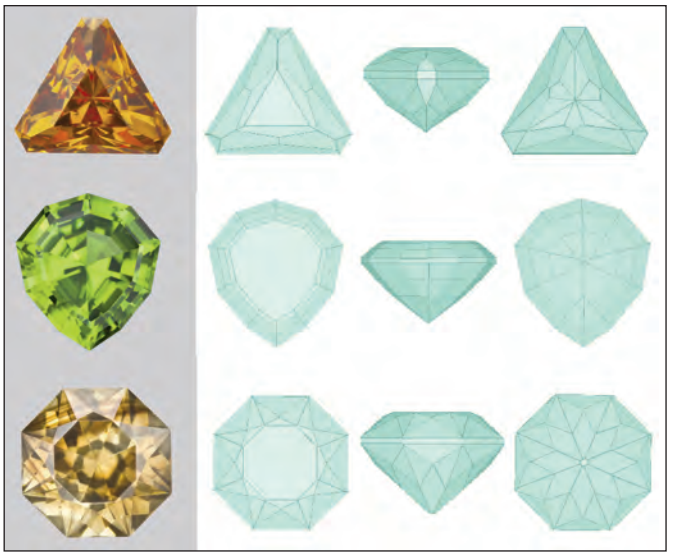

Fig. 2-18. Illustration by Al Gilbertson, © GIA. *Scheelite, peridot, phosgenite.* Photos by Robert Weldon, © GIA.

standards, but then modern methods finish the gem. Obviously there is a range of quality for both native cut and commercial cut goods, and the border between the two is often unclear.

Just as the border between commercial cut and native cut gems is somewhat ambiguous, the border between commercial and designer cuts is also ambiguous. The third design shown in Figure 2-17 could be viewed by many as a designer cut.

"Designer cuts" (also called "precision cuts") are best described as gems where the designer creates a unique face-up pattern utilizing unusual facet arrangements while using traditional faceting methods (see Fig. 2-18). The goal of most designers is to create a crisp appearance with a unique face-up pattern, whether that is bright and sparkly or purposely windowed as part of the unique face-up pattern. There are many cutters within the US that cut for local jewelers as well as large-scale cutting firms (some are members of groups like the American Gem Trade Association) that have booths at trade shows.

Distinctions between designer and craftsman are better understood when compared to the auto industry. Designers design a new model of car, and skilled artisans or craftsmen make thousands of 'clones' of it in the factory. Here in the context of this article, "designer cut" distances itself from the many styles that have been traditionally produced to create new face-up appearances. That's where the comparison breaks down, because once a new design has been produced that is visually interesting, it gets reproduced by many, with the design often being shared with other cutters. Those who repeat these designs are perhaps better called artisans, but the style can be referred to as designer cut, since it is a break with more traditional styles. This may be why some choose to use the less confusing term "precision cut."

"Fantasy cuts and artistic cutting" includes both unusual outlines with standard faceting and standard outlines with concave faceting (see Fig. 2-19). Most of these designs have a unique arrangement of polished grooves on the pavilion which create a dynamic outline. Polished grooves on the pavilion (or crown) help to create new patterns of light not possible with conventional faceting. Some artists have found ways to use odd rough, such as Glen Lehrer who uses shallow rough for his Torus Cut. This discussion (taken up again in part 5) is limited to faceted styles mentioned above and avoids those borderline areas (carved designs as well as "optical dishes" sometimes placed seemingly randomly on the reverse of a gem).

The term fantasy was derived from the German word *Phantasie*, meaning fancy, and is an attempt to classify this style in conventional lapidary terms. One of the most significant artists for fantasy styles is Bernd Munsteiner, who introduced this style in the

Fig. 2-19. Illustration by Al Gilbertson, © GIA. *Ametrine cut by Christopher Wolfsberg.* Photo by Orasa Weldon, © GIA. *Blue topaz.* Photo by Robert Weldon, © GIA. *Tourmaline cut by Bernd Munsteiner, courtesy of Jeanne Larson, The Collector Fine Jewelry.* Photo by Robert Weldon, © GIA. *Cubic zirconia cut by D.K. Kim.* Photos by Orasa Weldon, © GIA. *Quartz cut by Dalan Hargrave.* Photos by Robert Weldon, © GIA.

1970s. Munsteiner focuses on what he calls "total reflection," seeming to, as one called it, "sculpt internal facets." Cutters of this style aim to create objects of beauty from gem materials. Since American and foreign factories and cutters are mass producing designer knock-offs of some of the most well-known designers using lower quality gemstones and less detailed workmanship, it is easy to find less expensive examples that are not well cut.

Summary

In Part 1 we reviewed the seven major factors that affect the price of a colored gemstone: color, country of origin, size, clarity, uniformity of color, shape, and quality of cutting. Part 2 defined aspects of various gem cutting styles to establish some common language, with a focus on basic faceting styles. With the advent of automatic cutting machines, these quality ranges that I have arbitrarily divided into four groups will continue to change. At this time, factories are using styles that certainly mimic artistic and precision cutting, but careful examination of the quality of cutting shows that they don't have the precision or quality expected. In the next installment, Parts 3 and 4 will dig deeper and explore many of the factors used in the trade to assess relative value, as well as explain some of the choices cutters make and why. In the third installment, Part 5 will discuss issues of craftsmanship. Parts 3 through 5, together provide a foundation for understanding cut quality and its value impact for a gem material. ◆

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About the Author: *Al Gilbertson is the Project Manager, Cut Research at the Gemological Institute of America Laboratory Carlsbad. He made significant contributions while functioning on the American Gem Society (AGS) Cut Task Force, when his patent was acquired by AGS and is the foundation of their ASET technology for cut grading. Hired by GIA in 2000, he became part of GIA's team that created the current cut grading system for round brilliant diamonds. Al is also the author of American Cut—The First 100 Years.*

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Value Factors, Design, and Cut Quality of Colored Gemstones (Non-Diamond)

Al Gilbertson, GG (GIA), CG (AGS)

In this comprehensive article, the author discusses the value factors of colored gems in five parts. Parts one and two appeared in Gem Market News, January/February 2016, Volume 35, Issue 1. What follows are parts three and four.

Part 3: Darkness and Brightness

Part 1 discussed the major value factors that affect the price of a colored gemstone, and broke down the various aspects of cut quality (one of the factors of value). Part 2 defined aspects of cutting styles to establish some common language, with a focus on basic faceting styles, and a short discussion on cabochons and beads. Since the color quality is such an important part of the value, parts 3 and 4 will focus on factors that affect value related to color, and examine how a cutter makes choices when cutting a gem.

Wireframes or depictions of facet arrangements (such as the left side of Fig. 3-09) are from scans of real gems so as to illustrate aspects of gem cutting. Face-up patterns (such as the right side of Fig. 3-09) were made using the program DiamCalc; adjustments were made to the refractive index to represent the gem material being demonstrated. DiamCalc does not show double refraction.

Tradeoffs

Before discussing how the trade assesses relative value of colored gems, it is important to realize that you will often see examples where the cutter had to choose between various tradeoffs. For example, a cutter has a very thin piece of rough that happens to be very rare. Do they cut several small gems from the rough or do they cut a single, larger gem that will be quite shallow and badly windowed? In many cases the resulting value in either scenario above will be about the same. However in some cases, one or the other may be significantly more valuable. Perhaps if cutting that rough into a single gem will result in the largest-cut gem of that species, the cutter may opt for cutting the single gem. There are many tradeoffs to be considered.

Dark Patterns in a Gem

• *Darkness—Good and Bad*

Extinction is considered by many in the jewelry trade to be the dark areas seen when looking at the gem face-up. That's not quite enough information. There are four different causes of the dark or black portions of the pattern observed in a gem (three are illustrated in Fig. 3-01—

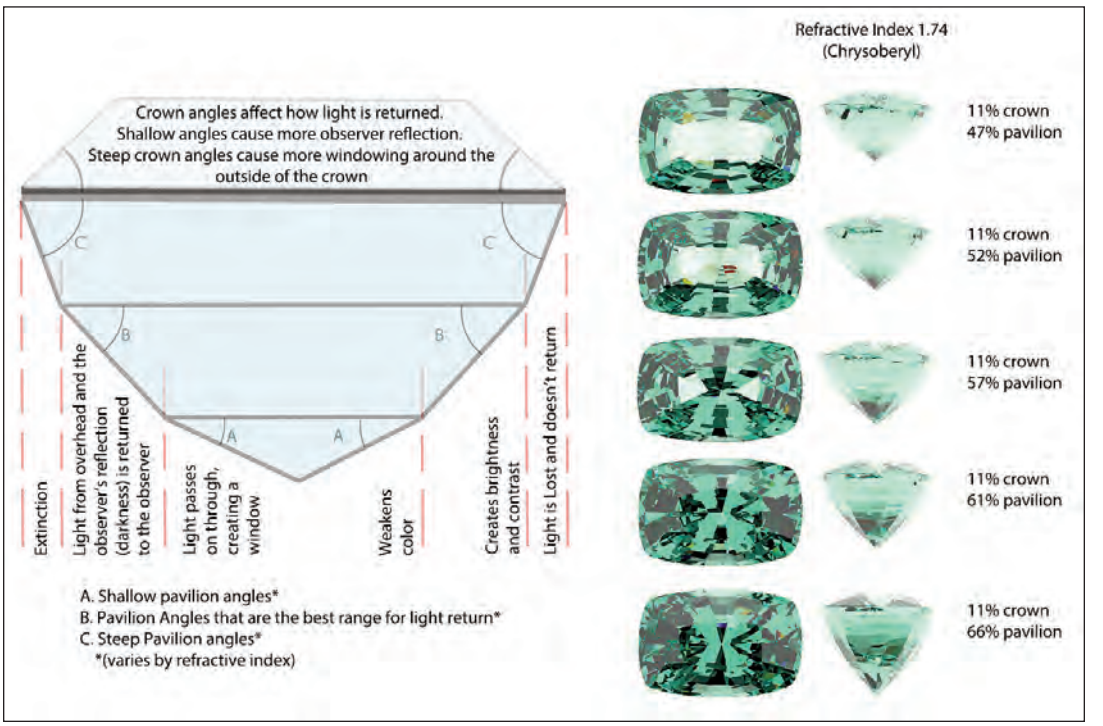

Fig. 3-01. Illustration by Al Gilbertson, © GIA.

parts of the figure borrowed from Richard Hughes—*Gemological Digest* 1988, Vol. 2, No. 1 & 2, pp. 10–15):
(a) Absorption. The material is very dark (see Fig. 3-02) and light just can't get through it. Virtually the entire spectrum of the visible light passing through the gem is absorbed. This type of darkness is bad.
(b) Windowing. Light passes through the gem and is not bounced back in any direction by the pavilion facets to the observer. The effect is that you are seeing though the gem. This creates gray and dull areas in the middle of the gem (see Fig. 3-01), which are negative factors.
(c) Extinction. Light goes into the gem and makes at least one bounce off a pavilion facet, but is not returned back to the observer through the crown. The observer sees a reflection from that steep facet that is coming from a low angle outside the gem. Compared to the adjacent facets that are reflecting from a bright light source (highly illuminated area), the strong contrast causes the

Fig. 3-02. Spinel. Photo by Robert Weldon, © GIA.

low-angle reflection to be so dark that it is near-black or extinguished. You aren't seeing through the gem, even though you should be seeing a reflection from that facet of something outside the gem; all that is seen is darkness. This is true extinction and is the result of steep angles on the pavilion (see Fig. 3-01). The steeper the pavilion, the more extreme the extinction. An accomplished cutter can use extinction to their advantage. For instance, cutting a pale material (kunzite or citrine) with a deep pavilion not only allows stronger absorption of light that travels a longer path through the gem (this improves some gems only slightly), but also renders the gem's color more distinct. The resulting extinction seems to increase the saturation of the color through contrast (more on this later). Purposely choosing angles that create extinction gives the illusion of a more saturated gem, and creating angles that produce higher light return with minimal extinction create the illusion of a less saturated gem.

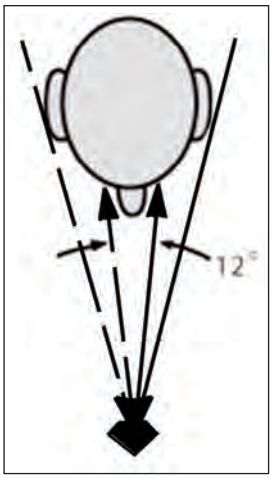

Fig. 3-03. Illustration by Harding, © GIA.

(d) Observer and object reflection. Observers usually hold a gem 8 to 20 inches away from their eyes. Light is typically coming over their shoulders, entering the gem, and returned back for them to see. The observer is reflected as dark compared to the light source around them (see Fig. 3-03). This should be thought of as observer and object reflection (Harding, 1975; Gems and Gemology Fall 1975; see http://www.gemology.ru/cut/english/faceting/; and Gilbertson, 2013; http://www.gia.edu/gems-gemology/Optimizing-Face-Up-Appearance-in-Colored-Gemstone-Faceting). This type of darkness can be good if in moderation. The contrast pattern we see in many gems is a result of this reflection of the observer's head and upper torso (see Figure 3-04). Observer reflection is important; the resulting contrast pattern affects the impression of brightness or dullness in a gem. To better understand this, consider what a faceted gem might look like in a totally diffuse white-lit environment. If the gem were not reflecting anything but white light, it would not have any contrast (see Fig. 3-05a). If you were to cover your face and shoulders with a fluorescent red mask (see Fig. 3-05b) and look at the gem in that diffused white light-only environment, this is what you would see (see Fig. 3-05c). If you were closer to the gem, there would be more of the red reflected throughout the gem (see Fig. 3-05d). If the room was not lit and the observer's face had a light shining on it, the result would be just the opposite, and the gem would be primarily dark with the observer's face reflecting as a

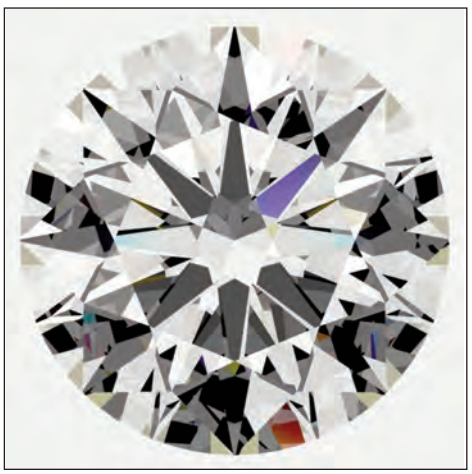

Fig. 3-04. Illustration by Al Gilbertson, © GIA.

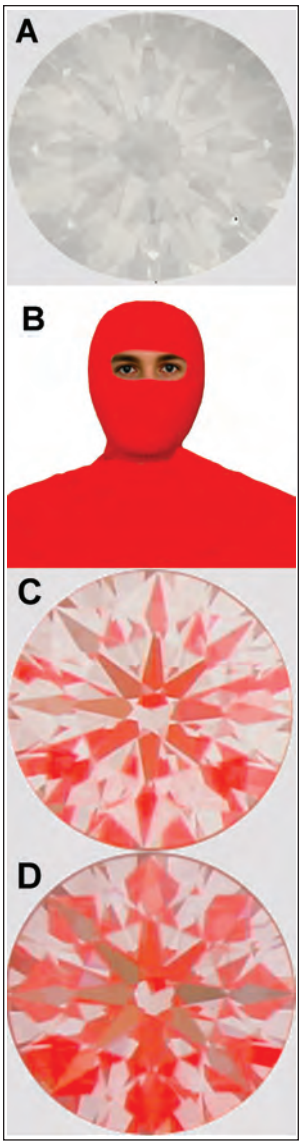

Fig. 3-05a. Diamond. Illustration by Al Gilbertson, © GIA.
Fig. 3-05b. Illustration by Al Gilbertson, © GIA.
Fig. 3-05c. Diamond. Illustration by Al Gilbertson, © GIA.
Fig. 3-05d. Diamond. Illustration by Al Gilbertson, © GIA.

bright area. Another example of observer reflection that is rather obvious is the dark bowtie. Figure 3-01 shows an example of how the bowtie (at 12 and 6 o'clock) in the sample gem is changed as the pavilion angles change. It is simply a result of observer reflection which occurs for a narrow range of angles on the pavilion.

The contrast pattern seen in a gem, whether from observer reflection or extinction, affects the appearance of color, brightness, and appeal. Contrast pattern is a result of the facet placement (angles and position). More traditional cutting styles de-emphasize the contrast pattern, and make the apparent color more uniform and softer. However, strong contrast, best exemplified by the dark accent areas of fantasy-style cutting, creates a stronger impression of the color and a more dynamic appearance (see Fig. 3-06). This series of circles has the same blue color (see Fig. 3-07), but the circles on the left have stronger contrast than the circles on the right. The overall impression of the blue on the right is weakened due to the lesser contrast with the gray. This illustrates that strong contrast is more appealing, resulting in more vibrant colors.

Unfortunately, the strong contrast in many designs may also render the impression of color as being much darker and even too dark when used with gem material that is already strongly saturated.

Experimentation, a form of TRADEOFF: Designers often try to think outside of the box and experiment with

Fig. 3-06. Sunstone and tourmaline cut by John Dyer. Photo courtesy of John Dyer & Co.

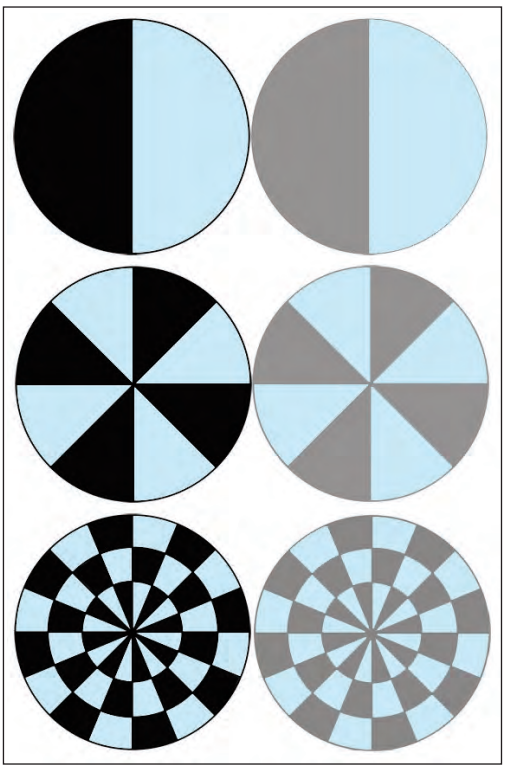

Fig. 3-07. Illustration by Al Gilbertson, © GIA.

new ideas of contrast and pattern in a gem. A designer who utilizes windowing may be trying to create a design that is unique and striking, even if the color is uneven or sometimes weaker. Additionally, some designs focus on returning bright light from under the table to the observer, while the color can be weakened by the excessive bright light return with little contrast. That brightness

Fig. 3-08. Three spinels. Photo by Robert Weldon, © GIA.

may have been part of the intended pattern. Ultimately, the success of their experimentation lies in the acceptance of sales of that final "look" that they gave the gem.

• ***Windowing***

As mentioned above, strong contrast can strengthen the impression and uniformity of color. Weak contrast does the opposite. Here are three light pink gems (see Fig. 3-08), each with a windowed area under the table. As the window gets larger, the color in the middle of the gem weakens and becomes less uniform. TRADEOFF: A cutter had to decide whether to finish with a larger diameter and more weight (and a larger window), or if cutting a smaller diameter gem that didn't window would yield as much value. In Figure 3-01 a cutter may choose to use a slightly shallow pavilion (57%) because the saturation of color is strong enough that the windowing will minimally impact the face-up appearance and value. This may also mean that they can recover a higher yield from the rough, and the final value of the gem will be higher than if they were to cut a smaller diameter with a 62% pavilion depth. Others may feel that the depth has to be at least 62% to achieve a prime color and that is more important.

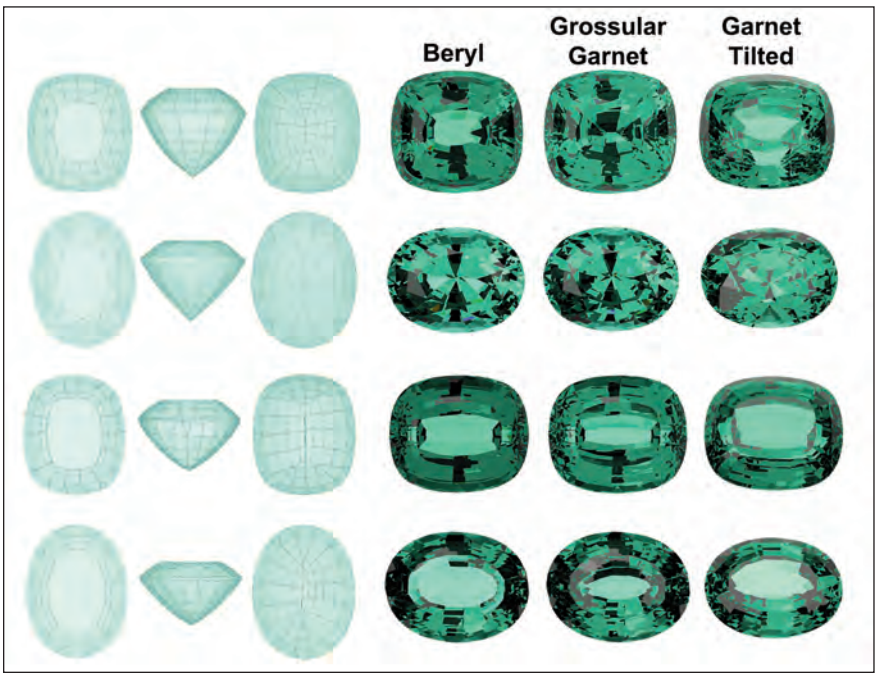

Fig. 3-09. Illustration by Al Gilbertson, © GIA.

Note that in Figure 3-09, the depth gets a little shallower (moving from top to bottom). The diagrams on the left reflect the exact proportions used for the gem materials displayed on the right—jewelers tend to avoid gems as deep as the first two rows. The difference in face-up appearance is because of the refractive indices (RI) of the gems. Refractive index is a measurement of how far a particular gem material can bend light. The higher the RI, the less deep it needs to be cut to avoid windowing. That's why well-cut diamonds (RI 2.417) can be cut much shallower and do not window even when tilted. These examples are beryl (such as aquamarine with an RI of 1.589), grossular garnet (RI 1.74), and grossular garnet tilted 15 degrees. In the illustration there is no windowing for garnet, until tilted for the steep proportions or until the proportions are shallower. For beryl, the degree of windowing is minimized in the two deeper stones. The first one is not deep enough to avoid windowing. Note how the placement of facets in the oval-shaped beryl (second from the top) closes in to reduce the window. If the cutter is working with quartz (RI 1.54, which is lower than beryl and garnet), the gem would require deeper proportions than any of the diagrams shown to avoid windowing.

Besides not reflecting light back up to the observer, the disadvantage of a window means that whatever is behind the gem affects the color. When a windowed gem is set in a pendant, the skin color or the fabric it rests on affects the apparent color. This is more obvious in lightly colored gems. Note that when there is a strong saturation of color, small windows are less noticeable and less distracting and can be beneficial by slightly weakening an overly-saturated color.

• ***Brilliance and Depth (Shallow, Deep, and Acceptable)***

In the jewelry trade, it is not uncommon to use the term 'brilliance,' but not everyone means the same thing when they use

it. Because of that confusion, GIA started using the term 'brightness' when it released information in 2004 about its upcoming cut-grading system for diamonds. Their definition for brightness is, "The appearance, or extent, of internal and external reflections of "white" light seen in a polished diamond when it is viewed face-up." (http://www.diamondcut.gia.edu/12_glossary.html)

For some, brilliance refers to the amount of 'life' a gem has. Does it sparkle when you rock and tilt it? Does the light dance around in the gem? For others, the not-so-technical term brilliance may not refer to the white light reflected from within the gem, but to colored light. Color is still king and in a well-cut gem, most of the light that returns needs to be saturated with color. A poorly cut colored gem will have areas of dullness and weakened color and will thus lack brilliance.

I'm going to use the term brightness, but not in the sense that GIA meant for diamonds as it doesn't really work with colored gems. Brightness needs to include the color saturation when talking about colored gems. Unfortunately good brightness depends upon good color depth to get that desired saturation. If we want to cut a gem that is uniform in color, bright white light reflected from within the gem can wash out that color.

Richard Hughes, author and one of the world's foremost experts on ruby and sapphire, points out that in cutting colored gems, "Generally, the pavilion facets closest to the girdle are cut too steep while those at the culet are too shallow; often only those in between are cut at the proper angle. This results in three distinct zones: extinction near girdle, windows near the culet and brilliance in-between…" (http://www.ruby-sapphire.com/ brilliance_windows_extinction.htm). Figure 3-01 demonstrates this in general terms (parts of the figure borrowed from Richard Hughes) and it is evident that cutters should avoid faceting gems too shallow or too deep. What is too deep or too shallow? TRADEOFF: Many jewelers shy away from gems with deep proportions because they don't fit their view of what looks good in a piece of jewelry, even if those gems are not windowed. The jeweler looks at the profile of the gem and decides it is too deep. The jeweler will probably never find a gem shallow enough without a window. In this way the jeweler influences the cutter, and even some of the market prices since the cutter will have a harder time selling the deeper gem even though the color is more even and faces up better. This Kunzite has a small window. The face-up color is more saturated than the color from the side, due to the deeper proportions (see Fig. 3-10).

Fig. 3-10. Kunzite top and side view. Photo by Orasa Weldon, © GIA.

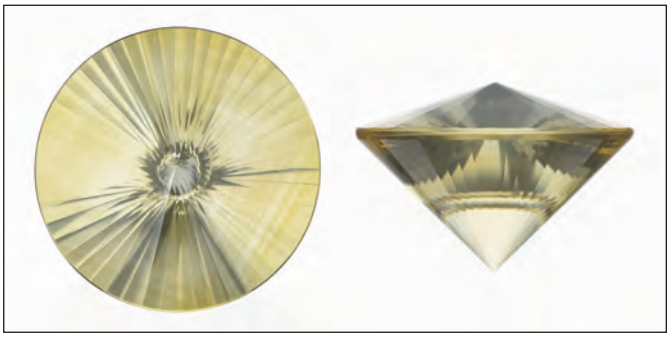

Fig. 3-11. Citrine top and side view. Pre-formed by Werner Anschvetz, cut and polished by Hans J. Roehrig. Photo by Orasa Weldon, © GIA.

At this point the discussion of brilliance has focused on more traditional cutting styles. Designer cuts bring a different approach, where scintillation and apparent brightness are the primary goals much like in diamond cutting, and the emphasis on evenness of color and saturation takes a back seat. Within this style of cutting, windowing is frowned upon and the face-up pattern is very important. The Spirit Sun, developed in the early 1980s (see Fig. 3-11), exemplifies this concept. All of the facets are designed to reflect white light back to the observer resulting in very little contrast pattern (this also causes the slight color zoning of this pale citrine to become more visible face-up).

The concept of brightness and what gives us the impression of brightness is not just a matter of how much light is sent out of the gem for us to see (the Spirit Sun in Figure 3-11 sends back most of the light going into it). It is also a question of perceived pattern. Cognitive scientists (they study our vision and how we perceive things) tell us that the stimuli our eyes and brain (our visual system or VIS) process are not simple (http://www.gia.edu/gems-gemology/Optimizing-Face-Up-Appearance-in-Colored-Gemstone-Faceting). Our

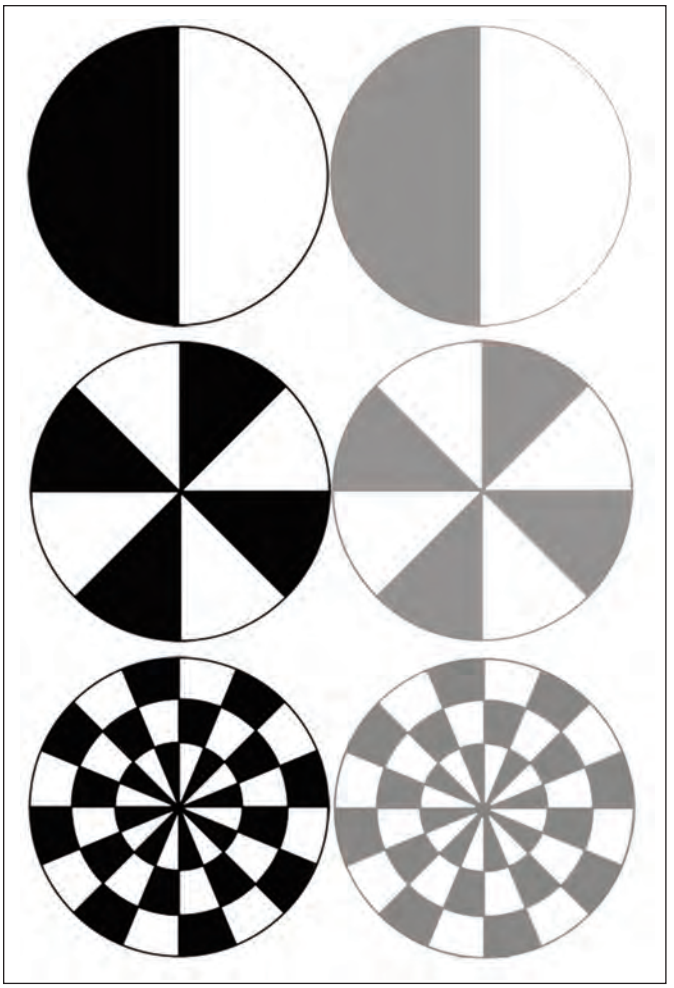

Fig. 3-12. Illustration by Al Gilbertson, © GIA.

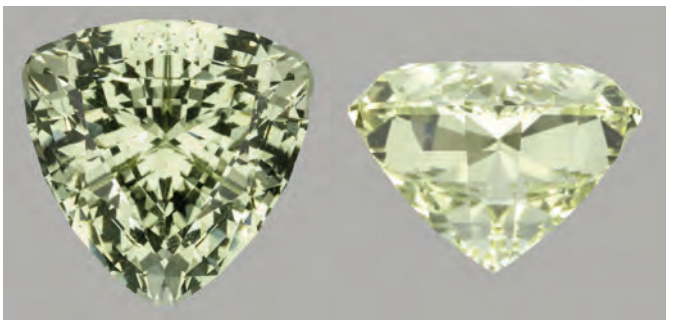

Fig. 3-13. Beryl top and side view. Cut by Maria Atkinson. Photo by Orasa Weldon, © GIA.

Fig. 3-14. Amethyst top and side view. Photo by Orasa Weldon, © GIA.

VIS also works with all of the available cues; for instance we perceive that a gem generates light from within itself in a pattern that changes as the gem moves. This pattern is created by the interaction of light with the faceting design of the gemstone. That pattern affects our perception of brightness.

Each of the circles in Fig. 3-12 is 50% dark and 50% white light (by surface area). "A light meter confirms that each one is equally bright when printed on paper (even the gray ones). The checkered pattern of the bottom left circle makes it perhaps the most visually interesting. If a gem were able to return 100% of the light (all white), and no dark areas were visible, it would measure brighter than a stone with dark areas of contrast—but its appearance would be far less appealing. For instance, the right column in Fig. 3-07 seems duller than the left due to weaker contrast. These images show that while good light return is an important aspect of 'brilliance,' contrast is a critical factor in face-up brightness. Obviously, there comes a point when too much darkness or a poor distribution of darkness is less pleasing." (http://www.gia.edu/gems-gemology/Optimizing-Face-Up-Appearance-in-Colored-Gemstone-Faceting)

An example of perhaps too much added pattern darkness can be seen in the yellow triangular-cut beryl (see Fig. 3-13). In a pale gem, this adds to the impression of darker color and can help the gem's salability. Similar to diamond cutters, some colored gem designers work to create strong contrast within a gem. This strong contrast brings about different, interesting patterns. Some designers create more subtle designs with less contrast. Both types can have their appeal. In a saturated color, adding a lot of dark contrast will make the gem overly dark (see Fig. 3-14). When the cutter is sensitive to what the pattern creates, it can enhance the gem. When the cutter fails in their choice of design, the gem's color is weakened (made too dark by too much strong contrast or too light by weak or non-existent contrast such as the Spirit Sun).

Cut designers like to experiment with variations of 'brilliant' styles of cutting which have been welcomed in the diamond trade, such as the radiant cut. Yet some in the colored stone industry don't care for designer-cut sapphires, rubies, or other colored gems because they feel the older styles of cutting bring out the color better (and generally make the color more even). This is another TRADEOFF that centers on the term 'brilliance.'

Many designers carefully modify facet arrangements using computer programs, such as GemCad and GemRay, to see how their plans will impact their design (Fig. 3-15 is from GemRay). Some years back, an effort was made to collect GemCad generated diagrams

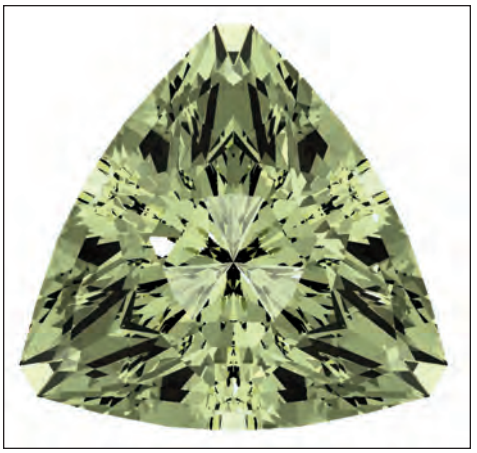

Fig. 3-15. Illustration by Al Gilbertson, © GIA.

(cutting plans) into a database. At that time, there were over 4,000 of these diagrams (some copyright protected). Since then more diagrams have come forward, and there is now an on-line repository for many published designs (http://www.facetdiagrams.org/).

We've talked about concepts that influence our perception of brightness. Now let's talk about evaluating the overall impact of the gem's cutting in reference to brightness. Remember that good color brightness depends upon color depth. Begin by picking up the finished gem. As you tilt and move it, most of the gem should return good brightness (with good color). Gems with 50% brightness are still considered appealing in the jewelry trade. However, gemstones with too many dark areas (from deep proportions) or windowing (from shallow proportions), and less colored brightness are not as valuable. Less brightness means less value. Uneven patterns also start to have greater impact as cut quality worsens.

Part 4: Some Factors that Interact to Affect Value

Part 3 spoke about dark patterns and bright areas in a gem, what causes them and their effect on color appearance. Part 4 will dig deeper and explore additional factors used in the trade to assess relative value, and explain some of the additional choices cutters have to make. Part 5 will discuss craftsmanship.

Wireframes or depictions of facet arrangements (such as Fig. 4-02) are from scans of real gems so as to illustrate the certain aspects of gem cutting.

We previously said that it is important to realize that the cutter had to choose between various tradeoffs. For instance the thickness of the rough might dictate their choices. There are many other tradeoffs that will become apparent as we talk about more factors that interact to affect value.

- ***Color Zoning (Lack of Uniform Color)***

As a value factor, we have mentioned color zoning and

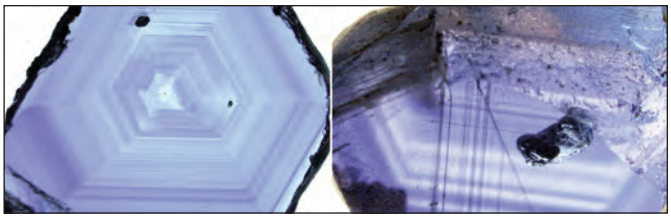

Fig. 4-01. Rough sapphires. Photo by Jonathon Muyal, © GIA.

described it as any uneven distribution of color within a gemstone. Color zoning is often due to temperature changes or the uneven incorporation of certain trace elements during the gem's formation, such as in these sapphires (see Fig. 4-01). Visible color zoning can range from minor to obvious. As with clarity, the location and contrast are important. If the cutter has hidden it well through careful planning of facet arrangements, there is little impact on value. An experienced cutter mutes the face-up effects of color zoning by arranging uneven color zones to run parallel to the girdle, or by placing a small bit of concentrated color at the culet. Remember the native cut gem from Part 1 with the culet off-center (see Fig. 4-02)? This type of cutting used a spot of strong color that is placed at the culet, which spreads that color throughout the face-up appearance. That spot of color was not at the center, so the cutter made the culet off-center to use that spot of color to evenly distribute its effect. Re-cutting the culet to center will remove that spot of color and the final gem will have much weaker color.

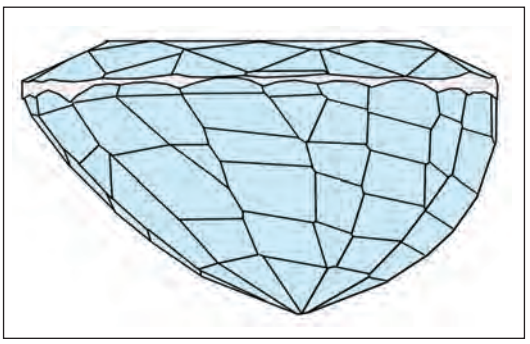

Fig. 4-02. Illustration by Al Gilbertson, © GIA.

Sapphires are well known for their color zoning, which presents some challenges to the cutter (see Fig. 4-03). Many of the green sapphires from Australia and Thailand, when viewed under magnification, show that the green color is actually a function of blue and yellow color zoning. Some of these sapphires display interesting blue-green color zoning that is visible to the naked eye, and less expensive parti-colored sapphires (showing different colors, such as blue and orange, green and blue, etc.) have sold well in some markets.

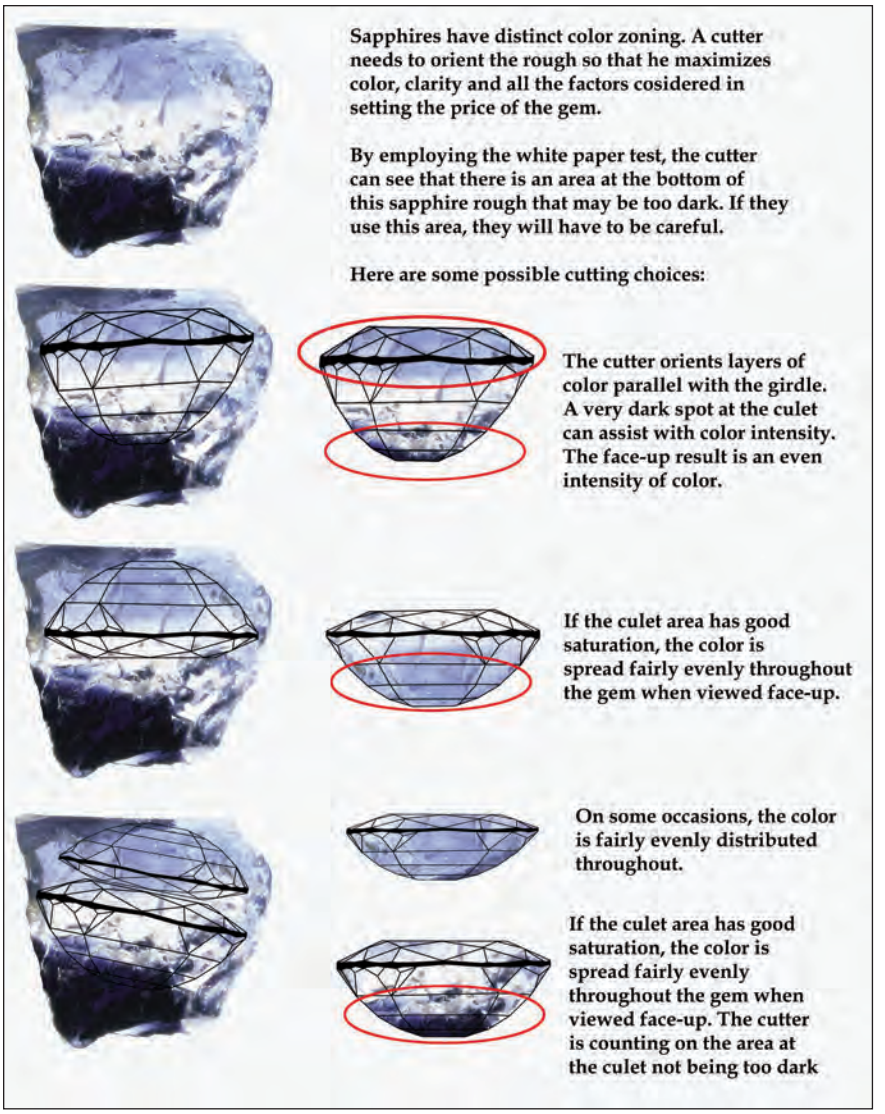

Fig. 4-03. Sapphire. Photo by Jonathon Muyal, © GIA.

Fig. 4-04. Ametrine top and side view. Cut by Dalan Hargrave. Photo by Orasa Weldon, © GIA.

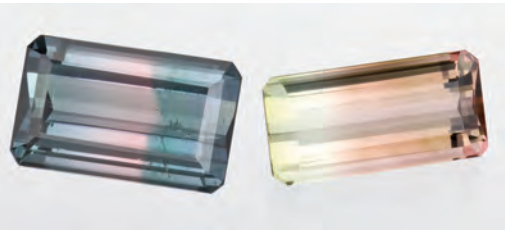

Fig. 4-05. Tourmalines. Photo by Robert Weldon, © GIA.

It is important to remember that many natural gems will exhibit some degree of color zoning, which is often an indicator of their natural origin. There are a few gemstones that are valued specifically because of their distinctive color zoning. Both ametrine (see Fig. 4-04) and some multicolored tourmaline (see Fig. 4-05) display well-defined zones of color. Ametrine combines amethyst and citrine in the same crystal, and the color zoning is due to differing oxidation states of iron within the crystal (http://www. mnh.si.edu/earth/text/dynaicearth/ 6_0_0_GeoGallery/geogallery_browse.cfm?categoryID=1&browseType=type&typeName=Quartz&typeID=127). The cause is believed to be temperature differences across the crystal during its formation. A gem with the color zoning that creates interesting patterns of contrast has higher demand in the market as opposed to the gem with blended colors. In these cases color zoning is intentionally displayed face-up.

• *Double Refraction*

Gems that split light into two separate rays that are polarized into right angles to each other are called doubly refractive (e.g. tourmaline, peridot, and tanzanite). Singly refractive gems do not split light into separate rays (e.g. spinel, opal, amber, and diamond). In doubly refractive gems, each of those rays has a different refractive index measurement. The difference in the RI values of the two rays is called birefringence and is also a measured value. Gems like beryl (aquamarine), corundum (sapphire and ruby), or tourmaline are examples of gems that are doubly refractive but with lower birefringence. Those that have a large RI difference (such as zircon) are easier to spot; the facet edges appear doubled under 10X magnification. The blurred facet edges are associated with higher birefringence (over .10).

There are two types of doubly refractive gems. In a uniaxial gem, there is a direction that behaves like it is singly refractive (light entering that direction is not broken into two beams) called the optic axis. Biaxial gems have two directions that act as an optic axis. The cutter should try to take this into consideration. As a general

rule, the table of a doubly refractive gem should be cut exactly at right angles to its optic axis. There are notable exceptions to this and for a better understanding, read Richard Hughes' article on pleochroism (http://www.lotusgemology.com/index.php/library/articles/296-pleochroism-in-faceted-gems-lotus-gemology). A gem that is singly refractive, such as garnet or spinel, can be oriented in any direction when cutting.

• *Pleochroism*

When light is split into two rays (doubly refractive), those two rays may emerge as different colors, or in two shades and intensities of the same color. Different parts of the spectrum are absorbed in the different directions causing the apparent difference in color. Examples of gems which show the strong pleochroism are andalusite, corundum, spodumene, tourmaline, and tanzanite. Here the cutter needs to pay close attention to cut the gem so that it faces up with the best color. They can lower the potential value by introducing weak or less desirable colors.

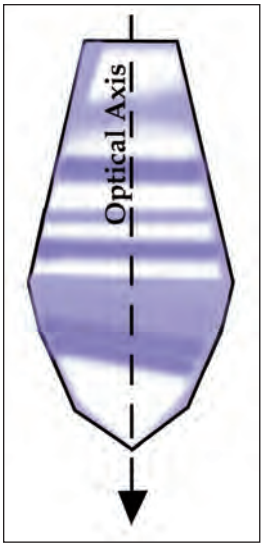

Fig. 4-06. Illustration by Al Gilbertson, © GIA.

This cross-section of a sapphire crystal (see Fig. 4-06) shows common color zoning and the optic axis. Colors seen at right angles to the optic axis are frequently a different intensity or of a different hue. This is particularly true for sapphire, aquamarine, and tourmaline. Other times, mixing the colors in the face-up position is attractive, such as with tanzanite. This block of tanzanite was cut with faces perpendicular to an optical axis (see Fig. 4-07). Each face (top, right, and left) shows a different color. This cube is small, so the colors are not well-saturated. A larger cube would have more saturated colors. When tanzanite is cut and the colors mix, sometimes the face-up appearance can be improved as two different colors blend so that we view them as one color.

TRADEOFF: Cutters are often faced with a dilemma; weight retention or best color. The best color may lie in a direction of the piece of rough that will only allow recovering a couple of small gems, rather than cutting a large one but of weaker or less desirable color. The expected final weight and estimated selling price of the finished gems influences which direction is most profitable for the cutter.

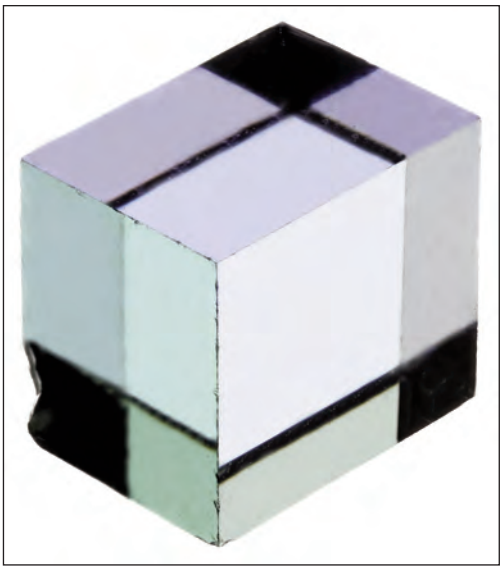

Fig. 4-07. Tanzanite. Cut by Nathan Renfro. Photo by Jonathon Muyal, © GIA.

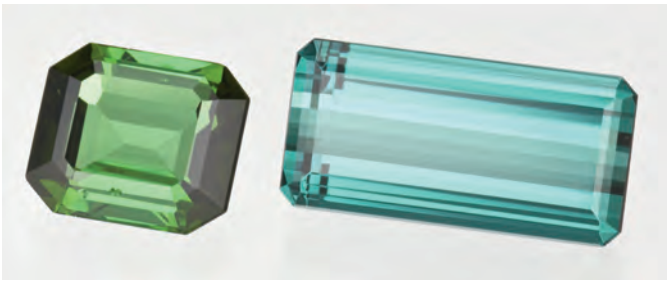

Fig. 4-08. Tourmalines. Photo by Robert Weldon, © GIA.

Green tourmaline sometimes has what cutters call a closed c-axis. This means that the optic axis absorbs all of the light entering the gem in that one direction and the result is a black opaque direction. In this case the cutter must cut at a right angle to the optical axis, even then the darkness will be reflected back into the gem. Figure 4-08 shows two tourmalines, the one on the left has a closed c-axis compared to the tourmaline on the right with an open c-axis. To mute the effect of the closed c-axis, most cutters cut the end facets along the c-axis very steeply so that the black end is not reflected into the face-up position of the gem (not done in Fig. 4-08, which is why the ends are black). TRADEOFF: When working with a closed c-axis, choices are limited to step-cut styles and cutting the ends with steep angles. If the rough is an odd shape, it may be that the cutter has to introduce these dark areas of absorption rendering the color less desirable.

Strongly pleochroic gems cut in rounded shapes with the c-axis parallel to the table facet show a pleochroic "bow tie", visible as blue-green and yellow-green in this tourmaline (see Fig. 4-09). TRADEOFF: Cutters must decide if the pleochroic colors will be attractive or diminish the potential value of the finished gem. For some gems, that's easy. For tanzanite, they often try to bring

together the two opposing colors, whereas for tourmaline the two different colors can create a less attractive gem.

- ***Size***

TRADEOFF: A uniformly colored piece of rough yields gems of different color intensity as the sizes and proportions vary. For example, a gem cut from light colored rough is considered attractive if it reaches a certain size to produce enough color saturation. If the rough seems quite pale, a cutter might plan for one large, deep gem rather than several lightly colored, well-cut ones. In the case of dark rough, some cutters use the "white paper test" to determine the best yield from the piece of rough. A piece of rough is placed on white paper, and viewed under incandescent and then fluorescent light, each time staying away from any other bright sources of light. The color seen through the rough is from light that is reflected from the white paper underneath. By using both light sources you see the colors the gem will have under both

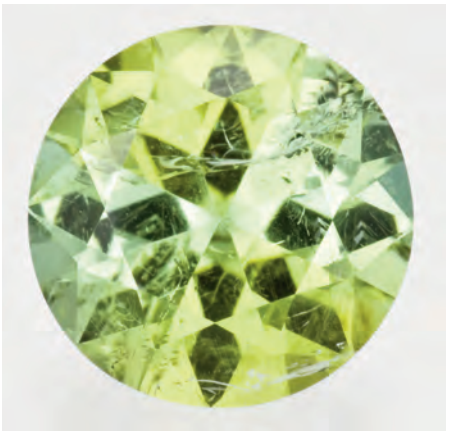

Fig. 4-09. Tourmaline. Photo by Robert Weldon, © GIA.

types of lighting. If the rough is too dark to see much color, it should be cut into smaller gems to optimize the color. In Figure 4-10, there are four gems cut from material that is very evenly colored (only half of the image is shown because of space limitations). The largest two gems are too dark (left). The third gem has good color saturation and the last gem is starting to become too light. To achieve the best range of color, this large piece of rough should be cut in a range of sizes around the third gem (7.5 mm), probably from 6 to 12 mm.

Summary

Face-up color is dependent upon a number of things, including orientation to mute the effects of pleochroism and orientation of common color zoning. The gem also has to have the right amount of color saturation. Increasing the gem's size can increase the color saturation, both of which are dependent upon the features of the rough.

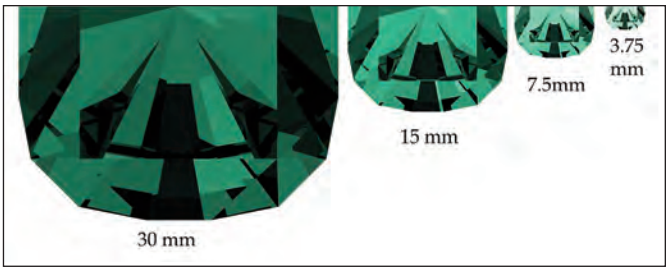

Fig. 4-10. Illustration by Al Gilbertson, © GIA.

There is no question that beauty is in the eye of the beholder, but gems have been faceted to attract our eye for hundreds of years. During that time, many forms have disappeared because they are visually less interesting. This section dealt with the heart of what makes a gem's fashioning appeal to us (or not). We want to see vibrant color. We want to see an interesting visual pattern. Instead of settling for 'good enough', ask yourself if the gem you are considering to purchase was cut to enhance the color, make it more vibrant, and ultimately create an interesting visual pattern. The gem should have some kind of 'Wow' factor. ◆

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About the Author: *Al Gilbertson is the Project Manager, Cut Research at the Gemological Institute of America Laboratory Carlsbad. He made significant contributions while functioning on the American Gem Society (AGS) Cut Task Force, when his patent was acquired by AGS and is the foundation of their ASET technology for cut grading. Hired by GIA in 2000, he became part of GIA's team that created the current cut grading system for round brilliant diamonds. Al is also the author of* American Cut—The First 100 Years.

Correction to photo in January/February issue part two of this series. Fig. 2-19 Cubic zirconia patented design by Rudi Wobito. Photos by Orasa Weldon, © GIA.

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Value Factors, Design, and Cut Quality of Colored Gemstones (Non-Diamond)

Al Gilbertson, GG (GIA), CG (AGS)

In this comprehensive article, the author discusses the value factors of colored gems in five parts. Parts one and two appeared in Gem Market News, January/February 2016, Volume 35, Issue 1. Parts three and four appeared in Gem Market News, March/April 2016, Volume 35, Issue 2. What follows is the fifth and final part.

Part 5: Craftsmanship and Summary

Part 1 discussed the major value factors that affect the price of a colored gemstone which included cut quality. Part 2 defined aspects of cutting styles to establish some common language, with a focus on basic faceting styles, and a short discussion on cabochons and beads. Part 3 spoke about dark patterns in a gem and what causes them. Part 4 explored many of the factors used in the trade (rightly or wrongly) to assess relative value as well as explained some of the additional choices cutters make and why. Part 5 will discuss craftsmanship's bearing on cut quality.

Wireframes or depictions of facet arrangements (such as Fig. 5-07) are from scans of real gems so as to illustrate certain aspects of gem cutting. Face-up patterns (such as Fig. 5-03, right) were made using the program DiamCalc; adjustments were made to the refractive index to represent the gem material being demonstrated. DiamCalc cannot show double refraction.

Craftsmanship

Craftsmanship is a broad term that denotes how much attention to detail the cutter gave to the finished gem. Most colored gemstones are cut in a variety of fancy shapes with many facet variations. Because of that, some aspects are less critical than others. Minor deviations of craftsmanship aren't as critical as achieving the optimal color. However, very careful attention to detail is rewarded by being able to demand a higher price. As the general value of the type of gem goes up, this becomes truer. A very well-cut richly hued citrine will not get as much added benefit as a tourmaline with very exceptional color. Yet with very rare and expensive gems, this becomes less true, e.g., a very well-cut and fine-colored sapphire will only benefit slightly from exceptional cutting. There are a number of elements that fold into craftsmanship which significantly impact value.

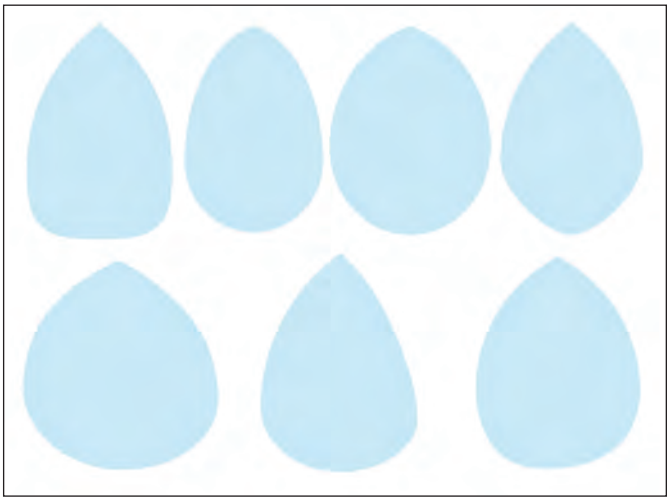


Fig. 5-01. Illustration by Al Gilbertson, © GIA.

- **Outline.** The outline, or shape, of the stone should be graceful and pleasing, and symmetrical (when appropriate) (see Fig. 5-01). While all of these are pear shaped, none could be considered an idealized pear shape. TRADEOFF: A finished gem of exceptional cutting, color, or rarity can get away with a less pleasing shape provided it is still symmetrical (see Fig. 5-01, row 1). The cutter chose to recover significant weight from the rough due to what they felt was an important gem. The value per carat may be less for that same stone if the outline lacks symmetry (see Fig. 5-01, row 2), but the weight saved may make it a gem that sells for more than one of average color or size.

- **Table.** The table should be centered, parallel to the girdle, and follow the general shape of the gem. A rectangular table on an oval gem looks out of place (see Fig. 5-02). Additionally there is usually an optimal table size for the best appearance for any facet arrangement, and the relative size will vary depending upon a number of factors. Figure 5-03 shows first the table size and facet arrangement, followed by images of the gems face-up, and lastly the gems tilted 15 degrees, demonstrating that there is more windowing when tilted for gems with a large table of this facet arrangement. TRADEOFF: A cutter chose to cut the gem with a large table rather than cut several smaller gems. In extremely dark gems, a large table with shallow proportions can be preferable to a gem that is extremely dark, since it lightens the color to a range that sells for more.

  Very small tables are generally less desirable (see Fig. 5-03), and surprisingly, do not minimize windowing. The greater crown height retains more weight creating the perception that the gem is top-heavy and pointed.

Fig. 5-02. Illustration by Al Gilbertson, © GIA.

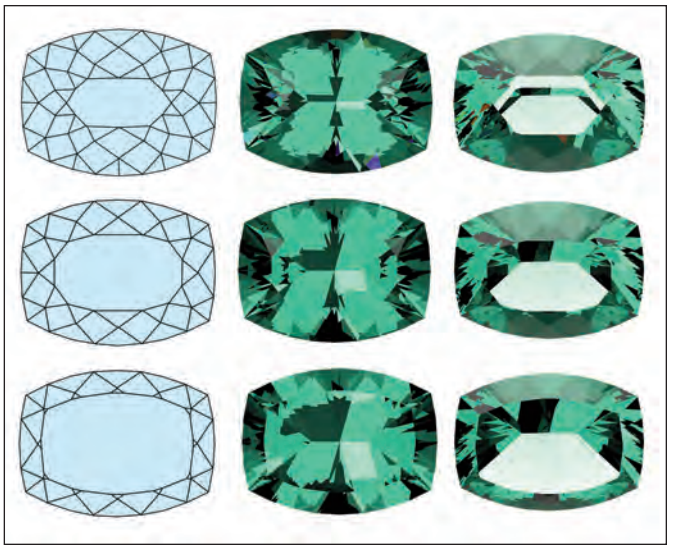


Fig. 5-03. Illustration by Al Gilbertson, © GIA.

- **Shoulders.** Shoulders on hearts, ovals, and pears (see Fig. 5-01) that look pinched are less pleasing (see Fig. 5-01, row 1, fourth pear shape). Broad shoulders are acceptable if the overall outline is still pleasing.

- **Culet or Keel Line.** The culet or keel line of the bottom of the gem needs to be centered (see Fig. 5-04). The more visibly off-center, the more it affects the perception of how well the gem was cut.

- **General Symmetry.** Looking at the gem face-up, mentally divide it into halves or quarters (fifths if it is a pentagon, etc.) and look at how each segment mirrors the others. If there is an impression of a significant deficiency, this will also affect the perception of the cut quality, and ultimately the gem's value.

- **Girdle Thickness and Unevenness.** Girdle thickness rarely affects a gem's face-up appearance. Extremely thin girdles should be avoided as they are very easily chipped. While corners and points (tips) are vulnerable to chipping, slightly thicker girdles at these spots are acceptable to help mitigate their vulnerability. Extremely thick girdles are difficult to set and

Fig. 5-04. Spinel, euclase, iolite. Photos by Robert Weldon, © GIA.

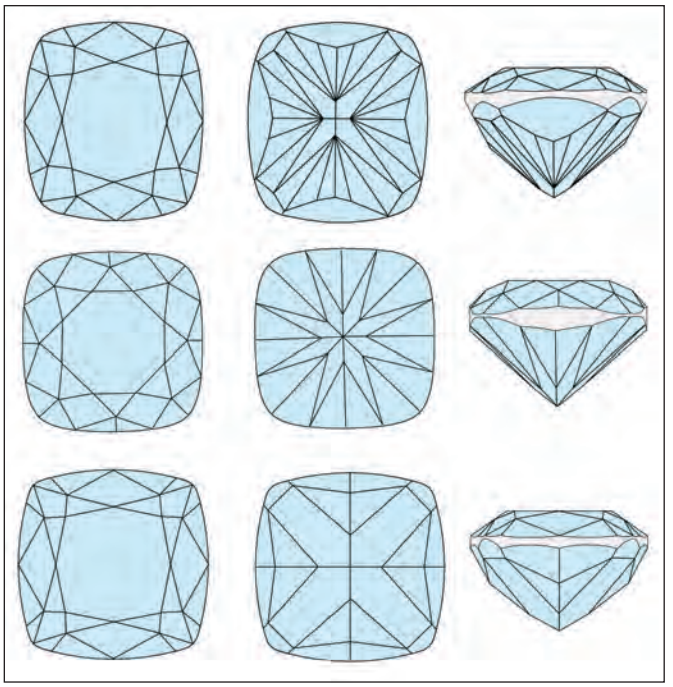


Fig. 5-05. Illustration by Al Gilbertson, © GIA.

obviously add unnecessary weight. Extreme unevenness can be an important intentional part of a designer cut where certain parts of the design require a thicker portion of the girdle (e.g. corners on cushions) (see Fig. 5-05) and don't detract from the value as much when it is required for the cutting style. Other types of extreme unevenness or waviness also lower the perception of the gem's cut quality and ultimately its value.

- **Girdles with Sharp Edges.** Nathan Renfro (Analytical Manager, Identification at GIA, Carlsbad) points out that some cutters round the girdle edges so that they are less likely to chip when being set. This means that the girdle edge may not come to a sharp edge where the girdle meets the crown or pavilion and that the girdle itself may not be flat.

- **Polish.** The late Stephen Kotlowski (Uniquely K Custom Gems) noted that all of the facets should look like they are highly polished with a mirror-like quality, and this polish quality should be examined under magnification. Poorer polish means less value and vice versa.

- **Alignment of Crown and Pavilion.** With certain facet arrangements (e.g. step cuts, designer cuts), better crown and pavilion alignment will help set the quality of cutting to a higher level. This alignment is fairly unimportant in many standard oval, pear, and cushion shaped commercial-cut quality gems unless it makes the girdle extremely uneven. In hearts, this alignment can be seen in angular or mismatched lobes, and shallow or deep or awkward clefts (see Fig. 5-06). Often these deficiencies can be slightly masked by the design of the jewelry.

- **Facet Meets.** With designer cuts (see Fig. 5-07) it is more important and fairly expected that the facets should meet in sharp points with each other, according to Stephen Kotlowski. Some designs will purposely have portions without standard meets, so be careful not to be overly critical (see circled areas on the triangle in Fig. 5-07). Outline, facet symmetry, and polish are more important than the exactness of the facet meets.

- **Misshapen Facets.** With designer cuts it is fairly expected that the facets should mirror each other. If the deviation is obvious to the unaided eye when the gem is viewed face-up, it can be distracting and lessen the overall value of the designer cut. Wayne Emery (The Gemcutter) says, "In a designer or precision cut, there is no excuse for any misshapen facets, not even slightly. It's too easy to be very precise; anything less is poor workmanship."

Fig. 5-06. Illustration by Al Gilbertson, © GIA. *Brazilianite, spinel.* Photos by Robert Weldon, © GIA.

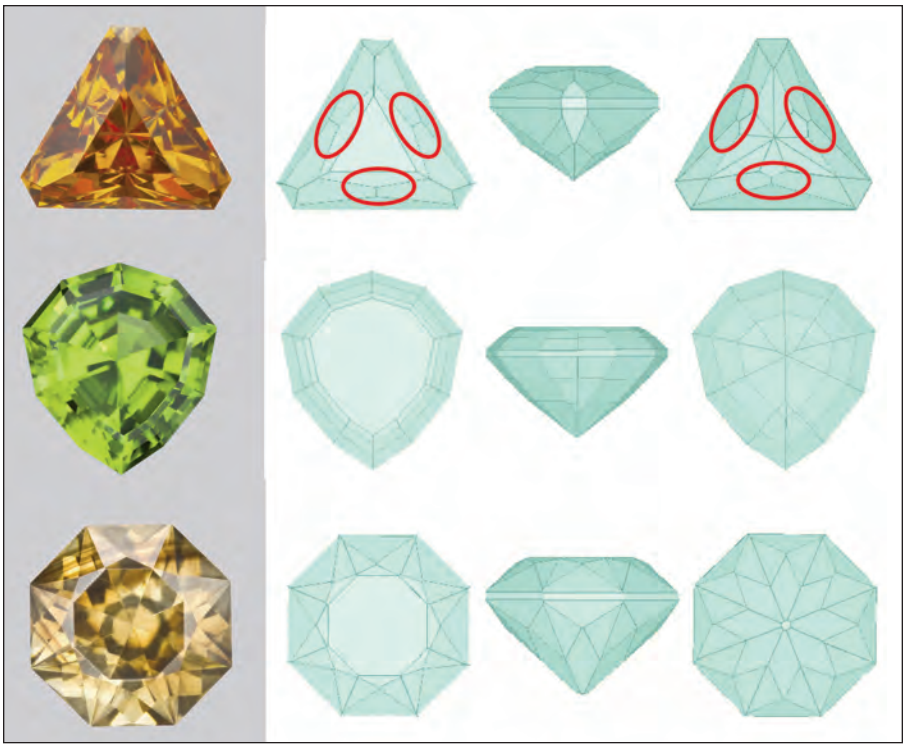


Fig. 5-07. Illustration by Al Gilbertson, © GIA. *Scheelite, peridot, phosgenite.* Photos by Robert Weldon, © GIA.

- **Rounded Facet Junctions.** Ideally, adjoining facets should have sharp junctions. However it is not uncommon to see slightly rounded facet junctions in commercial grade cutting. Unless this slight rounding is eye-visible, it seldom detracts from the value of the gem, but it should. The difference between stones with sharp flat facet junctions and those with very slightly rounded facet junctions is notable. The flat facets and sharp edges add crispness to the appearance that cannot be achieved otherwise. The extra time needed to add this care when cutting justifies a significant difference in cost for a designer gem.

- **Proportions.** Proportions affect the face-up appearance of the gem in general, so calling out proportions any more than this article already has is unnecessary (see Parts 3 and 4, Gem Market News March/April 2016).

- **Bulge.** Bulginess in the pavilion or crown sacrifices the face-up beauty of a gem while adding significant excess weight (even up to 35% and more). Often the jeweler pays less per carat for the less attractive deep bulgy gem.

Re-cutting Issues

It is not unusual for jewelers to want to re-cut a damaged or poorly cut gem. Re-cutting requires determining the added expense versus the recovered weight to see if it is worth the effort (don't be surprised at substantial weight loss). Not all cutters have the same philosophy about how a gem should look when it is re-cut. Will they re-polish an older style step-cut cushion without changing the angles substantially, resulting in that older classic appearance? Or, do they want to use a modern cutting style and will the resulting face-up appearance match a consumer's expectations? Get recommendations from others who have used their services, ask what they deem appropriate for the gem, and view examples of their work.

Cutters agree that the total number of facets is relative to the finished size of the gem. Figure 5-08 shows three very different facet arrangements for a round gem. The first, with only 17 facets, is best utilized on small gems, generally under about 3 mm. More facets than that on such small gems will start to blur the effect of the faceting and be less interesting, especially if the material is strongly doubly refractive. The second example with 57 facets is great for sizes from about 4 to 11 mm. This facet pattern will be less interesting or dynamic on larger sizes. Gems larger than 12 mm really need more facets, such as the third diagram with 113 facets. Note that emerald cuts don't suffer when cut in all of these size variations.

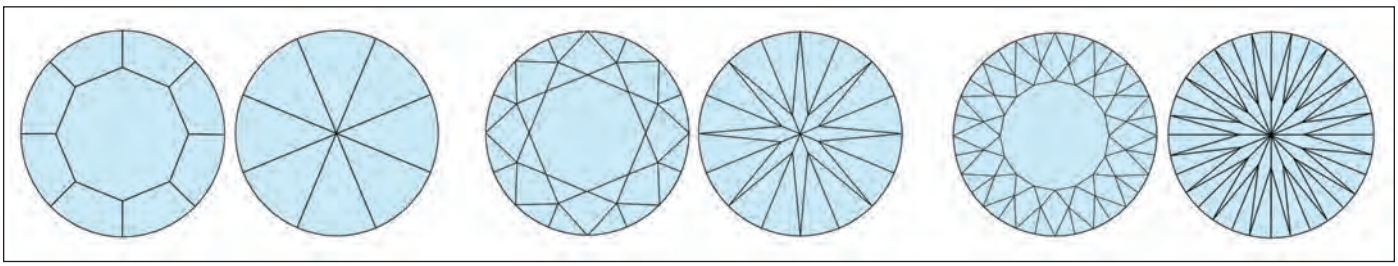
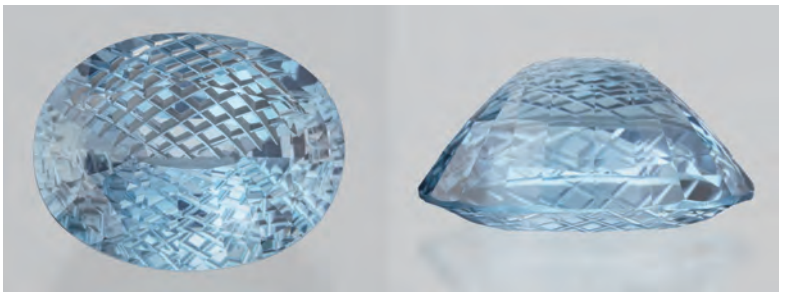


Fig. 5-08. Illustration by Al Gilbertson, © GIA.



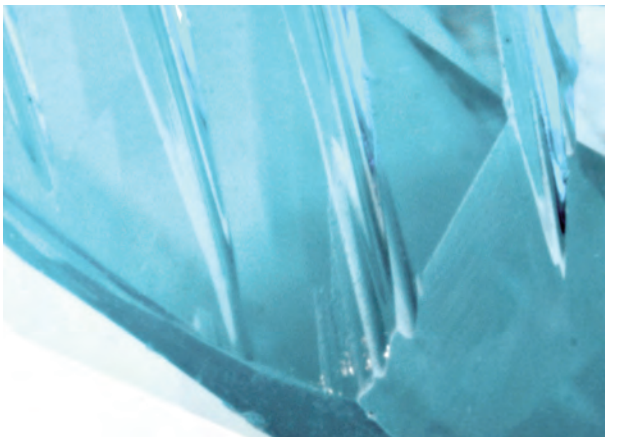
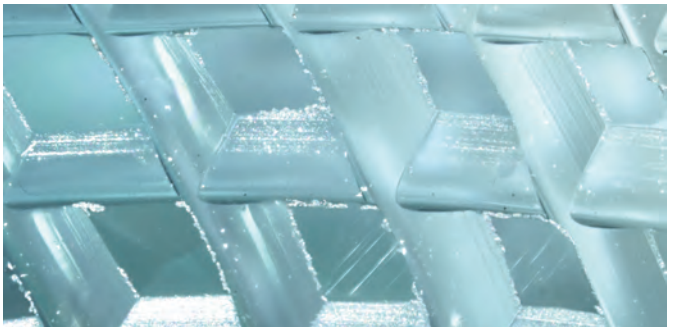


Fig. 5-09a. Blue topaz top and side view. Photo by Orasa Weldon, © GIA.
Fig. 5-09b. Blue topaz ends of grooves. Photo by Robison McMurtry. © GIA.
Fig. 5-09c. Blue topaz unpolished grooves. Photo by Jonathon Muyal. © GIA.

Wayne Emery points out that the relative size of the facets, especially on the crown, is important to a pleasing design. There are some designs that split the star or upper girdle facets into several small facets, while leaving the crown mains large. At first glance, this type of cutting will result in a disappointment. Crown facets need to be evenly sized not only to keep the color more evenly spread, but to create a better face-up appeal.



Craftsmanship Evaluation of "Fantasy Cuts and Artistic Cutting"

Noted gemstone artists Dalan Hargrave (of Gemstarz) and Mark Gronlund (of G3 Gems) were kind enough to share some critical insights for evaluating the craftsmanship of concave faceting. V-grooves and concave dish-shaped grooves or facets are two types of applications to colored gems. There are three ways to evaluate these applied styles of cutting:

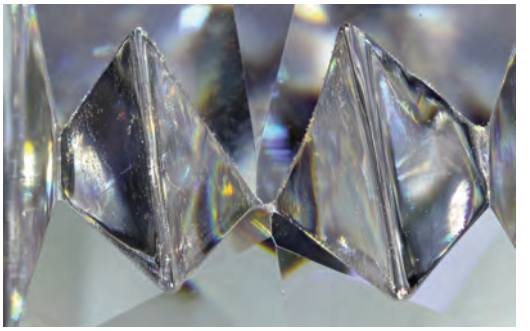
- **Finish.** Using a loupe, look at the inside of the facets and grooves or concave areas. The edges of where the concavities meet the facets should be sharp-edged and free from chipping (see Figs. 5-11b and 5-11c). The surfaces should all have a very high, even

Fig. 5-10a. Cubic zirconia top and side view cut by D.K. Kim. Photo by Orasa Weldon, © GIA.

Fig. 5-10b. Cubic zirconia bottom view cut by D.K. Kim. Photo by Robison McMurtry. © GIA.

Fig. 5-10c. Cubic zirconia close up side cut by D.K. Kim. Photo by Robison McMurtry. © GIA.

Fig. 5-10d. Cubic zirconia close up top cut by D.K. Kim. Photo by Jonathon Muyal. © GIA.



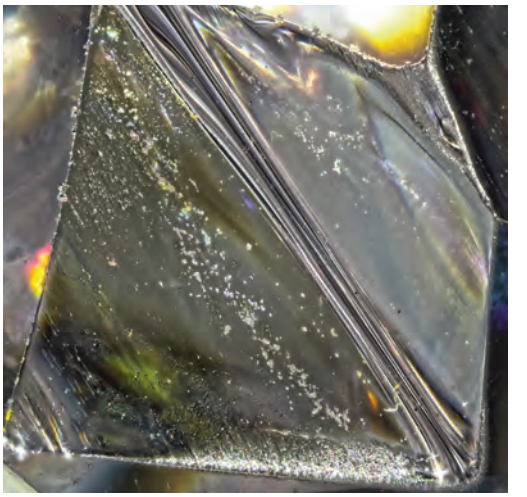


Fig. 5-11a. Ametrine top and side view cut by Dalan Hargrave. Photo by Orasa Weldon, © GIA.

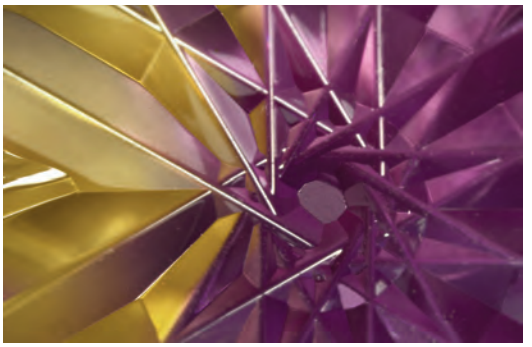


Fig. 5-11b. Ametrine close up center cut by Dalan Hargrave. Photo by Jonathon Muyal. © GIA.

Fig. 5-11c. Ametrine close up side cut by Dalan Hargrave. Photo by Jonathon Muyal. © GIA.

Fig. 5-11d. Ametrine close up top cut by Dalan Hargrave. Photo by Jonathon Muyal. © GIA.

polish. Mass-produced work or lesser quality work will often have chipped edges and grooves from the cutting tools that haven't been polished out (see Fig. 5-09c). Sometimes there may be pock-marks because the polishing did not remove the earlier grinding done with coarser grits (see Fig. 5-09c and 5-10d). Distorted polished surfaces are common with lower quality goods (see Fig. 5-10d).

- **Central Brilliance.** Since the purpose of these reflections is to enhance the brilliance and visual interest of the gem, concave faceting works very easily with round gems, as it brings the visual interest to the center. For odd shaped gems, this centrality of focus is harder to achieve, but can still be used to accent a portion of the gem (see Fig. 5-12). These reflections are playing with optics or using light in a new way in a particular gem material to create strong contrast patterns. The effect should enhance the "central brilliance" of the gem and make interesting patterns. The application of a few grooves on the pavilion or at the edge of the gem is easily done and mass-produced (see Fig. 5-09a), while applying them in a way that provides a visually vibrant pattern with central brilliance takes more artistic ability and work.

Even the freeform sunstone from Figure 5-12 has optical dishes placed in a manner that points the eye to the central green area. Without these dishes, the sunstone would be less visually interesting. Central brilliance can also be symmetrical, so that if you were to fold the gem in half, one side mirrors the other (called line-symmetry). The long rectangular tourmaline in Figure 5-12 has a line-symmetry type of brilliance. Central brilliance is not seen in all fantasy items, but when present enhances the face-up appearance of the gem.

- **Symmetry of Groove Placement.** Grooves and concavities that are symmetrical or laid out in a well-developed pattern not only enhance the central brilliance, but show a consistency even under magnification. The sunstone of Figure 5-12 does not have symmetrically placed optical dishes, whereas the concave facets in the tourmaline in the same figure have a high level of symmetry. Added symmetry adds more value.

Fig. 5-12. Sunstone and tourmaline cut by John Dyer. Photo courtesy of John Dyer & Co.

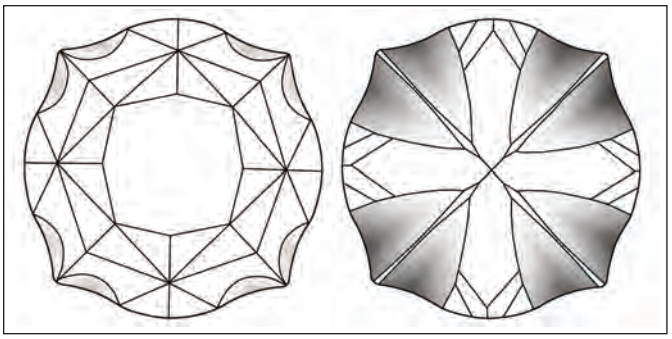


Fig. 5-13a. Illustration by Al Gilbertson, © GIA.

Fig. 5-13b. Ametrine top view cut by Chris Wolfsberg. Photo by Orasa Weldon, © GIA.

Fig. 5-13c. Ametrine close up back cut by Chris Wolfsberg. Photo by Robison McMurtry. © GIA.

Fig. 5-13d. Ametrine close up side cut by Chris Wolfsberg. Photo by Robison McMurtry. © GIA.

Four Examples of Fantasy Cutting

- **The oval blue topaz** (see Fig. 5-09a) has a series of cross-hatch style grooves on one side of the pavilion. When observed face-up, the grooves reflect to the other side and fill the gem with the effect. The ends of the grooves are uneven and irregular (see Fig. 5-09b). There is small chipping and abrading at some of the places where the cross hatching occurs (see Fig. 5-09c) and at the end of some of the grooves. The bottoms of the valleys of all of the grooves are well polished, but the groove walls have scoring from the original grinding that has not been polished out (see Fig. 5-09c). This is an indication of lesser cutting quality and/or mass-manufacturing.

- **The star-shaped CZ** (see Fig. 5-10a) is grooved at the girdle to create a star-styled outline. When looking at the gem face-down, some of the grooves are not evenly spaced (see Fig. 5-10b), are not perpendicular to the table, and tilt at an angle (see Fig. 5-10c). The walls of the grooves have scoring from the original grinding of the grooves that has not been completely polished (see Fig. 5-10d). This is an indication of lesser cutting quality and/or mass-manufacturing. In this case, it is a poorly executed knock-off of a patented design by Wobito.

- **The drop-shaped ametrine** (cut by Dalan Hargrave—see Fig. 5-11a) is good example of concave faceting that uses v-shaped grooves on the back of the gem (see Figs. 5-11b and 5-11c) for optical effect. A closer look from the back of the gem shows that the grooves are all well-polished and the ends of the grooves are chip and abrasion-free. This is typical of fantasy gems of high quality. Dalan employs a technique that curves the grooves seen in the top of the face-up image of Figure 5-11a. Note also the symmetry of the groove placement. The grooves used for the cross-hatched pattern create bright lines of contrast, emphasizing a central brilliance in that portion of the gem. The curved grooves also create strong lines of contrast, adding a line-symmetry to the top portion of this gem.

- **Not all concave faceting uses grooves to create contrast.** A more careful examination of Chris Wolfsberg's design for an ametrine (see Fig. 5-13a) demonstrates how the use of more gently curved concave facets helps create the unique outline of the gem. Another example of very fine craftsmanship, Wolfsberg uses evenly polished, concave curved or dished facets that are very carefully matched to mirror each other (see Fig. 5-13b). There are no unpolished, abraded, or chipped areas (see Figs. 5-13c and 5-13d).

Summary
Faceting is a series of compromises. The cutter compares various tradeoffs to make decisions about cutting the final gem. Most importantly, the cutter needs to achieve the best face-up color possible from that gem. The shape (outline) needs to be aesthetically pleasing and desirable, while the quality of the cutting should provide an attractive contrast pattern that enhances the color.

Many jewelers and gem dealers haven't taken the time to understand the difference between good gem cutting and great gem cutting. With a little effort, it is always possible to detect the hand of a dedicated artisan in their creation. We often sacrifice values of real craftsmanship at the altar of "good enough." In a world that places a premium on low price, disposable goods, and speed of getting things done, craftsmanship suffers. Even though we are able to quickly realize the quality of something that has been expertly cut, many often choose the cheap and average gem instead. Diamonds have gone through a bit of commoditization over the years, and much of the public and most of the trade is keenly aware of price ranges for certain goods. High quality cutting in diamonds is now appreciated. Prices for colored gems are very blind to the public and even many jewelers, so quality can be sacrificed and sellers can purport fictitious "good deals." It's time to set good enough aside.

Expert craftsmanship comes from creativity, and a passion and attention to detail that improves over the length of an artisan's career as they seek to do better. The artisan grows as they pay more attention to the small details. Too often the jewelry trade treats highly skilled professionals as something they don't think they want to sell, since they think that the work is too expensive. By learning the difference and becoming passionate about quality in the goods you sell, you pass on to the consumer an attitude that says good enough is not good enough. You pass on a care for the detail and an ability to recognize and appreciate quality.

In a world that seems to want to treat all of us the same, people struggle to point out their own uniqueness. Some do it by their clothing or lifestyle, others by what they drive. Why not demonstrate their uniqueness by the quality of the fine gems they wear? Handling and selling quality craftsmanship is at the heart of getting out of the rut of good enough. It's also key to earning the respect of clients and customers, and ultimately creating friends (your clients) who appreciate fine quality. ◆

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About the Author: *Al Gilbertson is the Project Manager, Cut Research at the Gemological Institute of America Laboratory Carlsbad. He made significant contributions while functioning on the American Gem Society (AGS) Cut Task Force, when his patent was acquired by AGS and is the foundation of their ASET technology for cut grading. Hired by GIA in 2000, he became part of GIA's team that created the current cut grading system for round brilliant diamonds. Al is also the author of* American Cut—The First 100 Years.