Планирование бриллианта

Figure 1. The cutting process is critical to the transformation of a diamond from a simple crystal to a brilliant faceted gem in a beautiful piece of jewelry. The faceted diamonds in these contemporary rings range from 1.04 ct for the smallest oval to 1.96 ct for the largest marquise. Courtesy of Hans D. Krieger, Idar-Oberstein, Germany; photo © Harold & Erica Van Pelt.

Figure 2. Many decisions are required to turn a rough diamond like the macle on the left into a fine triangular brilliant-cut diamond like the stone on the far right. Courtesy of Kleinhaus, New York; photo © Harold & Erica Van Pelt.

Эта «конвейерная лента» экономики показывает добавочную стоимость, которую алмаз получает в процессе от его извлечения из недр – до потребителя ювелирного изделия

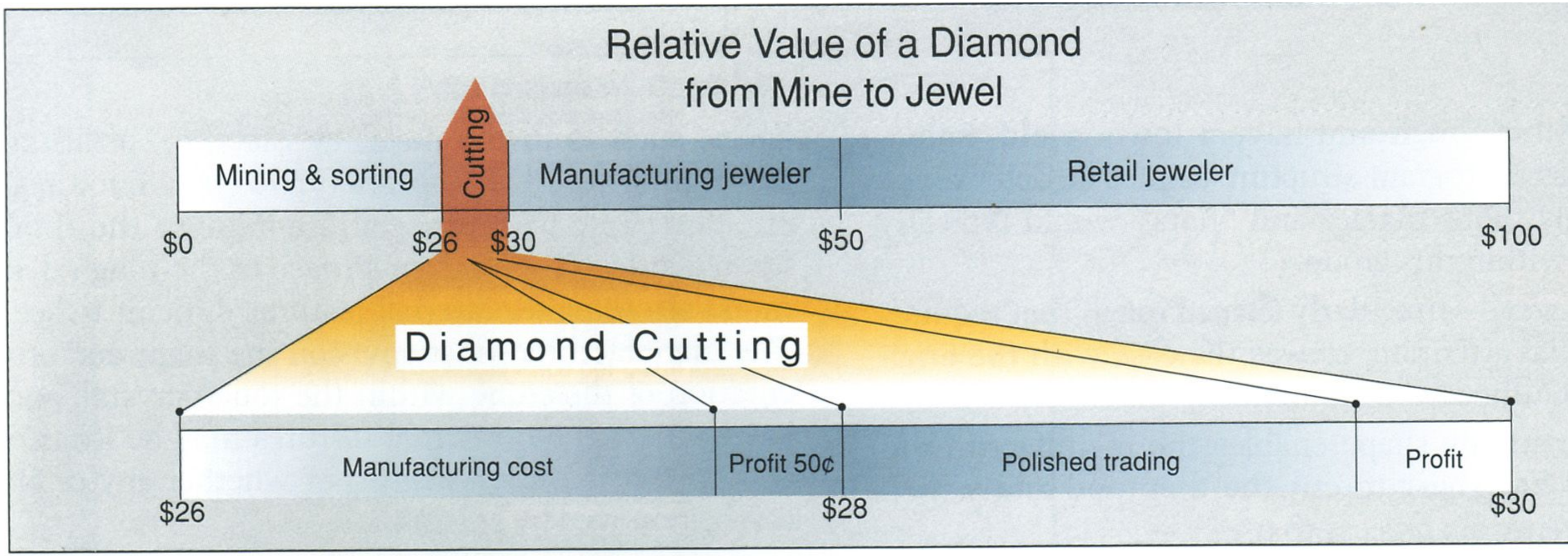


Figure 3. This economic "conveyor belt" illustrates the added value that a diamond attains as it passes through the manufacturing process from the mine to the retail jewelry store. Typically, within this conveyor belt, the diamond manufacturer's component is only a very small portion of the ultimate retail value, about 2%. Within this narrow range, all manufacturing costs must be included as well as some profit for the manufacturer.

Наиболее ответственная часть в обработке алмаза – это подготовка его к распиливанию или раскалыванию, что требует принятия комплекса решений для получения максимальной выгоды в конечном камне.

Figure 4. The most critical stage in diamond manufacturing, marking the diamond for sawing or cleaving, requires a complex decision-making process to optimize the value of the finished stones.

На этих диаграммах приведены примеры поиска правильных решений при раскрое кристалла-сырца.

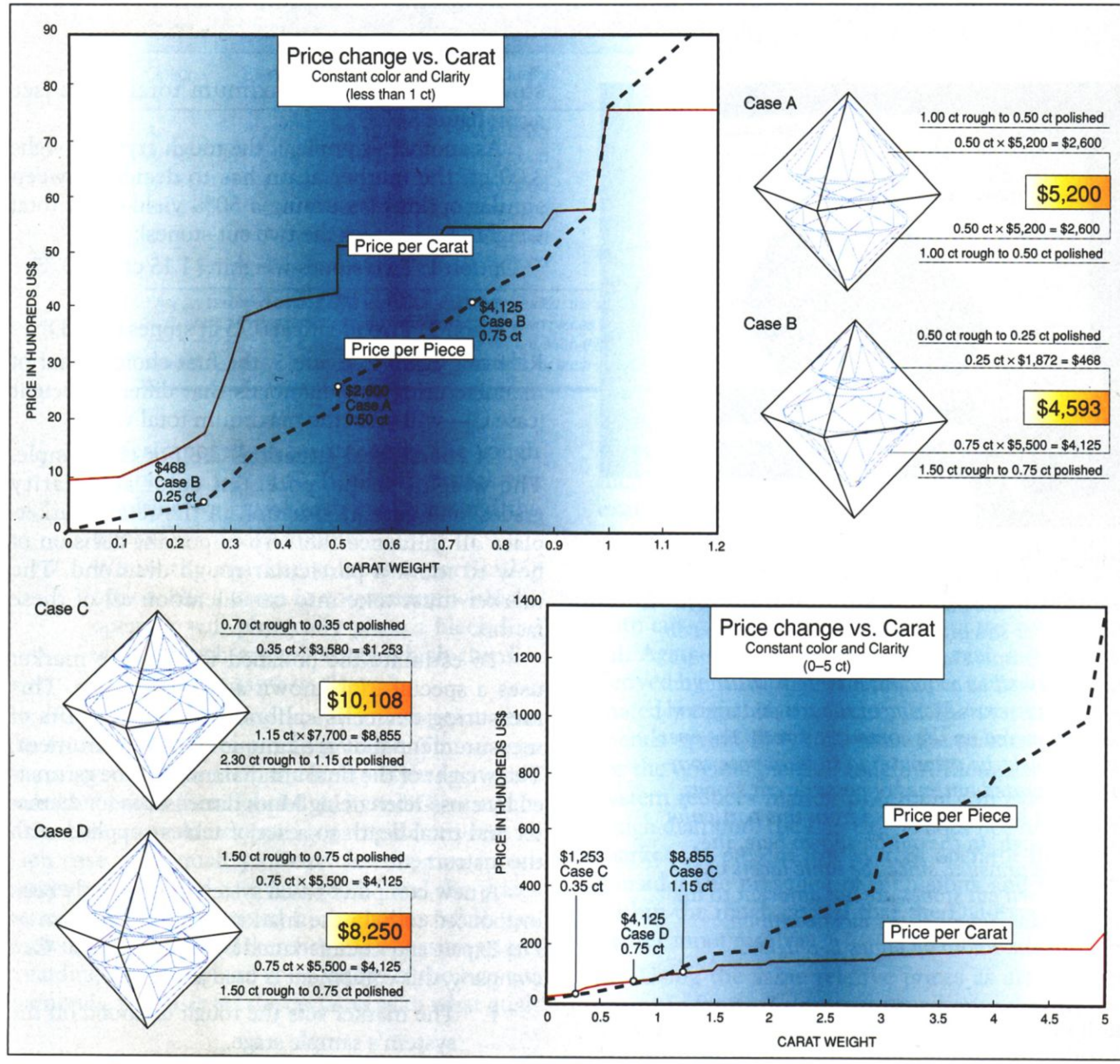
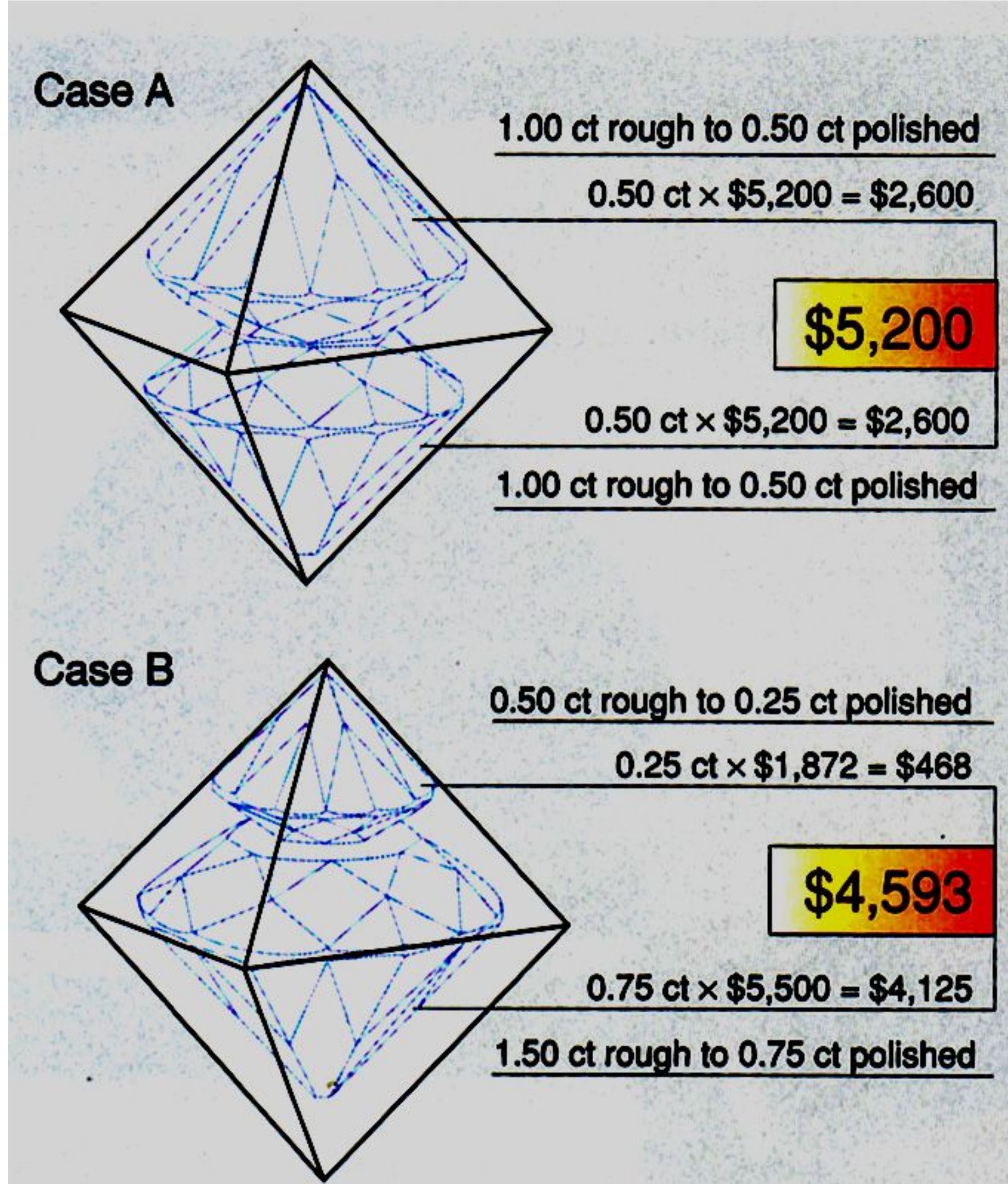


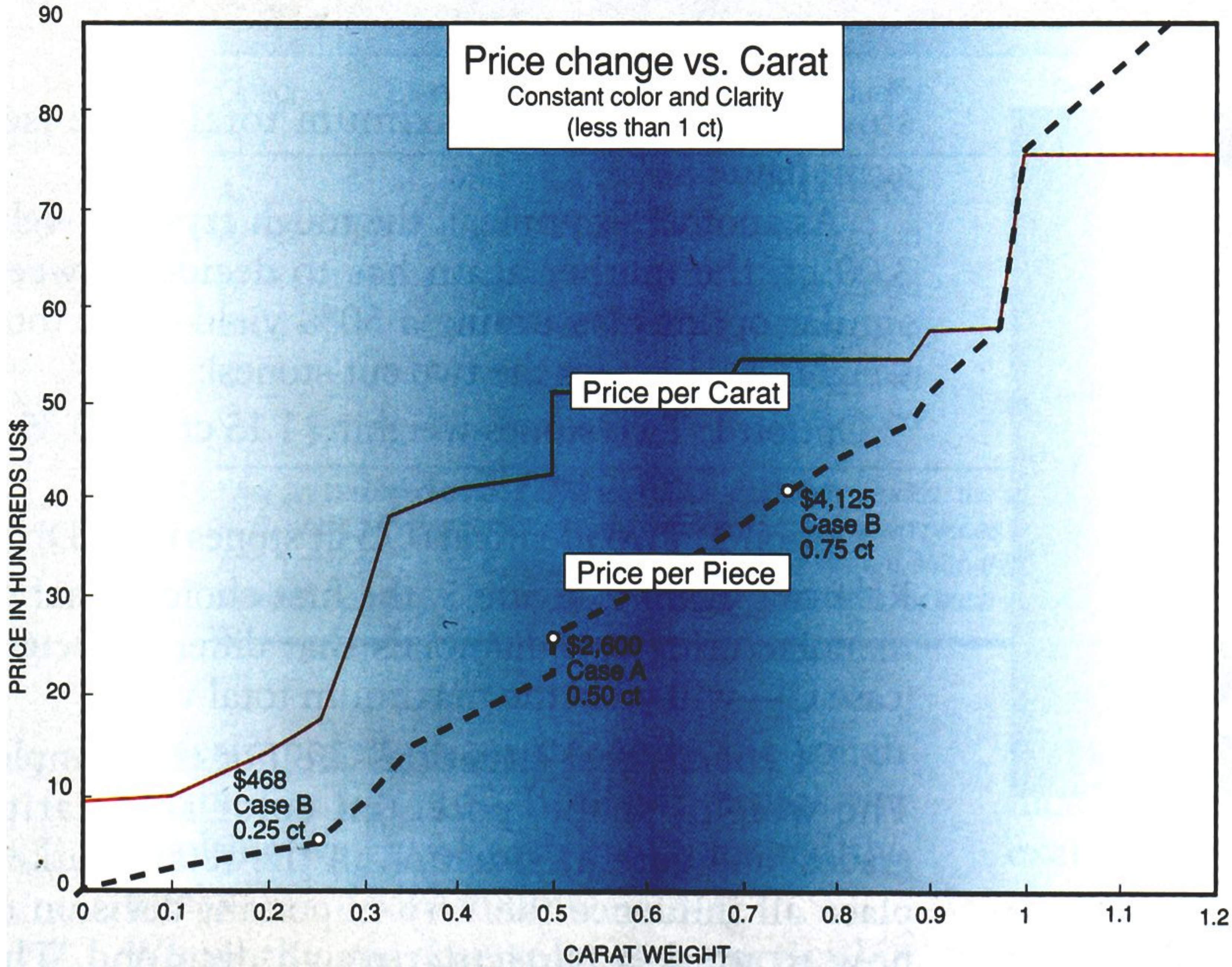
Figure 5. These graphs show the relative prices per carat and per piece for cut diamonds with weights primarily below (top) and above (bottom) approximately 1.00 ct. Note how the price differential increases significantly as carat weight increases (assuming other factors are identical; for the purpose of this illustration, the diamonds are all round brilliants and all have the same color and clarity grades). At certain key points (such as near 1.00, 2.00, and 3.00 ct), price jumps sharply. In the diamond-manufacturing process, the price per piece of the single stone—or total price for the two stones—cut from the original piece of rough is the crucial value to maximize. Even though case B will yield a 0.75 ct stone, case A provides the greater total value for the original piece of rough. However, the added value for the 1.15 ct stone that case C will yield makes it the better choice than the two equal-size stones in case D

Масса кристалла 2 ct

Случай А. Кристалл раскраивается на два одинаковых камня массой по 1 ct, из которых после огранки выйдет 2 бриллианта по 0,5 ct каждый, общей стоимостью 5,2 тыс.долл.

Случай В. После раскроя 1 камень в сырье 0,5 ct, после огранки – 0,25 ct. Второй камень в сырье 1,5 ct , а после огранки 0,75 ct. Масса в обоих случаях одинаковая, но стоимость бриллиантов в первом случае выше на 607 долл.



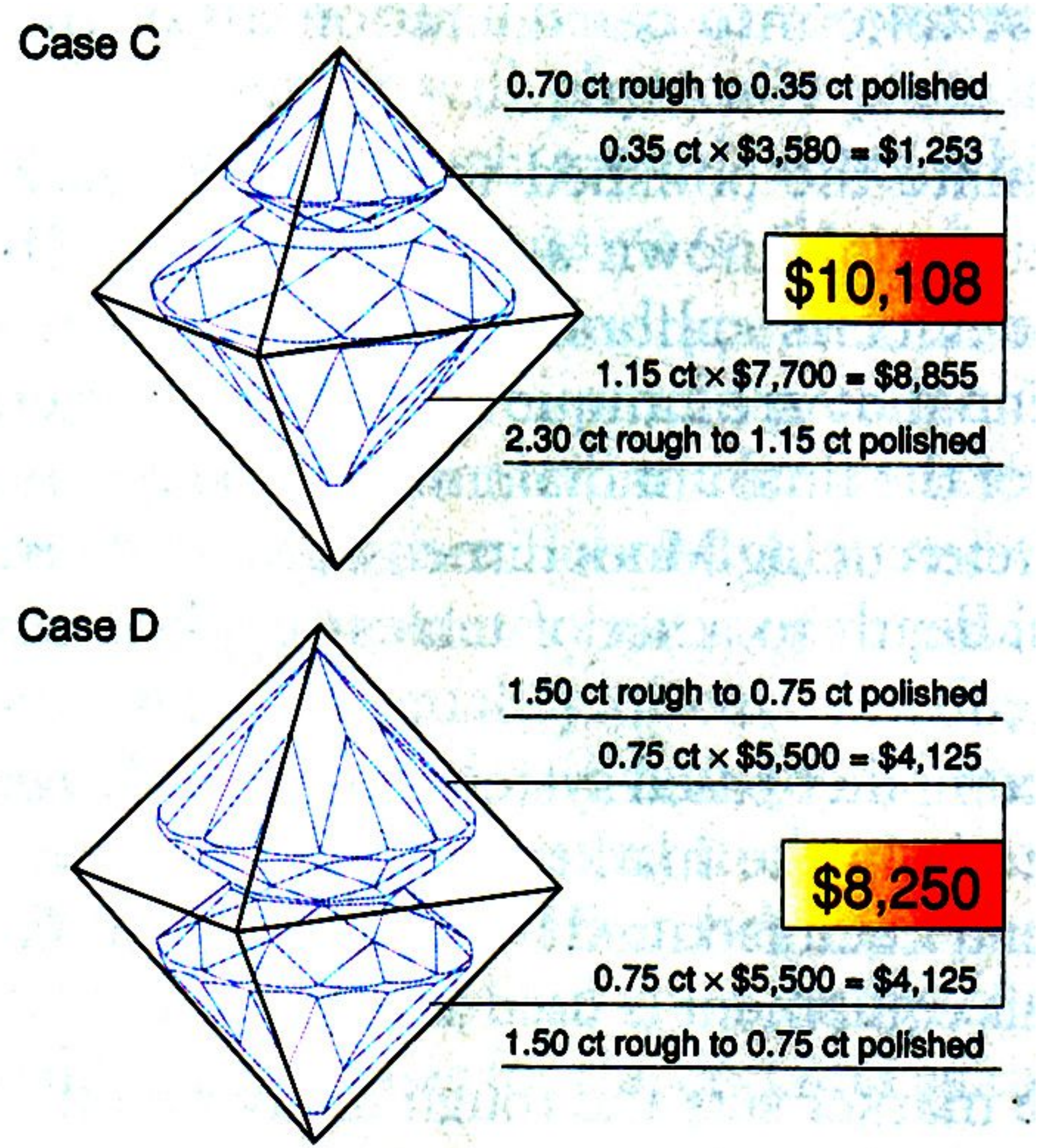

Price change vs. Carat
Constant color and Clarity
(less than 1 ct)
Price per Carat
Price per Piece
$468
Case B
0.25 ct
$2,600
Case A
0.50 ct
$4,125
Case B
0.75 ct
PRICE IN HUNDREDS US$
CARAT WEIGHT
0
10
20
30
40
50
60
70
80
90
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

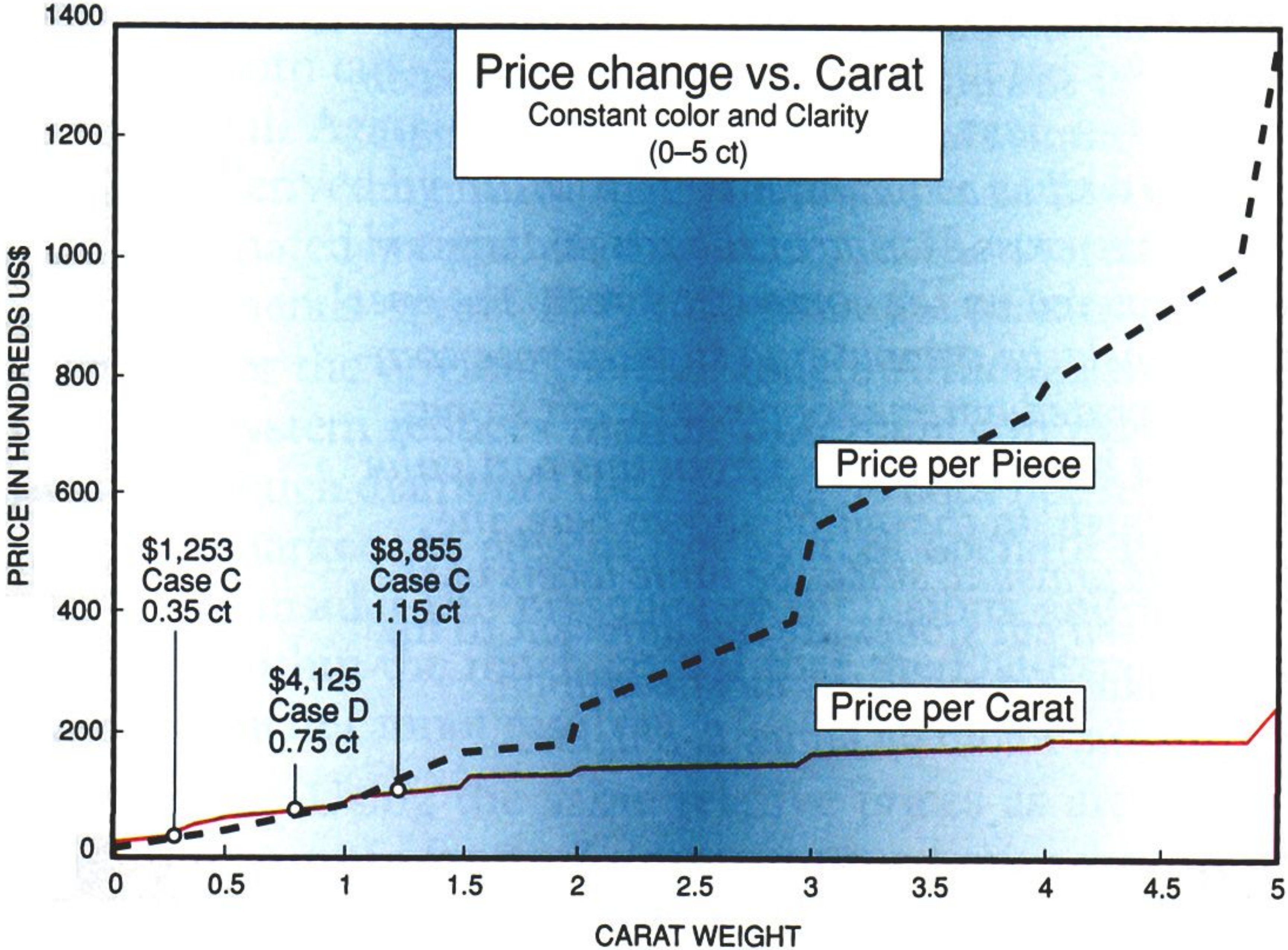
Масса кристалла 3 ct

Случай С. Один конечный бриллиант 0,35 ct, а второй 1,15 ct дают суммарную стоимость $10.108.

Случай D. Оба бриллианта одинаковые по 0,75 ct, общей стоимостью $8.250.

Как видим, здесь результат противоположный: вариант С дает камни на 1858 долларов дороже.





Price change vs. Carat
Constant color and Clarity
(0–5 ct)
PRICE IN HUNDREDS US$
1400
1200
1000
800
600
400
200
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
CARAT WEIGHT
Price per Piece
Price per Carat
$1,253
Case C
0.35 ct
$4,125
Case D
0.75 ct
$8,855
Case C
1.15 ct

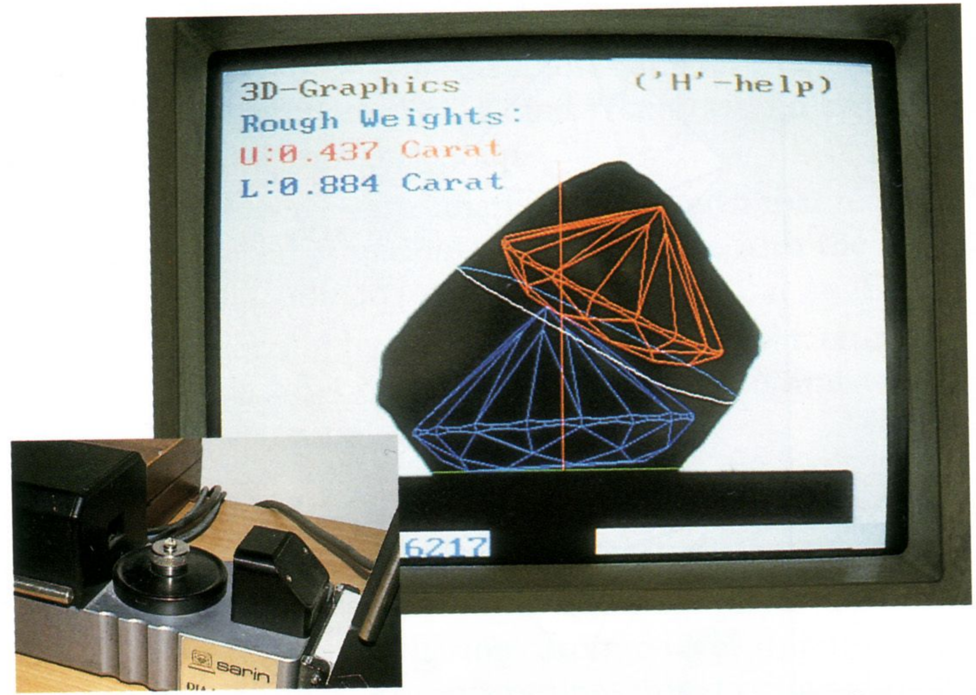
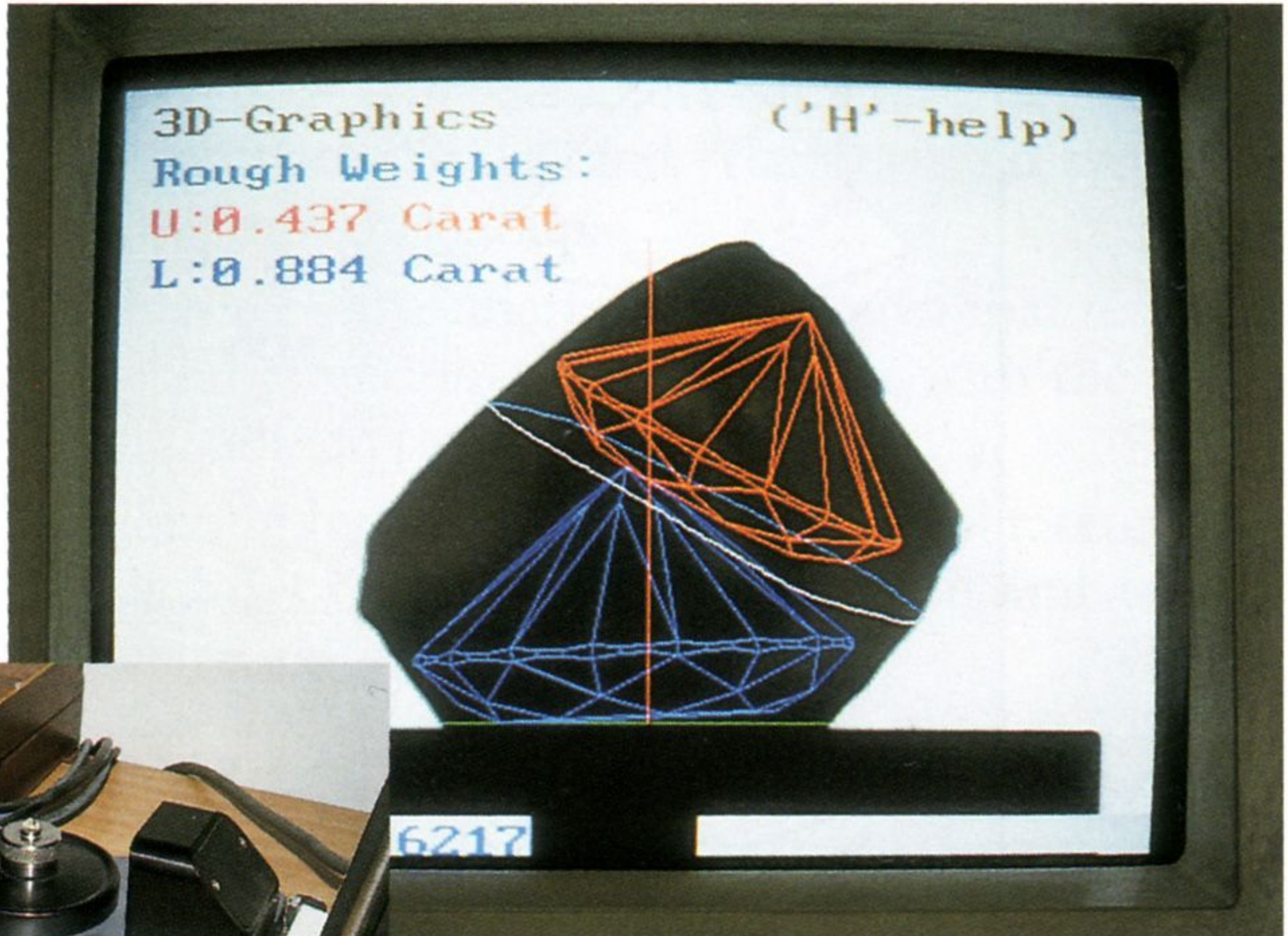


Figure 6. The marker uses the Sarin Dia-Expert system (here, with Dia-Mension hardware) to help identify the best position to mark a rough diamond for sawing or cleaving. The system consists of a sample stage, light source, and camera (inset), as well as a computer system. Within an image of the cross-section of the rough diamond that is depicted on the computer screen, the operator may ask the computer to superimpose computer-generated outlines of possible cut stones that could be manufactured from this particular piece of rough. In the option shown here, the solution is unusual, since the table facets of the two proposed cut stones are not adjacent to the sawing plane, which is the most common arrangement. Photo by James E. Shigley.


3D-Graphics ('H'-help)
Rough Weights:
U:0.437 Carat
L:0.884 Carat
6217


sarin

Представьте себе величину 0,05 мм! Невооруженным глазом практически неразличима. Но при раскрое алмаза она может иметь драматические последствия, что иллюстрируется данным рисунком. Расстояние между двумя плоскостями **0,05 мм**. Разница в стоимости конечных бриллиантов составляет **2377 долларов**!

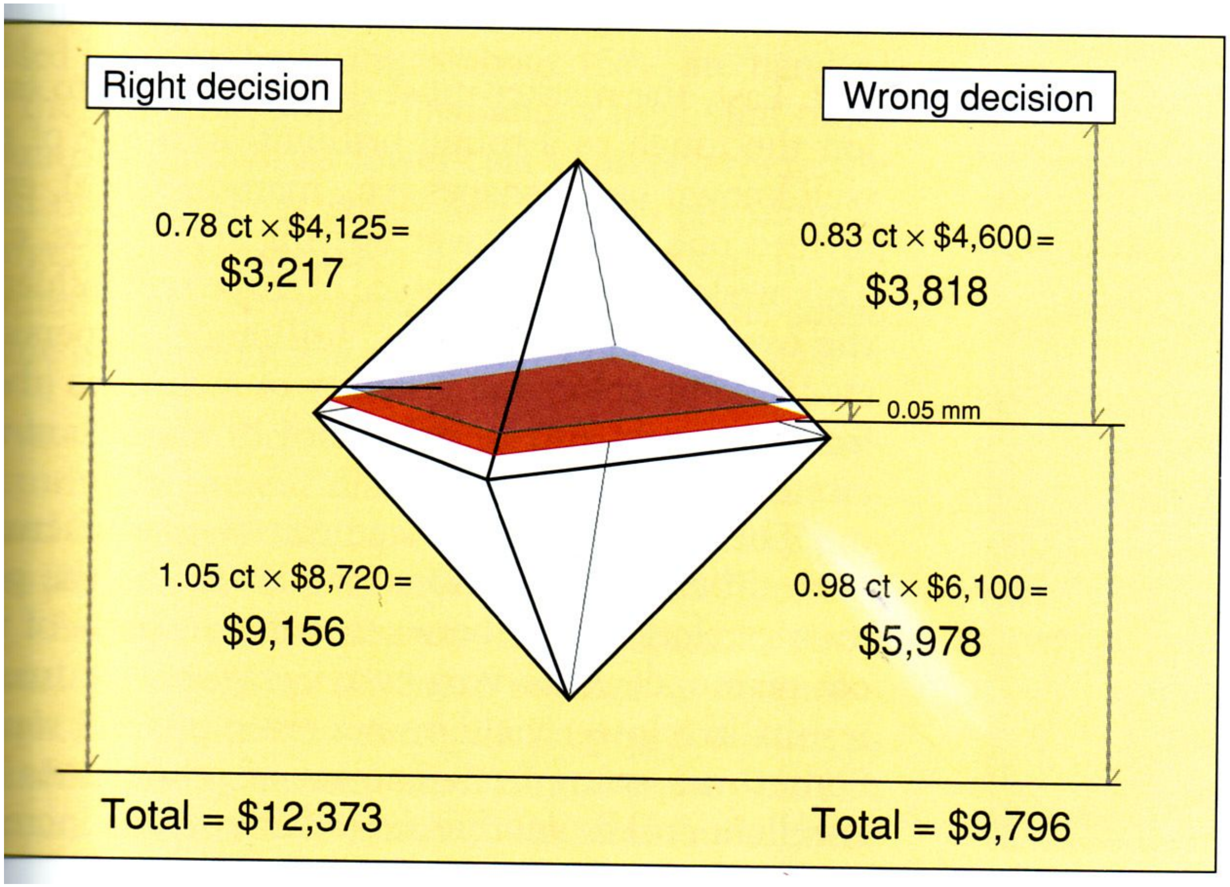


Figure 7. The marker must carefully evaluate where to place the marker line on the rough diamond so as to achieve the maximum yield from that piece of rough. As this illustration shows, even a small, 0.05 mm, change in the placement of this line can result in a major difference in the total price of the two final cut diamonds. To determine the price per piece, the final carat weight of each stone is multiplied by the price per carat (using the same relative prices as are given in figure 5).

Более сложные задачи ставят перед ювелиром включения в кристалле алмаза. Здесь ему приходится решать как получить максимальный выход ограненного камня и одновременно как можно сильнее нейтрализовать влияние включения на качество бриллианта. В идеальном случае единичное включение можно нейтрализовать путем помещения его в плоскость распила. При этом надо принимать во внимание, что включение отражается многими гранями кристалла и его нужно правильно локализовать.

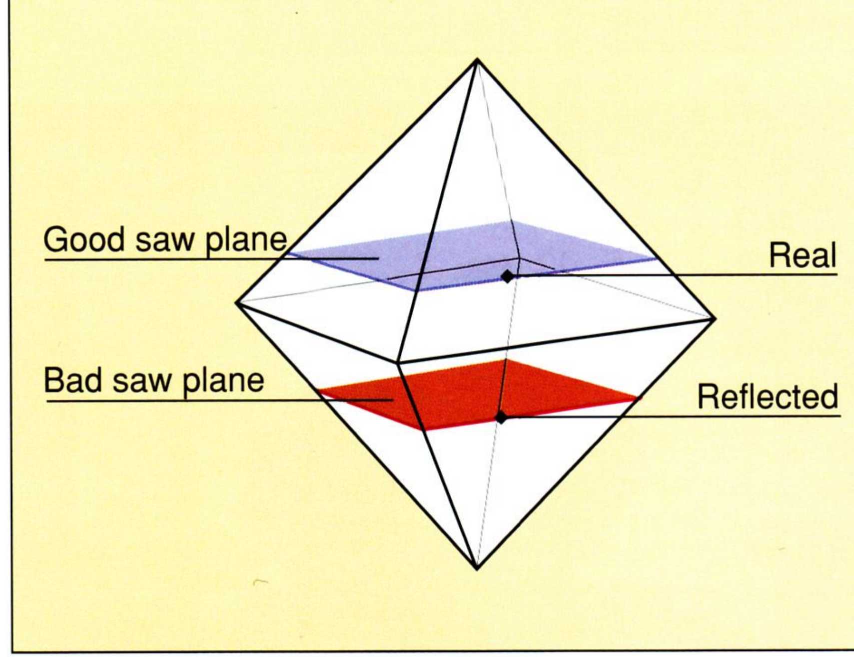


Figure 8. One of the greatest challenges facing the marker is the location of inclusions in the rough diamond and how to avoid or place them in the polished stone. This illustration shows the locations of a real inclusion in a diamond crystal and a reflection of this same inclusion produced by the refraction of light. The diamond could be sawn through either location, depending on where the marker line is placed. If the crystal was sawn through the imaginary "inclusion" (the reflection), the result would be a larger lower-clarity stone and a smaller higher-clarity stone. If the crystal was sawn through the real inclusion, however, it would yield two stones similar in weight to those in the first option, but both would be of higher clarity—and, therefore, would have a higher total value.

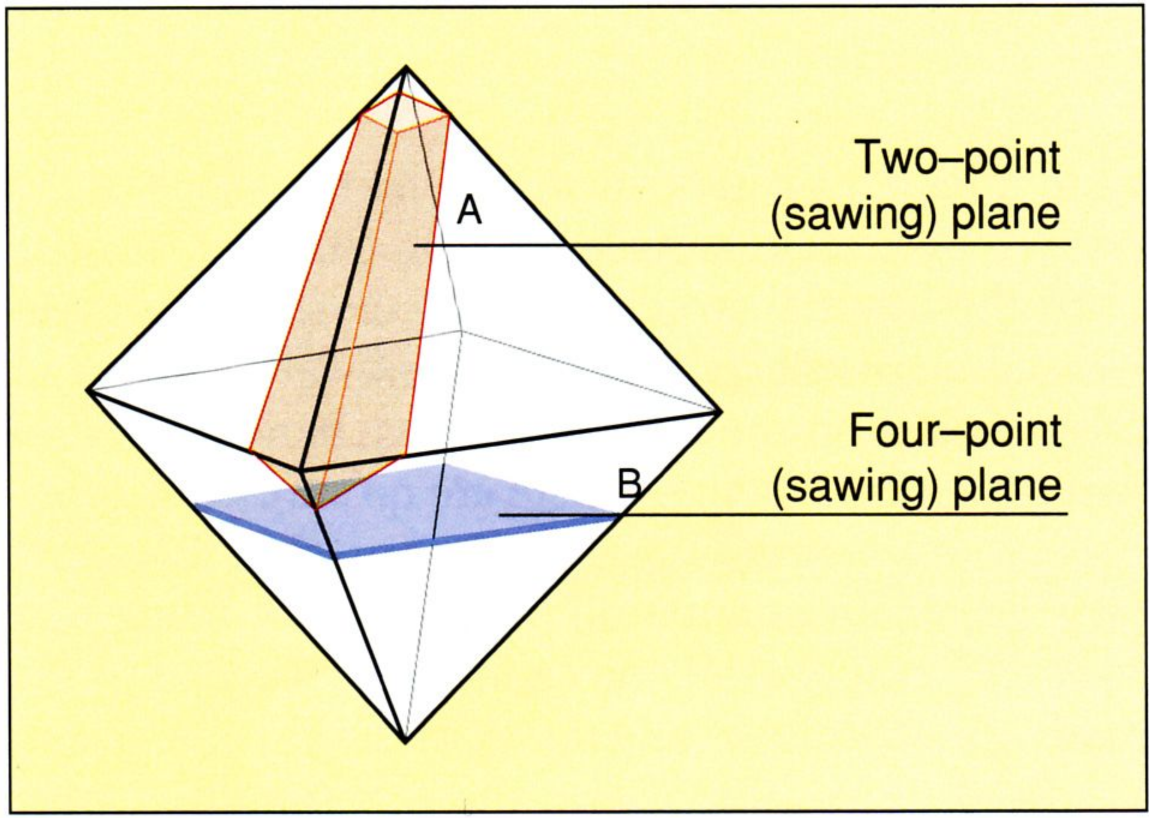


Figure 10. The sawing plane used for an octahedral diamond crystal is indicated by outline B. Mechanical sawing commonly takes place along such planes (ones parallel to cubic faces). This plane is also known as the "four point" plane, because the sawn surface has four equidistant corners. Outline A indicates another sawing plane, a two-point plane; such planes are parallel to dodecahedral crystal faces.

Figure 11. Modern sawing machines, like this Dialit AS500, have a pressure controller. After setting the diamond in the machine, the operator sets the required pressure of the diamond on the blade and the maximum velocity in which the diamond will be sawn. The control system continuously checks and adjusts the pressure.

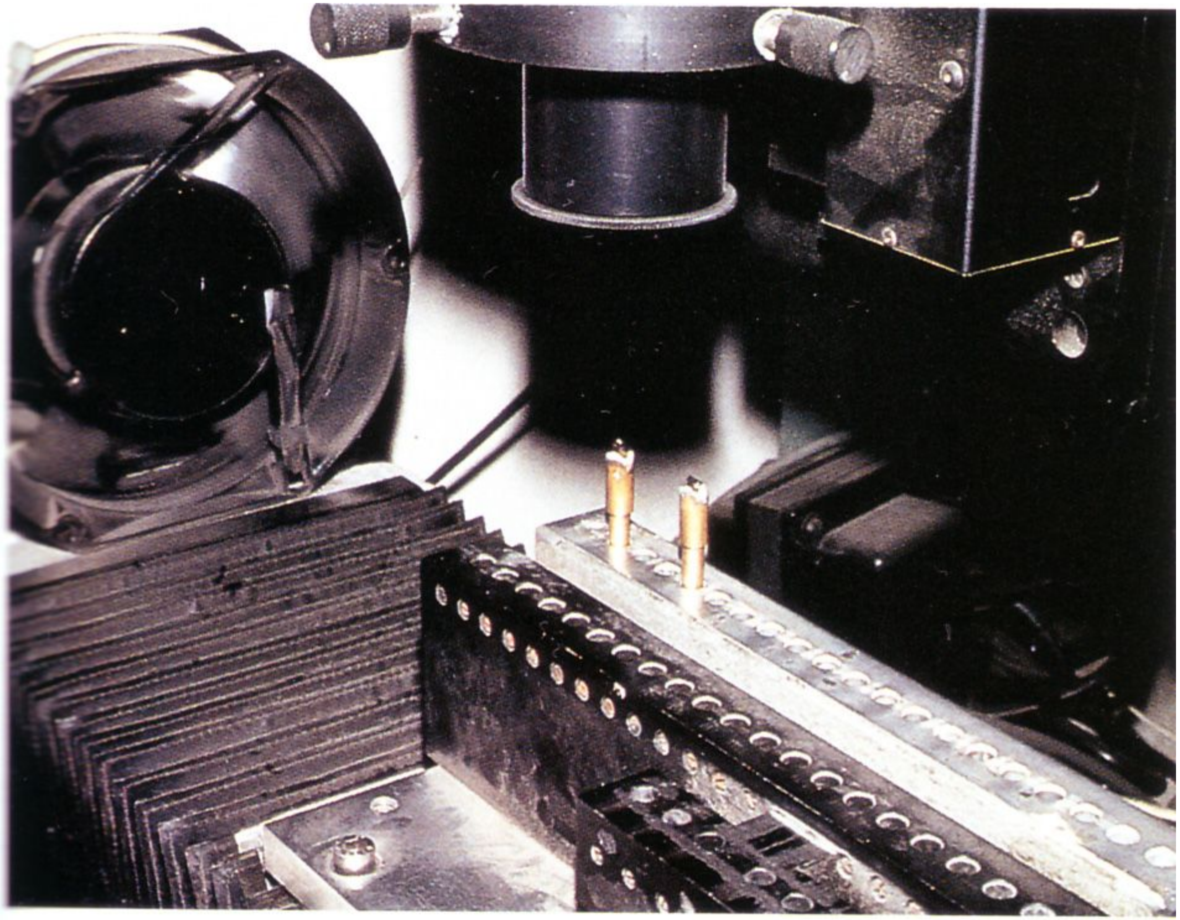
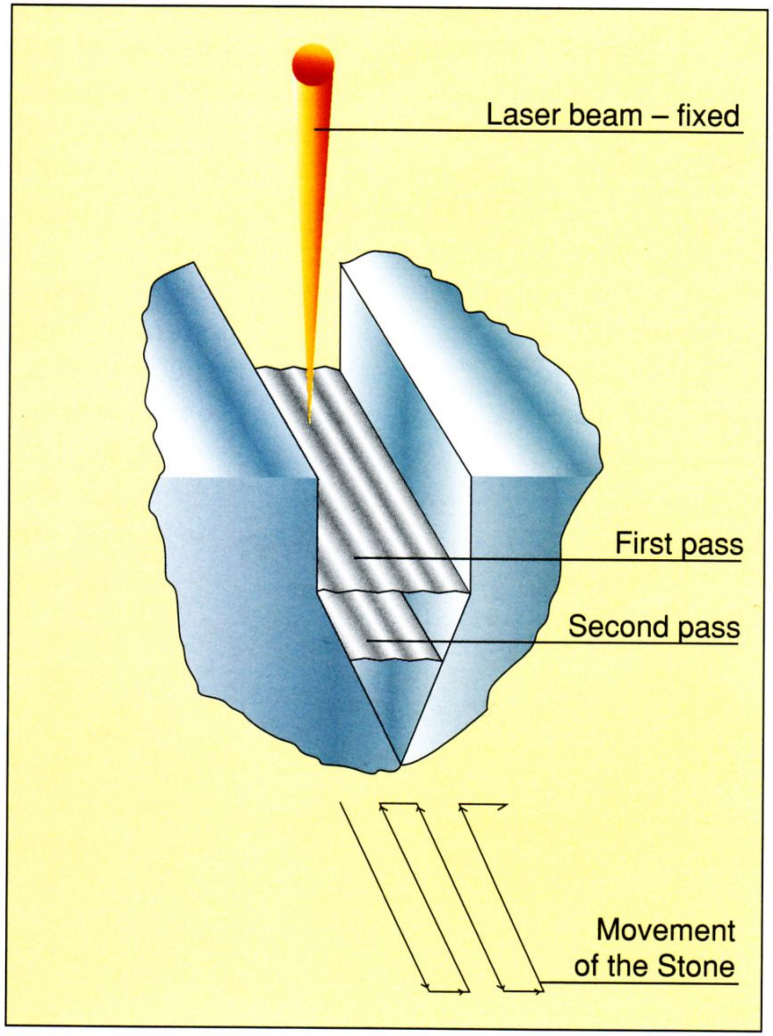


Figure 12. In this laser-sawing operation, a YAG laser is being used to saw two dark yellow diamond crystals. The laser beam is oriented vertically, and it strikes the upper surface of each crystal as the latter is moved back and forth by a motorized cassette. Photo by James E. Shigley.

Figure 13. In laser sawing, a wide "path" (about 0.2 mm across) is made by moving the diamond back and forth beneath the fixed position of the laser beam. Then, the focal point of the laser beam is lowered and a second, narrower path (about 0.17 mm across) is formed. This process is repeated several more times, with the width of the path decreasing gradually to yield a V-shaped groove by the time the laser beam reaches the bottom edge of the rough diamond.



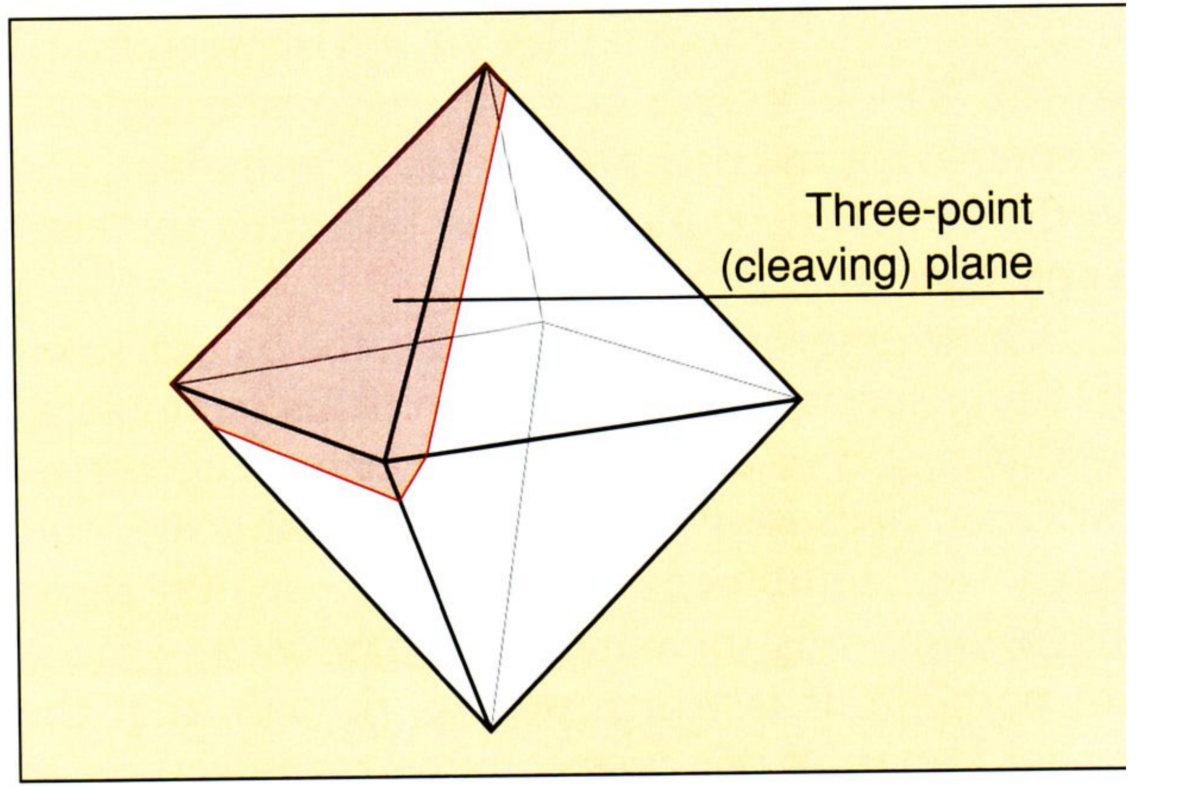


Figure 14. A diamond is cleaved along a different grain orientation than it is sawn. Compare, for example, the cleaving plane marked on this octahedral diamond crystal with the sawing planes marked on the illustration in figure 10. (Note that the cleaving plane is also known as the "three point" plane because of the three corners of the cleaved surface.)

Figure 15. With a manual bruting machine, the diamond is glued to a dop that is set in the machine. In his hand, the bruter holds a stick with another dop to which a diamond has been glued. As the diamond in the machine is rotated, the other diamond is bruting it.

Figure 16. In this photo of an automated bruting machine built by Milano Industries in Israel, two diamonds are mounted for bruting to create a girdle surface on each by mutual abrasion. By viewing the screen, the operator can correctly position each stone and then monitor the progress of the bruting process. Photo courtesy of Milano Industries.

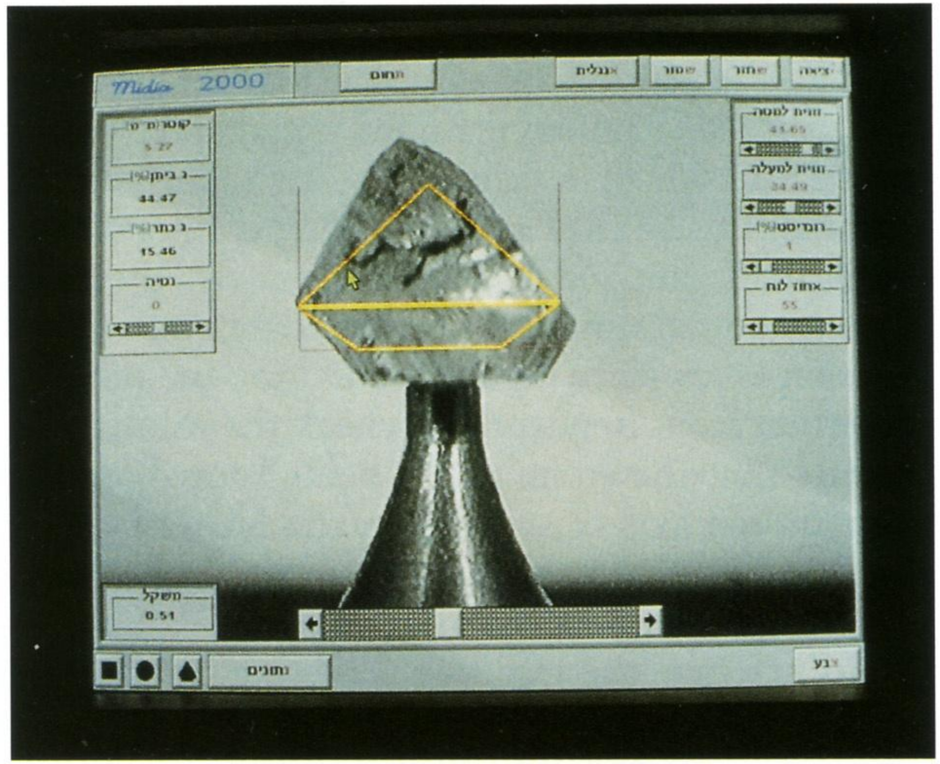


Figure 17. A manual centering system has two video cameras, so that the operator can view the piece of rough from the side and the top. By rotating the image of the rough diamond, the operator can center it on the dop before the glue holding the diamond is hardened. First, an outline of the future cut stone is superimposed on the outline of the crystal. Then, the diamond is centered so that the maximum diameter and maximum yield are achieved. The operator makes sure that the image of the cut stone will fit within the outline of the rough diamond. Photo by James E. Shigley.

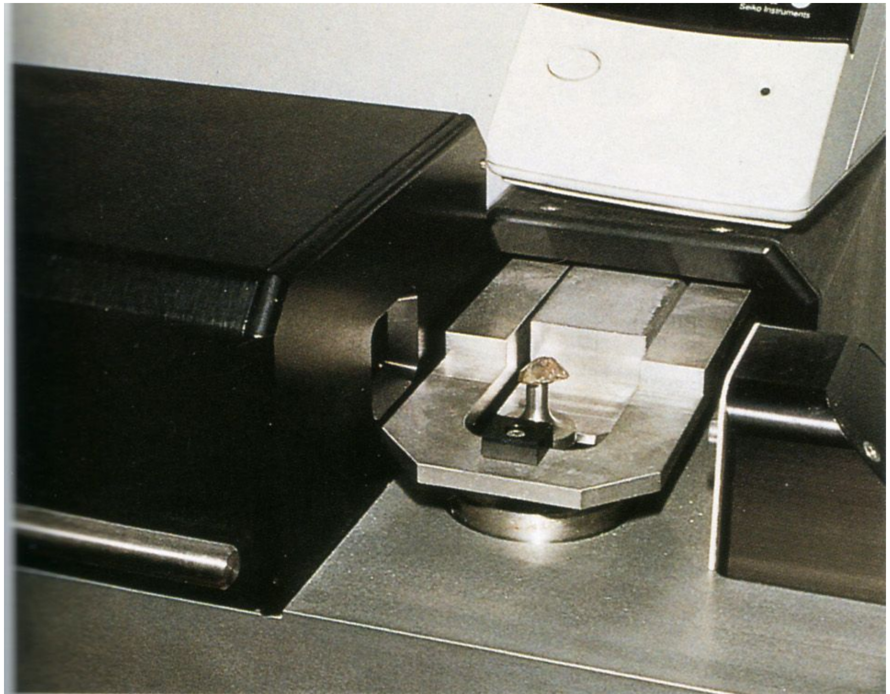
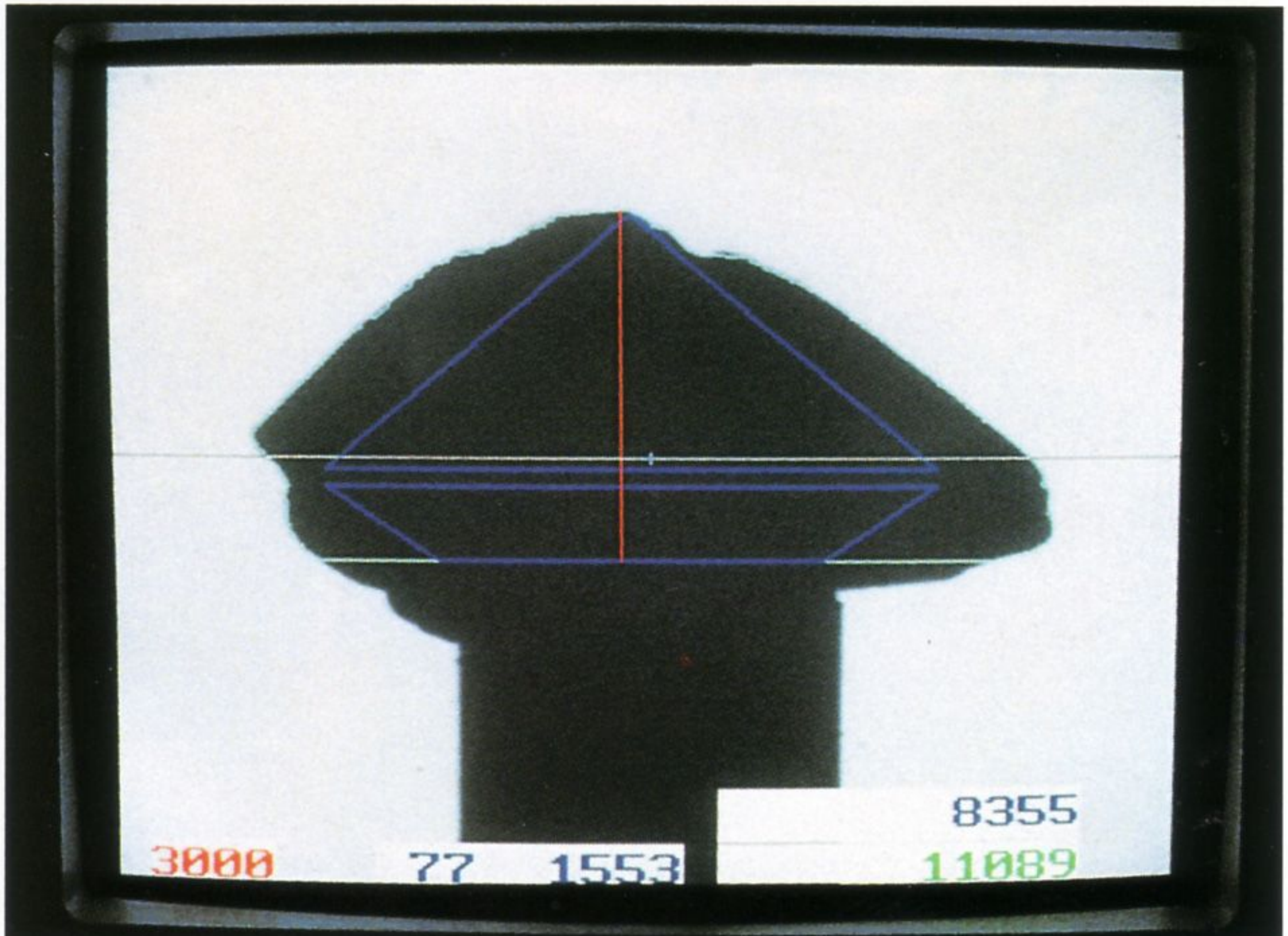


Figure 18. The Sarin automatic centering system (Dia-Center) consists of a sample chamber, light source, camera, computer, and monitor. On the right of the sample chamber (shown above) is the light source, and on the left is the camera. In front of the holder is the mechanical apparatus that moves the holder and centers the diamond. The camera measures the dimensions of the rough diamond, which is glued to a special dop, from a number of orientations. After the computer decides where the optimal center of the future cut stone will be, it moves the upper part of the dop so that the center of the diamond and the center of the bruting machine are co-axial. Photo by James E. Shigley.

Figure 19. The automatic centering system also constructs a three-dimensional image of the rough diamond on which it superimposes an image of the future cut stone that gives the best possible fit. Photo by James E. Shigley.



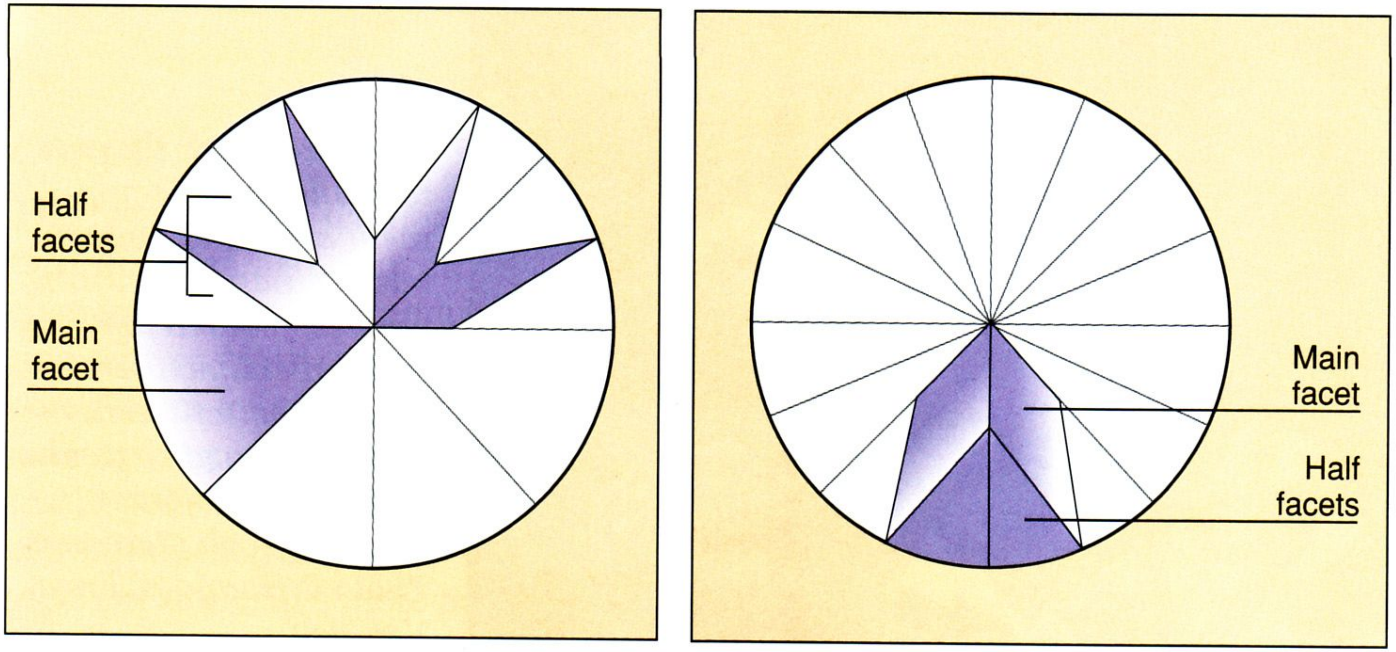


Figure 22. When polishing a diamond by manual methods (left), one first polishes the eight main pavilion facets, and then proceeds to the 16 lower-girdle (half) facets on the pavilion. With automated facet polishing (right), the reverse sequence is followed: the 16 lower-girdle (half) facets of the pavilion are polished first, followed by the eight main pavilion facets.

Figure 23. *This diagram illustrates how a diamond is set in a holder (left, full holder; right, upper part) for automatic polishing. The angle for polishing the 16 lower-girdle facets is indicated. When the ring comes into physical contact with the scaife, and electrical contact is made, the computer automatically halts the polishing of that particular facet and moves on to the next. When the 16 half-facets are completed, the angle is lowered by approximately 1° and the eight main pavilion facets are polished. For this procedure, an electrical contact is made (and the computer moves to the next facet) when the* pot *comes into contact with the scaife.*