Diamond Cut Grading Simplified

The Hanneman System

A Basic Course

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The cut grade of any round brilliant diamond can be derived from the knowledge of four measurements, two equations, and a table of 12 numbers. The measurements are total height, diameter, crown angle, and pavilion angle. The equations are C/P=0.84 and H=58.3 +3. The table is printed below.

This information can also be used to evaluate the relative severity of any commercial grading system or laboratory. Simply plug in their numbers and compare the results.

LESSON ONE - INTRODUCTION

O.K. Now that I have your attention, I'll give you the next couple of paragraphs. First, let me say this. Every diamond in every jewelry store, under the bright lights of the sales counter looks good to someone. If it is pretty, you like it, and the price is right, buy it, be happy, and read no further. But then, how can you know if the price is right, if you don't know its cut grade?

Learning to cut grade a diamond is not rocket science. When all is said and done, the final result is expressed in one or two words like "Good" or "Very Good", letters like A or B, a relative number like 1 or 2, or a fancy one like I or II. All the rest is just "window dressing" designed to make a customer feel better for the fee paid for that report or an attempt to "justify" the *subjective* opinion just rendered.

For about $1300 plus travel, lodging, and four days of your time, you can have all this spoon fed to you. Or, you can read the following few words and learn how anyone can develop the same, no, actually more useful, information easier and faster.

The only reason for grading a diamond is to assign a relative value to that stone. However, since each grading laboratory sets its own entirely subjective proprietary limits on their grade requirements, accurate comparisons are impossible. What one lab calls "Good" may be another lab's "Very Good". Still, the trade understands this, and that explains why some certificates are recognized as being more desirable than others. As a seller, one desires lenient grading, while buyers prefer stricter standards.

As of a few years ago, based upon the requirements for a "top quality" classification, the severity of grading by various labs was roughly in the order shown below.

	C/P Range
AGA	0.83 - 0.85
AGT	0.81 - 0.86
CGL	0.80 - 0.86
AGJ	0.80 - 0.87
AGS	0.81 - 0.89
IGI	0.80 - 0.90

The current GIA system, as taught to students, would rank next to the top with C/P = 0.81 - 0.85. This, alone, despite their ballyhooed denial of its existence, confirms GIA's belief in an ideal cut.

For the present, don't concern yourself with those C/P values. That is what this "course" is all about. Soon, you will learn how convert the data from any "Diamond Report" to an objective "Universal" rating in less than two minutes. Just be patient. First, you have to jump through a few hoops.

Homework Assignment

1. Visit one or more local jewelry stores, or contact them by phone and tell them you would like to know their prices for a 3/4 carat solitary round brilliant cut diamond ring, or the price of an equivalent unmounted stone. They should have several levels of quality from which to choose.

2. For each level, record the data supplied on its certificate regarding the 4Cs, Carat weight, Color, Clarity, and Cut. You really don't need the data on Color and Clarity, but they will think you are some kind of a nut if you don't ask.

3. Ask for the following information from their grading report. Diameter, Height, Crown Angle, and Pavilion Angle, and any other information or notations they would like to give you. At a minimum, you should get data for Diameter and Total Height or Depth.

4. Collect similar data for six different stones. If possible, collect data for two each in categories the seller regards as his good, better, and best qualities. If that is not possible, try to get data for three good, two better, and one best quality.

5. If you are really too lazy to do this right, just make up some numbers you think look good. and we will show you how to cut grade those stones you "created".

LESSON 2 - BASIC PROPORTIONS

This is basic geometry, but stick with me. In simple terms, a diamond can be considered as being composed of three components which fit together—a cone, a

cylinder and a frustum, i.e., part of a cone shaped solid next to the base that is formed by cutting off the top by a plane parallel to the base. These shapes correspond to the pavilion, girdle, and crown of a cut diamond. The base of the cone forming the pavilion, the base of the frustum forming the crown, and the girdle all have exactly the same diameter.

Now, if one defines the diameter, the crown angle and the pavilion angle, one cannot define the size or shape of the object because the size of the girdle has been ignored. If one defines the diameter, the crown and pavilion angles, and the girdle, one still cannot define the size or shape of the object because the height of the crown has been ignored. However, if one defines the diameter, the crown and pavilion angles, the girdle, and the crown height or Total Height, the size and shape of the object is completely defined. That is why these measurements are used in cut grading to define the size and shape of the stone. In practice, one can consider the combination of all of these measurements to be unique for each cut diamond.

Over 100 years of diamond cutting has led to a consensus (except for the GIA) there are optimum values for each of these measurements, if one wishes to produce a product recognized as having the best compromise between brilliance and fire. This optimum has been termed the "Ideal Cut". To be sure, there are "many" ideal cuts which have been proposed by others. They stress brilliance, fire, or even economics, by minor alterations to things like table size. However, no one has seriously challenged the fact the crown and pavilion angles are the key to beauty.

The GIA claims there is no single set of proportions which produces the "best" cut for round brilliants. In this, they are mistaken. Granted, one will never be able to demonstrate it, as our measuring systems are not precise enough, but all the data, including the GIA's own monumental study demonstrate there is an optimum set of proportions. Those proportions are attained when the ratio of the crown angle:pavilion angle (C/P) has a value of 0.84.

Useful as that information is, as said earlier, defining crown and pavilion angles are not enough to define the shape and size of a stone. Every dimension has an effect, and we shall now consider them.

The most critical measurements are those of crown height and girdle thickness. If one can directly measure them, fine, do so. However there is another way to get the same information. If one examines the certificates commonly found accompanying almost all diamonds in "lower end" jewelry stores, information such as diameter and total height or depth will be found.

Again, years of diamond cutting has shown the optimum thickness of the girdle can be considered to be 3% of the diameter of the stone, and the total height or depth of the pavilion plus the height of the crown also has an optimum. That value is 57.3% of the diameter. Combining these values gives us Total Height = 57.3 + 3%. This is the other equation needed in the Hanneman Cut Grading System

Homework Assignment

1. Using the information gathered for the stones in Homework Assignment 1, determine the C/P ratios and Total Height values for each of your samples.

2. If you do not have the data to determine C/P, don't worry. We can make up some.

LESSON 3   CUT GRADE CATEGORIES AND TAKING OUT THE GARBAGE.

Cut Grade Categories

Cut diamonds can be fitted into one of five categories. Not renowned for my tact, I simply call them Best, Better, Good, Junk and Garbage. Granted, retailers use more euphemistic terms. They are, nevertheless, still undefined. But, never mind what they are called. By the time we are finished, we will have dispensed entirely with all such subjective terms and we will be able to assign two precise objective numbers to any stone. These numbers will have a universal meaning. They will transcend all previous subjective designations and will be unambiguous.

But, first, consider the present situation. From the information supplied by sellers and required by truth in advertising laws, one can read between the lines of their certificates, if one knows how. Here is how, starting from the bottom up.

1. If the stone is set in a mounting and sold without a certificate of any kind, you can rest assured it would grade either as Trash or Garbage.

2. If it is sold with a grading report or certificate, READ IT. In its simplest form, you should still see notations relative to the stone's weight, color, and clarity, as well as numerical values for its diameter, as well as total height or depth. These will be considered in a moment.

3. If offered by a top class jeweler, it will probably be sold unmounted and accompanied by a fancier certificate listing all sorts of measurements, e.g., diameter, table size, crown height, crown angle, girdle size, pavilion angle, culet size, polish, finish, and other comments. Don't be confused by this plethora of data. You don't need all this to grade a stone. Junk is junk and it is obvious if you know what to look for.

Taking out the Trash and Garbage

Well cut diamonds have certain characteristics. So do Junk and Garbage. For those who can, I would suggest visiting your local shopping mall. There you'll find a Diamondologist or Gemologist who will be happy to educate you. They have numerous stones to illustrate the different features. Look at their stones. Ask questions.

If the girdle obviously appears too thick or too thin, the table appears too large or too small, or the culet is noticeable, you are at best dealing with Junk. If you wish to confirm this, measure them or look at the numbers on the certificate for total height and diameter. The Total Height of the stone is the important number. If the height value is not between the values of 58% and 64% of the diameter, you know you are dealing with Junk or Garbage.

Diamonds are sold by nominal weight. A three quarter carat (0.75 ct) diamond must weight at least 0.70 ct to qualify. Also, diamond cutters are not fools. They know if they leave a little extra weight on what should produce a nice 0.69 ct stone in order to produce a 0.70 ct stone, their profit will be greater. Consequently, one finds an inordinate quantity of 0.70 and 0.71 ct stones for sale. Most of these stones have been cut for weight rather than beauty, and they deserve to be called Junk.

If your stone passes the previous tests, and the Junk and Garbage have been eliminated from further consideration, it is then necessary to determine only two additional properties; crown angle and pavilion angle. If not, don't bother. You will be wasting your time. Cut grades are based on the worst properties, and you have already found them.

LESSON 4 EVALUATING CUT

To begin, we must first define our categories, Good, Better, and Best. We have already disposed of Junk and Garbage. Now, we need to determine what is called the C/P ratio. To do this, simply divide the value of the crown angle of the stone by the value of its pavilion angle. This should give you a result somewhere between 0.79 and 0.91. If it doesn't, you have made a mistake in arithmetic.

Now, consult the table below to convert that C/P value into the cut category of your stone. That is all there is to it.

C/P Ratio	Cut Category
0.83 - 0.85	Best
0.81 - 0.83 or 0.85 - 0.88	Better
0.79 - 0.81 or 0.88 - 0.91	Good
Less than 0.79 or More than 0.91	Junk or Garbage

 Many stones which have been previously classified as Junk or Garbage on the basis of Total Height will indeed show C/P ratios between 0.79 and 0.91, if you were to measure them. Don't, it will only confuse you. They have already been eliminated from consideration. Merely having the "correct" C/P ratio is not enough.

The Problem and Solution
From the preceding it is obvious one can convert any Total Height and C/P ratio into a cut grade. The grades above represent perhaps the most stringent cut grading

system yet devised. As previously shown, it is more stringent than the present GIA system or any other system in general use today. Therein lies the problem. A cut rating of "Good" does not have an unambiguous definition clearly understood by everyone, everywhere. In simple terms, it is subjective and that makes it useless.

Time and experience have shown there is no simple way of resolving that problem. The only solution lies in abandoning the use of subjective terms and replacing them with purely objective numbers. This can and should be done for all future cut grading reports. The simple act of reporting the Total Height as % of diameter and the C/P value of the stone in question will accomplish this. With that information, anyone can cut grade any stone without ever seeing it—as has just been shown.

Reporting these two values would not require any change in present practices. Graders could still use their subjective terms and customers would still be confused and wondering why one grader calls their stone's cut "Excellent" while another calls it only "Very Good". However, now, anyone can simply look at the C/P ratio and Total Height values and instantly recognize both graders evaluated that stone identically. Only the names of the categories they used to subjectively describe the cut of that stone were different.

Advantages of Reporting C/P
Current cut grading systems measure the pavilion and crown angles to the nearest 0.1 degree. Since the C/P value is a ratio, there is no problem calculating that value to three decimal places.

Now suppose a laboratory has arbitrarily chosen to define their "Very Good" category as having the "correct" Total Height and a C/P ratio of 0.800 to 0.820, and they receive two stones which have C/P ratios of 0.801 and 0.819 respectively. Certainly, the lab could simply report both stones as grading "Very Good". However, that is not the whole story.

The first stone is what one could call "barely Very Good" while the other could be described as "almost Excellent". All other things being equal (which they never are), there should be some sort of a value differential between the two stones. If so, I believe it would behoove the laboratory to convey that information about the two stones to their customer. Using C/P ratios, that can be easily done. Using the present system, it is impossible. Essentially, reporting C/P ratios can increase the precision of one's cut grade by an order of magnitude. That is indeed worth doing.

Epilogue
Anyone doubting the superiority of this system is invited to try it on their own previously graded stones. Besides the simplicity and ease of determining the final cut grade, you will find the results (adjusted for the less stringent requirements of your present system) are essentially identical. As said in the beginning, "This information can be used to evaluate the relative severity of any commercial grading system or laboratory. Simply plug in their numbers and compare the results."