

Critical Evaluation of Fashioning of Gemstones in Sri Lanka

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Abstract

Sri Lanka exports about six million carats of gemstones worth Rs 4000 million per year, of which, over four million carats are calibrated stones and the balance is free sized stones. The value of the free sized stones is about Rs 3600 million per year. The calibrated stones require accurate dimensions and proportions, whereas free sized stones are cut without paying much attention to the lustre and brilliance, which are essential properties of gemstones. Sri Lankan lapidarists always optimize the weight of the stone than the quality. Foreign gem traders almost always re-cut Sri Lankan cut and polished stones. Advertisements still appear in international magazines making available "Sri Lankan cut and polished stones suitable for re-cutting"

This paper discusses the importance of the quality of cutting, in order to enhance the value of gemstones and also the possibility of expanding the gem industry by introducing the use of ornamental stones.

Key words: Gemstones, Fashioning of Gemstones

Introduction

Sri Lanka is well known for its wide varieties of gemstones of various sizes. Many of the large precious stones discovered in Sri Lanka are displayed in many gemmological museums in the world (Gunarathne & Dissanayake, 1996). Gem and jewellery industry in Sri Lanka has a long history. Over the centuries, gems have been cut and polished without paying much attention to achieving optimum beauty, which is an essential property required in gemstones.

The earliest styles of fashioning were those, which produced a curved surface, a style now perpetuated by the cabochons, or a flat surface upon which the worker could engrave. The engraving of gems was carried out in times far earlier than the fashioning with symmetrically arranged flat surfaces as in the styles that are in common use today. Perhaps the cutting styles in Sri Lanka have evolved as a result of international trade. Up to the time the State Gem Corporation was established in 1971, the gem trade was confined to a handful of people and the jewellery industry, if it existed, was mainly geared to meet the local demand. The gem industry rapidly gained ground since 1971, and it has now become a major industry providing employment to over 30,000 personnel and much needed foreign exchange to the country (Ellawala, 1995:30).

But the Sri Lankan gem industry sadly lacks the advanced technical knowledge, which could make us one of the leading gem traders in the world. Although local traders have adopted the international gem cutting styles, Sri Lanka has paid little attention to the quality of cutting. Furthermore Sri Lanka has modified accepted cutting styles giving rise to new styles identified as Ceylon cut. In fact, Sri Lankan cut for some time was synonymous with heavy or flat bottomed ill cut gems whose main claim was caratage (Hughes, 1990:273-283)

Classification of cutting styles

There are two basic styles of cutting gems depending on the type of material (Webster, 1983:471-501)

Curved

surfaces: Translucent, opaque or heavily included gemstones with or without special optical effects are cut in this style. Most common are the cabochons, carving (cameos and intaglios), beads, spheres, egg shapes etc.

Cabochons: These cut stones consist of a polished domed top and a bottom which may be polished or unpolished. The shape is usually round or oval. The "Simple cabochon" has a flat rough base, and is used for gems, which display special optical effects, such as asterism or chatoyancy. Silvery rays are well defined when the base is left unpolished. The "Double cabochon" has both top and bottom, dome shaped but the bottom is less steep. The stones such as moonstone and opal with special optical effects are cut with "Double cabochon". The "Hollow cabochon" has its underside hollowed and polished. Deep coloured stones are cut in this style to lighten the colour. In some cases the hollowed back is foiled to make the stone look brilliant. When the rough material is flat, the top dome is made low and it is called "tallow topped cabochon"

Carving, Cameos (raised carvings), Intaglios (incised carvings):

Translucent to opaque materials such as jade, agate, onyx, coral and shell are used for this type of fashioning.

Beads: Translucent to opaque material such as amber, hematite, rhodochrosite, rhodonite, jade, agate, chrysoprase, onyx and heavily included emerald, ruby, sapphire and tourmaline etc. are used for bead making.

Spheres, egg shapes: Spheres and egg shapes of different sizes are made out of any translucent to opaque materials.

Special optical effects

Certain gemstones possess special effects, attributed to the reflection of light from internal structures or inclusions.

Asterism: This is the "star" effect produced by several rays caused by the reflection of light from sets of parallel fibers or crystals. Each set of inclusions cause a ray and there are 4, 6, 12 ray stars. Corundum usually has three sets of inclusions intersecting at 60° and therefore it produces a 6 ray star. Some stones belonging to the cubic system, such as spinels and garnets have only two sets of inclusions intersecting at 90° and therefore produce 4 ray stars.

Chatoyancy: This is the cat's eye effect or the appearance of a streak of light caused by the reflection of light from parallel groups of fibers, crystals or empty channels within the stones. The finer and more highly reflecting the fibers or channels are, the brighter is the ray. Chrysoberyl, kenerupine, tourmaline, apatite, enstatite and quartz are some of the stones possessing chatoyancy.

Iridescence: This is the play of rainbow coloured light caused by extremely small regular structures beneath the surface of the gemstone, Precious opal, fire agate etc. show the effect of iridescence.

Labradorescence: A particular form of iridescence, which can be seen in the labradorite variety of feldspar, is caused by the reflection of light from thin layers beneath the stone's surface.

Adularescence: Also known as " Schiller", this is the bluish or orange sheen seen in moonstones. It is caused by thin laminated plates or layers within the stones.

Colour changing effect: Certain gemstones show one colour in daylight and another in incandescent light. Alexandrites show green in day light and red in incandescent light. Similarly there are some garnets, spinels and sapphires which show this effect.

Faceted stones

Faceting of gemstones was developed through diamond cutting. The present day brilliant cut evolved from the point cut where only the natural crystal faces of octahedrons were polished and table cut, where additionally one end of point cut was ground away to produce a square flat surface. These two styles were further improved by octagonal or rounded single cuts. The modern brilliant cut was thus evolved and subsequently it was introduced with different shapes such as oval, marquise, heart shape etc. A totally different cut was next developed to suit particular gem varieties, and it is called trap cut or step cut.

Over the years many modifications of the modern brilliant cut have taken place. The trap cut was modified as the octagonal cut with corners cut off and adopted particularly for emerald. The faceting basically has two conditions viz : style and form. There are several basic styles such as brilliant cut, step cut, star cut, cross cut etc. The style can be any one of them or any combination. The form is the shape of the cut gem and any form can be applied to any cut. The style of cut is based on the following properties;

Colour: Selective absorption of white light causes the colour in gems. It is important to select the correct direction to get the desired tone or the intensity of colour. For example, stones faceted out of dark tourmaline crystals will have their table facet parallel to the C axis where the crystal shows a lighter shade of colour. If the crystal is already light, to obtain optimum colour, the table facet will be cut perpendicular to the C axis.

Lustre: Lustre is the optical effect created by the reflection of light from the stones' surface. It is directly related to the quality of the stone's surface polish and is therefore partly dependant upon the hardness of the gem, as well as its internal structure. Because of the differences in hardness and other properties, the degree of lustre varies for different stones and are termed, adamantine, vitreous, resinous, waxy, pearly and silky etc. depending on the quality of their lustre.

Brilliance: Brilliance is the amount of white light rays, reflected upwards from the pavilion of the gemstone. This is the property of total internal reflection of light, which depends on the angle of the pavilion facets.

Fire: In colourless gemstones, spectral colours shown from the facets is called fire. Total internal reflection and the colour dispersion of white light produce it. The fire is masked by the body colour in the coloured stones.

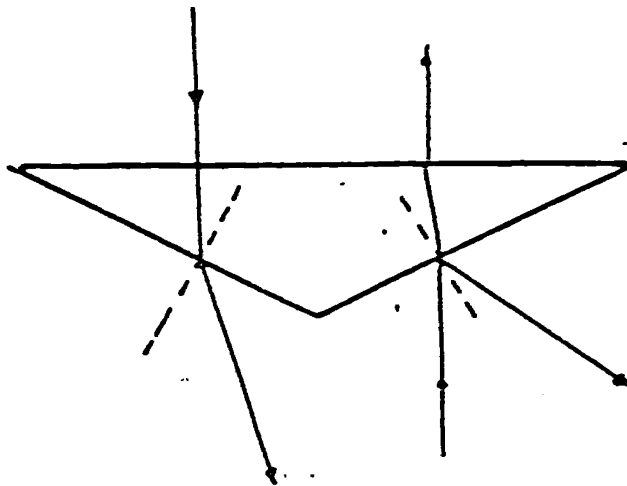
The lapidist or gem cutter in an attempt to gain the maximum yield while maintaining optimum optical properties of a given gem will decide on the type of cut he will use, largely on the rough material he has at hand, as different material will require different approaches in cutting.

Common Defects in Locally Cut Gemstones

Cabochons

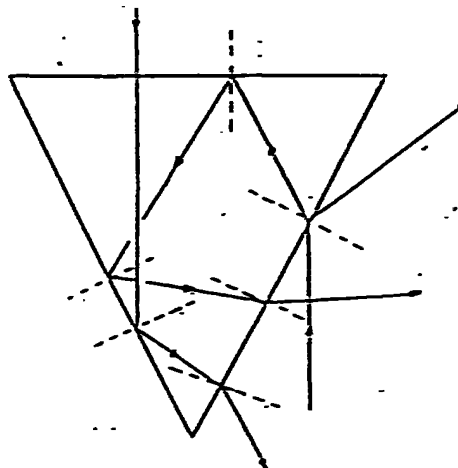
The gemstones with star effect and cat's eye effect are cut without paying much attention to the position of the effect. This gives rise to off centered star or cat's eye effect, thus reducing their beauty and value.

Fig. 1



(a) Open Star

- One ray parallel to the width and hence rays are evenly spaced



(b) Closed Star

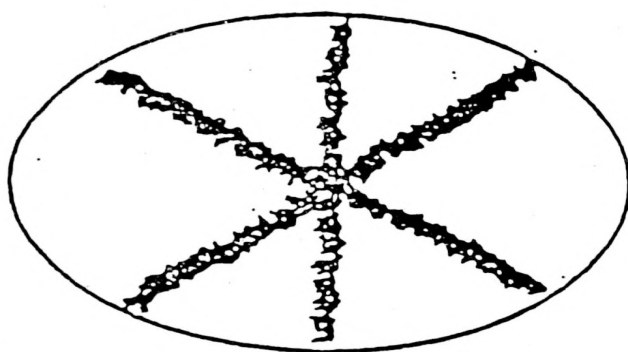
- One ray is parallel to the length of the oval and hence rays appear to be pinched together

Oval cut star stones, should be oriented in such a way, so that one ray is parallel to the width of the stone. This produces an 'open star' where the rays are well spread and attractive. However, most often stones are oriented so that one ray is parallel to the length of the oval and it produces a 'closed star' with rays pinched together (Figure 1b). In order to obtain a proper star, the curvature of the dome must be uniform throughout , but the Sri Lankan cut stones have a large flat area at the center and it causes the star to appear diffused.

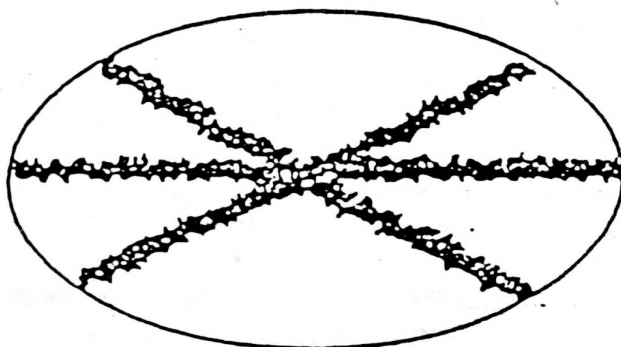
Faceted stones

The transparent gemstones need to be cut to obtain maximum brilliance, however, in most cases, more attention is paid to the weight, and hence stones are either too flat which produces a dull and low intensity colour zone called "window" (Fig. 2a) or too deep which produces a dark zone called "extinction" (Fig 2b)

Fig. 2



(a) Pavillion facets cut too shallow produces a low intensity dull colour zone called window



(b) Pavillion facets cut too steep produces a dark zone called Extinction

Table 1 Export of Gems and Jewellery (Value Rs Mn.)

YEAR	GEMS	GEUDA	JEWELLERY	DIAMOND	D.JEWELLERY
1972	15.5				
1973	153.0				
1974	132.9				
1975	188.9				
1976	287.1				
1977	253.9				
1978	525.0		3.6		
1979	494.7		6.4		
1980	663.7		9.3		
1981	632.5		15.3		
1982	393.4		19.9		
1983	520.5		33.3		
1984	523.3		23.1		
1985	447.1		23.0		
1986	653.0		37.0		
1987	1,156.2	188.7	51.8		
1988	1,425.2	528.6	74.3		
1989	1,351.4	554.4	76.6	1,903.6	
1990	1,840.0	597.1	94.3	2,035.7	
1991	1,568.8	634.1	251.8	1,986.4	
1992	1,620.9	455.9	310.4	4,491.2	
1993	1,989.8	494.1	401.6	7,752.5	240.1
1994	2,253.6	450.6	463.6	7,568.7	643.2
1995	1,990.9	435.6	526.3	8,976.3	844.8
1996	1,498.8	462.8	438.7	9,384.7	884.6
1997	*3,594.1	304.0	559.4	8,350.0	412.0

*with consignments

(Source- The National Gem & Jewellery Authority)

The other common defects seen in the faceted gemstones are the asymmetrical table facet, asymmetrical pavilion, incorrect table size, unequal thick girdle, wavy girdle, upper (contd.) and lower facets not meeting on the girdle, unequal facets, additional facets, star facets not meeting, girdle facets and star facets not meeting at a point, overlapping star facets and creating unnecessary facet edges etc.

The lack of perfect roundness in round shaped cuts and, oval stones having improper proportions are some of the other defects associated with different shapes.

Discussion

The annual exports of gems and jewellery in Sri Lanka are over Rs. 4000 million and Rs. 550 million respectively (Table1). For over two decades, exports have grown up by nearly 200 times. The re-export of diamonds after cutting and polishing started in 1989 and over a period of 9 years it has grown by nearly eight times. The export of diamond studded jewellery too is slowly picking up. With the liberalization of imports to develop the gem and

Jewellery industry, imports of rough gemstones have reached Rs 248 million in 1997 and Rs 134 million upto May 1998.

As a support to develop this industry, the government allows the imports of rough gemstones and machinery required for the lapidary industry free of both the duty and national defence levy. Perhaps this is the only industry which received such concession from the National budget of 1998.

However Sri Lanka has not reached perfection in cutting and polishing of gems. It has been discussed in many national fora that local gem traders place much emphasis on the quantity or the size than the quality (Rahuman, 1995:63-69). The author has had on many occasions to go through hundreds of blue sapphires to find a single, properly cut and polished stone. Most often stones are cut with asymmetrical, deep or shallow pavilion. It is extremely difficult to find a good one carat or larger blue sapphire with a perfect cut. Even when properties are correct facets may not be symmetrical. There are many other cutting defects in our gemstones which can be easily avoided without losing weight. The increasing value due to proper proportions and increasing lustre and brilliance do not seem to be understood properly.

It is important to consider the pleochroism when deciding a direction of cutting. For both ruby and sapphire, the best colour is seen along the c-axis. Failure to position the c-axis perpendicular to the table results in a lower colour intensity and hence a lower value. An exception to this is, the cutting of "ottu" stones where only patches of blue are in the colourless stones. Then it is important to orient the stone, so that the colour patches lie around the culet or fully across the crown. This will make the whole stone appear blue in colour. Most often ruby and sapphire have rutile needles as inclusions perpendicular to the c-axis. If the table is cut perpendicular to the c-axis in such cases, needles become obvious and give rise to bright reflections. However, orienting the table parallel to the c-axis makes them much less visible. Therefore the cutter must strive to balance desirable and undesirable features to obtain maximum value.

Most often ruby and sapphires are not cut as round brilliants, because the pavilion facets in this case, extend all the way from the girdle to culet and it is not possible to increase the yield by rounding the pavilion. Instead, a mixed cut is used for these stones, where the crown is brilliant cut with a step cut pavilion. Thus the weight retention can be increased while maintaining some brilliance.

During the commercial Gemmology course in the German Gemmological Association, the author had the opportunity of examining a 6.2 carat Sri Lankan alexandrite, with a German gem dealer. The beautiful green coloured stone with almost perfect colour change had been cut with the colour changing effect parallel to the girdle. Although the cutter would have been able to save 1 to 1.5 carats in this cut, the present dealer wanted to re-cut it into two smaller stones with the colour changing effect on the crown as it really should be. The resulting loss was expected to be around two carats. Whereas had it been cut properly at the first instance, a single stone of over 4 carats would have been the result and it would certainly have been more valuable than the wrongly cut 6.2 carat stone.

The author has come across many occasions, when gem dealers have got their locally purchased stones re-cut before taking them away. The resulting loss of weights was around 10-15%. For many years, advertisements have been appearing in international gemmological magazines on the availability of "Sri Lankan cut and polished stones suitable for re-cutting" (The Australian Gemmologists, 1994:38, Lapidary Journal, 1991:58)

Sri Lanka at present exports over six million carats of gemstones, of which, about four million are calibrated stones. While this four million brings in Rs 400 million, the balance two million carats of free size stones fetch Rs 3600 million. The calibrated stones require accurate dimensions and proportions. Therefore it is obvious that Sri Lanka has mastered the cutting. However, their application to free sizes, is still not satisfactory.

There are many varieties of less valuable gemstones in Sri Lanka, and they are not suitable for faceting. Topaz, rock crystal (vein quartz), smoky quartz, rose quartz, serpentinite, agate, dolomite, feldspar, garnet rock corundum rock, black tourmaline crystals are the most commonly available of the valuable gemstones. The gem industry can be expanded by harnessing the full potential of our lapidarists not only to facet gems but also to produce carved statues, cameos and intaglios, spheres, egg shapes, beads for ornamental jewellery, figurings and many other artifacts. Such objects consist of a major fraction of the international gem trade.

Conclusions

It is well known that most of the free sized stones are not properly cut. Either the proportions are not correct or facets are improperly cut and these stones make up a large percentage of "Sri Lanka cut" free size stones. Nearly all the Sri Lankan faceted stones are, re-cut by foreigners within Sri Lanka or elsewhere, thus wasting this valuable rare wealth, by cutting many times.

The experience with calibrated stones needs to be applied to free sized stones, since free sized stones fetch about five times the value of calibrated stones. Thus we can safely increase the value of total exports without additional resources. Perhaps in this regard, the Gem Traders Association, Lapidary Association and National Gem and Jewellery Authority should take an initiative to make the lapidarists aware of the importance of proper cutting of gemstones.

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