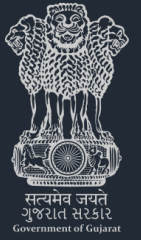


CELEBRATING



VIBRANT GUJARAT
(2003-2023)

AS THE SUMMIT OF SUCCESS



Manufacturing of Lab-Grown Diamond



Gems & Jewellery Sector

Government of Gujarat



Contents

Project Concept	3
Market Potential	5
Growth Drivers	7
Gujarat - Competitive Advantage	9
LGD Manufacturing Ecosystem in Gujarat	12
Project Information	14
- <i>Project Location</i>	
- <i>Infrastructure Availability/ Connectivity</i>	
- <i>Key Players/ Machinery Suppliers</i>	
- <i>Key Considerations</i>	
Project Financials	18
Approvals & Incentives	19
Key Department Contacts	21

Project Concept

Introduction

The lab grown diamond industry is seen as the 'Sunrise Industry' for the global economy and especially for an economy like India which derives livelihood of millions of people and foreign exchange from the diamond industry.

As per the Ministry of Commerce and Industry, the nation already produces around three million lab-grown diamonds a year, accounting for 15% of global production.

The Gems and Jewellery Export Promotion Council notes that the sector has the potential to employ approximately one million workers and achieve annual revenue of US\$5.1 billion. China is the other big producer, with a similar market share.

In January, in an effort to boost the sector further, the Indian government abolished a 5% tax on imported diamond seeds and announced funding to help India develop its own diamond seed production.

Natural and Lab Grown Diamonds

A natural diamond is a gemstone/precious stone made up of carbon. Lab Grown Diamonds are created in a controlled environment by using high-pressure high-temperature" method (HPHT), and the "chemical vapor deposition" method (CVD). HPHT Diamonds and CVD Diamonds are exactly similar to natural diamonds.

Natural diamonds are classified into four categories according to the level of their chemical impurities into 1a, 2a, 1b and 2b.

- ▶ **Type 1a** - Nitrogen atoms are clustered together within the carbon lattice. They are of pale-yellow colour. Around 98% of the diamonds are 1a.
- ▶ **Type 2a** - Considered the purest form of diamonds. They contain no or very less impurities, very little amount of nitrogen and are almost transparent.
- ▶ **Type 1b** - Single nitrogen atoms instead of clusters are dispersed throughout the crystal lattice. Usually found in darker colours
- ▶ **Type 2b** - Contain boron and are electrically conductive. All naturally blue diamonds are classified as Type 2b. They are extremely rare and form 0.1% of the diamonds

Lab Grown Diamond is seen as a sustainable and pertinent source of diamonds for the future in the light of the projections for rough mined diamond supply which is set to decline from the current level of 125 million carats to only 14 million carats in 2050, whereas demand for rough diamonds will rise to 292 million carats.

Source: [Lab Grown Diamonds: What Are the Different Types of Lab Diamonds? \(growndiamondcorp.com\)](https://growndiamondcorp.com)
[PHD REPORT version5 With new conclusion \(phdcci.in\)](https://phdcci.in)

Project Concept

High Pressure High Temperature (HPHT)

The HPHT method, essentially mimics the natural process. This diamond formation process begins with a small diamond seed that is placed into pure carbon and is exposed to intense pressure and heat. The carbon melts and a diamond begins to form around the seed. The substance is carefully cooled to form a diamond. The HPHT process is permanent, and hence does not require regular upkeep to maintain its colour.

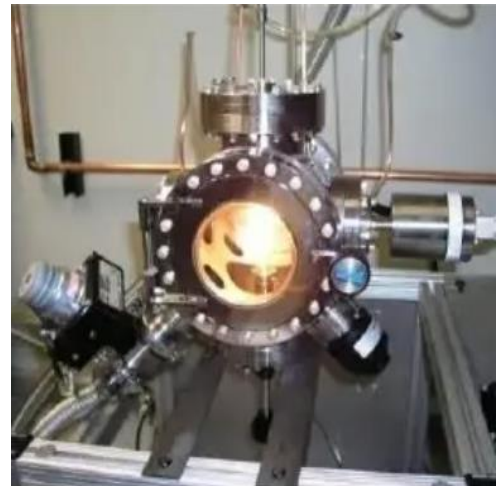
The HPHT process is very costly, given the energy and equipment required, and produces diamonds with mainly yellowish or brownish yellow colours.









Chemical Vapor Deposition (CVD)

In this process, a thin 'seed' diamond is placed inside a sealed chamber and subjected to high temperatures (around 800°C). Then, a carbon-rich gas mixture (usually of hydrogen and methane) is introduced to the chamber. The gases are ionized to break down their molecular bonds, allowing the pure carbon to attach itself to the diamond seed. As the carbon builds up, it forms atomic bonds with the diamond seed, resulting in the growth of a new, larger diamond – entirely identical to the diamonds found in nature.

The CVD method is much less costly because it works at moderate temperatures and low pressure, which requires smaller and less expensive equipment.



Comparison of HPHT and CVD Diamonds

Growth Process	Typical Growth Morphology	Image
Natural	 Shape : Octahedron Growth: 8 directions	
HPHT	 Shape : Cuboctahedron Growth: 14 directions	
CVD	 Shape : Cube Growth: 1 directions	

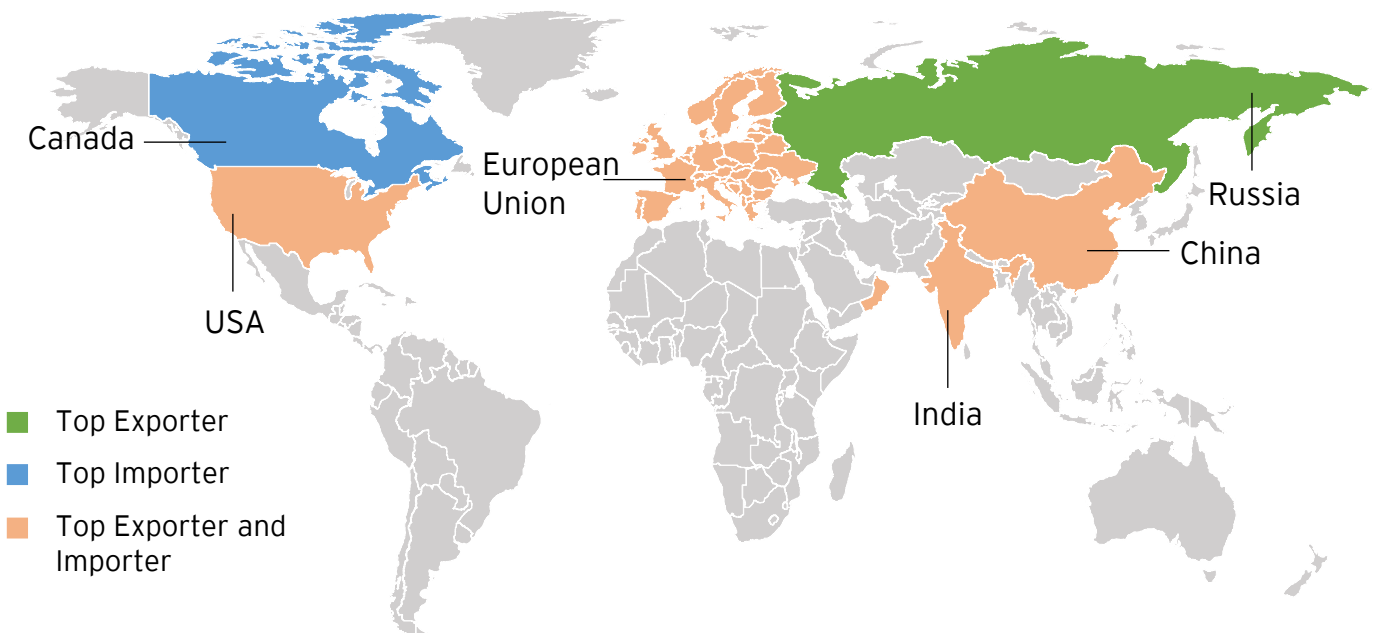
Source: [What is the HPHT Process to Grow Lab Diamonds? | With Clarity About CVD Diamonds | Clean Origin](#)

Market Potential

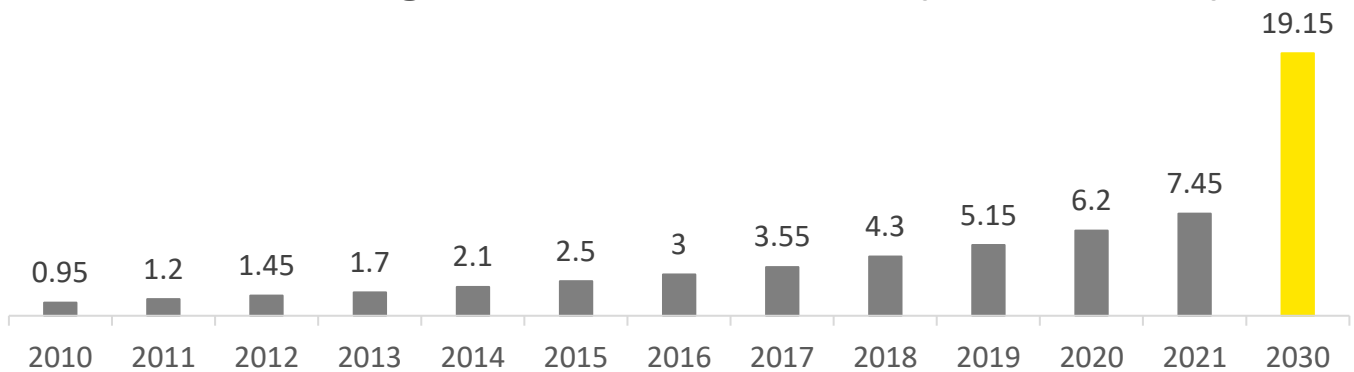
Global Scenario

The global Lab-Grown Diamond market size was valued at US\$ 23,898.6 million in 2022 and is expected to expand at a CAGR of 8.64% during the forecast period, reaching US\$ 39,301.2 million by 2028.

Asia-Pacific is one of the largest producers of lab grown diamonds in the world and held the major share of the market in 2021. This growth is owing to improvements in living standards and rise in disposable income, thereby leading customers to adopt a lavish lifestyle, which is also driving the demand for jewellery in the region.



Market Volume of Lab grown Diamonds Worldwide (in million carats)



Top 5 countries in terms of lab-grown diamond production (2020)

China, India, United States, Singapore, Europe, Middle East and Russia

Source: Statista

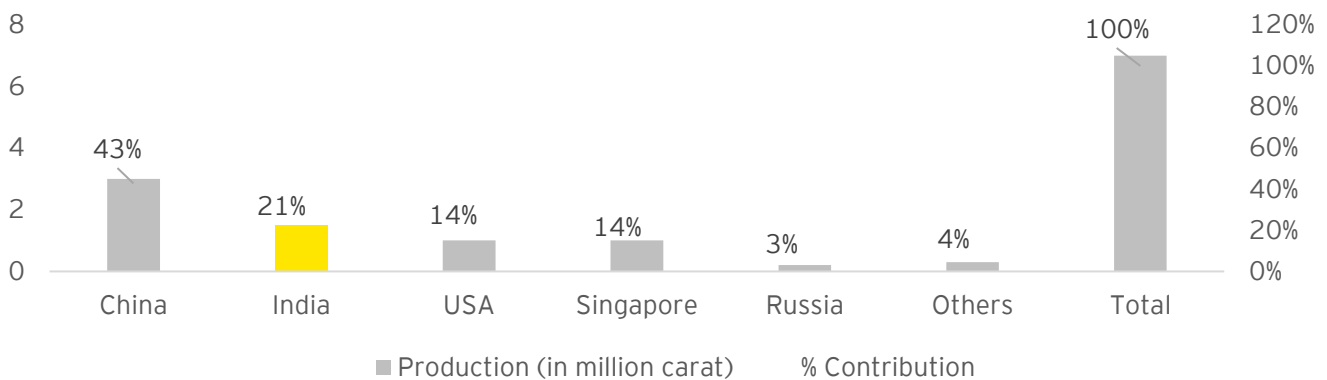
Market Potential

Indian Scenario

According to a commerce ministry report, India was making 15% of all lab-grown diamonds in the world as of May 2022. India is the world's leading cutting and polishing centre.

The India lab grown diamond jewellery market was valued at **US\$ 264.5 million** in 2022. Over the next ten years, lab grown diamond jewellery sales will rise at **14.8% CAGR**. Total market size is set to increase from **US\$ 299.9 million** in 2023 to **1,192.3 million** by 2033.

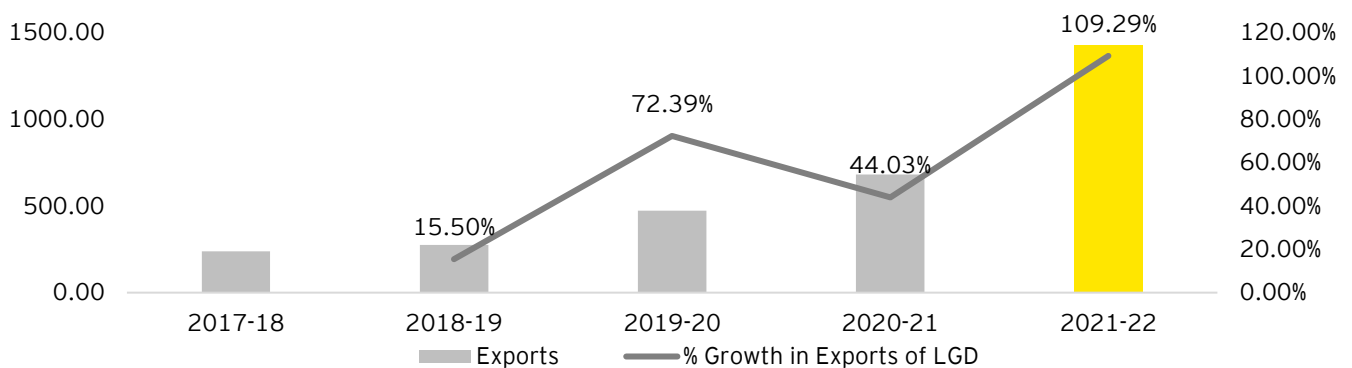
LGD Production Worldwide in 2020 (in million carats)



India was the second largest producer of lab grown diamonds with 1.5 million carats in 2020. Surat and Mumbai are the major LGD hubs producing over 98% of the LGD.

India holds a prominent value share in the South Asia lab grown diamond jewellery market due to the fast-moving lifestyle of the resident population. Lifestyle changes and growing spending on premium & high-cost ornamental products are spurring growth in India market.

Exports of LGD from India (in USD Billion)



Source: Statista and DGCIS

Growth Drivers

Ethical and Environmental Concerns

- ▶ Lab-grown diamonds are often perceived as a more ethical and environmentally friendly alternative to mined diamonds.
- ▶ Emphasizing the sustainable and ethical aspects of is a common approach for positioning and marketing LGDs

Rise in disposable income

- ▶ Increasing disposable income and a shift in the perceived investment value of diamonds have contributed to a rise in global demand for diamonds of all shapes and sizes.
- ▶ With technological evolution the quality and variety of LGDs will improve, making it an attractive choice

Changing consumer preferences

- ▶ Younger consumers, in particular, tend to be more open to alternative choices, and LGDs resonate with those who seek uniqueness and innovation in their purchases.
- ▶ LGDs offer the possibility of creating customized and personalized jewellery designs.
- ▶ The shift in consumer preferences towards experiences and values rather than traditional symbols of status can drive demand for lab-grown diamonds.

Growth Drivers

Cost Competitiveness

- ▶ LGDs can be produced at a lower cost compared to mined diamonds making them a more attractive, affordable and high-quality diamonds

Government Initiatives

Various initiatives are being taken by the Indian government for export promotion.

- ▶ It recently permitted 100% FDI, wherein foreign investors or Indian companies do not require any approval from the Government of India or RBI. This is making India a lucrative market for lab grown diamond jewellery companies.
- ▶ Reduction of Customs Duty on LGD seeds to zero from 5%.
- ▶ Govt. has also accepted to have clear segregation Customs (IT HS) codes for Silver and Platinum studded Lab-grown jewellery for better differentiation and identification at consumer level
- ▶ The GJEPC held the first ever LGD Buyer - Seller meet in April 2023 featuring 22 exhibitors presenting their LGD diamonds to 50 buyers from 13 different countries. It is a platform for buyers and sellers to interact directly, negotiate deals, and develop long-lasting business relationships.

Awareness and Acceptance

- ▶ LGDs are gaining acceptance in the jewellery industry, with more designers and manufacturers incorporating them into their collections.
- ▶ This acceptance can contribute to the mainstream adoption of lab-grown diamonds by consumers.

Gujarat - Competitive Advantage

Gujarat overview

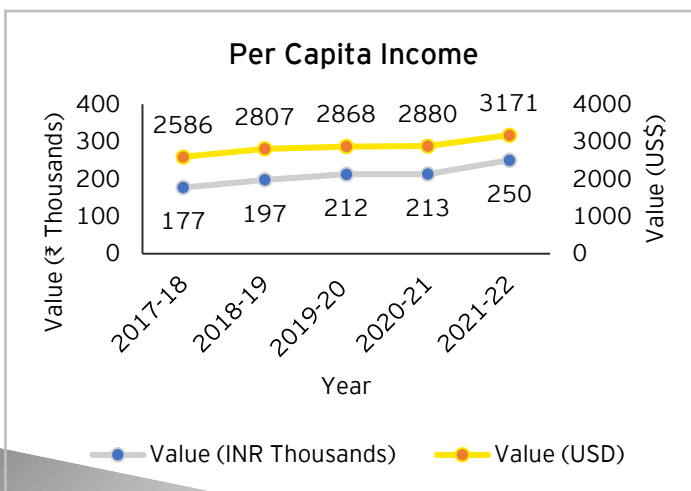
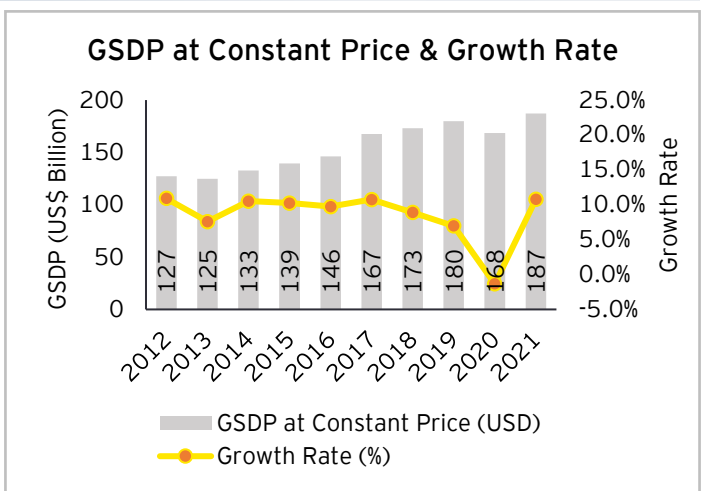
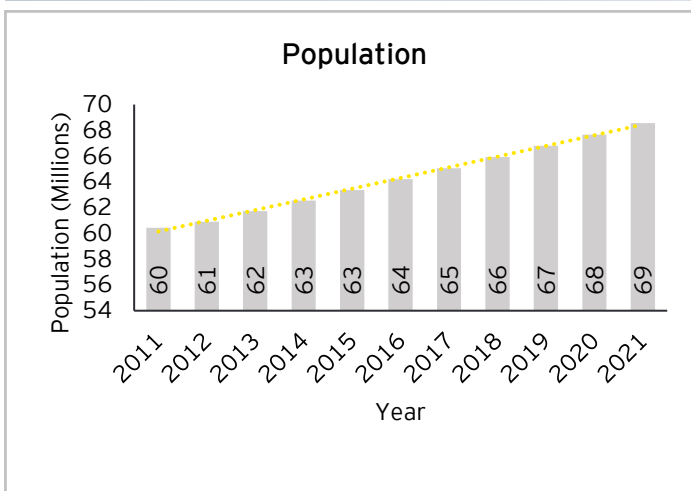
- ▶ 9% of India's GDP: GSDP at current price ~US\$ 269 Bn
- ▶ 35% share of manufacturing sector in State's GDP
- ▶ 18% of India's industrial output

**6% of India's geographical area
And 5% of India's population**

- ▶ 30% share in India's total exports
- ▶ 40% cargo of the entire country is handled by Gujarat Ports
- ▶ Huge base of MSMEs (~830,000)

Gujarat has strong presence of industries such as Chemicals & Petrochem, Textiles, Pharmaceuticals, Automobiles, Gems & Jewellery, Ceramics, etc.

Macroeconomic trend



Industrial Production Data

Gujarat enjoys the status of industrially developed state of India with its 18.14% share to Country's industrial output, the largest among the states of India in the year 2019-20. The Net Value Added (NVA) has increased from ₹8,944.8 billion in 2010-11 to ₹1,902.57 billion in 2019-20. As per Annual Survey of Industries, the number of factories has increased from 26,842 in the year 2018-19 to 28,479 in the year 2019-20, showing a growth of 6.10% over the previous year.

Source: CEIC; <https://gujecostat.gujarat.gov.in/>

Gujarat - Competitive Advantage

Key advantages

Ease of doing business



Ranked among the top achievers in 'Ease of Doing Business' ranking 2020



1st Rank in Logistics Performance Index (LEADS Index) in 2018, 2019, 2021 & 2022



1st Rank in NITI Aayog's Export Preparedness Index of states - 2020 & 2021



1st Rank in Good Governance Index (GGI) in 2021



Ranked among the top achiever state in 'Ease of Doing Business' ranking 2020



National Start-Up Rankings in 2021 (Start-Up Megastars), 2019 and 2018



Top performer by labour force participation rate and minimum man-days lost due to labour unrest

Talent pool

Gujarat has emerged as one of the top states in India with excellent infrastructure for technical education. The state currently has 350+ engineering colleges, 41 polytechnics and 770+ Industrial Training Institutes (ITI) inculcating quality education. The government through its Gujarat Skill Development Mission is also providing training courses to the youth and making them industry ready.

11

Institutes of National Importance

116

Graduate & **60** Post Graduate Colleges

33,000+

Trained technical professionals annually

113

diploma courses

41,000+

Trained Diploma professionals annually

Gujarat - Competitive Advantage

Infrastructure & connectivity



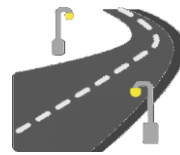
Longest coastline
1,600 km
48 seaports



5,300 km
Railway
network



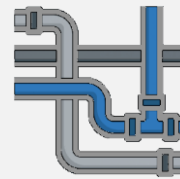
19 Airports
(including
4 intl. airports)
*Upcoming airport at
Dholera SIR*



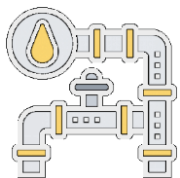
75,000+ km of road
network
7,873 km of national
highways



Power surplus State
48 GW total capacity
44% from renewables



Statewide water
network
62,778 km Narmada
Canal
120,000 km
distribution



1st statewide
extensive
piped natural gas
grid - 3,370 km
network



Ahmedabad-Mumbai
semi-highspeed rail
Bullet train
(*upcoming*)



Delhi-Mumbai
Industrial corridor -
DMIC covering 23/33
districts



239 GIDC
Industrial estates
with
Plug & play facility



1st Global
Business District
- GIFT City

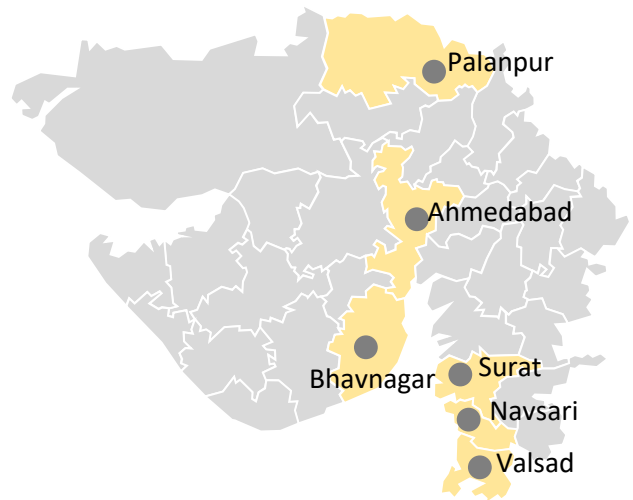


1st Platinum rated
Green industrial city
- Dholera Semicon
City

LGD Manufacturing Ecosystem in Gujarat

Existing LGD manufacturing ecosystem

- ▶ Gujarat is the leading state in India in gems and jewellery sector, as it contributes to about 72% of the total exports of India.
- ▶ Lab-grown diamonds or LGDs have been identified as a major growth area by the Government of India in the latest Union Budget 2023-24.
- ▶ As per the Industrial Policy 2020 for Gujarat, the gems and jewellery sector has been identified as one of the 15 thrust sectors in line with the Atmanirbhar Bharat Mission.
- ▶ Gujarat has a well-established diamond industry. Diamond processing and trading units are spread across the State in cities such as Surat, Ahmedabad, Palanpur, Bhavnagar, Valsad and Navsari.
- ▶ Gujarat accounts for about 80% of diamonds processed and 95% of diamonds export from India.
- ▶ Surat, in Gujarat, is a major hub for diamond manufacturing and is known as the diamond cutting and polishing capital of the world.
- ▶ Approximately 90% of the world's diamonds are cut and polished in Surat, with around half of the 10,000 diamond processing units in Gujarat making use of laser-cutting machines.
- ▶ Some of the major LGD manufacturers in Gujarat are



Green Lab Diamonds	Cupid Diamonds	Finegrown Diamonds	Rahi Impex	Eco Labgrown Diamonds
--------------------	----------------	--------------------	------------	-----------------------

- ▶ Surat has more than 3500 diamond processing units.
- ▶ The easy availability of processed diamonds (used as seed for culturing diamonds) makes it a natural choice for the manufacturers of lab grown diamonds
- ▶ Diamond Research and Mercantile (DREAM) City - A Smart City being developed close to the diamond capital of India - Surat, to promote diamond trading from Gujarat at an estimated project cost of ₹ 2,400 Crore (~US\$ 350 Million). Spread over 2,000 acres, DREAM City will house an International Diamond Trading Hub and a Diamond Bourse.

Source: Gujarat Industrial Policy 2020, Kinara Capital's MSMEs in Gujarat, GJEPC
 Gems and Jewellery: Project Opportunities in Gujarat | Information | NPCS (niir.org)

LGD Manufacturing Ecosystem in Gujarat

Surat Diamond Bourse

- ▶ The Surat Diamond Bourse (SDB) is a diamond trade centre located in Surat, Gujarat. It is a part of the newly built DREAM city.
- ▶ The complex is a pre-certified green building by Indian Green Building Council and is dubbed as the world's largest corporate building.



World's largest diamond trading hub



World's largest office building ahead of Pentagon



Floor space of 7 Mn sq. ft with 4,717 offices

- ▶ The Bourse streamlines the diamond trading process and creates a one stop shop with importers and traders to cutters, polishers, and certifiers making it a global attraction and stimulant for more significant economic activity in the region.
- ▶ SDB is estimated to create over 1,50,000 jobs, significantly boosting the local economy.



Source: [Surat Diamond Bourse: A New Infrastructural Marvel, A City Within A City 2023 - Inventiva](#)

Project Information

Gujarat Hira Bourse (GHB)

- ▶ **Infrastructure:** The GHB project is spread across 100 hectares of land and houses a hi-tech convention centre, trading centre, and all relevant infrastructure facilities like roads, electric system, water supply network, etc.
- ▶ **Location:** The GHB is located at Ichchhapore, Surat, which has traditionally been the headquarters of the Diamond polishing, trading, and export industry in Gujarat.
- ▶ **Facilities:** The GHB provides world-class infrastructure facilities available in the huge open space in the lap of nature. These include all relevant infrastructure facilities like roads, electric system, water supply network, etc.
- ▶ **Connectivity:** The GHB provides continuous connectivity with the public transport facility of the city. There is a proposed planning of special BRTS bus facility for the Workers of the Park.
- ▶ **Additional Facilities:** There is a proposed planning of common hostel facility for Diamond Workers. A Rough Diamond Trading centre of mining companies will be operational soon.

Source: *Gujarat Hira Bourse* (<http://www.gujarathirabourse.org/>)

Surat Special Economic Zone (SuRSEZ)

- ▶ Manufacturers setting up units at Surat SEZ are eligible for various incentives from the Central and State Government
- ▶ SuRSEZ enjoys excellent location which is a vital input for industrial activity. It is located just 14 Kms from the heart of Surat city and lies adjacent to the Mumbai-Ahmedabad Road and Rail routes
- ▶ It has over 250 units representing various industry segments including, jewellery making, diamond processing, engineering, textiles, textile machinery, pharmaceuticals and so on
- ▶ About 80 of the 250 units are occupied by various national and international manufacturers, traders and exporters of diamonds and diamond jewellery
- ▶ These units are flourishing due to the locational benefits, cost effectiveness, peaceful environment, competent labour force available in abundance for all industrial sectors and superior infrastructure provided in the Zone.

Source: *SURAT SPECIAL ECONOMIC ZONE* (sursez.com)

Project Information

Indian Diamond Institute, Surat

- ▶ Indian Diamond Institute is established in Surat, Gujarat which provides Educational and Training programs, promotes Technology and Innovation in Diamond, Gems & Jewellery sector.
- ▶ It is the only institute in Gems & Jewellery field offering Educational & Gemmological Laboratory services through its campuses at Katargam and Vesu, Surat.

Programs and Certifications

Courses	Details	Degree/Certifications
Diamond Programs	Manufacturing of Diamonds Diamond planning with Laser 4P Grading and Polishing.	<ul style="list-style-type: none"> ▶ Diploma Program ▶ Certificate Program
Jewellery Programs	Jewellery manufacturing (Manual and CAD-Matrix), Metallurgy.	<ul style="list-style-type: none"> ▶ Bachelor Program ▶ Diploma Program ▶ Certificate Program ▶ Graduate Program
Gemmology	Gem Identification, Groups and species classification of inorganic gems.	<ul style="list-style-type: none"> ▶ Diploma Program ▶ Certificate Program

Source: Indian Diamond Institute <https://diamondinstitute.net/>

Collaborations

- ▶ The five-year research grant announced in the Union Budget 2023-24 to encourage the indigenous production of lab-grown diamonds (LGD) machinery, seeds and recipe has been given to IIT- Madras.
- ▶ It is proposed to establish an India Centre for Lab grown Diamond (In Cent-LGD) at IIT Madras with the estimated cost of ₹242.96 crores over 5 years.

Project Information

Infrastructure & connectivity



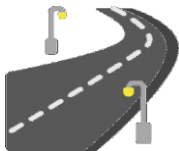
- ▶ Magdalla & Hazira Ports are the two ports in Surat which has good rail and road connectivity.
- ▶ Hazira Port in Surat has close proximity to the high speed dual carriageway which is under construction. The port is also well connected with main Mumbai - Ahmedabad - Delhi broad gauge railway line.



- ▶ Surat is connected with other districts of the state such as Rajkot, Vadodara and Ahmedabad by rail
- ▶ Hazira port is ~ 16kms away from Surat railway station



- ▶ Surat domestic airport as daily flights to major destinations like Delhi, Hyderabad, Kolkata, Pune, Jaipur etc.
- ▶ It also has a domestic cargo terminal in operation since January 2020
- ▶ Surat recently received the status of International airport with regular direct flights to Dubai. Flight connectivity to Hongkong is also proposed



- ▶ The city is connected to Delhi Mumbai Industrial Corridor (DMIC) which links Ahmedabad, Vadodara and Surat.
- ▶ Proximity to NH-8 and NH-6 further enhances connectivity in the city.



The main source for the power supply is Torrent Power Limited in Surat and State DISCOMs



Water for industrial purposes can be obtained from four sources viz. Gujarat Water Supply and Sewerage Board (GWSSB), an irrigation canal, dams, and surface reservoirs

Source: [Lab Grown Diamond at Surat | PDF | Diamond | Chemical Vapor Deposition \(scribd.com\)](#)
[Surat Airport - Air Cargo Terminal \(suratinternationalairport.com\)](#)
[Surat Airport - About Surat Airport \[STV\] \(suratinternationalairport.com\)](#)

Project Information

Key Considerations



Cost of Production

- ▶ High costs associated with equipment, energy, and raw materials used in the production process
- ▶ The LGD industry is becoming increasingly competitive, maintaining market share and differentiating products from competitors can be a challenge.



Technical Challenges

- ▶ Maintaining consistent quality and avoiding impurities or irregularities and ensuring that the diamonds meet or exceed industry standards can be challenging
- ▶ Establishing and adhering to industry standards, certifications, and regulations is crucial and the LGD industry must navigate and comply with evolving standards and regulations



Consumer Perception

- ▶ Educating consumers about the benefits and characteristics of lab-grown diamonds and clearing misconceptions about their quality, value, and authenticity is an ongoing challenge.
- ▶ The price differential between lab-grown and mined diamonds can sometimes be a barrier to wider adoption.
- ▶ Convincing consumers to shift from natural to lab-grown diamonds may require overcoming cultural and emotional attachments.
- ▶ Convincing consumers that lab-grown diamonds hold their value and are a worthwhile investment over time can be challenging.

[\(47\) Challenges Faced By Lab-Grown Diamond Industry | LinkedIn](#)

Project Financials

Project Sector and Implementation Models

- ▶ Synthetic diamond manufacturing projects are usually funded through a private model

Land Cost

- ▶ The land in the proposed locations can be purchased or taken on long term lease.

Labour Cost

- ▶ The labour cost per carat in Gujarat is ~₹ 1,500, the lowest among the major diamond trading centres across the world

Manufacturing unit particulars	Units
Installed Capacity (carat per annum)	72,000
Construction/Lease (4000 sq ft. @₹3000 per Sq.ft)	12
Installed machinery	48
Profit Margin	20%
Total Project Cost (₹ Million)	60.55

Sources of finance	Amount (₹ Million)
Term Loan	390
Secured Loan	63.5
Equity	140
Total	593.5

Source: <https://gidc.gujarat.gov.in/allotmentprice>

[Lab Grown Diamond at Surat | PDF | Diamond | Chemical Vapor Deposition \(scribd.com\)](#)

Incentives

Atmanirbhar Gujarat Scheme 2022

Government of Gujarat launched **Atmanirbhar Gujarat Scheme 2022 for assistance to Industries** in 2022. The state is also offering incentives for the development of project related infrastructure as a part of the project. Thus, **units establishing their industries will be able to avail benefits under the Atmanirbhar Policy.**

The incentives provided by the government are as follows:

Particular	Atmanirbhar Gujarat Scheme for SME's
Interest Subsidy	<p>Category 1: @7% on Term Loan with maximum amount of ₹ 35 Lakhs per annum for a period of 7 years</p> <p>Category 2: @6% on Term Loan with maximum amount of ₹ 30 Lakhs per annum for a period of 6 years</p> <p>Category 3: @5% on Term Loan with maximum amount of ₹ 25 Lakhs per annum for a period of 5 years</p>
Net SGST	<p>Category 1: 100% of net SGST for 10 years upto 7.5% of eFCI p.a.</p> <p>Category 2: 90% of net SGST for 10 years upto 6.5% of eFCI p.a.</p> <p>Category 3: 80% of net SGST for 10 years upto 5% of eFCI p.a.</p>
EPF Reimbursement	<p>100% reimbursement of employer contribution of EPF upto 12% of basic pay or upto ₹ 1,800 per month per employee, whichever is less, for a period of 10 years.</p>
Electricity Duty	100% for 5 years
Other Incentives	<p>MSMEs will continue to get the incentive components as defined in Gujarat Industrial Policy 2020 like Quality Certificate, ERP, IT, Software/Hardware, Patent Registration, Water/Power Consumption Audit, Technology Purchase, Utility connection charges</p>

Approvals through IFP Portal

The Investment Facilitation Portal is the online single point interface of the Government of Gujarat to facilitate investors. It facilitates the online filing of all required forms, online payments, downloading online certificates. Licenses and a grievance redressal mechanism.

For more details: <https://www.ifp.gujarat.gov.in/>

Source: <https://cmogujarat.gov.in/en/portfolio/aatmanirbhar-gujarat-2022-industries-assistance/>

Key Department Contacts

Relevant departments and useful links



**Industries & Mines
Department
Government of Gujarat**



**Industries
Commissionerate
Govt. Of Gujarat**

Department of Industries & Mine, Gujarat
<https://imd.gujarat.gov.in/>

Industries Commissionerate, Gujarat
<https://ic.gujarat.gov.in/>



GIDC
<https://gidc.gujarat.gov.in>



IndexTb
<https://indextb.com>



Investor Facilitation Portal
<https://ifp.gujarat.gov.in>

This project profile is based on preliminary study to facilitate prospective entrepreneurs to assess a prima facie scope. It is, however, advisable to get a detailed feasibility study prepared before taking a final investment decision.



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iNDEXTb
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(A GOVT. OF GUJARAT ORGANISATION)
ISO 9001 : 2015 Certified

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