

Diamond : price and production

January 2010 mailing n°9-1 Dr Thomas Chaize

Diamond is a mineral; this stone is a symbol of purity, romance and luxury. Diamond is used by jewellers to adorn rings and necklaces; it is not a gem engagement ring or princess necklace.

Diamond is also appreciated for its physical qualities in the industry for its hardness (harder than

ruby or a sapphire, nothing except scratch another diamond), for its high thermal conductivity (higher than [silver](#) and copper, used in electronics) and its optical qualities. Its hardness makes it the largest number of industrial applications such as drill bits for oil [drilling](#) and exploration drilling for mine.

I. Origins of diamond.

Carbon Crystals were requiring temperatures and pressures important to be transformed into diamond. Transformation occurs in the mantle of Earth (between 120 and 250km depth) ensues reassembled a swift diamonds to the surface needed to prevent the transformation of graphite. These are very violent eruptions of lava provide the conditions necessary for the recovery of diamonds, called millions of years later kimberlites.

The impurities present during the formation of diamond can give it a blue, pink, yellow, black or even red (very rare) colour. The largest white diamond is the *Cullinan I*, it adorns the scepter of the British crown and was discovered in South Africa in 1905 (3106 carats rough). The largest yellow diamond is *the Incomparable* (890 carat rough). The largest black diamond (unnamed, is 1000 carat rough), the largest blue diamond indeed the crown of England (704 carats rough), the largest pink diamond is a diamond found in India 17th century (240-carat, cut) and the largest red diamond was discovered in Brazil in 1990, it is *the Moussaieff* (13 carats rough).

Kimberlite is named so because in a South African there is a city: Kimberley. The first Kimberlite was discovered with the first diamonds in South Africa in 1870, resulting in a diamond rush in South Africa before that of gold.

These kimberlites are present only on certain locations of the ancient continental crust (southern Africa, Russia, Australia, Canada, and a few in West Africa, eastern Brazil and China). Unlike gold, which is rare but well distributed over the earth, diamonds are scarce and poorly distributed in

the earth's surface. Diamond is only present in some areas with unique and ancient geology. Diamonds are scarce in their native environment: the mantle of Earth, the next favourable conditions for them to reach the surface of the earth where they are concentrated in some very specific points, the kimberlites.

Kimberlite is forming a "funnel" from 500 to 1500 meters in diameter at the top and a depth of 1 000 to 2000 meter. It is eruptions of lava that has given this form, the diamond mines open are very impressive.

There are also diamonds in the "placers", there are diamonds that nature has excerpts from kimberlites by a slow erosion and water that are stored in an area of a river or an ancient river.

Lavoisier discovered in the 18th that the diamond is a crystalline form of carbon, and since the early 1950s, synthetic diamonds are produced in the laboratory using pressure and high temperatures to recreate the natural conditions of creation of a diamond. Synthetic diamonds and natural diamonds are very close, so close that you need a laboratory to differentiate them. The synthetic diamonds now represent more than 3 / 4 of world production of diamonds in the world and the U.S. are the world's leading producers of synthetic diamonds. Synthetic diamonds substitute in many uses the natural diamond (mainly in industry) and I want to say fortunately. Yes fortunately, because for industrial applications related to the unique properties of diamond are growing and production of natural diamond is long been largely insufficient to meet industrial demand.

II. Diamonds: Production and Using.

Unit of diamond's measurement is carat. One carat diamond is equal to 0.2 gram. One carat is divided into 100 points, one diamond of a half-carat equals 50 points.

Production of rough diamonds is often measured in carats, it is also money (dollars). Unlike gold, one carat of rough diamond may have a different value according to several criteria: weight carat (price of the diamond does not progress linearly, but exponentially), according to colour measured on a

scale of D to Z (exceptional white coloured) and according to its purity (no defects in the diamond).

In 2007, Russia was the largest producer of diamonds by number of carats of diamonds produced and the second in terms of value (38.7 million carats of diamonds and 2.6 billion dollars). Botswana is the largest producer by value (2.9 billion dollars) and the second in number of carats of diamonds produced (33.6 billion dollars).

Canada upset the hierarchy of producers by talking third place in terms of value (1.6 billion dollars) and fifth carat diamond product.

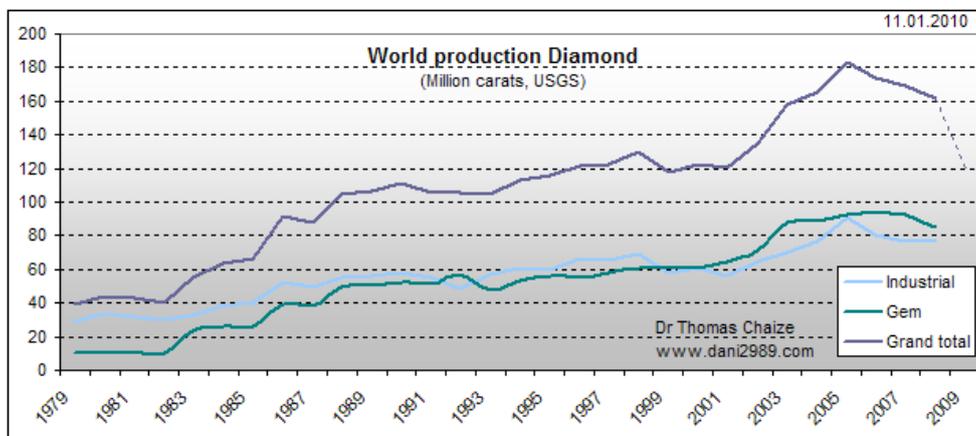
South Africa is the fourth largest diamond producer by value and the sixth in number of carats, then comes Angola, Namibia, Congo, Australia and finally China.

The following chart gives an estimate of possible numbers for 2009, these are obviously not yet available. We can already see on graph that diamond production began to decline in 2005, three years before the economic crisis of 2008.

The economic crisis has only amplified the already slightly downward trend in diamond production since 2005. In presence of an economic recovery, a slow return to 2007 levels is possible, but a return to 2005 levels seems much more difficult given the aging of the diamond mines and the small number of new diamond mines.

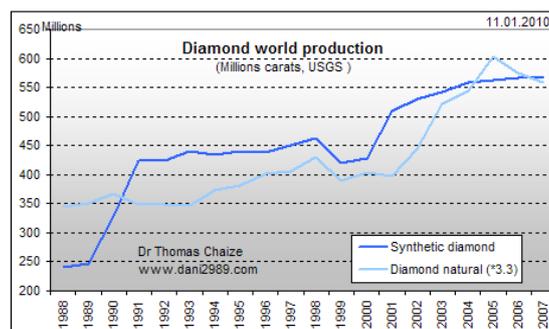
USA is the leading consumer of diamonds with half of global consumption. The following consumer

countries are Japan and China, the country obviously amount to the consumption of diamonds is China. Despite the crisis, the 1st half of 2009 was a record for the half diamond imports in China. The consumption of [gold](#) and [platinum](#) jewellery looks favorable for 2010, thus the Chinese consumption of diamonds should also follow this trend. The diamond cutting is done by lapidaries, it occurs mainly in Antwerp in Belgium, Israel and India. Just under half of the diamonds are of sufficient quality to be cut and used as gemstones and jewellery by jewellery-making. Other half of natural diamonds of lower quality (diamond too small, wrong colour or riddled with impurities) are used in industry where their hardness is much appreciated. Diamond is used on saws, drills, scalpels or some abrasive. Much of the synthetic production meets the demand of industrial diamonds. The production of synthetic diamonds is three times higher than natural diamonds, for years the natural diamond is not enough demand for industrial diamond.



There are two ways to consider the future of the diamond production in the world. The first, pessimistic thinking that the diamond is more eternal and production of natural diamond is threatened by the production of synthetic diamond.

The second option is to believe that demand for natural diamond is like gold, and inexhaustible wonder how much remains to discover kimberlites that will ensure the sustainability of the world's diamond production.



As can be seen on the graph of diamond production, there is no difference between the production of natural and synthetic diamond. When demand for diamond exist both (synthetic and natural) moving in the same direction. If synthetic diamonds doesn't exist, the price of natural diamond would be even higher because global production of natural diamond is insufficient to meet any demand. In South Africa, diamond production began there more than 130 years. In many African country diamonds's producer, production is almost centenary (Namibia, Zimbabwe, Democratic Republic of Congo, Angola, Ghana, Sierra Leone, Liberia, and Tanzania). Brazil's diamond production has commenced at the beginning of the 18th, Russia the intensive exploitation of diamonds

began in the fifties. Since the early 90s, the new Eldorado of the diamond is Canada, Northern Canada, the most cold and isolated. It is very expensive to build a diamond mine, the proposed new diamond mines are worthy of the pharaohs, some mines in effect beyond the one billion dollar investment. The largest diamond producer in the world, which is the diamond that Rockefeller is the world's oil dominates the production of diamonds for over 130 years. It was completed in 2007 to build two mega projects in Canada, while a century since its production takes place in Africa, land of diamonds.

He does not seem to doubt the sustainability of the global demand for natural diamond.

Dr Thomas Chaize
www.dani2989.com

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