

# Hypothesis or practicality: The quest for the Ideal cut

*The Gemological Institute of America appears to have withdrawn its historical support of the American Ideal Cut. AGS urges cutters, optical physicists, gemologists and mathematicians to continue working to better understand proportion, polish and symmetry parameters in their search for the most beautiful diamond.*

By Michael Cowing, MS, FGA, AGS, NJA; Peter Yantzer, CG; Thomas Tivol, GG.

In 1919 the young diamond cutter Marcel Tolkowsky, studying mathematics in London, published the book that revolutionized diamond cutting. It provided mathematics that showed that diamond cutters like Henry Morse had been correct in cutting the pavilion and crown angles of what eventually would become known as the American Ideal and the Tolkowsky Ideal.

Said Tolkowsky: "In the course of his connection with the diamond-cutting industry the author has controlled and assisted in the control of the manufacture of some million pounds' worth of diamonds, which were all cut regardless of loss of weight—the only aim being to obtain the liveliest fire and the greatest brilliancy. The most brilliant larger stones were measured and their measures noted. It is interesting to note how remarkably close these measures, which are based upon empirical amelioration (improvement) and rule-of-thumb correction, come to the calculated values." Tolkowsky's words indicate his great respect for and

admiration of the diamond cutters' skill in developing the proportions that had been in use for many years to produce the best brilliance and fire.

Because his math confirmed these proportions he concluded: "We may thus say that in the present-day, well-cut brilliant, perfection is practically reached; the high-class brilliant is cut as near the theoretic values as is possible in practice, and gives a magnificent brilliancy to the diamond."

The last words in his book are, "it seems likely that the brilliant will be supreme for, at any rate, a long time yet."

Aspects of the "Ideal" have evolved, such as slight increases in table size, allowance for girdle thickness and lengthening of the lower-girdle facets. But Tolkowsky's basic findings concerning the best average pavilion and average crown angles have held true for 83 years.

In 1955, the American Gem Society formally organized its research to understand optical phenomena in diamonds with the establishment of the AGS Diamond Standards Committee. Many industry leaders, including Leo Kaplan, Bob Limon, Carlton Broer Sr. and George Sloan, working closely with Richard T. Liddicoat Jr. partici-

pated in these early discussions, which culminated in the completion of the first AGS Diamond Grading Standards Manual in 1966. The manual was revised in 1975, again in 1983 and 1991, and most recently in 1996.

Throughout this time, AGS retailers have applied the cut grade system in their businesses, addressing the relationship of proportions to a diamond's beauty in such a way as to provide consumers with an additional tool to analyze value at the point of purchase. This system of grading the proportions, polish and symmetry of a round brilliant diamond has enjoyed international popularity since the opening of the AGS Laboratories in 1996.

Ideal has the following dictionary definitions:

- "A standard of perfection, beauty, or excellence."
- "One that is regarded as a standard or model of perfection or excellence."

In our industry, man's quest for perfection in diamond cutting is embodied in the 57 facet American Ideal Cut. The concept of an Ideal cut for diamonds has been adopted, refined, taught and championed by both the American Gem Society (AGS) and the Gemological Institute of America

(GIA) for over half a century. Both organizations credited the diamond cutter and mathematician Marcel Tol-kowsky with the key design propor-tions of the American Ideal Cut.

Tolkowsky's ideas were advocated by Robert Shipley (1887-1978), the educator who almost single-handedly popularized gemology in America. In 1931, Shipley founded GIA, which has become the world's most respected training school for gemologists. In 1934, he founded AGS, a North Amer-ican professional society of jewelers. Shipley's goal was for the AGS to become a "cornerstone of ethics" for the jewelry industry. For decades, students at GIA and members of AGS were taught the superiority of "American Ideal" cut diamonds.

Tolkowsky wrote of a breed of diamond cutter whose goal was to cut a diamond "regardless of loss of weight, the only aim being to obtain the liveliest fire and the greatest brilliancy."

But, although extolled by Tol-kowsky in his book, the beginnings of what came to be the American Ideal Cut diamond can be traced to Henry Morse, who in 1860 opened a diamond cutting firm in Boston, Massachusetts. By 1880 he was recutting the traditional Old Euro-pean cut diamond without regard for weight retention, to produce the most beautiful round brilliant cut diamond of his time.

Morse's work went largely unherald-ed because the great majority of dia-mond manufacturing in the United States steadfastly followed traditional European cutting, with the goal of maximum weight retention from the rough.

**S**ince 1919, cutters of the Ameri-can Ideal have continued to improve its beauty by lengthening the

tower-girdle facets and slightly increasing the table size—all the while staying close to Tolkowsky's recom-mended average crown and pavilion angles.

The subsequent decrease in depth of the crown allowed for a girdle thick-ness that was more resistant to the chipping of the knife-edge girdles of Tolkowsky's time.

During the 1970s and 1980s, Japan-ese gemologists and scientists also began studying the Ideal cut. Their research spawned an instrument called the Firescope.



*Michael Cowing: 'A noble purpose in any and every endeavor is mankind's quest for the Ideal.'*

While Tolkowsky's two-dimensional math modeling took into account only the 16 main facets and the table, this instrument permitted a three-dimen-sional visual display of the optical per-formance of all 57 facets of the round brilliant. Kioyishi Higuchi, a diamond cutter working for what was to become the EightStar Diamond Company in Japan, used this optical assessment tool to develop a combination of angles and proportions for all 57 facets of the American Ideal, advancing the quest for maximum diamond brilliance and fire.

This was the birth of what some call the "super Ideal cut"—the term subse-quently applied to hearts and arrows diamond cuts and others.

"Super Ideal cuts," with their three-dimensional optical perfection, and crown and pavilion main angles close to Totkowsky's, achieved a new dimension in cutting perfection, termed "optical symmetry."

The "super Ideal" reached the United States in the 1990s and was champi-oned by American diamond cutting houses producing optically symmetrical Ideal cuts. They continued to refine and improve on the "super Ideal cut" using the latest diamond cutting tech-nology and optical performance assessment tools.

**T**he American Ideal Cut diamond has evolved and improved in opti-cal performance and beauty through the advancing skills and technology of the very best of the diamond cutting profession. Today, cutting firms worldwide are embracing Morse's evolved American Ideal.

In the fall 1998 issue of *Gems and Gemology*, the GIA published an arti-cle entitled "Modeling the Appearance of the Round Brilliant Cut Diamond: An Analysis of Brilliance." This arti-cle, and subsequent statements by GIA's President Bill Boyajian, appeared to strongly suggest the insti-tute's intent to depart from its historical support of the American Ideal Cut.

The rationale for such a significant about-face seemed to be summed up in the following statement by the GIA, which concluded that their study results "do not support the idea that all deviations from a narrow range of crown angles and table sizes should be given a lower grade."

Two further comments by Boyajian attempt to clarify the organization's repositioning: "Although it is not GIA's role to discredit the concept of

an 'Ideal' cut,' he wrote in the introduction to GIA's study into brilliance, "on the basis of our research to date we cannot recommend its use in modern times."

Later, in an introduction to GIA's study on fire, Boyajian appears to suggest that there may be no way to prove or disprove what is Ideal, stating, "the researchers have concluded that there is no easy way to characterize 'best cut.'"

**I**n our judgment, the GIA's rationale for repositioning obscures the basic issues presented to our industry by advanced optical technologies. These technologies create—indeed, they mandate—the opportunity to refine the parameters defining the American Ideal Cut. However, nothing we have seen justifies elimination of this lofty standard.

Cutters, optical physicists, gemologists and mathematicians have labored

to better understand proportion, polish and symmetry parameters in their search for the most beautiful diamond. The goal that drove the evolution of the American Ideal was to find proportions that would maximize the diamond's beauty.

The light that the face-up or normal viewer sees in a diamond is reflected and/or refracted from both crown and pavilion facets, so the interrelationship of all the facets together determine the paths of light through the diamond to the observer. This is a valid reason for criticism of the cut grading systems that grade a diamond cut by specifying tolerances of each proportion parameter independently of the others. It is necessary to observe the result of the interaction of all diamond facets, in order to thoroughly evaluate optical performance, and assist the industry and the consumer with their understanding of the relationship of light and beauty.

**C**ontinuing research at the American Gem Society is keeping the AGS Ideal 0 cut grading system current with advancing knowledge of diamond optics and performance, as it relates to diamond beauty.

Just as in the current AGS American Ideal 0 cut-grading system, there is a range of proportions that will produce an Ideal result. The diamond's optical performance, as seen by the trained eye, aided by performance assessment devices, will become the final quality control measure that will be used in future to refine the range of "Ideal" proportions.

A noble purpose in any and every endeavor is mankind's quest for the Ideal. Our goal is to refine the AGS Ideal 0 using the most advanced diamond cutting knowledge and science of the day.

This is an essential mission of the American Gem Society and the American Gem Society laboratories. ■

## GIA to assess cut on reports

They're not calling it a cut grade, but the Gemological Institute of America (GIA) will add a cut "classification system" to reports this spring, officials say.

But one thing there will not be is a cut grade that measures how a stone fits into a fixed set of proportions such as those offered by the American Gem Society, which uses as its base Marcel Tolowsky's "Ideal."

The new system is being developed only for round brilliants, although the research eventually could have implications for fancies.

The new classification system stems from GIA's research on cut. The latest report from that study appeared in the Fall 2001 issue of *Gems and Gemology* and focused on fire. Among the discoveries:

- No single set of proportions yielded the most fire. GIA reached a similar conclusion regarding brilliance. Boyajian said this discredits the notion of an Ideal cut.

- While some cuts—including the Ideal—had strong fire and brilliance, the two qualities were often in opposition. For example, smaller crown angles boost brilliance, but larger crown angles, along with smaller tables, increase fire.

- The lengths of star-and lower-girdle facets affect both fire and brilliance. GIA noted that most previous cut studies, as well as cut grades, don't take this into account.

- Lengthening lower girdle facets from Tolowsky's value of 50 percent to 75-85 percent enhances a stone's fire.

The final part of the study, which explores scintillation, should be completed next year.

Meanwhile, American Gem Society lab director Peter Yantzer said that he welcomes more competition in the cut arena. "One of the tenets of the American Gem Society is protecting the consumer, so if GIA wants to provide more information on their reports, I commend them for that," he says.

As for GIA's disparagement of the Ideal concept, Yantzer said, "Our grading system has always been dynamic. And if more information becomes available to us either through our own studies or through GIA research, we are always willing to rethink things." But he doesn't see changes arising out of what's appeared so far. "I still feel that, when all is said and done and GIA finishes the research, they will end up with a stone that's close to the Tolowsky model," he said.