# GIA and Its History with Cut

*By Barak Green, Al Gilbertson, Mary Johnson and James Shigley*

GIA's study of diamond cut proportions has a long history – longer, in some ways, than the history of GIA itself, since one could say that poor cutting proportions helped motivate Robert M. Shipley to found GIA. In the mid-1920s Shipley, a successful jeweler, met with one of his wealthy clients who had just returned from the diamond cutting centers of Europe. This client informed him that his knowledge of diamonds was incomplete. Although Shipley knew as much about diamonds as most American jewelers at the time, he felt embarrassed to discover that he had sold many diamonds with apparently "poor makes" — that is, diamonds that were cut badly. Eventually, this embarrassment, along with his desire to fully educate himself on all aspects of diamonds and other gemstones, led him to enroll in the gemology courses offered by the National Association of Goldsmiths (London).

After his return to the United States, Shipley began teaching a night course in gemology at the University of Southern California in Los Angeles. This course proved to be so successful that in 1931 he transformed it into its own school: The Gemological Institute of America. Course material from 1936 shows some of Shipley's interests at the time. He devoted coursework to reviewing the differences between the proper proportions of "European" and "American" styles of diamond cutting (with the American cut credited mostly to Tolkowsky's 1919 publication, *Diamond Design)* and to describing the appearance of polished diamonds as the relationship of two separate aspects: brilliance and fire (scintillation would come later). At that time, Shipley wrote that polished diamonds showing "more vivid spectrums" possessed more brilliancy, and those that showed "wider spectrums" possessed more fire. The fact that both terms dealt with colored light return explains his use of the term "spectrum."

However, Shipley's primary concern in this early course centered around his desire to identify those diamonds of poor make. Thin (shallow) diamonds and "lumpy" (deep) diamonds were singled out as bad light reflectors, allowing light rays to leak out of the pavilion. Similarly, Shipley singled out shallow-topped diamonds (those with shallow crowns and/or larger tables) as "swindled" or "spread," and stated that they sacrificed brilliance and fire to give the appearance of a larger size. In this way, he attempted to make up for his prior lack of knowledge on diamond cut proportions by sharing his newly acquired education with all of his students.

By this time, Shipley was also warning about diamond merchants who were advertising "perfect diamonds" or "perfectly cut stones." He felt that even if a diamond was internally "perfect" (i.e., internally flawless), it was almost impossible for it to be "perfectly" cut. This was soon reflected in the 1937 ruling by the Federal Trade Commission that banned the use of the term "perfect" and its variants for any diamond, when that term had the effect of "misleading or deceiving purchasers, prospective purchasers, or the consuming public."

By 1946, Robert Shipley had also made the distinction between brilliance and scintillation in his course material. In response to several new "novelty" cuts on the market that were advertising greater brilliance, Shipley changed the course material to distinguish a separate aspect of a diamond's appearance which he called scintillation. (Shipley suspected the new "novelty" cuts were displaying scintillation, not brilliance.) He defined this new appearance aspect as the throwing off, or glittering, of "spark-like flashes of light." GIA thereafter used three distinct aspects of light performance (brilliance, fire, and scintillation) to describe a diamond's appearance. Shipley also introduced into the courses the idea of re-cutting "old style cuts" to the proportions of modern American cuts, and estimating their "recut" weight. This would later play a large role in GIA's grading system.

"Make" has played a role in diamond evaluation for hundreds of years. As early as the 1500s, diamond merchants were adjusting a diamond's price based on poor cut proportions (along with other considerations such as color and clarity). Nor was GIA the first to suggest a method of grading diamonds based on their specific cut proportions or "make." In 1942, it published an article by an early proponent of such a method in its journal, *Gems & Gemology*. M. E. Vedder had created a system of diamond grading for modern round brilliants that required 22 proportion measurements to be averaged into seven cut factors (total depth, table size, crown height, pavilion depth, crown angle, girdle thickness, and culet size). Some of Vedder's methods resemble aspects that GIA would later adopt into its own diamond-cut grading system in 1953.

A change in leadership sparked the birth of GIA's new grading system. In 1952, Robert Shipley retired and was succeeded by Richard T. Liddicoat. Liddicoat had started at GIA in June 1940, and was named director of education in 1946. Within a year of taking over as president of GIA, Liddicoat (with the help of other experts on the GIA staff) developed and refined a complete grading system for diamonds that included a system for evaluating cut. This system debuted in April of 1953, as the first one-week "Diamond Grading and Evaluation" class in New York City.

In addition to establishing criteria for color and clarity[1], this new grading system included an evaluation of cut. This was based on the weight difference between a diamond and what that diamond would have weighed had it been originally cut to Tolkowsky's recommendations (e.g., a 53% table). Liddicoat's new diamond grading system also based its value system on market research. The accuracy with which the pricing guidelines given with the course's new evaluation system matched the market prices at the time was one reason it became so useful in the diamond trade. (It is important to note that this accuracy was possible because of the long-term stability in diamond prices.)

The method of computing weight loss was based on considering a half-octahedron of diamond rough and the largest faceted diamond that could be attained from that rough within the proportion constraints of the "American cut" standard. Volume (carat weight) was measured by modeling the diamond as two cones connected at their widest points, with the point of the upper cone being truncated to form the table facet (figure 1).

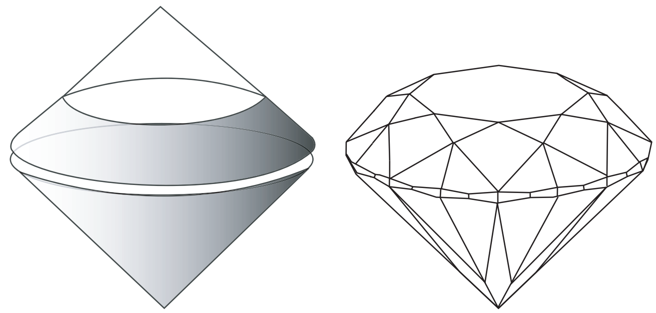
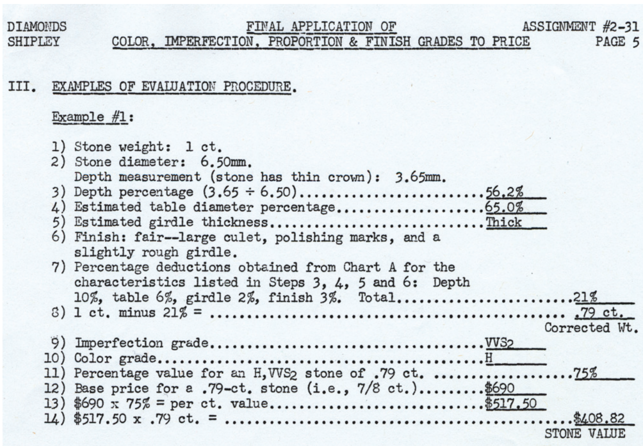


Figure 1. In the early GIA grading system, two cones represented the volume of a diamond

Taking the volume of the "American cut" diamond as a reference point (primarily because this cut almost always represented the greatest loss of weight from a piece of rough), GIA computed the amount of "extra" weight any diamond with different proportions would have. Charts of these differences were then incorporated into a grading system that was based on deductions for excess weight. The diamond was evaluated on its "corrected weight," which was then used with color and clarity to compute its value. Thus, weight loss was equated with a price reduction that affected the overall monetary value of the diamond.

This new system was meant to educate jewelers, and students training to be jewelers, in how to evaluate, appraise, and purchase polished diamonds. Students were given mimeographed worksheets (figure 2) to record their evaluations, and then were able to check their results against those previously found by instructors. Soon, students who had taken the course began sending in the diamonds they were purchasing with their completed worksheets to double-check if they were still grading them correctly. Eventually, students realized that it was easier just to send the diamonds they were selling to GIA and have GIA return a completed worksheet. Since GIA assumed that former students knew how to compute monetary deductions based on color, clarity and



DIAMONDS SHIPLEY — FINAL APPLICATION OF COLOR, IMPERFECTION, PROPORTION & FINISH GRADES TO PRICE — ASSIGNMENT #2-31 PAGE 5

III. EXAMPLES OF EVALUATION PROCEDURE.

Example #1:

1) Stone weight: 1 ct.
2) Stone diameter: 6.50mm.
   Depth measurement (stone has thin crown): 3.65mm.
3) Depth percentage (3.65 ÷ 6.50)........................56.2%
4) Estimated table diameter percentage....................65.0%
5) Estimated girdle thickness.............................Thick
6) Finish: fair--large culet, polishing marks, and a slightly rough girdle.
7) Percentage deductions obtained from Chart A for the characteristics listed in Steps 3, 4, 5 and 6: Depth 10%, table 6%, girdle 2%, finish 3%. Total........................21%
8) 1 ct. minus 21% = .............................................. .79 ct. Corrected Wt.
9) Imperfection grade.....................................VVS2
10) Color grade...........................................H
11) Percentage value for an H,VVS2 stone of .79 ct. ...................75%
12) Base price for a .79-ct. stone (i.e., 7/8 ct.).........$690
13) $690 x 75% = per ct. value.............................$517.50
14) $517.50 x .79 ct. = ...............................................$408.82 STONE VALUE

Figure 2. Sample of worksheet used to evaluate price of diamonds

finish grades, along with two proportion measurements (total depth percentage and table percentage), it included these factors on the sheets.

These returned worksheets evolved into the official GIA Diamond Grading Reports issued by the GIA Gem Laboratory. Although students of GIA's courses were taught how to compute monetary evaluations of diamonds from these reports, the reports themselves never showed any grade or value assigned for a diamond's cut proportions. An increasing number of dealers in the United States and Europe began to use GIA Diamond Grading Reports to assure customers of the quality of the diamonds they were buying (sometimes unseen). In this way, GIA Diamond Grading Reports soon became a standard in the diamond industry.

Figure 3. Modern ProportionScope™

These reports were only part of GIA's interest in developing tools to aid in the evaluation of cut. In 1954, GIA developed the first version of its ProportionScope™, an instrument that allowed a quick analysis of the proportions of a round brilliant cut (RBC) diamond[2]. This version was a small box with a screen (on which were printed graduated proportion lines) that attached to a microscope. A silhouette of the diamond's profile was cast on the screen, by which a grader could take quick proportion measurements. In 1967, a new version of the ProportionScope™ was released. This new version was a separate instrument that also used a cast silhouette of a diamond's profile to evaluate cut (figure 3).

In 1957, Liddicoat strengthened GIA's commitment to properly understanding and evaluating diamond cut when he sketched out a new classification system in the Summer issue of *Gems & Gemology*. Liddicoat suggested that polished RBC diamonds could be classified into four categories based on their proportions. The proportions considered in this new system were total depth-to-diameter ratio, table size, and pavilion angle. These early guidelines were later adapted and expanded into a classification system that could be used as a teaching aid. The new system incorporated table size, crown angle, pavilion depth, and girdle thickness into its classifications (figure 4). It is important to note that these classifications were merely suggestions that readers of the course materials might use as models on which to base their own classification systems. Also, although these classifications were used to evaluate diamonds in coursework, they were never used by GIA in the laboratory for grading reports.

Then, in the early 70s, GIA found itself embroiled in a controversy over diamond cut. Huisman Bros., Inc. claimed that their new 144-facet diamond was 32% more brilliant than the 58-facet diamond that was, and still is, the norm for round brilliants. GIA stated that the difference between the two cuts of diamonds had more to do with scintillation than brilliance. To resolve the issue, the parties agreed to publish two articles (each articulating one perspective) in the Spring, 1974 issue of *Gems & Gemology*.

This agreement necessitated a new wave of research by GIA into the issue of diamond cut proportions and faceting. GIA showed that a 58-facet RBC diamond was more brilliant (i.e., returned more light) than the 144-facet diamond by using a photometer that measured the amount of light returned from these diamonds.

By 1979, GIA's diamond courses had been revised to eliminate computations of monetary value based on a diamond's proportions. GIA realized that standardized estimations of monetary value were not valid in the (now quite volatile) global marketplace. One example of the divergence of trade realities from teaching practice was table size: the "American cut" proportions that GIA often used in their evaluations did not always match the preference for larger tables seen in some countries.

Consequently, GIA took the position that scientific evidence was needed in order to conclude that any set of diamond proportions was superior for the 58-facet round brilliant cut. The research department began amassing that scientific evidence in 1989. Rather than limiting themselves to the traditional approach of looking at actual diamonds to evaluate cut, GIA researchers chose to address the problem using computer graphics and data analysis technologies. Its first job was to create a computer program that accurately modeled the movement of light in a transparent solid with a round brilliant shape and the optical properties of diamond. This approach had two goals: the creation of realistic visual images of RBC diamonds, and the ability to calculate and evaluate the optical performance of various combinations of proportions for RBC diamonds. In June 1991, GIA provided a brief introduction to their work.

Once the computer model was judged to be an accurate representation of an internally flawless, colorless, perfectly symmetrical, RBC diamond, GIA began research on the effect that different proportions have on the aspects of a diamond's appearance. The first attribute to be studied was brilliance — which was defined as the return of white light from the crown of a polished diamond, but excluded any light that was merely reflected back from the surface of the crown facets; the latter was defined as glare. GIA published the results of this study in 1998.

GIA has continued its work on evaluating the cut properties and proportions of RBC diamonds. Current research is focusing on a second aspect of a polished diamond's appearance: fire. In addition, GIA is comparing computer model results with actual diamonds to ensure the accuracy of their computer modeling. This is simply the next chapter in GIA's long history of research into diamond cut proportions.

MAKE CLASSES

| Class | 1 | 2 | 3* | 4** |
|---|---|---|---|---|
| Table | 53-60%*** | 61-64% | 65-70% | +70% |
| Crown | 34-35° | 32-34° | 30-32° | -30° |
| Girdle | medium - slightly thick | thin/ thick | very thin / very thick | extremely thin/ extremely thick |
| Pavilion | 43% | 42-44% | 41-46% | -41/+46% |
| Culet | none-medium | slightly large | large | very large |
| Finish | very good - excellent | good | fair | poor |

*Class 3 also includes stones with 51 or 52% tables or 37° crown angles.

**Class 4 also includes stones with tables less than 51%, crown angles more than 37°, or major symmetry variations.

***Table size for class 1 goes up to 61 or 62% in stones under 0.50 ct.

Figure 4. Classification system from the 1994 GIA Diamond Grading course

We hope that you enjoyed this article, and invite any feedback or comments that you may have. You may contact us by e-mail at DiamondCut@gia.edu ■

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[1]It was at this time that GIA developed its color scale (which would become the standard in the industry). This new color scale was innovative in that it used "D" as the top color grade. GIA also refined the clarity scale that was currently being used at that time. By splitting the VVS, VS, SI, and I grades into two categories each, GIA made the scale more precise. This clarity scale would also become the standard in the diamond industry.

[2]GIA's ProportionScope™ provided a reliable instrument that was also easy to use, at a time when several individuals were experimenting with similar concepts.

 