

DIAMOND



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DIAMOND

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**GOVERNMENT OF INDIA
MINISTRY OF MINES
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9 Diamond

Diamond has been the most valuable among gems for more than 2,000 years. Diamond occurs in two types of deposits, primarily in igneous rocks of basic or ultrabasic composition and in alluvial deposits derived from the primary sources. Its composition is pure carbon and has cubic crystal system and common form octahedron. India is known for its diamond cutting & polishing business especially for small sized diamonds. Most of the world's diamond cutting and polishing business comes to India, particularly to Surat in Gujarat. Indian Diamond Industry handles about 80% of the global polished diamond market. India depends largely on imports of rough gem diamonds for its Cutting and Polishing Industry as there is no notable production except for one producer in Madhya Pradesh whose limited production is too sparse to meet the Cutting and Polishing Industry's requirements. The cut and polished diamonds are re-exported. The Indian Government's recent fiscal and monetary reforms (Demonetisation and Goods & Services Tax) have generally been welcomed by the diamond business community. Despite short-term disruption, reforms are seen as an instrument for creating a more stable and professional environment and an opportunity for improved economic growth. Larger retailers and companies in the midstream that have been able to maintain normal operations are seeing the benefits of transparency and compliance with more stringent financial regulations.

Diamond has a high refractive index and strong dispersion which gives it exciting brilliance when cut as a faceted stone. Gem diamonds are transparent and colourless or show faint shades of different colours.

Flawless stones of good colour are abundantly used in gem trade while off-colour, flawed & defective stones, chips & cuttings as well as small grains & dust are used in industry. Industrial grade diamond, i.e., diamond that does not meet gem quality standards in terms of colour, clarity, size or shape and those that are produced as a by-product of mining for gem diamonds continue to be used principally as abrasives in many applications despite their initial cost. Although diamond is more expensive than the

other abrasive materials, it is more cost-effective in numerous industrial processes because it lasts longer than any other material.

Broadly, industrial diamonds have three varieties viz, 'ballas' which is mass of minute diamond crystals difficult to cleave; 'bort' is yellowish grey to black colour and massive, flawed or irregular in shape and 'carbonado' is black, very hard opaque and without cleavage.

RESERVES/RESOURCES

Diamond occurrences are reported since pre-historic times in the country. Presently, diamond fields of India are grouped into four regions:

- 1) South Indian tract of Andhra Pradesh, comprising parts of Anantapur, Kadapa, Guntur, Krishna, Mahabubnagar and Kurnool districts;
- 2) Central Indian tract of Madhya Pradesh, comprising Panna belt;
- 3) Behradin-Kodawali area in Raipur district and Tokapal, Dugapal, etc. areas in Bastar district of Chhattisgarh; and
- 4) Eastern Indian tract mostly of Odisha, lying between Mahanadi and Godavari valleys.

As per the NMI data, based on UNFC system as on 1.4.2015, all India reserves/resources of diamond have been placed at 31.83 million carats. Out of these, 0.95 million carats are placed under Reserves category and 30.87 million carats under Remaining Resources category. By grades, about 2.37% resources are of Gem variety, 2.64% of Industrial variety and bulk of the resources (95%) are placed under Unclassified category. By States, Madhya Pradesh accounts for about 90.18% resources followed by Andhra Pradesh 5.72% and Chhattisgarh 4.09% (Table-1).

EXPLORATION & DEVELOPMENT

The Exploration & Development details, if any, are given in the review on Exploration & Development in "General Reviews".

DIAMOND

**Table –1: Reserves/Resources of Diamond as on 1.4.2015
(By Grades/States)**

(In carats)

State/Grades	Reserves			Remaining Resources						Total Resources (A+B)
	Proved	Probable	Total	Measured	Indicated	Inferred	Reconnaissance	Total		
	STD111	STD121	STD122	STD331	STD332	STD333	STD334	(B)		
				STD221	STD222					
All India:Total	959500	159	959659	-	-	29047514	-	30876432	31836091	
By Grades										
Gem	-	-	-	-	-	596929	-	756765	756765	
Industrial	-	-	-	-	-	798936	-	840823	840823	
Unclassified	959500	159	959659	-	-	27651649	-	29278844	30238503	
By States										
Andhra Pradesh	-	-	-	-	-	98155	-	1822955	1822955	
Chhattisgarh	-	-	-	-	-	1304000	-	1304000	1304000	
Madhya Pradesh	959500	159	959659	-	-	27645359	-	27749477	28709136	

Figures rounded off

DIAMOND

PRODUCTION & STOCKS

Production of diamond was at 36,516 carats in 2016-17 as against 36,044 carats in the previous year. There were two operating mines, both under Public Sector located in Panna district of Madhya Pradesh. The one mine out of these two mines that is operated by NMDC Ltd contributed almost the entire production of diamond and a very small quantity of production was reported by the Department of Geology and Mining, Government of Madhya Pradesh (Tables 2 & 3).

Out of the total output, gem variety covering only rough & uncut constituted 37% and the remaining 63% was of industrial grade covering both off-colour and dark brown varieties (Table - 4).

Mine-head closing stocks during the year 2016-17 were 24,102 carats as against 14,084 carats in the previous year (Table-5).

The average daily employment of labour during 2016-17 was 157 as against 156 in the previous year.

Table – 2: Principal Producers of Diamond, 2016-17

Name & address of producer	Location of Mine	
	State	District
National Mineral Development Corporation Ltd 10-3-311-/A, Khanij Bhavan, Castle Hills, Masab Tank, Hyderabad-500 028, Andhra Pradesh	Madhya Pradesh	Panna
Directorate of Geology & Mining, (Diamond Project) Government of Madhya Pradesh, Khanij Bhavan, 29-A, Arera Hills, Bhopal - 462 016, Madhya Pradesh.	Madhya Pradesh	Panna

**Table – 3: Production of Diamond, 2014-15 to 2016-17
(By State)**

(Quantity in carats; value in `000)

State	2014-15		2015-16		2016-17 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India /Madhya Pradesh	36107	613504	36044	621441	36516	639596

**Table – 4: Production of Diamond, 2015-16 & 2016-17
(By Sector/State/District/Grades)**

(Quantity in carats; value in `000)

State/District	No. of mines	2015-16				2016-17 (P)				
		Quantity			Value	Quantity			Value	
		Gem (rough & uncut)	Industrial*	Total		Gem (rough & uncut)	Industrial*	Total		
India/Public Sector	2	12784	23260	36044	621441	2	13488	23028	36516	639596
Madhya Pradesh/ Panna	2	12784	23260	36044	621441	2	13488	23028	36516	639596

* Includes off-colour and dark-brown varieties of diamond.

**Table – 5: Mine-head Closing Stocks of Diamond, 2015-16 & 2016-17
(By State)**

(In carats)

State	2015-16	2016-17 (P)
India/Madhya Pradesh	14084	24102

MINING & PROCESSING

Majhgawan in Madhya Pradesh is a fully mechanised mine operated by National Mineral Development Corporation Ltd. It is worked by opencast method in tuff rock by deploying 4.1 cu m hydraulic shovel and 40 tonnes dumpers in combination. The mine benches have been designed with a height of about 10 m. Few benches are of 4-5 m height. Drilling is done by 4-inch diameter drills and charged with slurry explosives, and about 40-50 holes are blasted at a time with delay pattern. The capacity of the mine is about 30,000 carats per year. Diamonds are also recovered from conglomerate and gravel beds at shallow depths by small operations on the basis of annual permits granted by Diamond Officer, Government of Madhya Pradesh. At Majhgawan, kimberlite rock after mining is stockpiled for weathering action and then is fed to crushing plant. It is processed through Heavy Media Separation System in processing plant for recovery of diamond. Recently, X-ray diamond sorter has been installed for sorting of diamonds from ore and this has increased the recovery of raw diamonds to 98%.

Diamond Mining Factors

Grade: Grade is the weight of diamond expressed as carats per tonne (ct/t) of ore. It varies widely from one mine to another but generally falls somewhere between 0.3 and 1.3 ct/t. One carat is equivalent to 0.2 grams.

Size (weight) of rough diamonds in deposit: Individually, rough diamonds can range from microweight to stones weighing more than 1,000 carats. Depending on the mine, the average size of rough diamond recovered can weigh from 0.01 ct (about 1 mm) to more than 0.7 ct. Many mines in the world show an average of about 0.4 to 0.5 ct per tonne.

INDUSTRY

Indian Diamond Industry enjoys credible standing and reputation in the world market,

particularly for small diamonds used in jewellery. Indian diamond manufacturing standards are reckoned as the best in the world. Workmanship & skill of Indian artisans at polishing small diamonds economically and efficiently has been widely acknowledged. Surat in Gujarat is the main centre of the Cutting and Polishing Industry.

As per the Southern Gujarat Chambers of Commerce there are about 3500 to 4500 diamond processing units in Surat employing about 1.5 million people. Most of them now use computerised cutting machines with deployment of the latest technology. India continues to be the dominant player in the world Diamond Cutting and Polishing Industry. According to India's Gem & Jewellery Export Promotion Council (GJEPC), India has further strengthened its world dominance.

India's predominance as leader in the world market is due to a combination of pragmatic policies of the Government and sustained efforts of exporters. Policy changes, such as, creation of Special Economic Zones (SEZ) is expected to boost the export prospects further. Several diamond polishing companies have already established offices in India for trading in rough & polished diamonds. India obtains rough diamonds from Belgium, UK, Hong Kong, UAE, Israel, etc. Indian diamond traders seek opportunities to establish direct trade ties with mining countries and companies. The expectations of the Indian Diamond Industry are to access rough diamonds at competitive rates directly from the producers to maintain its lead in the world market.

CONSUMPTION

Industrial diamonds are mostly consumed by manufacturers of drill bits, grinding tools and stone cutting & polishing machines and demand of industrial diamonds is mostly met by imports. There are many small-scale sector units that operate in cutting & polishing trade.

SUBSTITUTES

Synthetic Diamond

Today, market for industrial diamond is dominated by synthetic stones, first developed in 1950s. Synthetic diamonds, manufactured using high pressure and high temperature methods compete as an abrasive mineral with natural industrial diamonds and also with manufactured materials like silicon carbide (SiC), alumina (Al₂O₃), tungsten carbide (WC) and carbide boron nitrate (CBN). Synthetic diamonds being marketed are mostly 0.6 - 0.8 mm and smaller in size. Synthetic Diamond Abrasives (SDA) are used for sawing, drilling or milling hard stones, concrete aggregate, refractory materials, masonry and asphalt. In general, large crystals are used for cutting softer materials and smaller crystals for tougher jobs. Synthetic diamonds now account for bulk supply of industrial diamonds and are preferred over natural diamonds because their quality can be controlled to suit customer's requirements.

Synthetic diamonds were produced earlier by using graphite with a metal catalyst under very high pressure & temperature.

Of late a new process, such as, Chemical Vapour Deposition (CVD) has been evolved which requires relatively low pressure for production of synthetic diamonds. This process involves depositing tiny crystals of diamond on a film which can be built in complicated shapes and used at desired places or instruments such as machine part, heat conductors in micro circuit, shortwave UV, microwave sources and radiation detectors. In future, CVD can be a substitute for silicon in Computer Industry. In USA, developments have taken place in CVD method of growing 100% pure diamond using microwave plasma technology. This method is more economical and also enables production of larger crystals.

TRADE POLICY

Import of diamond under HS Code 7102, whether or not worked, but not mounted or set,

fall under 'Free' category as per the Export-Import Policy 2015-2020. Foreign Direct Investment (FDI) in diamond mining up to 100% is admissible for automatic approval of Reserve Bank of India.

WORLD REVIEW

The world reserves of industrial diamond are about 1,200 million carats located mainly in Russia (54%), Congo (Kinshasa) (12.5%), Australia (10%) Botswana (7.5%) and South Africa (6%). The world reserves of diamond are furnished in Table-6.

The total world production of diamond decreased from 126 million carats in 2015 to 122 million carats in 2016.

The principal producers were Russia (33%), Botswana (17%), Australia (11%), Congo, Dem. Rep. (10%), Canada (9%), Angola and South Africa (7% each). During the year, increase in diamond production was observed in Australia (3%), South Africa (3%) while the production in Congo, Dem. Rep. (13%), Canada (5%), Russia (4%) reported declining trend (Table-7).

Natural diamonds are cut in 52 countries. The major diamond cutting centres in the world are Antwerp in Belgium, Ramat Gan in Israel, New York in USA, Surat in India and Guangzhou & Shenzhen in China.

Table – 6: World Reserves of Diamond (Industrial) for the year 2017 (By Principal Countries)

(In million carats)	
Country	Reserves
World : Total (rounded off)	1200
Australia	120
Botswana	90
Congo (Kinshasa)	150
Russia	650
South Africa	70
Other countries	90

Source: Mineral Commodity Summaries, 2018

**Table – 7: World Production of Diamond
(By Principal Countries)**

(In '000 carats)

Country	2014	2015	2016
World Total	124500	126400	121700
Angola	8791	9019	9022
Australia	9288	13561	13958
Botswana	24658	20824	20954
Canada	12082	11677	11104
Congo, Dem. P. R.	14689	14284	12377
Ghana	241	174	142
Lesotho	346	304	342
Namibia	1898	1775	1584
Russia	38304	41912	40322
Sierra Leone	594	500	550
South Africa	8060	8233	8451
Zimbabwe	4772	3491	2103
Other countries	745	695	809

Source: World Mineral Production, 2012-2016.

Canada

The Gahcho Kué Mine in the Northwest Territories, Canada began commercial production in February 2017. The mine is expected to be one of the world's largest diamond mines and it is estimated that the mine will produce around 54 million carats of rough diamond over its 12-year lifetime.

Rio Tinto and Dominion Diamond Corporation's Diavik Mine A 21 Extension will start production in 2018.

Botswana

The Cut - 8 project at Jwaneng Mine in Botswana owned by De Beers will begin producing diamonds in 2017.

Russia

ALROSA's Verkhne-Munskoe Mine is due for completion in 2018. It is the only greenfield project expected to be commissioned in the medium term. Several brownfield projects are underway.

Angola

ALROSA announced in 2017 that it has plans to work with Endiama to develop the Luele kimberlite mine in the Luaxe concession in Angola.

FOREIGN TRADE

Exports

Value of exports of diamond increased by about 14% to ` 1,62,706 crore in 2016-17 against ` 1,42,734 crore in the previous year. Diamond (mostly cut) alone accounted for almost cent-percent exports in terms of value. The share of industrial diamonds and diamond powder was about ` 110 crore and ` 29 crore, respectively in 2016-17. Exports were mainly to Hong Kong (38%), USA (30%), Belgium (10%), UAE (9%) and Israel about (4%) (Tables- 8 to 11).

Imports

In 2016-17, imports value of diamond increased by about 17% to ` 1,29,674 crore from ` 1,10,565 crore in the previous year. Uncut diamond shared the bulk, i.e., almost cent-percent of the imports. Imports of industrial diamond and diamond powder were about 0.95 million carats and 387 million carats, respectively, valued at ` 79 crore and ` 152 crore, respectively. Imports were mainly from Belgium (26%), UAE (23%), Hong Kong (11%), Russia (12%), Israel (6%) and Botswana (7%). (Tables-12 to 15).

**Table – 8: Exports of Diamond : Total
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (**)	Value ('000)	Qty (**)	Value ('000)
All Countries	**	1427340191	**	1627066250
Hong Kong	**	515660381	**	615325376
USA	**	426775000	**	494373745
Belgium	**	145177411	**	160166429
UAE	**	143162330	**	147895724
Israel	**	65219100	**	66511146
Thailand	**	36570823	**	35654022
Singapore	**	14566160	**	19935928
Japan	**	14200147	**	16082073
Switzerland	**	13119569	**	11591674
Australia	**	10620220	**	10473674
Other countries	**	42269050	**	49056459

Note : Quantity not given due to partial coverage; value figures, however, have full coverage.

DIAMOND

**Table – 9: Exports of Diamond
(Industrial)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (carats)	Value (` '000)	Qty (carats)	Value (` '000)
All Countries	5651009	342214	6769897	1099542
Belgium	1271305	63124	653976	537642
UAE	200528	59560	609512	255578
UK	1754200	68184	1565919	65332
USA	425225	30926	770194	59240
Israel	1199300	51839	1654586	54951
Botswana	-	-	123632	39262
Ireland	436046	31220	610669	34112
Hong Kong	78142	11869	491610	23120
China	211650	18141	183714	16267
Germany	56700	2909	105058	8927
Other countries	17913	4442	1027	5111

**Table – 10: Exports of Diamond (Mostly Cut)#
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (**)	Value (` '000)	Qty (**)	Value (` '000)
All Countries	**	1426640484	**	1625672978
Hong Kong	**	515643397	**	615284341
USA	**	426641928	**	494209520
Belgium	**	145021344	**	159583449
UAE	**	143056634	**	147640135
Israel	**	65134122	**	66430515
Thailand	**	36570653	**	35650539
Singapore	**	14565988	**	19935868
Japan	**	14186480	**	16071614
Switzerland	**	13111622	**	11575597
Australia	**	10620220	**	10472746
Other countries	**	42088096	**	48818654

#: The quantity published in earlier issues for the years 2013-14, 2014-15, 2015-16 may be treated as '**' since it is found that the unit quantities were non additive.

**Table – 11: Exports of Diamond (Powder)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (`000 carats)	Value (` '000)	Qty (`000 carats)	Value (` '000)
All Countries	9702	357493	8197	293730
USA	2721	102146	2734	104985
Belgium	857	92943	1221	45338
Germany	710	22700	706	25883
Israel	1461	33139	1071	25680
UK	286	10500	609	20663
Hong Kong	308	5115	90	17915
Switzerland	132	7947	842	16077
Ireland	893	16272	439	15759
Japan	29	12761	279	10049
Thailand	20	170	31	3483
Other countries	2285	53800	175	7898

DIAMOND

**Table – 12: Imports of Diamond
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (**)	Value (` '000)	Qty (**)	Value (` '000)
All Countries	**	1105651209	**	1296740696
Belgium	**	426029350	**	340326541
UAE	**	244340863	**	297944868
Russia	**	72046802	**	151287534
Hong Kong	**	126934094	**	140731408
Botswana	**	32860354	**	87586948
Israel	**	68585039	**	74632840
Canada	**	25544469	**	36923798
South Africa	**	12604242	**	31298637
USA	**	31816285	**	27171166
Saudi Arabia	**	33259930	**	25247548
Other countries	**	31629781	**	83589408

**Table – 13: Imports of Diamond
(Industrial)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (carats)	Value (` '000)	Qty (carats)	Value (` '000)
All Countries	527650	495369	954463	798242
Russia	333324	263655	254695	241486
Congo Dem. Rep.	242	657	120903	198009
Zimbabwe	-	-	201826	119530
UAE	44038	67266	147806	74752
Congo Peo. Rep	85823	111164	29893	57716
Botswana	-	-	168632	49499
Belgium	24947	21493	11867	34218
Hong Kong	-	-	7665	14850
South Africa	11755	2663	6644	3621
China	-	-	1000	1521
Other countries	27521	28471	3532	3040

DIAMOND

**Table – 14: Imports of Diamond (Powder)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (`000 carats)	Value (` '000)	Qty (`000 carats)	Value (` '000)
All Countries	287431	1371129	387540	1516408
China	262914	1120520	364461	1280078
Ireland	6418	85501	5194	72782
USA	5402	58329	6238	61395
Korea, Rep. of	3833	41133	3643	34566
Belgium	1530	22601	1855	30755
Hong Kong	4593	12946	4478	11448
Switzerland	815	14242	675	9051
Germany	1	41	139	4175
UK	156	2087	167	3675
Korea, Dp Rp	-	-	305	2941
Other countries	1769	13729	385	5542

**Table – 15: Imports of Diamond (Mostly Uncut)#
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (**)	Value (` '000)	Qty (**)	Value (` '000)
All Countries	**	1103784711	**	1294426046
Belgium	**	425985256	**	340261568
UAE	**	244271474	**	297868963
Russia	**	71779396	**	151043397
Hong Kong	**	126921148	**	140705110
Botswana	**	32860354	**	87537449
Israel	**	68584617	**	74632186
Canada	**	25544469	**	36923798
South Africa	**	12601579	**	31295016
USA	**	31757408	**	27109680
Saudi Arabia	**	33259930	**	25247548
Other countries	**	30219080	**	81801331

#: The quantity published in earlier issues for the years 2013-14, 2014-15, 2015-16 may be treated as '**' since it is found that the unit quantities were non additive.

FUTURE OUTLOOK

In the Union Budget 2017-18, the Government of India offered tax cuts for the middle class and other sections of society (5 per cent for the Rs 250,000-500,000 tax slab; which was 10 per cent initially). All these measures will drive consumption, which will be favorable to the gems and jewellery industry.

The Government of India's proposal to cut corporate tax rates to 25 per cent for micro, small and medium enterprises (MSMEs) having annual turnover up to ` 50 crore will benefit a large number of gems and jewellery exporters from MSME category.

The Diamond Industry in the country currently employs over 8 lakh artisans who are experts in cutting and polishing of small diamonds and are now in a position to process full range of sizes and qualities of gemstones using latest technology.

The Chinese Government has begun to initiate multi-billion dollar deals for rough diamonds in exchange for things that China produces like

medicines, oils and industrial goods and services. Also, China's investment in Africa is a large threat to the Indian diamond cutting and polishing industry. There is a growing preference for polishing diamonds in countries where the diamonds are mined, like in Africa. It means that the Indian sector will have to face problems at home because India is not a large producer, and therefore, has to import rough diamonds from Africa. Low profit margins in the cutting and polishing segment have heightened midstream players' interest in synthetic diamonds, but synthetics have to be contented with only limited acceptance among jewellery retailers and end consumers.

With the support in the form of increasing urbanization, middle-class expansion and appeal as engagement rings, India is set to emerge as the third-largest market for diamond jewellery by 2020, leaving behind Europe and Japan. Meanwhile, China and the US are expected to remain as the leading diamond jewellery markets.