NEW DIAMOND

TECHNOLOGY

NEW DIAMOND TECHNOLOGY

# About

- **Established:** 2014
- **Location:** Saint-Petersburg, Russia
- **President:** Tamaz Khikhinashvili
- **General Director:** Nikolay Khikhinashvili
- **Workforce:** 135 employees
- **Sectors:** - Jewelry
  - Industrial & Hi-Tech

Our mission is to mass produce the world's highest quality diamonds — large, single-crystal, nitrogen-free, lab-grown diamonds. To reach our objective we've developed proprietary technology, purchased state-of-the art equipment and assembled a team of world-renowned professionals.

We are actively developing jewelry and Industrial trends for the international market and develop innovative approaches to improve the quality of our products. The company is focusing a lot on partnerships with international research institutes and innovative companies to create and improve the third-party technology and equipment by implementing our products.

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# Values and Vision

**Vision.** We firmly believe that new technologies must be sustainable. Our technology replaces the antiquated practice of extracting rough diamonds from the earth that has caused so much damage to the environment and societies around the globe.

**Values.** A global team of professionals passionately devoted to the transformation of their favorite cause into a reality.

# Technology

## Existing technologies for production of synthetic diamonds

HPHT и CVD - the most common methods of producing synthetic diamonds.

### HPHT

**High Pressure High Temperature:**

1.Spontaneous synthesis of diamond single crystals and powders.

**2.Controlled synthesis of diamond single crystals on a seed*.**

3.Synthesis of polycrystalline diamond by sintering powders.

*Applied Technology

### CVD

**Chemical Vapor Deposition:**

1.Synthesis of single-crystal diamonds on HPHT or CVD substrate.

2.Synthesis of polycrystalline diamond on the substrate from other crystalline materials (polycrystalline diamond, silicon carbides or nitrides of various materials).

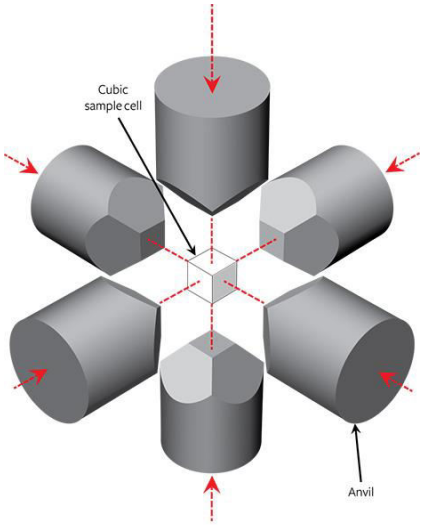
### Explosive synthesis

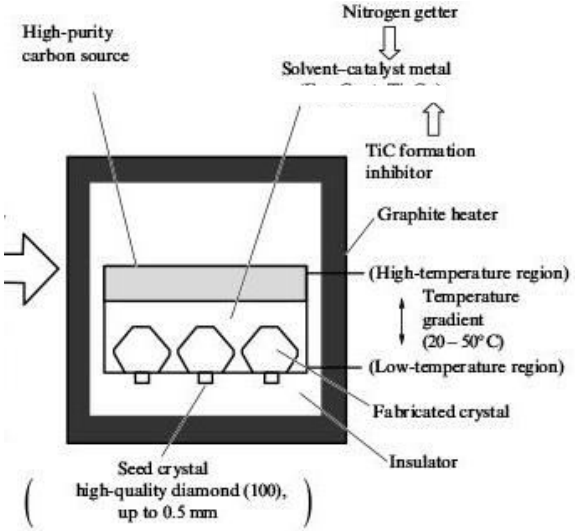
**Explosives containing carbon:**

1.Production of cluster polycrystalline (ultrafine) diamonds during the process of ammunition utilisation.

2.Production of detonation polycrystalline diamonds of micron range during the explosion of a TNT and RDX, metal catalysts and fine graphite mixture.

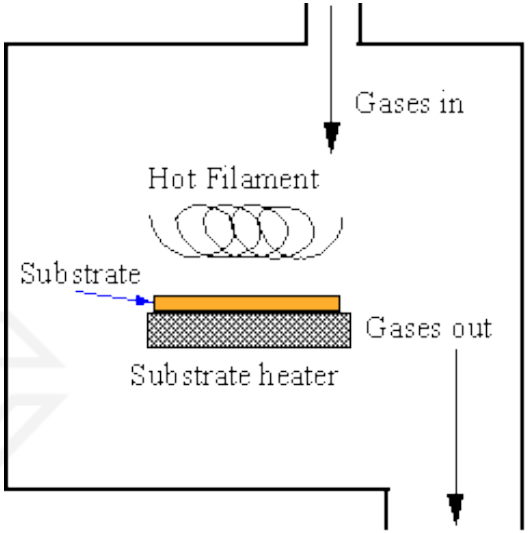
# Technology

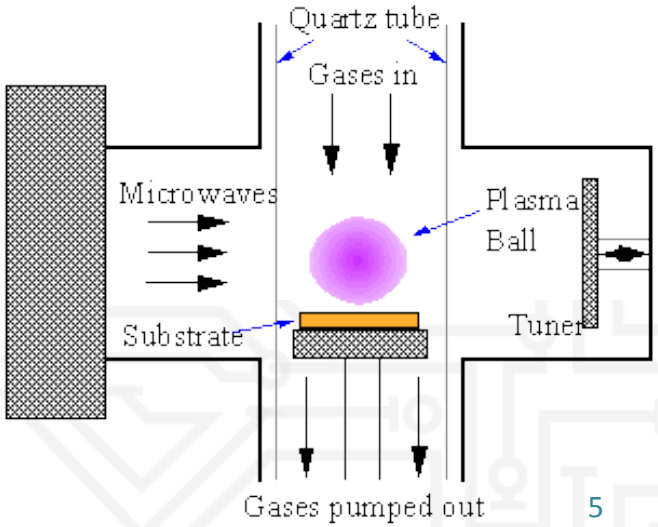



## HPHT

## CVD



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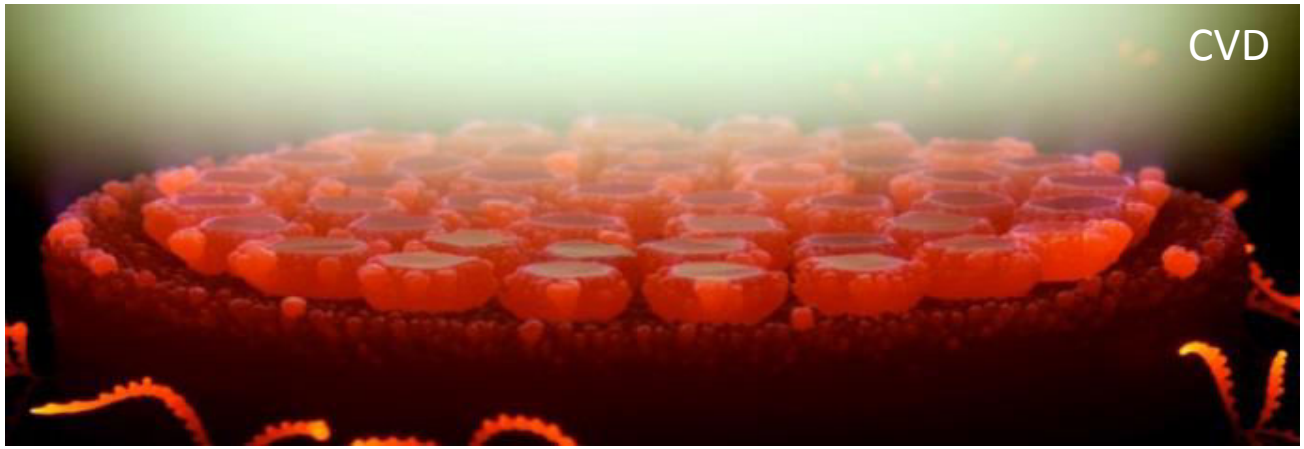
# Multi-seed and multi-layered growing layouts



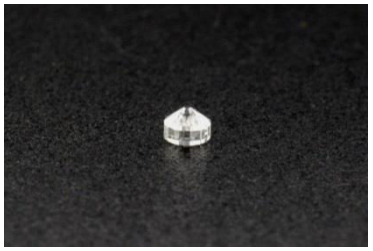




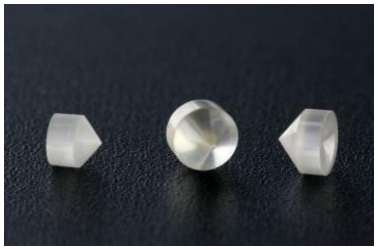
# Production

## Industrial & Hi-Tech

Single-Crystal Diamond Plates



Diamond anvils



Diamond anvils blanks

Diamond lenses

## Jewellery

Polished diamonds

## Raw Materials

Rough diamonds and semi-products

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# Applications

- Micro and power electronics;
- Semiconductors, transistors and diodes;
- Detectors and sensors;
- Optics & Lasers;
- Vacuum and diamond windows;
- X-ray and medical equipment;
- Quantum computers and photonics;
- Acoustics and electrochemistry;
- Abrasive and drilling materials;
- Aerospace and military fields;
- Processing and manufacturing;
- CVD process;
- Jewellery.

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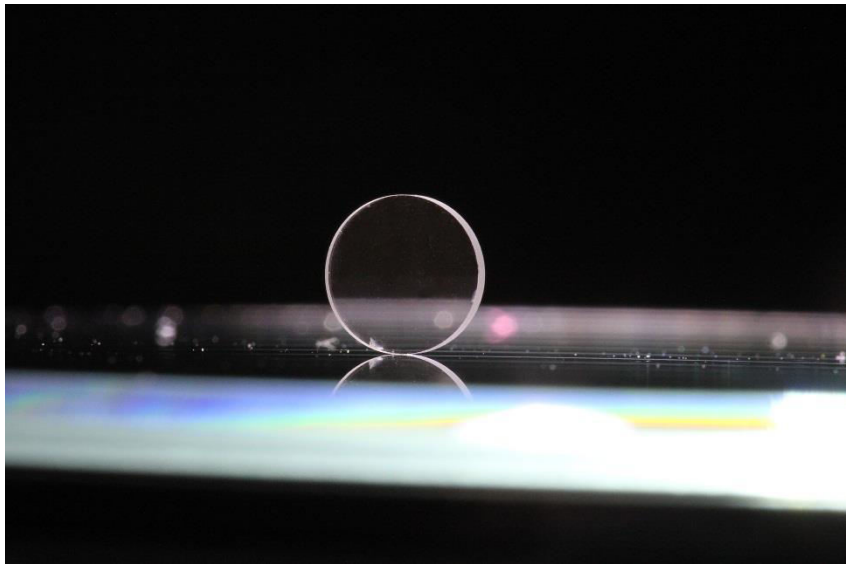
# Single crystal diamond plates

- Available sizes in stock are from 3.0x3.0 mm up to 10.0x10.0 mm with standard thickness 0.5 mm and orientation (100).

- For special technical applications we can provide sizes up to 15.0x15.0 mm and vary thickness, orientations (111), (110), (113) etc, types (IIa, IIa+IIb or IIb) and obtain mono- or multi-sectorial plates with different shapes.

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# SCD plates characteristics

| SPECIFICATION | VALUE | OTHER VALUES |
|---|---|---|
| Size | 3.0 x 3.0 mm | up to 10.0 x 10.0 mm |
| Thickness | 0.3 mm | 0.05 mm – 2.00 mm |
| Type | IIa | IIb, IIa+Iib |
| Face surface orientation | (100) | (111), (110), (113) |
| Crystallography | mono-sectorial | multi-sectorial |
| Side surfaces orientation | (110) | upon request |
| Roughness | ≈ 5 nm | 0.5 nm – 10 nm |
| Miscut | +/-3° | upon request |
| Lateral Tolerance | +0.2/-0 mm | |
| Thickness Tolerance | +/- 0.05 mm | |
| Edge Features | < 0.2 mm | |
| Laser Kerf | 3° | |
| Boron concentration | < 5 ppb | upon request |
| Nitrogen concentration | < 5 ppb | |
| Dislocations density | ~ $10^2$ $cm^{-2}$ | upon request |
| Charge collection efficiency | > 95% | |
| Thermal conductivity | ~ 2200 W/mK | |

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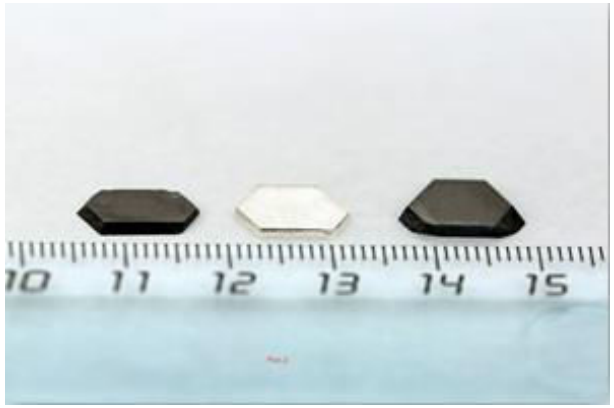
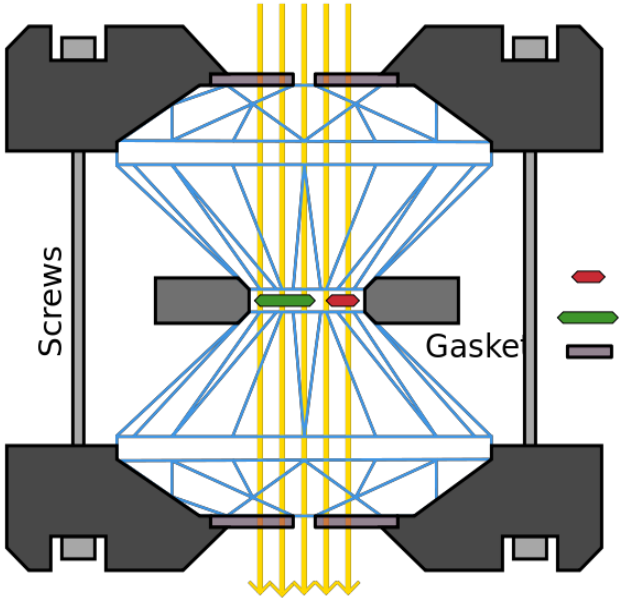
# Production capacity

- New Diamond Technology is able to produce more than 3 500 Ct monthly. The company improves the in-house technology every day to achieve better quality and bigger sizes of HPHT diamonds
- Already in 2015 New Diamond Technology produced 18.0x18.0 mm single-crystal multi-sectorial (100) plate, which is close to ¾ inch
- Unique single-crystal mono-sectorial (111) plate for X-Ray optics and laser equipment



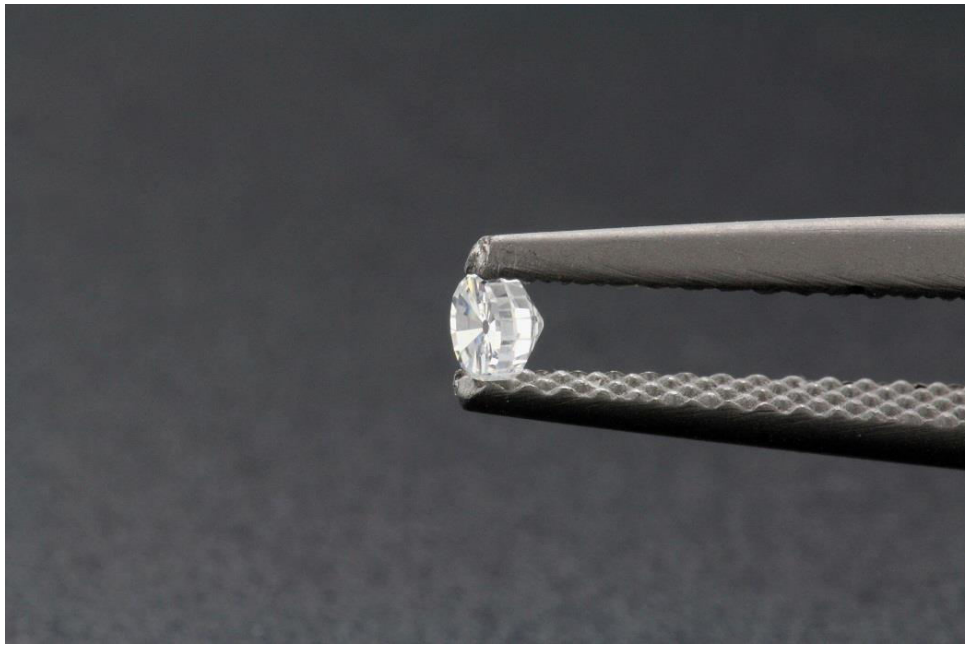


# Diamond anvils




- We produce anvils from d. 2.6 mm up to d. 4.15 mm of a cylindrical shape or with cone on top. Generatric line of the cone may have various angles (30°, 45°, 60°).
- Anvil blanks can be special ordered.

- The exceptional properties of diamond are used in research centers to study various properties of materials under high pressure over 1000000 bar / 1 million atmospheres.

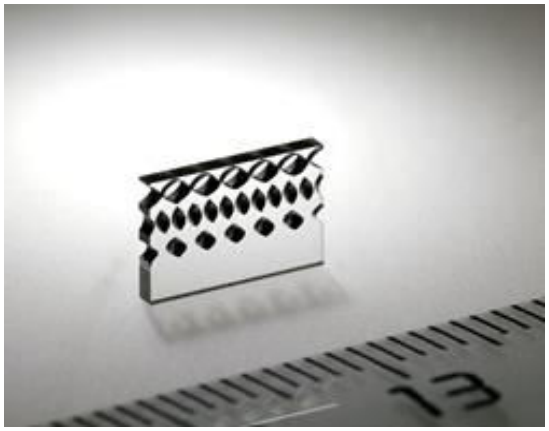


# Diamond lenses

Diamond lenses can be applied for various technologies that involve infrared, ultra-violet, visible and X-ray ranges.

Lenses for spectrometers

Diamond ophthalmic lens



Compound refractive lens

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# Polished diamonds






**Eco-friendly diamonds.** The growth of diamonds requires less energy and does not require mining. That means no draining of lakes, no explosions, no damage to the fragile ecosystem of the Earth.

**100% conflict-free (no blood diamonds).** Blood diamonds are diamonds mined in a war zone and sold to finance insurgency, invading army's war efforts or warlord's activity.

**General characteristics**:

Colors: D – F and Fancy Blue

Clarity: IF – SI

Size: 1.0 – 3.0 Ct

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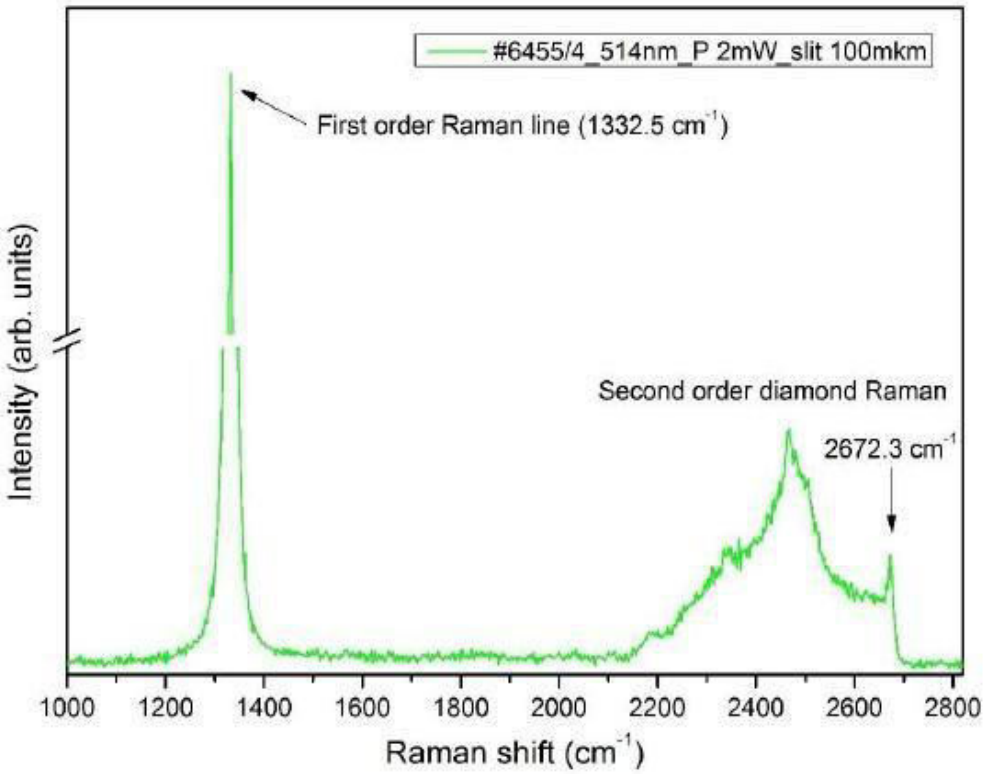
# Rough diamonds

- We produce only colorless (white) rough diamonds of 1C grade (D,E,F colors) and 1Q-4Q quality (IF-SI clarity)
- Standard sizes from 8-10 GR - 10.00 Ct
- Sizes for special order from 10.00 Ct and above

# Crystal quality

- Raman spectra of the second order registered in these samples corresponds with one-phonon density of states in the diamond.
- This spectra is specific only for **high-quality diamond crystals with near perfect structure.**




*- IAF RAS: lab. Microwave spectroscopy of crystals, lab. Solid State Microscopy, CCU "Materials science and diagnostics in advanced technologies"*

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# World records

New Diamond Technology Company has set several world records in lab-grown diamond field:

10.02 Ct (E / VS1) - the world's largest colorless grown diamond (more information at the IGI website)

The largest round colorless HPHT lab-grown diamond
Round / 6,07 ct / VVS1 / G

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# World records 2016

**Four record breaking stones from New Diamond Technology were unveiled at JCK Show 2016**

Blue HPHT lab-grown diamonds:

- Heart / 5.26 ct / Fancy Deep blue / $VVS_2$
- Emerald / 5.27 ct / Fancy Deep blue / $VS_1$

Large colorless HPHT lab-grown diamonds. Round and Heart shape cut diamonds were presented in June 2016 :

- Round / 5.06 ct / VS2 / D
- Heart / 5.05 ct / VS2 / D

**Find more information at the GIA website**

# World records 2016

## Brand new records. Again and again.
## New Diamond Technology introduces the largest blue HPHT lab-grown diamond

- **Emerald Cut**
- **10,07ct**
- **SI1**
- **Fancy Deep Blue**

**All diamonds have been grown and polished by specialists and on the territory of New Diamond Technology.**

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# Unique polished diamonds

- New Diamond Technology is the only company in the world that is able to produce pure and saturated **Fancy Blue colors 3 ct+,** that 100 % mimic the color of the natural diamond

Cushion
**Fancy Deep Blue**

Radiant
**Fancy Intense Blue**

Square Radiant
**Fancy Intense Blue**

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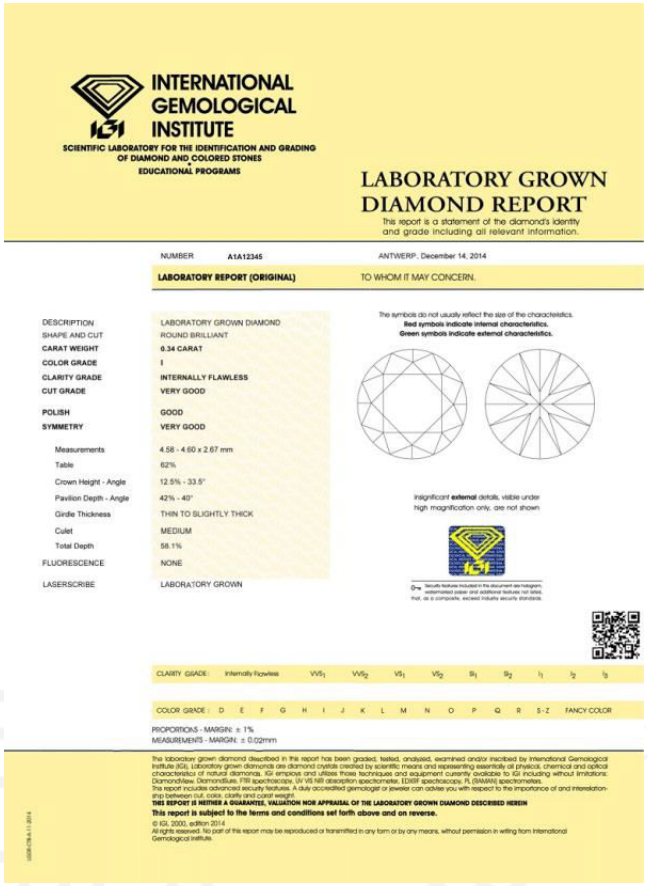
# Certification

**All our polished diamonds are certified at International Gemological Laboratories such as IGI and GCAL**



INTERNATIONAL GEMOLOGICAL INSTITUTE

SCIENTIFIC LABORATORY FOR THE IDENTIFICATION AND GRADING OF DIAMOND AND COLORED STONES
EDUCATIONAL PROGRAMS

LABORATORY GROWN DIAMOND REPORT

This report is a statement of the diamond's identity and grade including all relevant information.

NUMBER A1A12345 — ANTWERP, December 14, 2014

LABORATORY REPORT (ORIGINAL) — TO WHOM IT MAY CONCERN.

| | |
|---|---|
| DESCRIPTION | LABORATORY GROWN DIAMOND |
| SHAPE AND CUT | ROUND BRILLIANT |
| CARAT WEIGHT | 0.34 CARAT |
| COLOR GRADE | I |
| CLARITY GRADE | INTERNALLY FLAWLESS |
| CUT GRADE | VERY GOOD |
| POLISH | GOOD |
| SYMMETRY | VERY GOOD |
| Measurements | 4.58 - 4.60 x 2.67 mm |
| Table | 62% |
| Crown Height - Angle | 12.5% - 33.5° |
| Pavilion Depth - Angle | 42% - 40° |
| Girdle Thickness | THIN TO SLIGHTLY THICK |
| Culet | MEDIUM |
| Total Depth | 58.1% |
| FLUORESCENCE | NONE |
| LASERSCRIBE | LABORATORY GROWN |

The symbols do not usually reflect the size of the characteristics.
Red symbols indicate internal characteristics.
Green symbols indicate external characteristics.

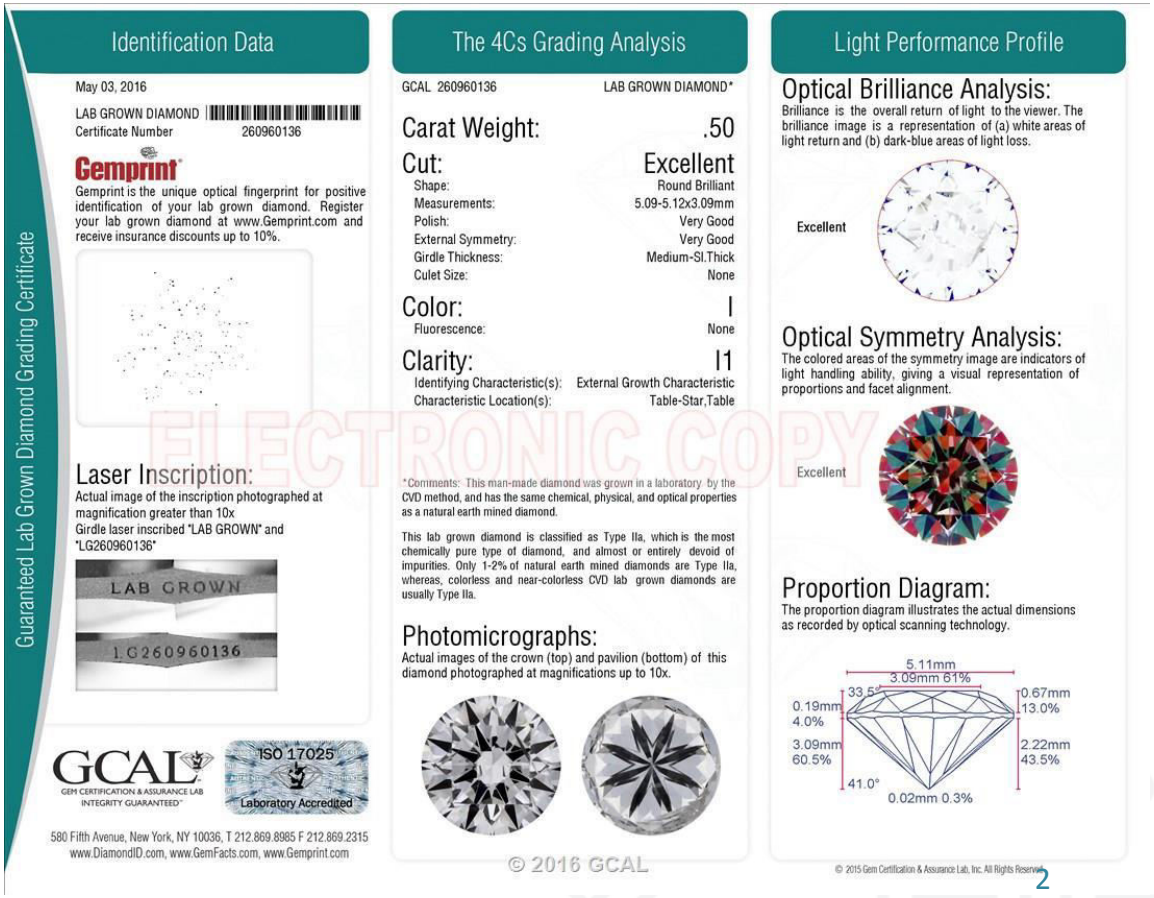
Insignificant external details, visible under high magnification only, are not shown

CLARITY GRADE: Internally Flawless | VVS1 | VVS2 | VS1 | VS2 | SI1 | SI2 | I1 | I2 | I3

COLOR GRADE: D E F G H I J K L M N O P Q R S-Z FANCY COLOR

PROPORTIONS - MARGIN: ± 1%
MEASUREMENTS - MARGIN: ± 0.02mm

The laboratory grown diamond described in this report has been graded, tested, analysed, examined and/or inscribed by International Gemological Institute (IGI). Laboratory grown diamonds are diamond crystals created by scientific means and representing essentially all physical, chemical and optical characteristics of natural diamonds. IGI employs and utilizes those techniques and equipment currently available to IGI including without limitations: DiamondView, Diamondlase, FTIR spectroscopy, UV VIS NIR absorption spectrometer, ED/EF spectroscopy, PL (SWAMA) spectrometers.
This report includes advanced security features. A duly accredited gemologist or jeweler can advise you with respect to the importance of and interrelationship between cut, color, clarity and carat weight.
**THIS REPORT IS NEITHER A GUARANTEE, VALUATION NOR APPRAISAL OF THE LABORATORY GROWN DIAMOND DESCRIBED HEREIN**
**This report is subject to the terms and conditions set forth above and on reverse.**

Guaranteed Lab Grown Diamond Grading Certificate

## Identification Data

May 03, 2016

LAB GROWN DIAMOND
Certificate Number 260960136

**Gemprint**

Gemprint is the unique optical fingerprint for positive identification of your lab grown diamond. Register your lab grown diamond at www.Gemprint.com and receive insurance discounts up to 10%.

### Laser Inscription:

Actual image of the inscription photographed at magnification greater than 10x
Girdle laser inscribed "LAB GROWN" and "LG260960136"

LAB GROWN
LG260960136

GCAL
GEM CERTIFICATION & ASSURANCE LAB
INTEGRITY GUARANTEED

ISO 17025
Laboratory Accredited

580 Fifth Avenue, New York, NY 10036, T 212.869.8985 F 212.869.2315
www.DiamondID.com, www.GemFacts.com, www.Gemprint.com

## The 4Cs Grading Analysis

GCAL 260960136 — LAB GROWN DIAMOND*

| | |
|---|---|
| **Carat Weight:** | .50 |
| **Cut:** | Excellent |
| Shape: | Round Brilliant |
| Measurements: | 5.09-5.12x3.09mm |
| Polish: | Very Good |
| External Symmetry: | Very Good |
| Girdle Thickness: | Medium-SI.Thick |
| Culet Size: | None |
| **Color:** | I |
| Fluorescence: | None |
| **Clarity:** | I1 |
| Identifying Characteristic(s): | External Growth Characteristic |
| Characteristic Location(s): | Table-Star,Table |

*Comments: This man-made diamond was grown in a laboratory by the CVD method, and has the same chemical, physical, and optical properties as a natural earth mined diamond.

This lab grown diamond is classified as Type IIa, which is the most chemically pure type of diamond, and almost or entirely devoid of impurities. Only 1-2% of natural earth mined diamonds are Type IIa, whereas, colorless and near-colorless CVD lab grown diamonds are usually Type IIa.

### Photomicrographs:

Actual images of the crown (top) and pavilion (bottom) of this diamond photographed at magnifications up to 10x.

## Light Performance Profile

### Optical Brilliance Analysis:

Brilliance is the overall return of light to the viewer. The brilliance image is a representation of (a) white areas of light return and (b) dark-blue areas of light loss.

Excellent

### Optical Symmetry Analysis:

The colored areas of the symmetry image are indicators of light handling ability, giving a visual representation of proportions and facet alignment.

Excellent

### Proportion Diagram:

The proportion diagram illustrates the actual dimensions as recorded by optical scanning technology.

5.11mm
3.09mm 61%
33.5°
0.19mm 4.0%
3.09mm 60.5%
0.67mm 13.0%
2.22mm 43.5%
41.0°
0.02mm 0.3%

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# Unique polished diamonds and special orders

**New Diamond Technology produces polished diamonds of different shapes.**

**We also are able to produce special shapes as individual order using your own parameters.**






Send us your graphite and we will grow and cut unique polished diamond special for you. Amazing way to capture the memories for a whole life!



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# Unique polished diamonds and special orders

New Diamond Technology diamonds can be anything

**YOU WANT IT TO BE!**

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# Special diamonds

- Moreover New Diamond Technology is able to produce special diamonds from different materials such as wood, leather, hair, wool and even ashes.
- We clean material from all inorganic substances such as salts to leave pure carbon and then use this carbon in HPHT presses to grow these special diamonds.
- For memorable moments, ceremonies and festive events.

# World records

- In 2015 a group of our scientists and technicians brought up one of the largest nitrogen-free colorless crystals weighing over 32 carats grown in record breaking 300 hours.

- In the lower part there are defects in the crystal form twinning parallel growths, but the upper part (more than two thirds of the crystal) is a perfectly formed single crystal.

More information on
Rough & Polished and Rapaport

Crystal length of 20.69 mm, a width of 17.53 mm and a height of 11.80 mm with a total weight of 32.26 carats.

# New opportunities

- After the primary treatment of 42 ct was received semi-finished 28 ct product of high quality, from which we plan to obtain another breaking world record - 15 ct colorless and clean grown diamond of the highest quality.

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# Partners and projects

- In the end of 2015 New Diamond Technology became an initial founder member of **International Grown Diamonds Association**. This association is aiming to protect interests of grown-diamond producers, to raise global awareness of advantages and opportunities of grown diamonds and to bring the entire industry to a whole new level.

- Since 2016 New Diamond Technology is one of the main suppliers of the most powerful European synchrotron **ESRF** and the largest European project for micro- and power electronic devices **Green Diamond**.

IGDA

ESRF

green diamond

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# Partners and projects

From 2015, New Diamond Technology actively supports the activities of the major research centers, laboratories, universities and institutions all over the world involved in development of diamond technologies and industry in general.