De Beers
Group of Companies

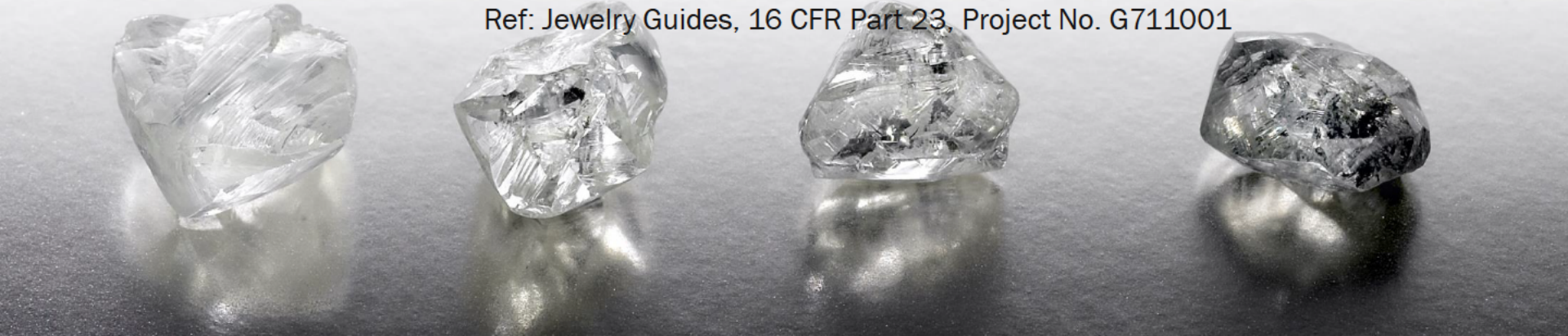
DPA Petition on Proposed Revisions to the Guides for the Jewelry, Precious Metals, and Pewter Industries

Annex 1 – The Technical Properties and Formation of Synthetic Diamonds

Prepared by De Beers Technologies UK

May 2016

Ref: Jewelry Guides, 16 CFR Part 23, Project No. G711001



OVERVIEW

- About De Beers Technologies UK
- Trade Definitions & Terminology
- Natural Diamond Formation
- High Pressure, High Temperature (HPHT) Synthesis
- Chemical Vapor Deposition (CVD) Synthesis
- Synthetic diamond substrate/seed crystals
- Comparisons: Images of HPHT and CVD synthetics vs natural diamond
- Biography – Dr Simon Lawson, Head of Technologies UK, De Beers Technologies UK

ABOUT DE BEERS TECHNOLOGIES UK

- The De Beers Group of Companies, the world's leading diamond company with extensive expertise in the exploration, mining and marketing of diamonds, has over 65 years of fundamental research experience on diamond
- Today, this research is conducted through De Beers Technologies UK, the world-leading diamond research and technological development centre in Maidenhead, Berkshire, UK
- For over 30 years, our scientists and engineers have been at the forefront of consumer confidence technical research seeking to ensuring that all synthetics, simulants and treated diamonds can be detected.
  - This includes a contract synthesis and treatment research project with Element Six, the world leader in synthetic diamond super-materials (part of the De Beers Group).
- De Beers Technologies UK supports and collaborates with a wide range of organisations and academic institutions, including:
  - International Institute for Diamond Grading & Research (IIDGR), part of the De Beers Group
  - Diamond research at UK universities including Oxford University, Cardiff University, Warwick University and Imperial College, London.
  - EPSRC funded UK national Centre for Doctoral Training in Diamond Science & Technology (www.DST-DTC.ac.uk)
  - Annual Diamond Conference: The 66th Conference was held at the University of Warwick in July 2015 with over 120 delegates attending from all over the globe

INTERNATIONAL INSTITUTE OF DIAMOND GRADING & RESEARCH

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DST Diamond Science Technology Centre

elementsix™ a De Beers Group Company

Image 1. De Beers Technologies UK Lab

TRADE DEFINITION OF DIAMOND & TERMINOLOGY

What is a diamond?

- A diamond is a natural mineral consisting essentially of pure carbon crystallised in the isometric (cubic) system, with a hardness on the Mohs' scale of 10, a specific gravity of approximately 3,52 and a refractive index of approximately 2,42.
- This is the accepted definition used by the US Federal Trade Commission in its Jewelery Guides. Similarly worded definitions based on the same principles are also used by the ISO Standard: Jewellery – Consumer confidence in the diamond industry and by the World Jewellery Confederation (CIBJO) in its Diamond Book.

What is a synthetic diamond?

- A synthetic diamond is an artificial product that has essentially the same chemical composition, crystal structure and physical (including optical) properties as a diamond.
- This is the accepted definition used in the ISO Standard: Jewellery – Consumer confidence in the diamond industry. A similarly worded definition is also used by the World Jewellery Confederation (CIBJO) in its Diamond Book.

What are the properties of a synthetic diamond?

- Synthetic diamonds have the same physical and chemical properties as natural diamonds, but have different growth structures and impurities which enable rapid identification using specialist detection equipment

What are the origins of the term synthetic diamond?

- 'Synthetic' is from the Greek 'Sunthetikos' meaning 'expert in putting together' and is applied to 'a substance or material made artificially by chemical reaction'
- This term was applied by the scientists who first synthesised diamond in the 1950's, namely General Electric in the US and ASEA in Sweden

NATURAL DIAMOND FORMATION

- Formed in the earth's mantle at depths of 150 - 200 km and temperatures of 900 – 1200ºC
- Formed 0.9 – 3.5 billion years ago (from isotopic analysis of inclusions) pre-dating life on this planet
- Stored under cratons at least 110 km below the earth's surface at pressures of 45-60 kbar
- Until brought up in kimberlite/ lamproite eruptions

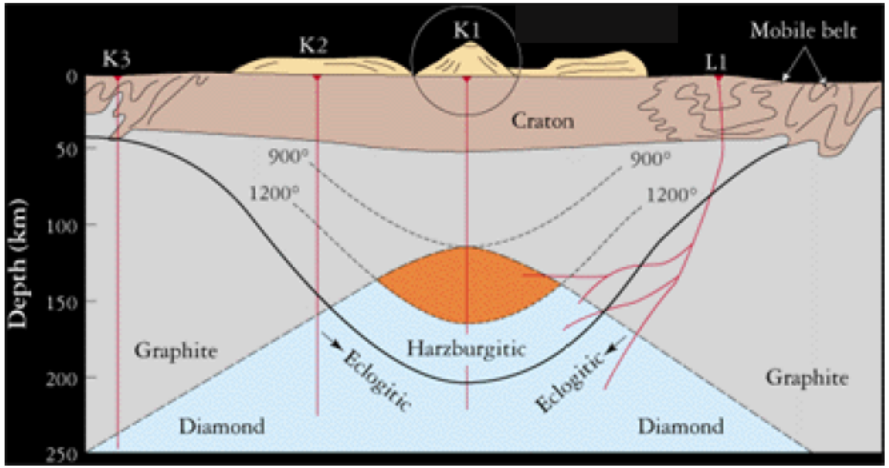


Image 2. Cross-sectional representation of the earth's upper mantle.

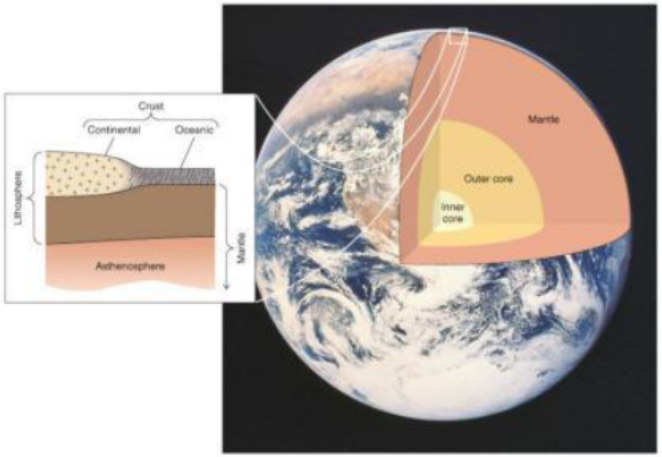


Image 3. Segment showing the core and mantle of the earth

FORMATION OF A KIMBERLITE PIPE

- The pressure of molten magma cracks the surrounding rock, around 125km below the Earth's surface.
- The kimberlite contains dissolved carbon dioxide, which begins to bubble and expand, either due to heat from below or reduced pressure from above.
- This expansion causes the kimberlite to erupt explosively up through the cracks, like an uncorked champagne bottle.
- The resulting explosion is vastly more powerful than most volcanoes, with molten rock rising to the surface at the speed of sound, forming a 'pipe' through the path of least resistance to the surface.
- The rock rises so quickly that diamonds do not have time to convert to graphite, which is the more stable form of carbon at the Earth's surface.
- Once the diamonds cool down, they don't have enough energy to re-form their crystal structure into graphite.
- As the volcanic cone cools, it starts to be eroded and weathered away by the elements. Eventually, it becomes almost undetectable on the surface.

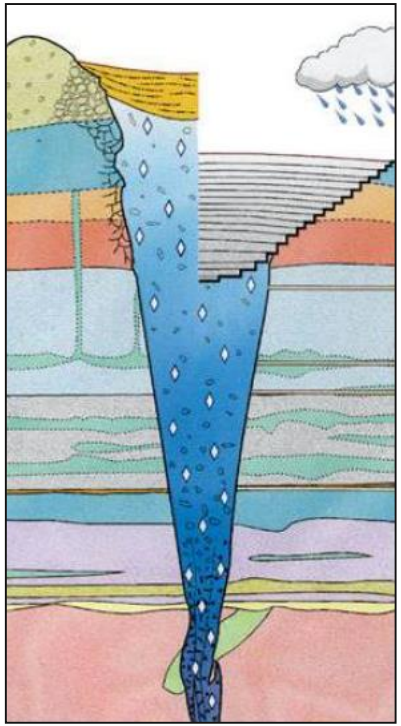
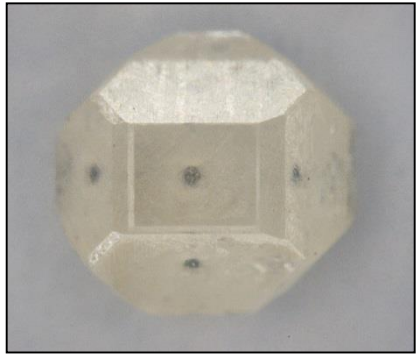


Image 4. Cross-section of a kimberlite pipe

TYPES OF SYNTHETIC DIAMONDS

- Synthetic diamonds are produced using different techniques:
  1. *High Pressure, High Temperature* (HPHT) Synthesis
  2. *Chemical Vapour Deposition* (CVD) Synthesis



a

b

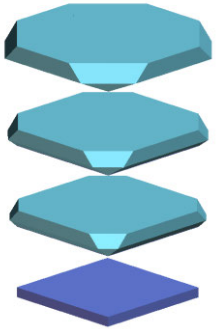


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Image 5: (a) & (b) Micrographs of as grown HPHT synthetic diamonds and (c) schematic of CVD growth on a substrate

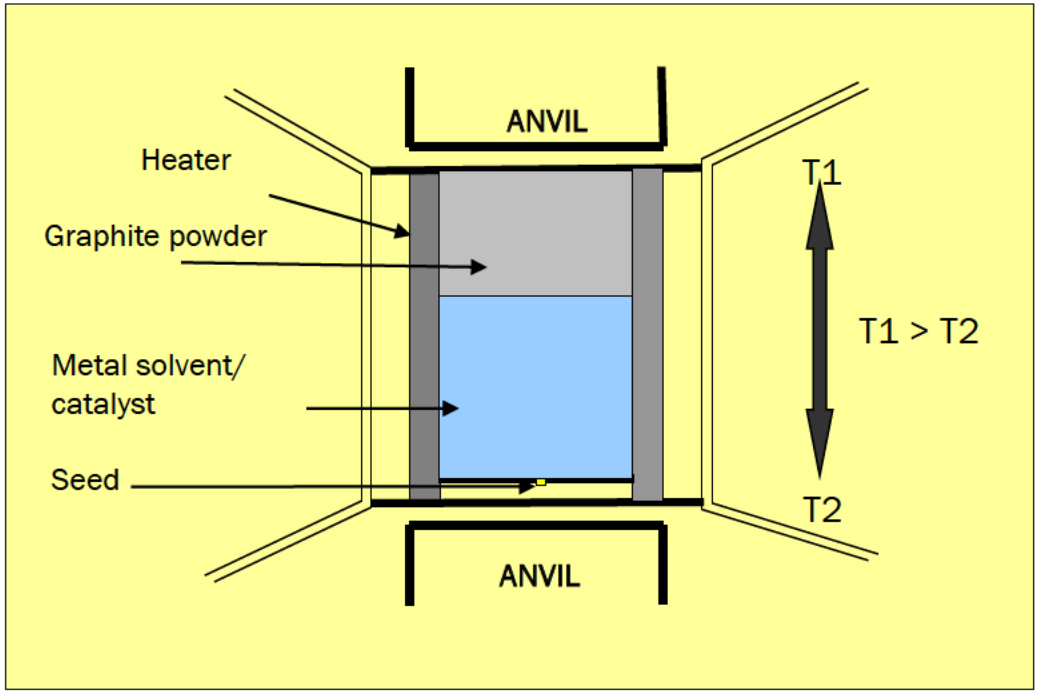
1. HPHT SYNTHESIS - OVERVIEW

- For HPHT synthesis complex man-made presses are constructed to generate pressures of around 50,000 atmospheres and temperatures of around 1300 Celsius within a synthesis capsule
  - Natural diamonds generally grow at lower temperatures and pressures. The synthesis capsule is made in a configuration and from materials which are entirely different from those associated with growth of natural diamonds. This is to enable the synthetic diamonds to develop over short timeframes (typically weeks) at economically viable rates whereas natural diamonds have millions of years available to them to grow.
- The source of carbon is normally purified graphite. The graphite dissolves in a solvent-catalyst typically formed of a combination of transition metals such as cobalt, iron and nickel.
- A temperature gradient is applied to the synthesis capsule so that carbon dissolved in the solvent-catalyst precipitates out onto synthetic diamond seed crystals and diamond develops layer by layer on the seed crystal since diamond is the stable form of carbon under these temperature-pressure conditions.
  - Inclusions of metal solvent or catalyst are often trapped in the synthesised diamond.
- Natural diamonds do not grow in pure transition metals – evidence from inclusions show that they grow from melts in environments of carbonates, eclogites, peridotites, garnets and clino-pyroxenes.
  - We are not aware of a single case where purely metallic inclusions have been found in natural diamonds.

1. HPHT SYNTHESIS - SCHEMATIC DIAGRAM

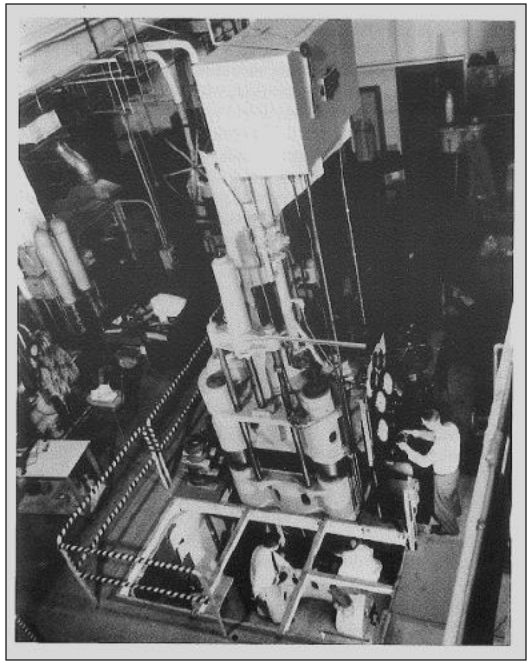
Temperature-gradient method

Metal solvent/catalyst E.g. Nickel/Iron, Cobalt/Iron



- Temperature = 1300 – 1500°C
- Pressure = 50 - 60 kbar

1. HPHT SYNTHESIS – IMAGES OF HPHT PRESSES



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b

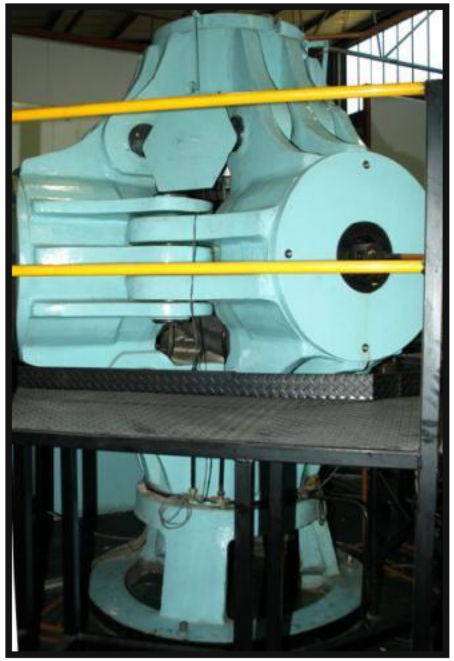

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Image 6: (a) (b) & (c) HPHT Presses

2. CVD SYNTHESIS - OVERVIEW

- For the CVD process the growth conditions are entirely different from those associated with growth of natural diamond.
- The synthesis is achieved at sub-atmospheric pressure by introducing carbon containing gases into a growth reactor and heating them to a plasma (typically using microwave energy).
- Many complex chemical reactions and species are formed and carbon from the plasma is deposited onto synthetic substrate or seed crystals in the form of diamond – growing layer by layer.
- CVD synthetic diamond is not produced under conditions where diamond is the thermodynamically stable form of carbon. It is the presence of a large fraction of atomic hydrogen that stabilises the synthetic diamond and etches away other forms of carbon.

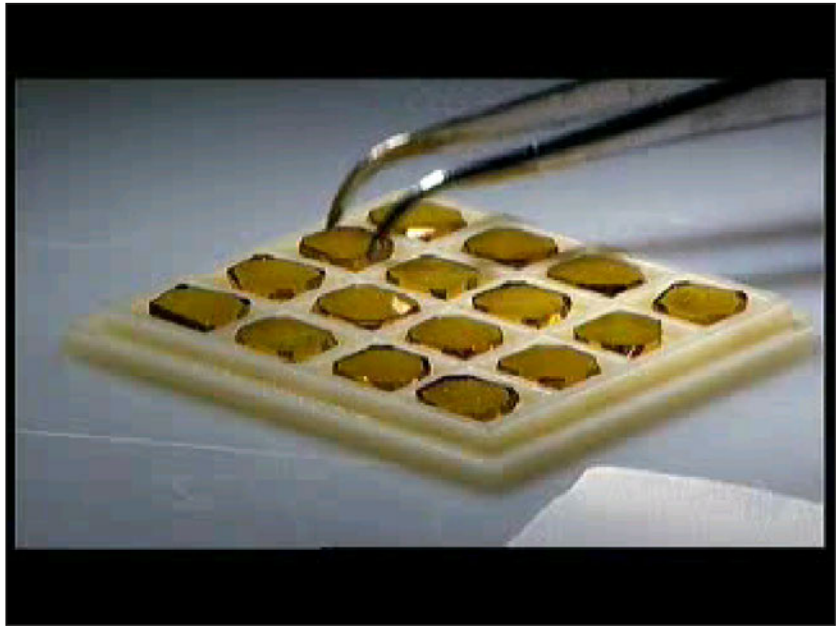
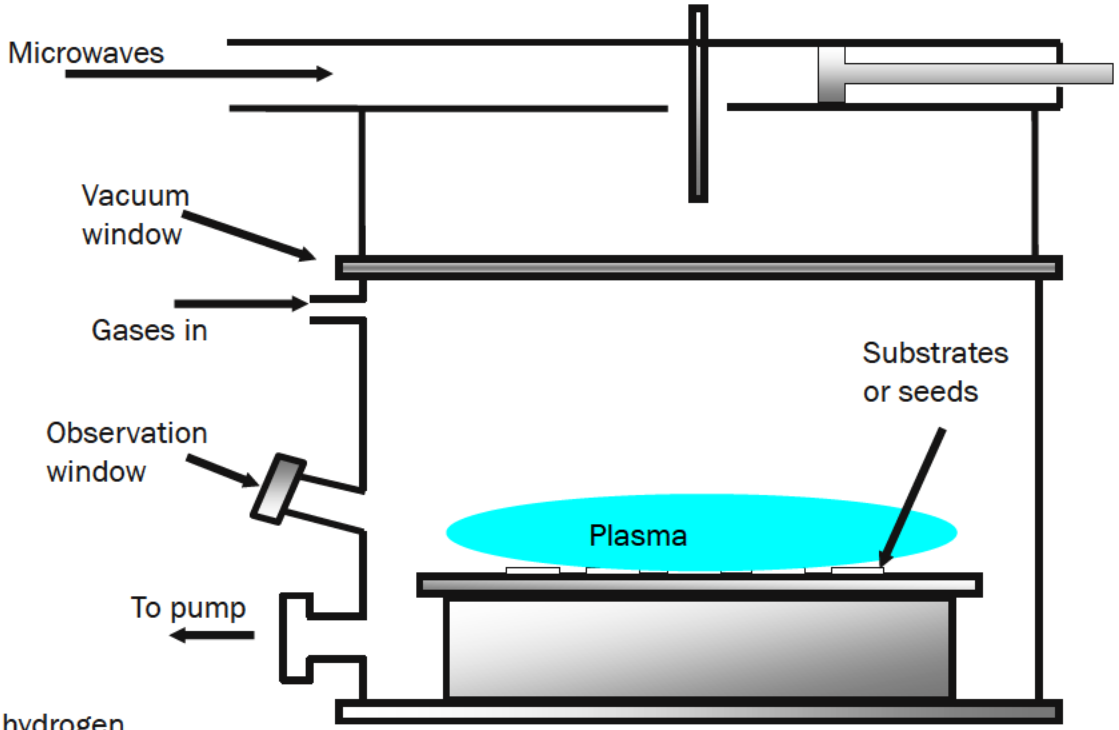


Image 7. HPHT substrates for CVD growth

2. CVD SYNTHESIS - DIAGRAM OF MICROWAVE CVD REACTOR



Pressure ~ 0.1- 0.2 bar
Gases: typically methane and hydrogen

2. CVD SYNTHESIS – GROWTH OF CVD STONES IN A CVD REACTOR

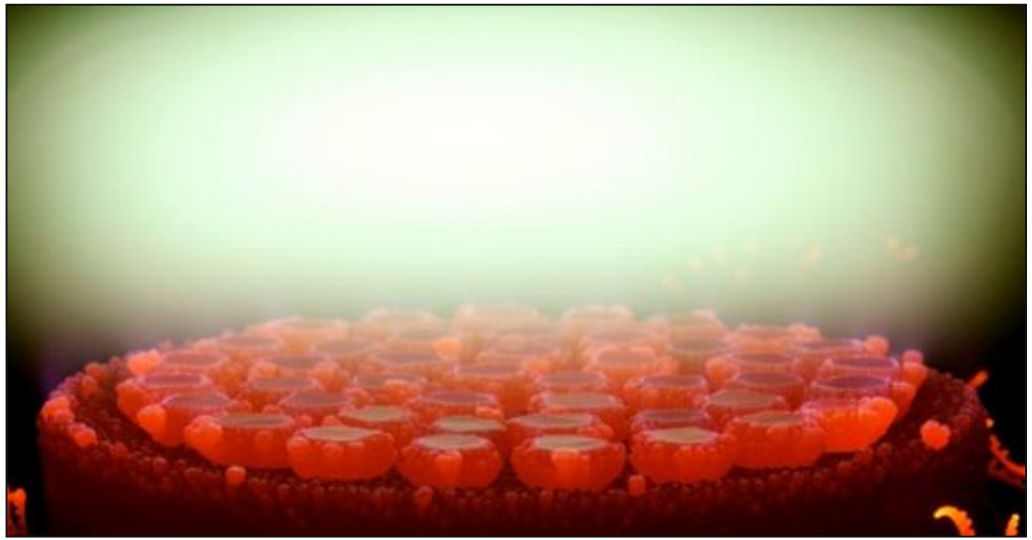


Image 8. Scio Diamond – Built in America (2013): http://www.youtube.com/watch?v=iQXVya-HAOk

Image 9. Image of a CVD Reactor

SYNTHETIC DIAMOND SUBSTRATE OR SEED CRYSTALS

- Whilst in principle natural diamonds could be used as seed crystals for both CVD and HPHT synthesis, in practice synthetic crystals are used for all commercial processes because of their lower cost and availability.
- The “seed” crystals used for HPHT synthesis are typically synthetic grit particles which were originally produced by the HPHT process and those used in the CVD process are larger slabs of HPHT synthetic or CVD synthetic diamond material.
- The nature of CVD substrates or seeds used cannot be determined once these seeds have been removed from the grown crystal after the growth process has completed.
- To create HPHT synthetics, natural or synthetic diamond seed crystals can be used but the seed is normally removed after the synthetic material is created.

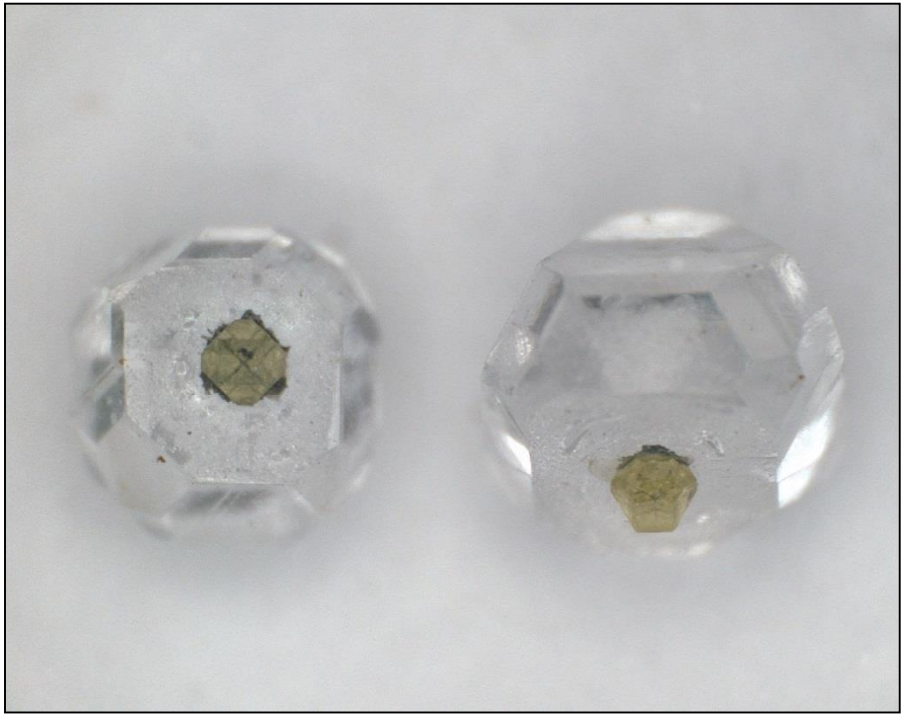


Image 10. HPHT synthetic stones with yellow synthetic seed crystal attached

COMPARISON: DIFFERENT GROWTH CONDITIONS LEAD TO DIFFERENCES IN SHAPE

Natural diamonds

- Octahedral/dodecahedral

Image 11. Natural diamonds

HPHT Synthetics

- Mainly cubo-octahedral
- Minor facets present

Image 12. HPHT Synthetics

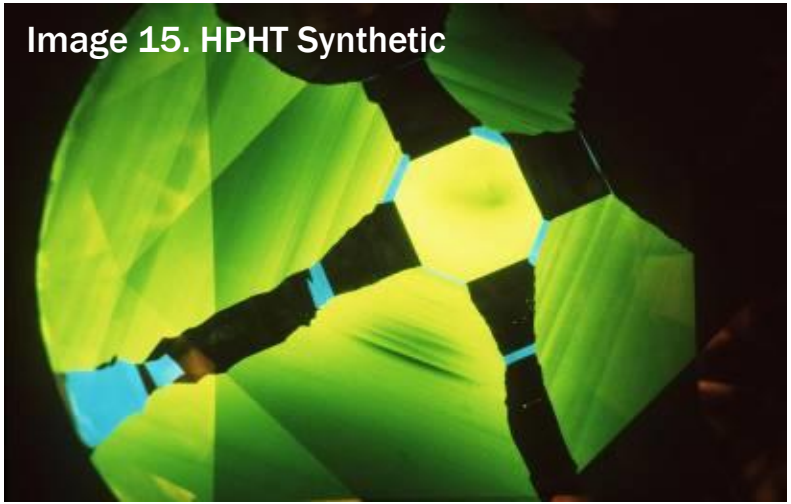
COMPARISON: DIFFERENT GROWTH CONDITIONS LEAD TO DIFFERENCES IN SHAPE

Image 13. Part processed CVD synthetics

Image 14. Part processed CVD synthetics

COMPARISON: YELLOW HPHT SYNTHETIC VS YELLOW NATURAL DIAMOND

- Illustration of the different fluorescence patterns which result from the different growth structures of HPHT synthetic diamond vs natural as viewed by the De Beers' DiamondView™ fluorescence imaging instrument, recorded on polished stones.

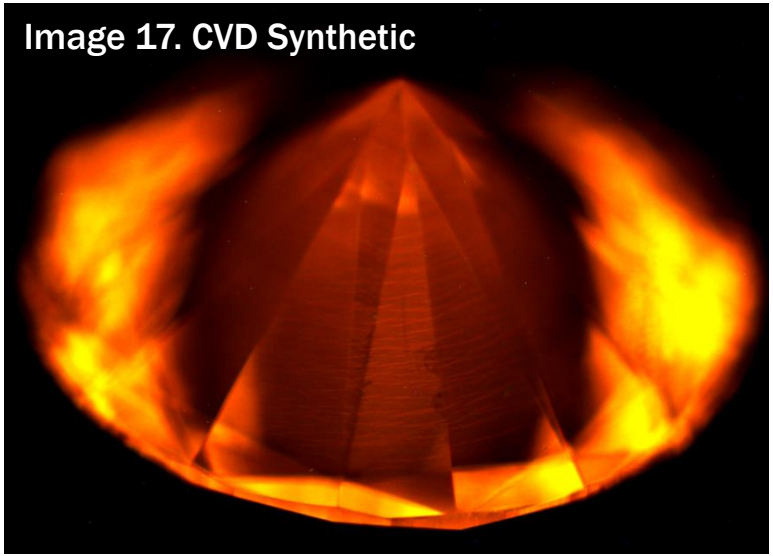


- **Blocky growth sectors typical of HPHT growth**

- **Octahedral 'tree-ring' growth patterns in a natural yellow diamond**

COMPARISON: ORANGE FLUORESCING TYPE II CVD SYNTHETIC VS NATURAL DIAMOND

- Illustration of the different fluorescence patterns which result from the different growth structures of CVD synthetic diamond vs natural as viewed by the De Beers' DiamondView™ fluorescence imaging instrument.



- **Course striations visible**

- **Typically blue fluorescence with tree ring structures**

BIOGRAPHY

This presentation was prepared on behalf of De Beers Technologies UK by Dr Simon Lawson, Head of Technologies UK.

Dr Simon Lawson, Head of Technologies UK

Following his BSc in Physics, Simon Lawson was awarded his PhD in optical spectroscopy of diamond at King's College, London in 1990.

He was then awarded a Royal Society Fellowship to study growth and characterization of synthetic diamond at the National Institute for Research in Inorganic materials in Japan where he stayed for 4 years before joining De Beers as a Research Scientist in 1995.

Dr Lawson was promoted to Senior Scientist in 2001 and then to Senior Project Manager of Consumer Confidence Technical Research in 2004 where he played a key role in the strategy and development of the various De Beers Verification instruments used to identify synthetic and treated diamonds.

In April 2009, Dr Lawson was promoted to Head of De Beers Technologies UK and in this role he ensures that the R&D centre is fully and efficiently aligned with the strategic objectives of midstream and downstream parts of the business and that it continues to provide value-adding differentiating technology to the group. The main products from Technologies UK are fast sorting machines for colour, shape and clarity sorting of rough diamonds, polished grading machines and inscription technology for Forevermark and equipment to rapidly identify synthetic and treated diamonds – underpinning the integrity of natural diamonds.

ANNEX 2

DECLARATION OF PROFESSOR MARK NEWTON

Department of Physics
University of Warwick
Gibbet Hill Road
Coventry CV4 7AL

Professor Mark Newton declares as follows:

I am Professor of Physics at the University of Warwick. I have served in this position since 2012. In this capacity, I am responsible for research (leading a research team of over 10 PhD Students and Research Fellows), teaching and examination of undergraduate and postgraduate courses and university administration (e.g. Director of the UK Centre for Doctoral Training in Diamond Science and Technology funded by the Engineering and Physical Research Council and Industry). Prior to the appointment as Professor of Physics at the University of Warwick I was a Reader (2006-2012) and Lecturer in Physics (2006-2012) in the same department. Previously, I held lectureships at King's College, London (1999-2002) and the University of Oxford (1992-1999), where I was also a Fellow of University College, Oxford and College Dean (1996-1999). I was awarded a D.Sc. from the University of Warwick (2007), a D.Phil. from the University of Oxford (1989), and a B.Sc. (Hons) Physics 1st Class from the University of Warwick (1986). I have personal knowledge of the matters set forth herein, unless otherwise noted.

1. I make this declaration in support of a written submission being made by the Diamond Producers Association ("**DPA**") in response to a request for public comments on

proposed amendments to the Federal Trade Commission ("**FTC**") Guides for the Jewelry, Precious Metals, and Pewter Industries (16 CFR Part 23, Project No. G711001) (the "**DPA Submission**"). The FTC's proposals are set out in a Statement of Basis and Purpose, Part J of which includes a proposal by the FTC to add a new diamond example that it is not unfair or deceptive to use the term "cultured" to describe laboratory-created diamonds if the term is immediately accompanied by "laboratory-created," "laboratory-grown," "[manufacturer name]-created," "synthetics," or by another word or phrase of like meaning.

2. In support of its submission, the DPA includes at Annex 1 a PowerPoint presentation dated May 2016 entitled "The Technical Properties and Formation of Synthetic Diamonds" ("the **Technical Submission**"). This presentation was prepared by Dr Simon Lawson, Head of Technologies UK, a division of De Beers UK Limited, which itself is part of the De Beers Group of Companies. I have read the DPA Submission, including the Technical Submission, in full. The Technical Submission: (a) explains how natural diamonds are formed; (b) sets out the different types of synthetic diamonds and how they are manufactured; and (c) describes certain differences between natural and synthetic diamonds that result from their different production conditions.

3. Pursuant to 28 U.S.C. § 1746, I declare under the penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on 21st May 2016

Mark Edward Newton
Professor of Physics
University of Warwick

ANNEX 3

Jewelers Vigilance Committee

Presented by: Harris Poll
April 20, 2016

Survey Methodology

The 2016 Jewelers Vigilance Committee (JVC) survey was conducted online within the United States by Harris Poll on behalf of the JVC between March 29 and April 4, 2016 among 1,014 US residents age 18+ who have either purchased fine jewelry in the past year or would at least consider purchasing any in the future. Figures for age, sex, race/ethnicity, education, region and household income were weighted where necessary to bring them into line with their actual proportions in the population. Propensity score weighting was used to adjust for respondents' propensity to be online.

All sample surveys and polls, whether or not they use probability sampling, are subject to multiple sources of error which are most often not possible to quantify or estimate, including sampling error, coverage error, error associated with nonresponse, error associated with question wording and response options, and post-survey weighting and adjustments. Therefore, Harris Poll avoids the words "margin of error" as they are misleading. All that can be calculated are different possible sampling errors with different probabilities for pure, unweighted, random samples with 100% response rates. These are only theoretical because no published polls come close to this ideal.

Respondents for this survey were selected from among those who have agreed to participate in Harris Poll surveys. The data have been weighted to reflect the composition of the adult population.
Because the sample is based on those who agreed to participate in the Harris Poll panel, no estimates of theoretical sampling error can be calculated.

For the purposes of this report, the term "jewelry non rejecter" refers to those US residents age 18+ who have either purchased fine jewelry in the past year or would at least consider purchasing any in the future.

*NOTE: A (*) means less than one-half percent responding; and a (-) means non-response or zero percent*

Key Findings

DIAMONDS

Seven in ten (70%) of jewelry non rejecters have seen or heard the term 'cultured' used when purchasing gems or jewelry, and when asked what they think it means, an array of responses were given.

When asked to compare the meaning of two terms describing diamonds, a plurality on each comparison answered that they ***did not know*** if the two terms being compared were the same: *a [manufacturer name]-created diamond and a cultured [manufacturer name]-created diamond (44%), a laboratory-created diamond and a cultured laboratory-created diamond (45%), a laboratory-grown diamond and a cultured laboratory-grown diamond (45%), and a synthetic diamond and a cultured synthetic diamond (43%).* About a third in each case answered yes: *a [manufacturer name]-created diamond and a cultured [manufacturer name]-created diamond (34%), a laboratory-created diamond and a cultured laboratory-created diamond (33%), a laboratory-grown diamond and a cultured laboratory-grown diamond (33%), and a synthetic diamond and a cultured synthetic diamond (33%).*

- *In all cases, men are more likely than women to think each pair of terms meant the same.*

When asked if the process for creating a cultured laboratory-grown/created diamond and a cultured pearl are the same, nearly half (49%) ***did not know,*** with 15% saying ***yes*** and 35% saying ***no***.

- Those aged 18-34 are more likely than those aged 45-54 and aged 55 or older to think that the processes are the same (23% vs. 8% and 10%).

When asked which was the best description of the term "cultured laboratory-grown/created" diamond, half (50%) of jewelry non rejecters said they didn't know or that none did. About 1 in 5 each said ***"a natural diamond seed grown in a press in a laboratory"*** *(21%)* and ***"an artificial seed grown in a laboratory"*** *(19%).* Fewer felt it meant *an artificial seed grown in a natural environment (like a cultured pearl) (16%) or a natural seed grown in a natural environment (like a cultured pearl) (14%).*

- Reflecting upon the fact they are more likely to think the processes were the same, those aged 18-34 are more likely than those aged 35-44, 45-54, and 55 or older to think that an artificial seed grown in a natural environment (like a cultured pearl) [28% vs. 14%, 12%, 5%] or a natural seed grown in a natural environment (like a cultured pearl) [22% vs. 11%, 8%, 10%] is the best description of the term "cultured laboratory-grown/created" diamond.

When asked whether several descriptions meant that the diamond was man-made or natural, a large majority in each case feel the terms describe man made diamonds: *a laboratory-created diamond (81%), a synthetic diamond (79%), a cultured laboratory-created diamond (72%), a laboratory-grown diamond (71%), a cultured laboratory-grown diamond (65%), and a cultured [manufacture name]-created diamond (62%).*

The term "cultured" seemed to more confusion with some, with 1 in 5 jewelry non rejecters not sure about each of these terms. For comparison, about 1 in 10 is confused by the other terms.

A plurality (45%) of jewelry non rejecters state that synthetic diamond is the best term to describe a man-made diamond. In a distant second is laboratory-created diamond (29%), followed by less than 1 in 10 who answered cultured laboratory-created diamond (7%), laboratory-grown diamond (6%), cultured laboratory-grown diamond (5%), and diamond (4%). Another 5% didn't feel any of these terms fit.

- Women are more likely than men to say laboratory-created diamond (34% vs. 24%).

When asked why they selected what they did, the majority of those who chose synthetic diamond (n=460) say that they did so because the term describes that the diamond is ***not "real" or natural*** (57%). The plurality (21%-41%) of those who chose a term with "laboratory" in it, say the term ***describes how the diamond was made***.

After randomly being assigned one of 6 terms to describe a diamond, and being asked to evaluate true/false statements using the term, a large majority, regardless of the term inserted state it's "true" that ***"a [ ] is generated by man in special conditions…"*** *[Laboratory -created diamond (71%), Laboratory-grown diamond (74%), Cultured laboratory - created diamond (59%), Cultured laboratory-grown diamond (66%), Synthetic diamond (74%), Cultured diamond (62%), Cultured [manufacturer name]-created diamond (65%)].*

Similarly, a majority in each case say ***"false"*** to their term meaning the ***same as a natural diamond*** [*Laboratory - created diamond (59%), Laboratory-grown diamond (70%), Cultured laboratory - created diamond (60%), Cultured laboratory-grown diamond (64%), Synthetic diamond (79%), Cultured diamond (52%), Cultured [manufacturer name]-created diamond (63%)].*

A majority in each case also say ***"false"*** to their term meaning having the ***same value as a natural diamond*** [*Laboratory -created diamond (62%), Laboratory-grown diamond (66%), Cultured laboratory - created diamond (61%), Cultured laboratory-grown diamond (58%), Synthetic diamond (78%), Cultured diamond (48%), Cultured [manufacturer name]-created diamond (60%)].*

And in each case each say ***"false"*** to their term meaning having ***as rare as a natural diamond*** [*Laboratory -created diamond (68%), Laboratory-grown diamond (65%), Cultured laboratory - created diamond (71%), Cultured laboratory-grown diamond (62%), Synthetic diamond (73%), Cultured diamond (52%), Cultured [manufacturer name]-created diamond (56%)].*

Strong majorities agree that:

- Different terms should be clearly defined for consumers. (93%)
- The same terms for man-made diamonds should be used universally (i.e., in the United States and other countries). (91%)
- I would find it confusing if different terms were used in the United States and other countries when describing man-made diamonds. (85%)
- Different terms are used for man-made diamonds in an attempt to trick consumers. (81%)
    - Men are more likely than women to agree with this (85% vs. 78%).

GOLD

When asked to think about alloys made with various proportions of gold and how the proportion impacted aspects of the alloy, nearly 8 in 10 jewelry non rejecters (77%) say that the resale value is majorly/moderately impacted. About 7 in 10 (71%) say that overall durability is majorly/moderately impacted, followed by just over 6 in 10 who felt color (65%), likelihood to tarnish (62%), and likelihood to corrode (61%). Surprisingly, nearly 3 in 4 (73%) think the purity of the gold used is major or moderately impacted based on its proportion in the alloy.

- Those aged 18-34 are more likely than those aged 45-54 and 55 or older to think there is a major/moderate impact on ***the likelihood to tarnish*** (72% vs. 51% and 58%) and ***the likelihood to corrode*** (73% vs. 54% and 52%).

Over 7 in 10 (71%) jewelry non rejecters feel that the minimum amount of gold needed for an item to be described as "gold" is 50% (or more)—with 20% expected all or almost all pure gold. Three percent stated it would not matter, while 16% were not sure.

True or False? Six in ten (59%) correctly say it is true that a karat is measurement of weight for precious metals—but nearly 1 in 5 (18%) said they didn't know. Meanwhile 3 in 10 (31%) incorrectly thought the terms carat and karat mean the same thing and 3 in 10 (30%) didn't know. When it comes to the amount of gold in an item, less than half in each case know that it is true 14K means the gold is 14/24th pure (46%) and that it is false that 14K means there is only 14% of gold in the item (49%). In both cases, sizeable percentages (41% and 31%, respectively) say they don't know the correct answer.

With respect to gold coating, sizeable percentages in each case did not know how to respond to the true/false statements.

Don't know percentages:

- Gold flashed items are generally very durable. (61%)
- A gold-filled item must be made of at least 25% gold. (59%)
- Gold over uses low karat gold (less than 10K). (58%)
- Rolled gold plate and gold overlay are the same thing. (58%)
- Gold electroplated typically lasts longer than gold washed. (57%)
- Gold layered items are typically more durable than gold electroplated items. (56%)
- Gold washed and gold flashed are just as thick as gold-plated. (55%)
- Gold overlay always uses silver as the base metal under the overlay. (54%)
- Rolled gold plate and gold plated items are created by two different processes. (54%)

- There are no standard thickness requirements for items that are heavy gold electroplated. (54%)
- Gold over and gold plated are the same thing. (49%)
- Gold plated items use low karat gold (less than 10K). (48%)
- Different metals are used as a base for different processes such as gold plated, gold washed and gold layered. (41%)
- Gold plated items are not likely to tarnish over time. (33%)

Meanwhile, minorities in each case got it right or wrong.

- Those aged 18-34 are more likely than all other ages groups (35-44; 45-54; and 55+) to think "***gold washed and gold flashed are just as thick as gold-plated***" (21% vs. 9% and 9% and 7%).

Expectations for gold plated items were generally reasonable, with 8 in 10 (84%) expecting that if a product is described as having a coating of gold, that there should be a minimum thickness required for that coating; about 3 in 4 (73%) expecting that products that are coated with gold will tarnish sooner than products composed throughout of gold, and about 7 in 10 (69%) expecting that products that are coated with gold will be less durable than products that are composed throughout of gold.

SILVER

When asked to think about alloys made with various proportions of silver and how the proportion impacted aspects of the alloy, nearly 7 in 10 jewelry non rejecters say that the likelihood to tarnish (72%), resale value (71%), and overall durability (71%) is majorly/moderately impacted, followed by just over 6 in 10 who state likelihood to color (62%) and corrode (65%) are.

One in five (20%) say that a silver item should contain all or almost all pure silver to be described as "sterling silver", while another 1 in 4 (24%) say a minimum of 92.5 percent. About 1 in 5 (21%) don't know.

About 1 in 5 (22%) say that a sterling silver item should contain all or almost all pure silver to be described as "sterling silver", while another 1 in 4 (26%) say a minimum of 92.5 percent. About 1 in 5 (22%) don't know.

When asked about silver coated items, large majorities had specific expectations of the items. Nearly 9 in 10 (87%) say they expect that if a product is described as having a coating of silver, that there should be a minimum thickness required for that coating. About 3 in 4 say they expect that products that are coated with silver will tarnish sooner than products composed throughout of silver (73%) and that products that are coated with silver will be less durable than products that are composed throughout of silver (73%).

PLATINUM

When asked about platinum coated items, large majorities had specific expectations of the items. Nearly 9 in 10 (87%) say they expect that if a product is described as having a coating of platinum, that there should be a minimum thickness required for that coating. About 2 in 3 say they expect that products that are coated with platinum will be less durable than products that are composed throughout of platinum (68%) and that products that are coated with platinum will tarnish sooner than products composed throughout of platinum (66%).

PALLADIUM

When asked about palladium coated items, large majorities had specific expectations of the items. Over 8 in 10 (84%) say they expect that if a product is described as having a coating of palladium, that there should be a minimum thickness required for that coating. About 2 in 3 say they expect that products that are coated with palladium will be less durable than products that are composed throughout of palladium (67%) and that products that are coated with palladium will tarnish sooner than products composed throughout of palladium (65%).

RHODIUM

When asked about rhodium coated items, large majorities had specific expectations of the items. Over 8 in 10 (82%) say they expect that if a product is described as having a coating of rhodium, that there should be a minimum thickness required for that coating. About 2 in 3 say they expect that products that are coated with rhodium will be less durable than products that are composed throughout of rhodium (67%) and that products that are coated with rhodium will tarnish sooner than products composed throughout of rhodium (66%).

harrispoll

CORE QUESTIONS

DIAMONDS

BASE: QUALIFIED RESPONDENTS
Q700 Have you ever seen or heard the term 'cultured' used when purchasing gems or jewelry?

	Total
Base	**1014**
Yes	70%
No	30%

BASE: QUALIFIED RESPONDENTS
Q705 Regardless of whether you have seen or heard the term before, what does 'cultured' specifically mean to you in the context of gems and jewelry? Please type your response below, in your own words. Please be as thorough as possible.

	Total
Base	**1014**
CHARACTERISTICS OF JEWELRY (NET)	**60%**
TYPE OF JEWEL/GEM/STONE (SUB-NET)	**33%**
Pearls/Cultured pearl	22%
Jewel/Stones/Gems (Unspec.)	8%
Jewelry/Made specifically for jewelry	5%
Other type of jewel/gem/stone mentions	2%
NATURAL (SUB-NET)	**16%**
Artificially made/created/Not natural	11%
Natural	4%
Grown under water/sea/salt water	1%
Other natural mentions	*
QUALITY (SUB-NET)	**12%**
Quality/High quality	4%
Real/Not fake	2%
Fine goods/jewelry	2%
Not real/Fake	1%
Hand made	1%
Pure	1%
Other quality mentions	1%
STYLE (SUB-NET)	**7%**
Classy/Sophisticated	4%
Refined	3%
Other style mentions	1%
APPEARANCE (SUB-NET)	**4%**
Attractive/Beautiful looking	1%
Polished/Shined	1%

Colored/Color of jewel/gem/stone	1%
Other appearance mentions	1%
UNIQUENESS (SUB-NET)	**2%**
Unique/Different/New	2%
Other uniqueness mentions	*
SIZE/SHAPE (SUB-NET)	**1%**
Shaped/Shaped in a certain way	1%
Other size/shape mentions	1%
MISCELLANEOUS CHARACTERISTICS OF JEWELRY (SUB-NET)	**3%**
Cut of the jewel/gem/stone	2%
Other miscellaneous characteristics of jewelry mentions	1%
CREATED PROCESS (NET)	**41%**
RAISED/FARMED (SUB-NET)	**10%**
Grown/Farmed (Unspec.)	8%
Raised/Farm raised	3%
GENERAL CREATED PROCESS (SUB-NET)	**6%**
Process used to make/create it	2%
It's made/created (Unspec.)	2%
Where it is made/created/Describes the origin of it	2%
Treated in some way	*
Other general created process mentions	*
Lab Process (SUB-NET)	**5%**
Made/Created/Grown in a lab	5%
Other lab process mentions	1%
MANUFACTURED (SUB-NET)	**2%**
Manufactured	2%
Other manufactured mentions	*
MISCELLANEOUS CREATED PROCESS (SUB-NET)	**27%**
Man made/created	16%
Pearls that are created/grown inside of oysters	4%
Made/Created in a controlled environment/conditions	4%
Aged/Vintage	1%
Harvested	1%
Cultured/Cultivated	1%
Altered/Scientifically altered	1%
Other miscellaneous created process mentions	4%
WORD APPEAL (NET)	**9%**
Relating to a specific culture	3%
Good/Like it	2%
Enhanced	1%
Other word appeal mentions	4%

ECONOMY (NET)	**3%**
Expensive	2%
Valuable/High value	1%
Other economy mentions	*
MISCELLANEOUS (NET)	**2%**
Only heard the term before	*
Other mentions	2%
None	2%
Don't know	11%
Declined to answer	2%

BASE: QUALIFIED RESPONDENTS

Q710 Do these terms relating to diamonds mean the same thing?

Summary Table: Yes

	Total
Base	**1014**
A [manufacturer name]-created diamond and a cultured [manufacturer name]-created diamond	34%
A laboratory-created diamond and a cultured laboratory-created diamond	33%
A laboratory-grown diamond and a cultured laboratory-grown diamond	33%
A synthetic diamond and a cultured synthetic diamond	33%

A laboratory-created diamond and a cultured laboratory-created diamond

	Total
Base	**1014**
Yes	33%
No	22%
Don't know	45%

A laboratory-grown diamond and a cultured laboratory-grown diamond

	Total
Base	**1014**
Yes	33%
No	22%
Don't know	45%

A [manufacturer name]-created diamond and a cultured [manufacturer name]-created diamond

	Total
Base	**1014**
Yes	34%
No	22%
Don't know	44%

A synthetic diamond and a cultured synthetic diamond

	Total
Base	**1014**
Yes	33%
No	24%
Don't know	43%

BASE: QUALIFIED RESPONDENTS
Q715 Is the process used to create a cultured laboratory-grown/created diamond and a cultured pearl the same?

	Total
Base	**1014**
Yes	15%
No	36%
I don't know	49%

BASE: QUALIFIED RESPONDENTS
Q720 Which of the following, if any, describe the term “cultured laboratory-grown/created” diamond?

	Total
Base	**1014**
ANY LISTED (NET)	**50%**
A natural diamond seed grown in a press in a laboratory	21%
An artificial seed grown in a laboratory	19%
An artificial seed grown in a natural environment (like a cultured pearl)	16%
A natural seed grown in a natural environment (like a cultured pearl)	14%
Don't know	42%
None of these	7%

BASE: QUALIFIED RESPONDENTS
Q725 For each of the following terms used to describe types of diamonds, please indicate whether you think this diamond is a natural diamond or a man-made diamond.

A cultured laboratory-created diamond

	Total
Base	**1014**
....is a man-made diamond	72%
...is a natural diamond	10%
I don't know	18%

A cultured laboratory-grown diamond

	Total
Base	**1014**
....is a man-made diamond	65%
...is a natural diamond	16%
I don't know	19%

A laboratory-created diamond

	Total
Base	**1014**
....is a man-made diamond	81%
...is a natural diamond	6%
I don't know	14%

A laboratory-grown diamond

	Total
Base	**1014**
....is a man-made diamond	71%
...is a natural diamond	12%
I don't know	16%

A synthetic diamond

	Total
Base	**1014**
....is a man-made diamond	79%
...is a natural diamond	8%
I don't know	12%

A cultured [manufacturer name]-created diamond

	Total
Base	**1014**
....is a man-made diamond	62%
...is a natural diamond	18%
I don't know	20%

BASE: QUALIFIED RESPONDENTS
Q735 In your opinion, which of the following would be the most accurate term to describe man-made diamonds?

	Total
Base	**1041**
ANY LISTED (NET)	**95%**
Laboratory-created diamond	29%
Laboratory-grown diamond	6%
Cultured laboratory-created diamond	7%
Cultured laboratory-grown diamond	5%
Synthetic diamond	45%
Diamond	4%
None of these	5%

BASE: QUALIFIED RESPONDENTS
Q740 In your own words, please explain below why you chose the option [INSERT FROM Q735] in the previous question as the most accurate term to describe man-made diamonds?

	Laboratory-created diamond (A)	Laboratory-grown diamond (B)	Cultured laboratory-created diamond (C)	Cultured laboratory-grown diamond (D)	Synthetic diamond (E)	Diamond (F)
Base	**293**	**68**	**75**	**40**	**460**	**41**
Term describes it is not "real"/natural	27%C	21%	10%	14%	57%ABC	7%
Term describes how it was made	41%CE	21%	34%E	38%	10%	11%
Term is the most accurate/correct/best fit	12%	11%	18%	6%	9%	14%
Term is clear/honest/not deceptive	4%	7%	1%	3%	10%A	2%
Term sounds good	2%	8%	4%	2%	3%	2%
Just an opinion/guess	1%	-	2%	1%	1%	-
A diamond is diamond	1%	-	1%	-	-	11%
Other mentions	3%	11%A	11%A	7%	5%	33%
None	1%	6%AE	-	-	0	-
Don't know	3%	6%	5%	29%	4%	13%
Declined to answer	5%	9%	14%	-	2%	6%

BASE: QUALIFIED RESPONDENTS

Q750 Man-made diamonds are often described in different ways. How strongly do you agree or disagree with the following statements?

Summary Table: Strongly/Somewhat Agree

	Total
Base	**1041**
Different terms should be clearly defined for consumers.	93%
The same terms for man-made diamonds should be used universally (i.e., in the United States and other countries).	91%
I would find it confusing if different terms were used in the United States and other countries when describing man-made diamonds.	85%
Different terms are used for man-made diamonds in an attempt to trick consumers.	81%

I would find it confusing if different terms were used in the United States and other countries when describing man-made diamonds.

	Total
Base	**1041**
STRONGLY/SOMEWHAT AGREE (NET)	**85%**
Strongly agree	40%
Somewhat agree	44%
STRONGLY/SOMEWHAT DISAGREE (NET)	**15%**
Somewhat disagree	10%
Strongly disagree	5%

The same terms for man-made diamonds should be used universally (i.e., in the United States and other countries).

	Total
Base	**1041**
STRONGLY/SOMEWHAT AGREE (NET)	**91%**
Strongly agree	52%
Somewhat agree	40%
STRONGLY/SOMEWHAT DISAGREE (NET)	**9%**
Somewhat disagree	5%
Strongly disagree	4%

Different terms are used for man-made diamonds in an attempt to trick consumers.

	Total
Base	**1041**
STRONGLY/SOMEWHAT AGREE (NET)	**81%**
Strongly agree	30%
Somewhat agree	51%
STRONGLY/SOMEWHAT DISAGREE (NET)	**19%**
Somewhat disagree	15%
Strongly disagree	4%

Different terms should be clearly defined for consumers.

	Total
Base	**1041**
STRONGLY/SOMEWHAT AGREE (NET)	**93%**
Strongly agree	70%
Somewhat agree	24%
STRONGLY/SOMEWHAT DISAGREE (NET)	**7%**
Somewhat disagree	4%
Strongly disagree	3%

BASE: QUALIFIED RESPONDENTS

Q755 Do you believe the following statements are true or false?

Summary Table: True

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
A ... is generated by man in special conditions.	71%	74%	59%	66%	74%C	62%	65%
A ... has exactly the same properties as a natural diamond.	20%	38%ADE	31%	20%	22%	31%	27%
A ... holds its value over time like a natural diamond.	21%	18%	23%	21%	15%	26%	27%
A ... is grown on a farm in natural conditions.	15%	8%	15%	16%	18%	24%B	18%
A ... is generated the same way as a natural diamond.	15%	16%	19%	9%	15%	25%D	13%
A ... is the same as a natural diamond.	13%	10%	21%D	9%	10%	20%	14%
A ... has the same value as a natural diamond.	10%	6%	14%	12%	9%	12%	12%
A ... is as rare as a natural diamond.	9%	7%	7%	6%	11%	14%	20%BCD

A ... is the same as a natural diamond.

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
True	13%	10%	21%D	9%	10%	20%	14%
False	59%	70%F	60%	64%	79%ACDFG	52%	63%
Don't know	28%E	20%	19%	27%E	11%	28%E	23%

A ... is generated the same way as a natural diamond.

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
True	15%	16%	19%	9%	15%	25%D	13%
False	54%	49%	47%	54%	67%BCF	41%	55%
Don't know	31%E	35%E	34%E	37%E	17%	34%E	32%E

A ... has the same value as a natural diamond.

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
True	10%	6%	14%	12%	9%	12%	12%
False	62%	66%F	61%	58%	78%ACDFG	48%	60%
Don't know	28%E	27%E	25%E	30%E	12%	40%CE	28%E

A ... is as rare as a natural diamond.

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
True	9%	7%	7%	6%	11%	14%	20%BCD
False	68%F	65%	71%F	62%	73%FG	52%	56%
Don't know	22%	28%	23%	33%E	16%	34%E	24%

A ... is grown on a farm in natural conditions.

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
True	15%	8%	15%	16%	18%	24%B	18%
False	46%F	48%F	41%	37%	44%	30%	40%
Don't know	39%	45%	44%	46%	39%	45%	42%

A ... is generated by man in special conditions.

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
True	71%	74%	59%	66%	74%C	62%	65%
False	10%	7%	13%	9%	15%	10%	13%
Don't know	19%	20%	28%E	25%E	11%	28%E	22%

A ... has exactly the same properties as a natural diamond.

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
True	20%	38%ADE	31%	20%	22%	31%	27%
False	42%	33%	39%	28%	44%E	30%	37%
Don't know	39%	29%	30%	53%BCEG	35%	39%	35%

A ... holds its value over time like a natural diamond.

	Laboratory - created diamond (A)	Laboratory - grown diamond (B)	Cultured laboratory - created diamond (C)	Cultured laboratory - grown diamond (D)	Synthetic diamond (E)	Cultured diamond (F)	Cultured [manufacturer name]-created diamond (G)
Base	**142**	**145**	**144**	**144**	**145**	**149**	**145**
True	21%	18%	23%	21%	15%	26%	27%
False	41%F	38%F	39%F	34%	51%DFG	20%	32%
Don't know	38%	44%	38%	45%	34%	54%ACE	41%

BASE: QUALIFIED RESPONDENTS

Q730 How much value do each of the following have when compared to a natural diamond?

Summary Table: A lot/Somewhat more resale value

	Total
Base	**1014**
Cultured diamond	18%
Cultured [manufacturer name]-created diamond	12%
Laboratory-created cultured diamond	9%
Laboratory-created diamond	8%

Laboratory-created diamond

	Total
Base	**1014**
A LOT/SOMEWHAT MORE RESALE VALUE (NET)	**8%**
A lot more resale value	2%
Somewhat more resale value	6%
The same resale value	16%
A LOT/SOMEWHAT LESS RESALE VALUE (NET)	**76%**
Somewhat less resale value	44%
A lot less resale value	32%

Cultured diamond

	Total
Base	**1014**
A LOT/SOMEWHAT MORE RESALE VALUE (NET)	**18%**
A lot more resale value	8%
Somewhat more resale value	10%
The same resale value	24%
A LOT/SOMEWHAT LESS RESALE VALUE (NET)	**58%**
Somewhat less resale value	37%
A lot less resale value	21%

Laboratory-created cultured diamond

	Total
Base	**1014**
A LOT/SOMEWHAT MORE RESALE VALUE (NET)	**9%**
A lot more resale value	2%
Somewhat more resale value	8%
The same resale value	18%
A LOT/SOMEWHAT LESS RESALE VALUE (NET)	**72%**
Somewhat less resale value	45%
A lot less resale value	28%

Cultured [manufacturer name]-created diamond

	Total
Base	**1014**
A LOT/SOMEWHAT MORE RESALE VALUE (NET)	**12%**
A lot more resale value	3%
Somewhat more resale value	9%
The same resale value	21%
A LOT/SOMEWHAT LESS RESALE VALUE (NET)	**67%**
Somewhat less resale value	42%
A lot less resale value	25%

GOLD

BASE QUALIFIED RESPONDENTS

Q760 Items made with gold are often mixed with other metals to form an alloy. How much of an impact do you think the proportion of gold to other metals in an alloy has on each of the following attributes of items made from an alloy?

Summary Table: Any Impact

	Total
Base	**1014**
Resale value	96%
Overall durability	93%
Color	92%
Likelihood to tarnish	90%
Purity of the gold used in the alloy	90%
Likelihood to corrode	89%

Summary Table: Major/Moderate Impact

	Total
Base	**1014**
Resale value	77%
Purity of the gold used in the alloy	73%
Overall durability	71%
Color	65%
Likelihood to tarnish	62%
Likelihood to corrode	61%

Resale value

	Total
Base	**1014**
ANY IMPACT (NET)	**96%**
A MAJOR/MODERATE IMPACT (SUB-NET)	**77%**
A major impact	41%
A moderate impact	37%
A slight impact	19%
No impact	4%

Color

	Total
Base	**1014**
ANY IMPACT (NET)	**92%**
A MAJOR/MODERATE IMPACT (SUB-NET)	**65%**
A major impact	26%
A moderate impact	39%
A slight impact	28%
No impact	8%

Likelihood to tarnish

	Total
Base	**1014**
ANY IMPACT (NET)	**90%**
A MAJOR/MODERATE IMPACT (SUB-NET)	**62%**
A major impact	28%
A moderate impact	34%
A slight impact	28%
No impact	10%

Likelihood to corrode

	Total
Base	**1014**
ANY IMPACT (NET)	**89%**
A MAJOR/MODERATE IMPACT (SUB-NET)	**61%**
A major impact	29%
A moderate impact	33%
A slight impact	28%
No impact	11%

Overall durability

	Total
Base	**1014**
ANY IMPACT (NET)	**93%**
A MAJOR/MODERATE IMPACT (SUB-NET)	**71%**
A major impact	35%
A moderate impact	36%
A slight impact	22%
No impact	7%

Purity of the gold used in the alloy

	Total
Base	**1014**
ANY IMPACT (NET)	**90%**
A MAJOR/MODERATE IMPACT (SUB-NET)	**73%**
A major impact	41%
A moderate impact	32%
A slight impact	17%
No impact	10%

BASE: QUALIFIED RESPONDENTS
Q765 When buying gold items, what do you expect the minimum amount of gold needed in that item for it to be described as "gold"?

	Total
Base	**1014**
50% OR MORE (NET)	**71%**
All or almost all pure gold	20%
90% - 99%	14%
80% - 89%	12%
70% - 79%	11%
60% - 69%	6%
50% - 59%	8%
40% - 49%	2%
30% - 39%	1%
20% - 29%	2%
10% - 19%	4%
Less than 10% pure gold	1%
It wouldn't matter how much gold it contained	3%
Not sure	16%

BASE: QUALIFIED RESPONDENTS
Q770 Do you believe the following statements are true or false?

Summary Table: True

	Total
Base	**1014**
A karat is a measurement of weight for precious metals.	59%
A gold item that is described as 14K means the gold is 14/24ths pure.	46%
The terms carat and karat mean the same thing.	31%
A gold item that is described as 14K means there is only 14% of gold in the item.	20%

A karat is a measurement of weight for precious metals.

	Total
Base	**1014**
True	59%
False	23%
Don't know	18%

A gold item that is described as 14K means the gold is 14/24ths pure.

	Total
Base	**1014**
True	46%
False	12%
Don't know	41%

A gold item that is described as 14K means there is only 14% of gold in the item.

	Total
Base	**1014**
True	20%
False	49%
Don't know	31%

The terms carat and karat mean the same thing.

	Total
Base	**1014**
True	31%
False	38%
Don't know	30%

BASE: QUALIFIED RESPONDENTS

Q775 Some jewelry products consist of precious metal (gold, silver or platinum) throughout, and some consist of a coating of precious metal over another metal.
Please think specifically about gold items you might purchase. How much do you agree or disagree with the following statements, regarding these products.

Summary Table: Strongly/Somewhat Agree

	Total
Base	**1014**
I expect that if a product is described as having a coating of gold, that there should be a minimum thickness required for that coating.	84%
I expect that products that are coated with gold will tarnish sooner than products composed throughout of gold.	73%
I expect that products that are coated with gold will be less durable than products that are composed throughout of gold.	69%

I expect that products that are coated with gold will tarnish sooner than products composed throughout of gold.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**73%**
Strongly agree	32%
Somewhat agree	41%
STONGLY/SOMEWHAT DISAGREE (NET)	**27%**
Somewhat disagree	21%
Strongly disagree	6%

I expect that products that are coated with gold will be less durable than products that are composed throughout of gold.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**69%**
Strongly agree	30%
Somewhat agree	39%
STONGLY/SOMEWHAT DISAGREE (NET)	**31%**
Somewhat disagree	24%
Strongly disagree	8%

I expect that if a product is described as having a coating of gold, that there should be a minimum thickness required for that coating.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**84%**
Strongly agree	34%
Somewhat agree	50%
STONGLY/SOMEWHAT DISAGREE (NET)	**16%**
Somewhat disagree	12%
Strongly disagree	4%

BASE: QUALIFIED RESPONDENTS

Q780 Items can have varying degrees of gold coating. For each of the following, please indicate whether you think the statement is true of false.

Summary Table: True

	Total
Base	**1014**
Different metals are used as a base for different processes such as gold plated, gold washed and gold layered.	48%
Gold plated items use low karat gold (less than 10K).	36%
Rolled gold plate and gold plated items are created by two different processes.	35%
There are no standard thickness requirements for items that are heavy gold electroplated.	30%
Gold over uses low karat gold (less than 10K).	28%
Gold electroplated typically lasts longer than gold washed.	28%
Gold layered items are typically more durable than gold electroplated items.	26%
A gold-filled item must be made of at least 25% gold.	26%
Gold plated items are not likely to tarnish over time.	26%
Gold over and gold plated are the same thing.	22%
Gold overlay always uses silver as the base metal under the overlay.	21%
Rolled gold plate and gold overlay are the same thing.	15%
Gold flashed items are generally very durable.	15%
Gold washed and gold flashed are just as thick as gold-plated.	12%

Gold washed and gold flashed are just as thick as gold-plated.

	Total
Base	**1014**
True	12%
False	33%
Don't know	55%

Gold over and gold plated are the same thing.

	Total
Base	**1014**
True	22%
False	29%
Don't know	49%

Gold electroplated typically lasts longer than gold washed.

	Total
Base	**1014**
True	28%
False	14%
Don't know	57%

Gold over uses low karat gold (less than 10K).

	Total
Base	**1014**
True	28%
False	14%
Don't know	58%

Gold layered items are typically more durable than gold electroplated items.

	Total
Base	**1014**
True	26%
False	18%
Don't know	56%

Gold plated items use low karat gold (less than 10K).

	Total
Base	**1014**
True	36%
False	16%
Don't know	48%

There are no standard thickness requirements for items that are heavy gold electroplated.

	Total
Base	**1014**
True	30%
False	16%
Don't know	54%

Different metals are used as a base for different processes such as gold plated, gold washed and gold layered.

	Total
Base	**1014**
True	48%
False	11%
Don't know	41%

Gold plated items are not likely to tarnish over time.

	Total
Base	**1014**
True	26%
False	42%
Don't know	33%

Gold flashed items are generally very durable.

	Total
Base	**1014**
True	15%
False	24%
Don't know	61%

A gold-filled item must be made of at least 25% gold.

	Total
Base	**1014**
True	26%
False	15%
Don't know	59%

Rolled gold plate and gold overlay are the same thing.

	Total
Base	**1014**
True	15%
False	26%
Don't know	58%

Rolled gold plate and gold plated items are created by two different processes.

	Total
Base	**1014**
True	35%
False	11%
Don't know	54%

Gold overlay always uses silver as the base metal under the overlay.

	Total
Base	**1014**
True	21%
False	25%
Don't know	54%

SILVER

BASE: QUALIFIED RESPONDENTS

Q785 Items made with silver are often mixed with other metals to form an alloy. How much of an impact do you think the proportion of silver to other metals in an alloy has on each of the following attributes of items made from an alloy?

Summary Table: Major/Moderate Impact

	Total
Base	**1014**
Purity of the silver used in the alloy	72%
Likelihood to tarnish	72%
Resale value	71%
Overall durability	71%
Likelihood to corrode	65%
Color	62%

Resale value

	Total
Base	**1014**
MAJOR/MODERATE IMPACT (NET)	**71%**
A moderate impact	38%
A major impact	33%
NO/SLIGHT IMPACT (NET)	**29%**
A slight impact	23%
No impact	6%

Color

	Total
Base	**1014**
MAJOR/MODERATE IMPACT (NET)	**62%**
A major impact	25%
A moderate impact	38%
NO/SLIGHT IMPACT (NET)	**38%**
A slight impact	28%
No impact	10%

Likelihood to tarnish

	Total
Base	**1014**
MAJOR/MODERATE IMPACT (NET)	**72%**
A major impact	28%
A moderate impact	44%
NO/SLIGHT IMPACT (NET)	**28%**
A slight impact	21%
No impact	7%

Likelihood to corrode

	Total
Base	**1014**
MAJOR/MODERATE IMPACT (NET)	**65%**
A major impact	30%
A moderate impact	35%
NO/SLIGHT IMPACT (NET)	**35%**
A slight impact	27%
No impact	8%

Overall durability

	Total
Base	**1014**
MAJOR/MODERATE IMPACT (NET)	**71%**
A major impact	30%
A moderate impact	41%
NO/SLIGHT IMPACT (NET)	**29%**
A slight impact	23%
No impact	7%

Purity of the silver used in the alloy

	Total
Base	**1014**
MAJOR/MODERATE IMPACT (NET)	**72%**
A major impact	33%
A moderate impact	39%
NO/SLIGHT IMPACT (NET)	**28%**
A slight impact	20%
No impact	8%

BASE: QUALIFIED RESPONDENTS

Q790 When buying silver items, what do you expect the minimum amount of silver in that item necessary for it to be described as "silver"?

	Total
Base	**1014**
All or almost all pure silver	20%
92.5% pure silver	24%
80% pure silver	13%
75% pure silver	7%
66.6% pure silver	5%
50% pure silver	7%
Less than 50%	3%
Don't know/not sure	21%

BASE: QUALIFIED RESPONDENTS

Q795 When buying sterling silver items, what do you expect the minimum amount of silver in that item necessary for it to be described as "sterling silver"?

	Total
Base	**1014**
All or almost all pure silver	22%
92.5% pure silver	26%
80% pure silver	10%
75% pure silver	7%
66.6% pure silver	4%
50% pure silver	5%
Less than 50%	3%
Don't know/not sure	22%

BASE: QUALIFIED RESPONDENTS

Q800 Please think specifically about silver coated items you might purchase. How much do you agree or disagree with the following statements, regarding these products.

Summary Table: Strongly/Somewhat Agree

	Total
Base	**1014**
I expect that if a product is described as having a coating of silver, that there should be a minimum thickness required for that coating.	87%
I expect that products that are coated with silver will tarnish sooner than products composed throughout of silver.	73%
I expect that products that are coated with silver will be less durable than products that are composed throughout of silver.	73%

I expect that products that are coated with silver will tarnish sooner than products composed throughout of silver.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**73%**
Strongly agree	27%
Somewhat agree	46%
STRONGLY/SOMEWHAT DISAGREE (NET)	**27%**
Somewhat disagree	21%
Strongly disagree	6%

I expect that products that are coated with silver will be less durable than products that are composed throughout of silver.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**73%**
Strongly agree	26%
Somewhat agree	46%
STRONGLY/SOMEWHAT DISAGREE (NET)	**27%**
Somewhat disagree	24%
Strongly disagree	3%

I expect that if a product is described as having a coating of silver, that there should be a minimum thickness required for that coating.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**87%**
Strongly agree	40%
Somewhat agree	48%
STRONGLY/SOMEWHAT DISAGREE (NET)	**13%**
Somewhat disagree	11%
Strongly disagree	2%

PLATINUM

BASE: QUALIFIED RESPONDENTS

Q805 Some jewelry products consist of precious metal throughout, and some consist of a coating of precious metal over another metal.

Please think specifically about platinum coated items you might purchase. How much do you agree or disagree with the following statements, regarding these products.

Summary Table: Strongly/Somewhat Agree

	Total
Base	**1014**
I expect that if a product is described as having a coating of platinum, that there should be a minimum thickness required for that coating.	87%
I expect that products that are coated with platinum will be less durable than products that are composed throughout of platinum.	68%
I expect that products that are coated with platinum will tarnish sooner than products composed throughout of platinum.	66%

I expect that products that are coated with platinum will tarnish sooner than products composed throughout of platinum.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**66%**
Strongly agree	23%
Somewhat agree	43%
STRONGLY/SOMEWHAT DISAGREE (NET)	**34%**
Somewhat disagree	25%
Strongly disagree	9%

I expect that products that are coated with platinum will be less durable than products that are composed throughout of platinum.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**68%**
Strongly agree	23%
Somewhat agree	45%
STRONGLY/SOMEWHAT DISAGREE (NET)	**32%**
Somewhat disagree	26%
Strongly disagree	6%

I expect that if a product is described as having a coating of platinum, that there should be a minimum thickness required for that coating.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**87%**
Strongly agree	39%
Somewhat agree	48%
STRONGLY/SOMEWHAT DISAGREE (NET)	**13%**
Somewhat disagree	11%
Strongly disagree	2%

PALLADIUM

BASE: QUALIFIED RESPONDENTS

Q810 Please think specifically about palladium coated items you might purchase. How much do you agree or disagree with the following statements, regarding these products.

Summary Table: Strongly/Somewhat Agree

	Total
Base	**1014**
I expect that if a product is described as having a coating of palladium, that there should be a minimum thickness required for that coating.	84%
I expect that products that are coated with palladium will be less durable than products that are composed throughout of palladium.	67%
I expect that products that are coated with palladium will tarnish sooner than products composed throughout of palladium.	65%

I expect that products that are coated with palladium will tarnish sooner than products composed throughout of palladium.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**65%**
Strongly agree	19%
Somewhat agree	46%
STRONGLY/SOMEWHAT DISAGREE (NET)	**35%**
Somewhat disagree	29%
Strongly disagree	6%

I expect that products that are coated with palladium will be less durable than products that are composed throughout of palladium.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**67%**
Strongly agree	20%
Somewhat agree	47%
STRONGLY/SOMEWHAT DISAGREE (NET)	**33%**
Somewhat disagree	28%
Strongly disagree	5%

I expect that if a product is described as having a coating of palladium, that there should be a minimum thickness required for that coating.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**84%**
Strongly agree	33%
Somewhat agree	51%
STRONGLY/SOMEWHAT DISAGREE (NET)	**16%**
Somewhat disagree	14%
Strongly disagree	2%

RHODIUM

BASE: QUALIFIED RESPONDENTS

Q815 Please think specifically about rhodium coated items you might purchase. How much do you agree or disagree with the following statements, regarding these products.

Summary Table: Strongly/Somewhat Agree

	Total
Base	**1014**
I expect that if a product is described as having a coating of rhodium, that there should be a minimum thickness required for that coating.	82%
I expect that products that are coated with rhodium will be less durable than products that are composed throughout of rhodium.	67%
I expect that products that are coated with rhodium will tarnish sooner than products composed throughout of rhodium.	66%

I expect that products that are coated with rhodium will tarnish sooner than products composed throughout of rhodium.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**66%**
Strongly agree	18%
Somewhat agree	48%
STRONGLY/SOMEWHAT DISAGREE (NET)	**34%**
Somewhat disagree	27%
Strongly disagree	6%

I expect that products that are coated with rhodium will be less durable than products that are composed throughout of rhodium.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**67%**
Strongly agree	20%
Somewhat agree	47%
STRONGLY/SOMEWHAT DISAGREE (NET)	**33%**
Somewhat disagree	28%
Strongly disagree	5%

I expect that if a product is described as having a coating of rhodium, that there should be a minimum thickness required for that coating.

	Total
Base	**1014**
STRONGLY/SOMEWHAT AGREE (NET)	**82%**
Strongly agree	33%
Somewhat agree	49%
STRONGLY/SOMEWHAT DISAGREE (NET)	**18%**
Somewhat disagree	14%
Strongly disagree	3%

SCREENING QUESTIONS

BASE: QUALIFIED RESPONDENTS

Q600 Which of the following items, if any, have you purchased in the past year, either for yourself or for someone else? Please select all that apply.

	Total
Base	**1014**
Lawn or gardening equipment	29%
Major appliance	28%
Fine jewelry	27%
Automobile	24%
None of these	38%

BASE: QUALIFIED RESPONDENTS

Q605 How likely are you to consider purchasing fine jewelry, either for yourself or someone else, in the future?

	Total
Base	**1014**
Will definitely consider	29%
Will probably consider	22%
Will possibly consider	49%
Will not consider at all	-

Demographics

BASE: QUALIFIED RESPONDENTS
Q268 Are you…?

	Total
Base	**1014**
Male	49%
Female	51%

BASE: QUALIFIED RESPONDENTS
Q280 Age

	Total
Base	**1014**
18 - 34	34%
35 - 44	18%
45 - 54	17%
55+	30%
MEAN	**44.4**

BASE: QUALIFIED RESPONDENTS
Q410 Which one of the following best describes your employment status?

	Total
Base	**1014**
EMPLOYED (NET)	**66%**
Employed full time	44%
Employed part time	12%
Self-employed full time	5%
Self-employed part time	4%
Not employed, but looking for work	3%
Not employed and not looking for work	1%
Retired	14%
Not employed, unable to work due to a disability or illness	4%
Student	6%
Stay-at-home spouse or partner	7%

BASE: QUALIFIED RESPONDENTS
Q462 Which of the following income categories best describes your total 2015 household income before/after taxes?

	Total
Base	**1014**
Less than $15,000	7%
$15,000 to $24,999	7%
$25,000 to $34,999	9%
$35,000 to $49,999	12%
$50,000 to $74,999	17%
$75,000 to $99,999	12%
$100,000 to $124,999	11%
$125,000 to $149,999	6%
$150,000 to $199,999	7%
$200,000 to $249,999	2%
$250,000 or more	4%
Decline to answer	7%

BASE: QUALIFIED RESPONDENTS
Q320 Region

	Total
Base	**1014**
East	22%
Midwest	22%
South	32%
West	24%

BASE: QUALIFIED RESPONDENTS
Q364 What is your marital status?

	Total
Base	**1014**
Never married	27%
Married or civil union	50%
Divorced	12%
Separated	2%
Widow/Widower	2%
Living with partner	7%

BASE: QUALIFIED RESPONDENTS
Q437 What is the highest level of education you have completed or the highest degree you have received?

	Total
Base	**1014**
HIGH SCHOOL OR LESS (NET)	**28%**
Less than high school	1%
Completed some high school	9%
Completed high school	14%
Job-specific training program(s) after high school	5%
SOME COLLEGE (NET)	**37%**
Some college, but no degree	22%
Associate Degree	14%
COLLEGE GRAD+ (NET)	**35%**
College (such as B.A., B.S.)	19%
Some graduate school, but no degree	2%
Graduate degree (such as MBA, MS, M.D., Ph.D.)	14%

BASE: QUALIFIED RESPONDENTS
Q485 Race/Ethnicity

	Total
Base	**1014**
White	66%
Hispanic	13%
Black/African American	12%
Native American or Alaskan Native	1%
South Asian	-
Chinese	2%
Korean	1%
Japanese	1%
Other Southeast Asian	2%
Filipino	1%
Some other race	1%
Decline to Answer	1%

DPA Comments on Proposed Revisions to the Guides for the Jewelry, Precious Metals, and Pewter Industries

Annex 4 – Current Marketing Practices by Synthetic Diamond Manufacturers

May 2016

Ref: Jewelry Guides, 16 CFR Part 23, Project No. G711001

Introduction

In marketing materials, synthetic diamond manufacturers misrepresent the production process, implying that it is “natural,” and refer to their products as “cultured diamonds.” For example:

- ***Diamond Foundry’s*** website states that they are “sustainably culturing diamonds.”

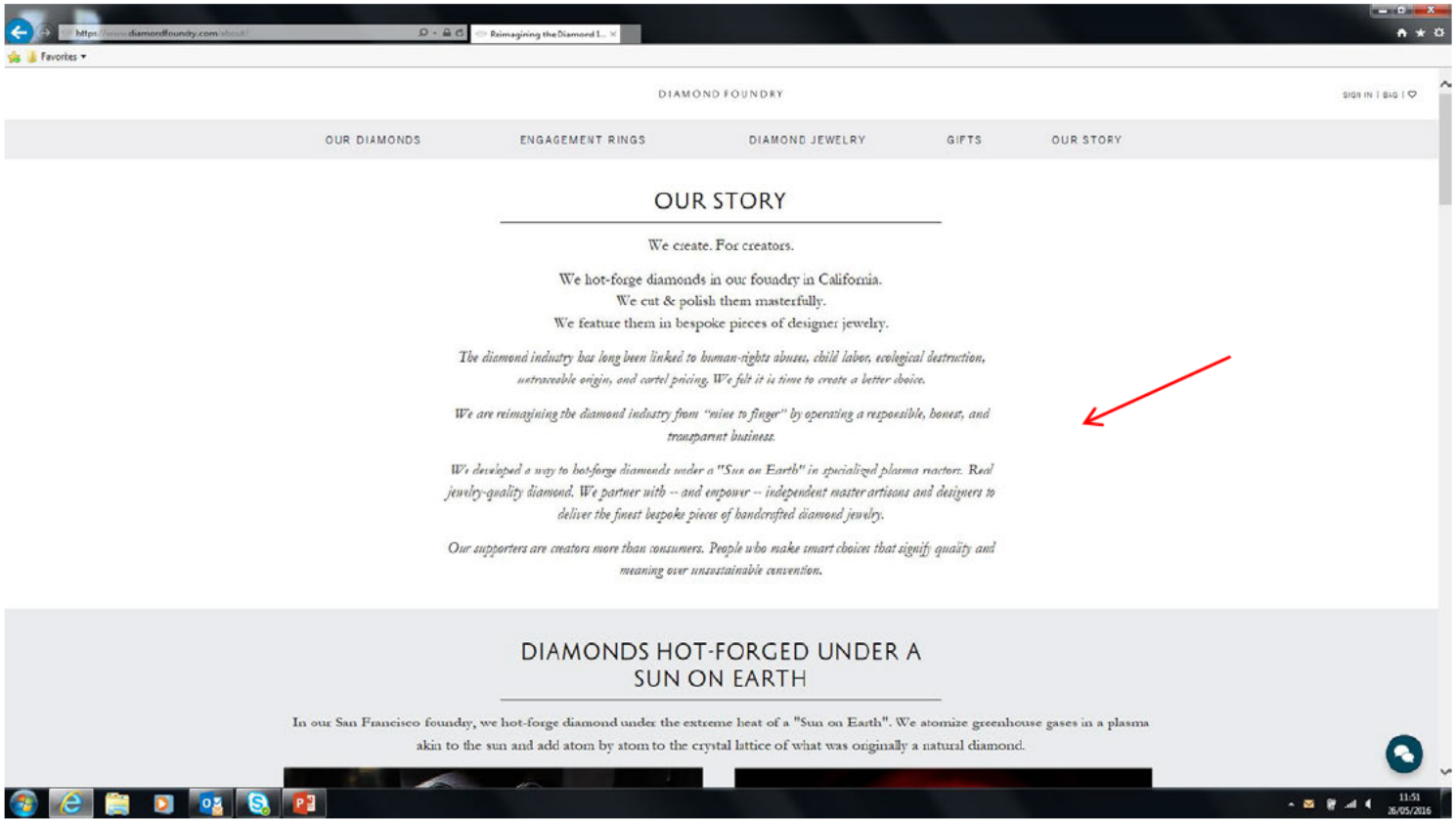
- ***Brilliant Earth’s*** website uses the term “cultured diamond” and states that lab created diamonds are “also known as cultured diamonds.” In addition they state that “Our lab diamonds are grown from the tiny carbon seeds of pre-existing diamonds.”

- ***Pure Grown Diamonds’*** website states that they are “Growing Seeds of Beauty: Like the most exotic orchid found in nature, the orchid lovingly grown in the greenhouse is equally rare and beautiful. The same is true for Pure Grown Diamonds. Similar to a greenhouse, the grown diamond process duplicates what occurs naturally, creating a rare, beautiful and sustainable product.”

- The term “cultured diamonds” is also appears frequently in social media feeds

DIAMOND PRODUCERS ASSOCIATION

Diamond Foundry (visited May 2016)



DIAMOND FOUNDRY

OUR DIAMONDS | ENGAGEMENT RINGS | DIAMOND JEWELRY | GIFTS | OUR STORY

OUR STORY

We create. For creators.

We hot-forge diamonds in our foundry in California.
We cut & polish them masterfully.
We feature them in bespoke pieces of designer jewelry.

The diamond industry has long been linked to human-rights abuses, child labor, ecological destruction, untraceable origin, and cartel pricing. We felt it is time to create a better choice.

We are reimagining the diamond industry from "mine to finger" by operating a responsible, honest, and transparent business.

We developed a way to hot-forge diamonds under a "Sun on Earth" in specialized plasma reactor. Real jewelry-quality diamond. We partner with -- and empower -- independent master artisans and designers to deliver the finest bespoke pieces of handcrafted diamond jewelry.

Our supporters are creators more than consumers. People who make smart choices that signify quality and meaning over unsustainable convention.

DIAMONDS HOT-FORGED UNDER A SUN ON EARTH

In our San Francisco foundry, we hot-forge diamond under the extreme heat of a "Sun on Earth". We atomize greenhouse gases in a plasma akin to the sun and add atom by atom to the crystal lattice of what was originally a natural diamond.

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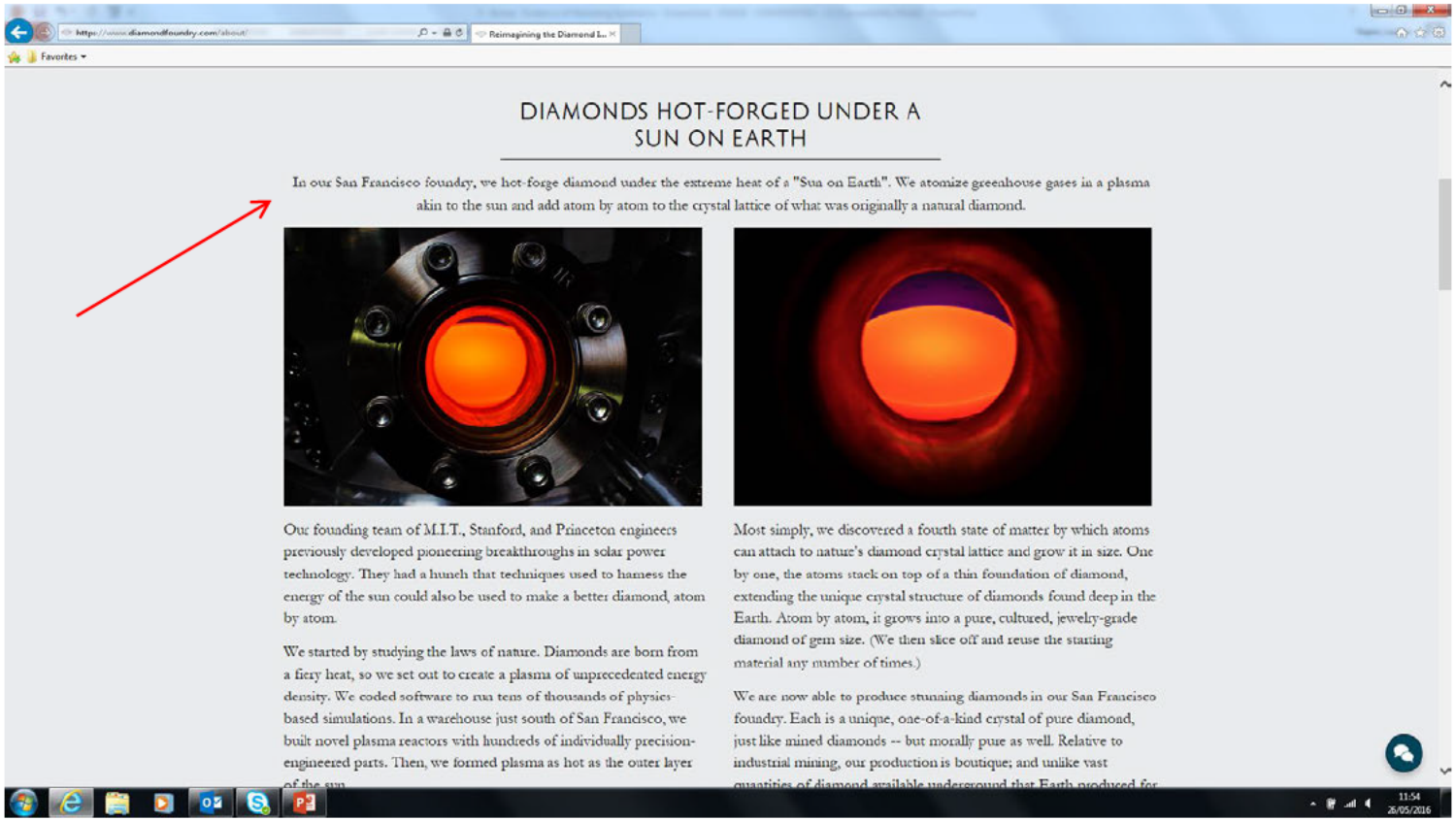
DIAMOND PRODUCERS ASSOCIATION

Diamond Foundry (visited May 2016)



DIAMONDS HOT-FORGED UNDER A SUN ON EARTH

In our San Francisco foundry, we hot-forge diamond under the extreme heat of a "Sun on Earth". We atomize greenhouse gases in a plasma akin to the sun and add atom by atom to the crystal lattice of what was originally a natural diamond.

Our founding team of M.I.T., Stanford, and Princeton engineers previously developed pioneering breakthroughs in solar power technology. They had a hunch that techniques used to harness the energy of the sun could also be used to make a better diamond, atom by atom.

We started by studying the laws of nature. Diamonds are born from a fiery heat, so we set out to create a plasma of unprecedented energy density. We coded software to run tens of thousands of physics-based simulations. In a warehouse just south of San Francisco, we built novel plasma reactors with hundreds of individually precision-engineered parts. Then, we formed plasma as hot as the outer layer of the sun.

Most simply, we discovered a fourth state of matter by which atoms can attach to nature's diamond crystal lattice and grow it in size. One by one, the atoms stack on top of a thin foundation of diamond, extending the unique crystal structure of diamonds found deep in the Earth. Atom by atom, it grows into a pure, cultured, jewelry-grade diamond of gem size. (We then slice off and reuse the starting material any number of times.)

We are now able to produce stunning diamonds in our San Francisco foundry. Each is a unique, one-of-a-kind crystal of pure diamond, just like mined diamonds -- but morally pure as well. Relative to industrial mining, our production is boutique; and unlike vast quantities of diamond available underground that Earth produced for

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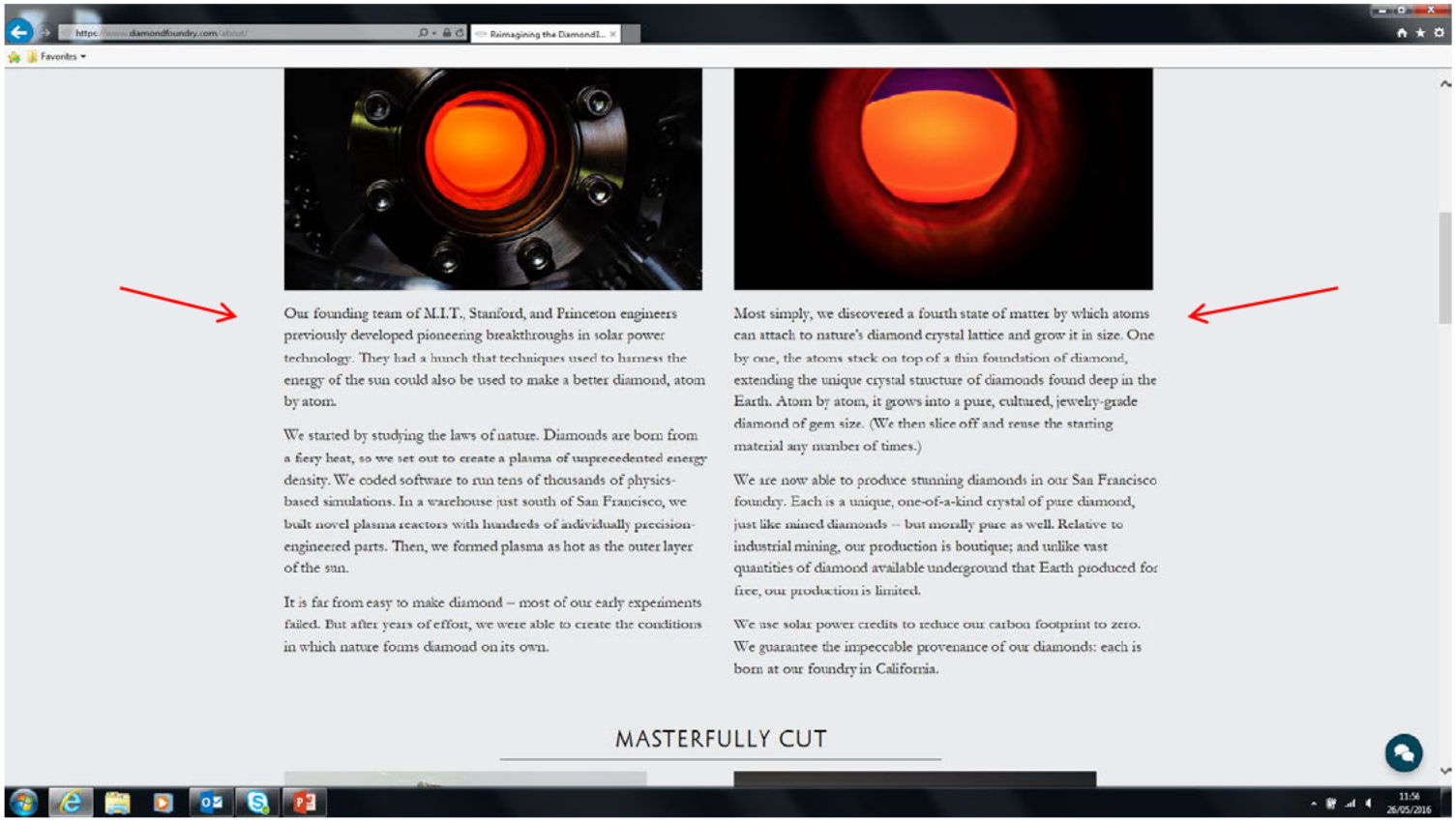

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We started by studying the laws of nature. Diamonds are born from a fiery heat, so we set out to create a plasma of unprecedented energy density. We coded software to run tens of thousands of physics-based simulations. In a warehouse just south of San Francisco, we built novel plasma reactors with hundreds of individually precision-engineered parts. Then, we formed plasma as hot as the outer layer of the sun.

It is far from easy to make diamond – most of our early experiments failed. But after years of effort, we were able to create the conditions in which nature forms diamond on its own.

Most simply, we discovered a fourth state of matter by which atoms can attach to nature's diamond crystal lattice and grow it in size. One by one, the atoms stack on top of a thin foundation of diamond, extending the unique crystal structure of diamonds found deep in the Earth. Atom by atom, it grows into a pure, cultured, jewelry-grade diamond of gem size. (We then slice off and reuse the starting material any number of times.)

We are now able to produce stunning diamonds in our San Francisco foundry. Each is a unique, one-of-a-kind crystal of pure diamond, just like mined diamonds -- but morally pure as well. Relative to industrial mining, our production is boutique; and unlike vast quantities of diamond available underground that Earth produced for free, our production is limited.

We use solar power credits to reduce our carbon footprint to zero. We guarantee the impeccable provenance of our diamonds: each is born at our foundry in California.

MASTERFULLY CUT

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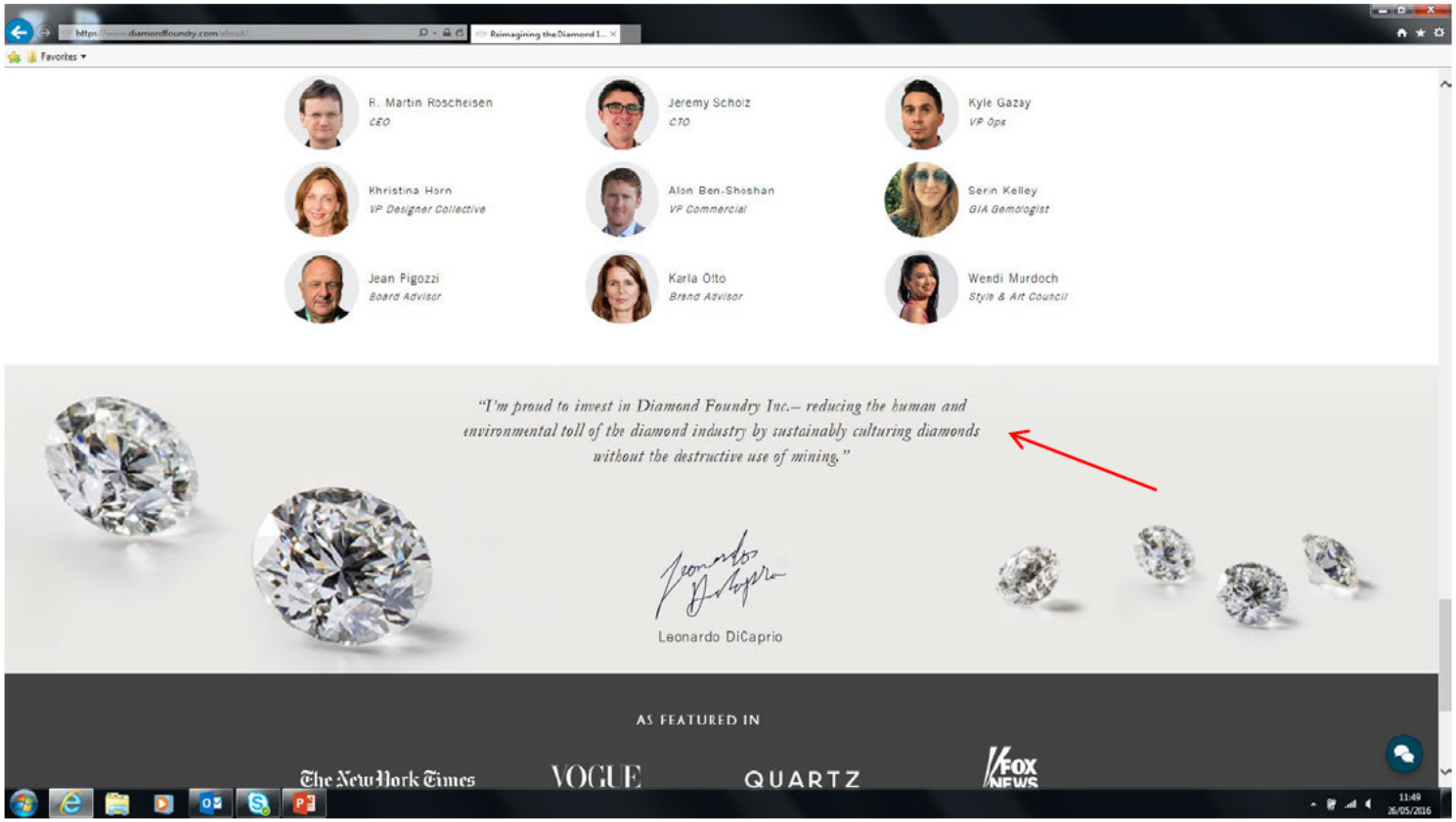

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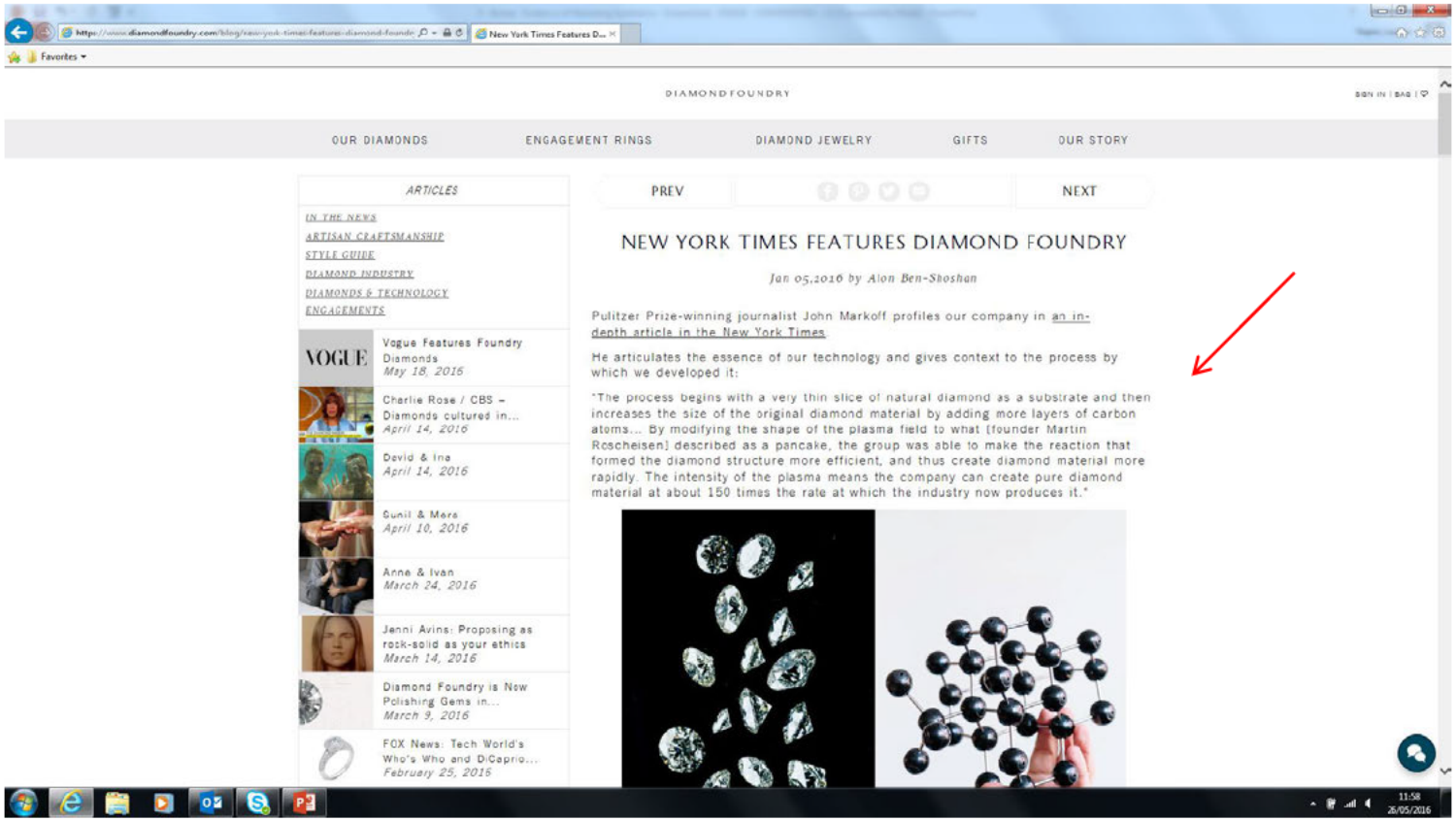

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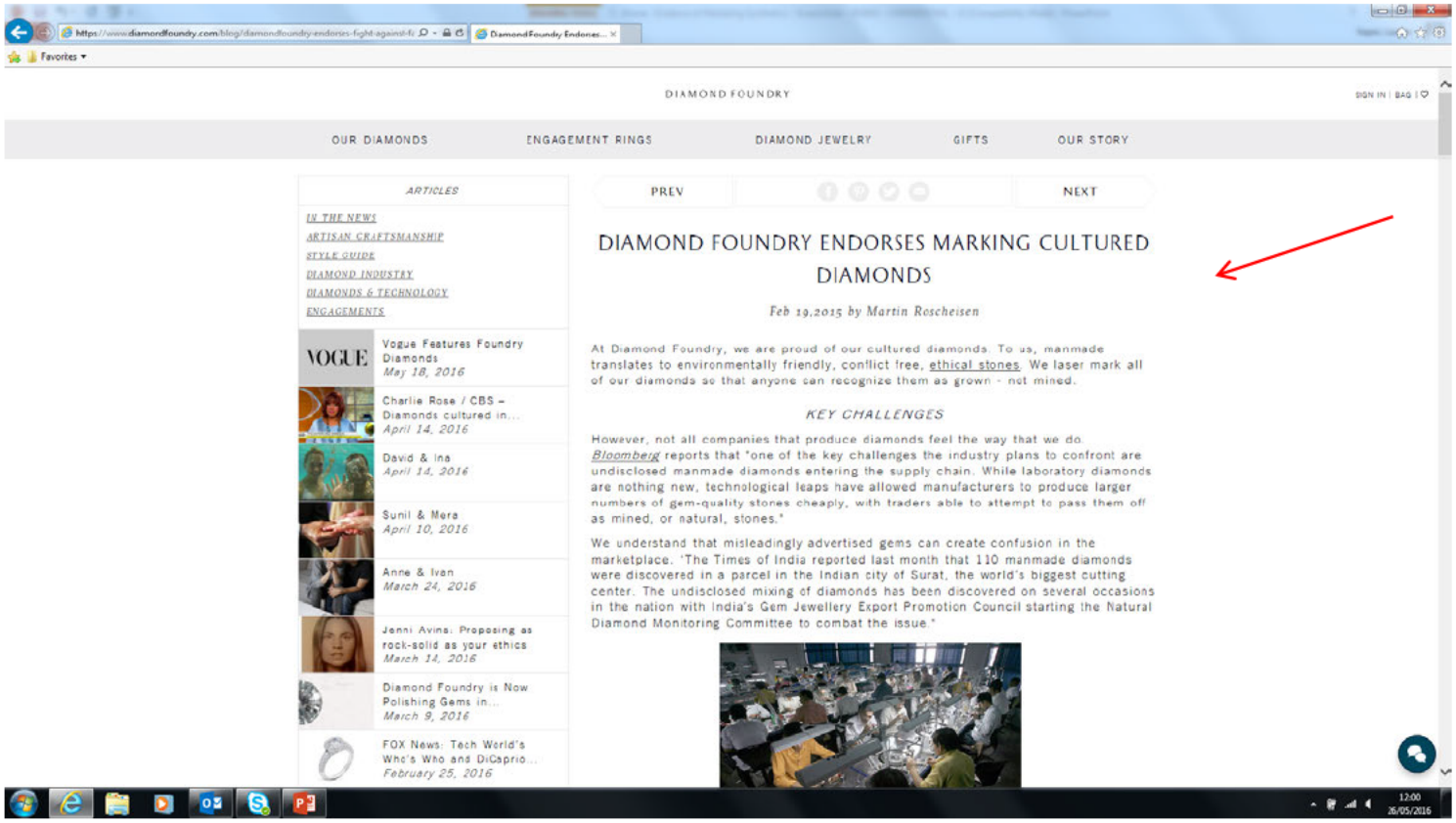

DIAMOND FOUNDRY

SIGN IN | BAG

OUR DIAMONDS | ENGAGEMENT RINGS | DIAMOND JEWELRY | GIFTS | OUR STORY

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Charlie Rose / CBS – Diamonds cultured in..., April 14, 2016
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DIAMOND FOUNDRY ENDORSES MARKING CULTURED DIAMONDS

Feb 19,2015 by Martin Roscheisen

At Diamond Foundry, we are proud of our cultured diamonds. To us, manmade translates to environmentally friendly, conflict free, ethical stones. We laser mark all of our diamonds so that anyone can recognize them as grown - not mined.

KEY CHALLENGES

However, not all companies that produce diamonds feel the way that we do. *Bloomberg* reports that "one of the key challenges the industry plans to confront are undisclosed manmade diamonds entering the supply chain. While laboratory diamonds are nothing new, technological leaps have allowed manufacturers to produce larger numbers of gem-quality stones cheaply, with traders able to attempt to pass them off as mined, or natural, stones."

We understand that misleadingly advertised gems can create confusion in the marketplace. 'The Times of India reported last month that 110 manmade diamonds were discovered in a parcel in the Indian city of Surat, the world's biggest cutting center. The undisclosed mixing of diamonds has been discovered on several occasions in the nation with India's Gem Jewellery Export Promotion Council starting the Natural Diamond Monitoring Committee to combat the issue."

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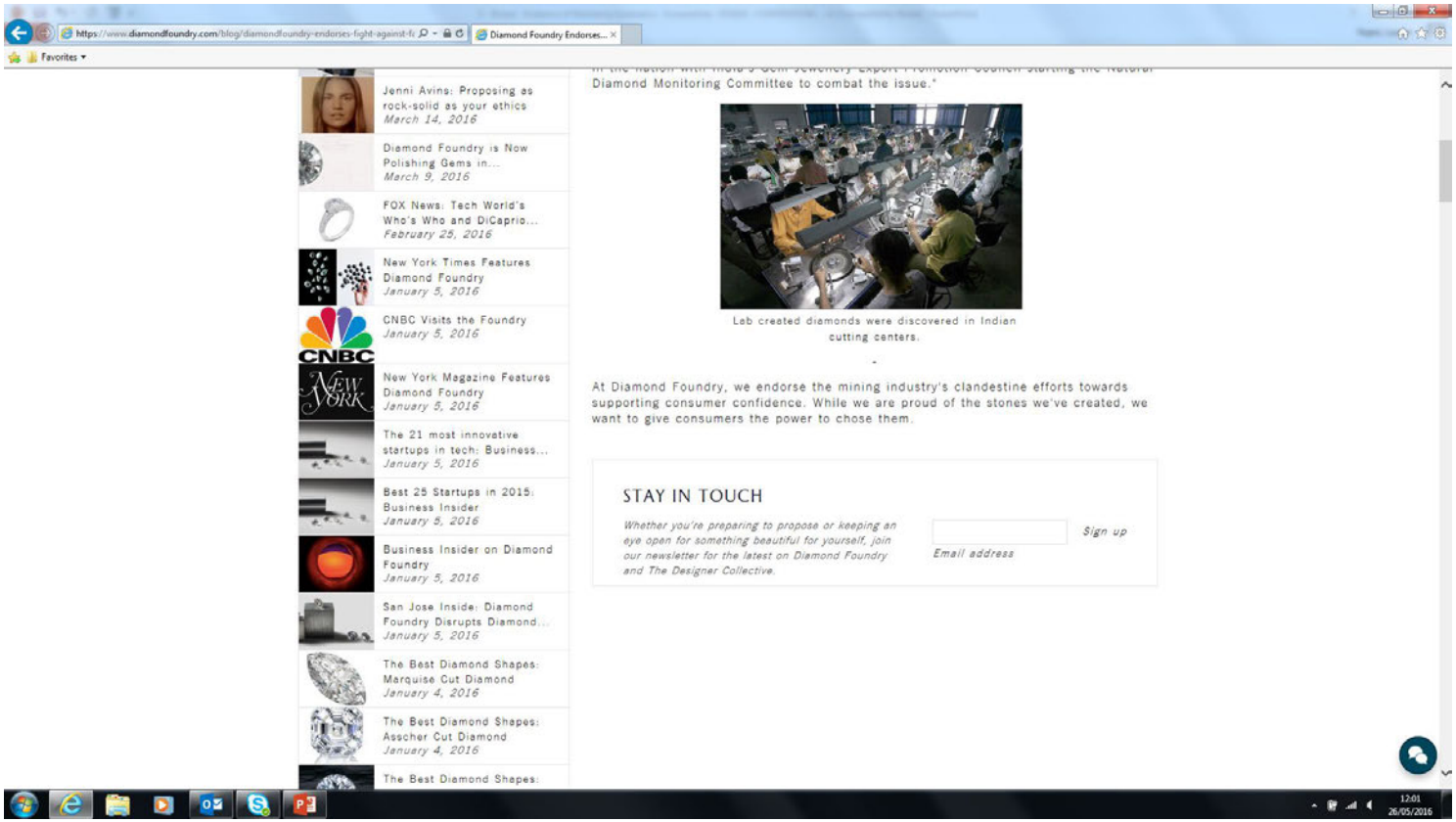
Diamond Foundry (visited May 2016)



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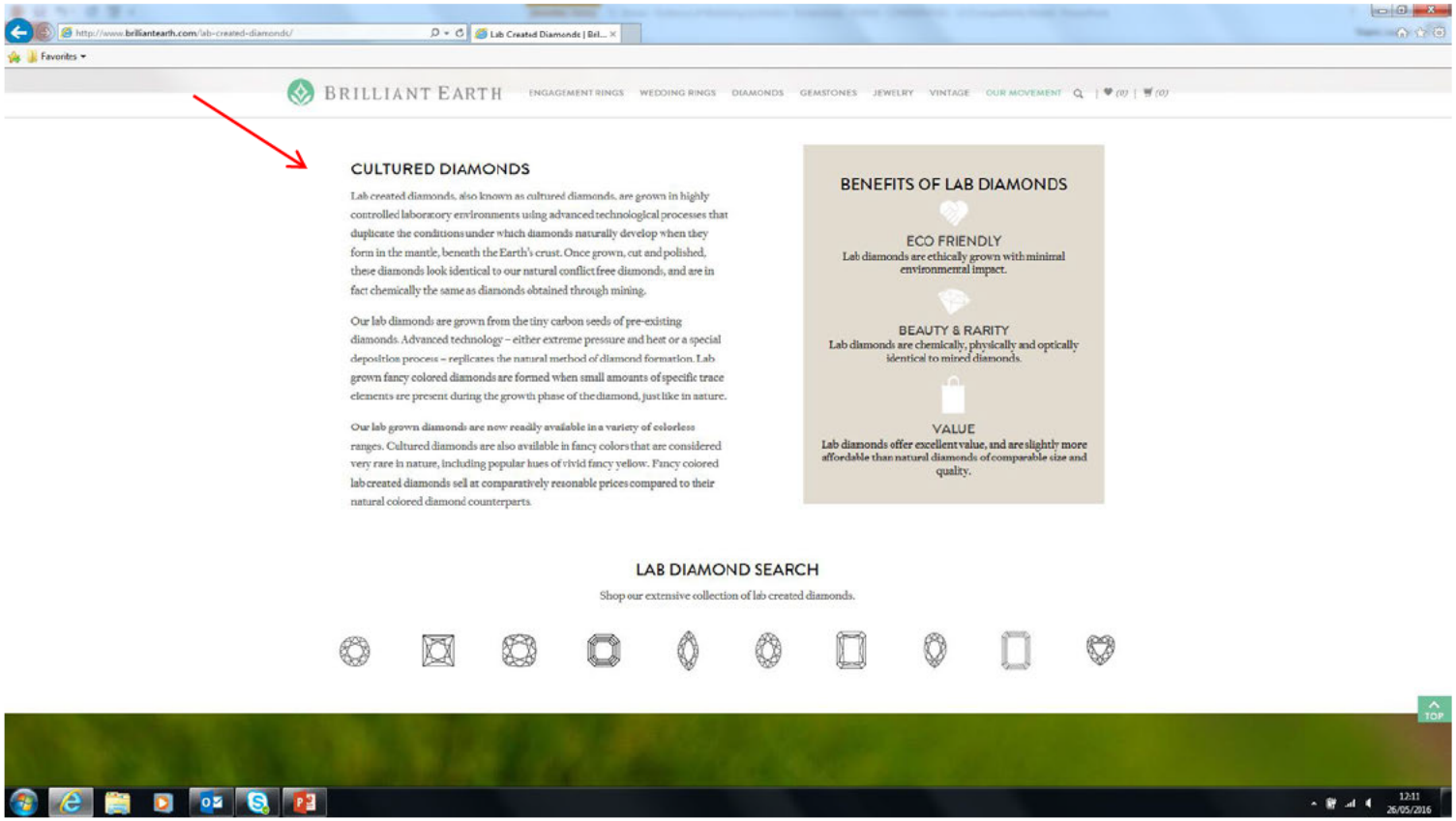
Brilliant Earth (visited May 2016)



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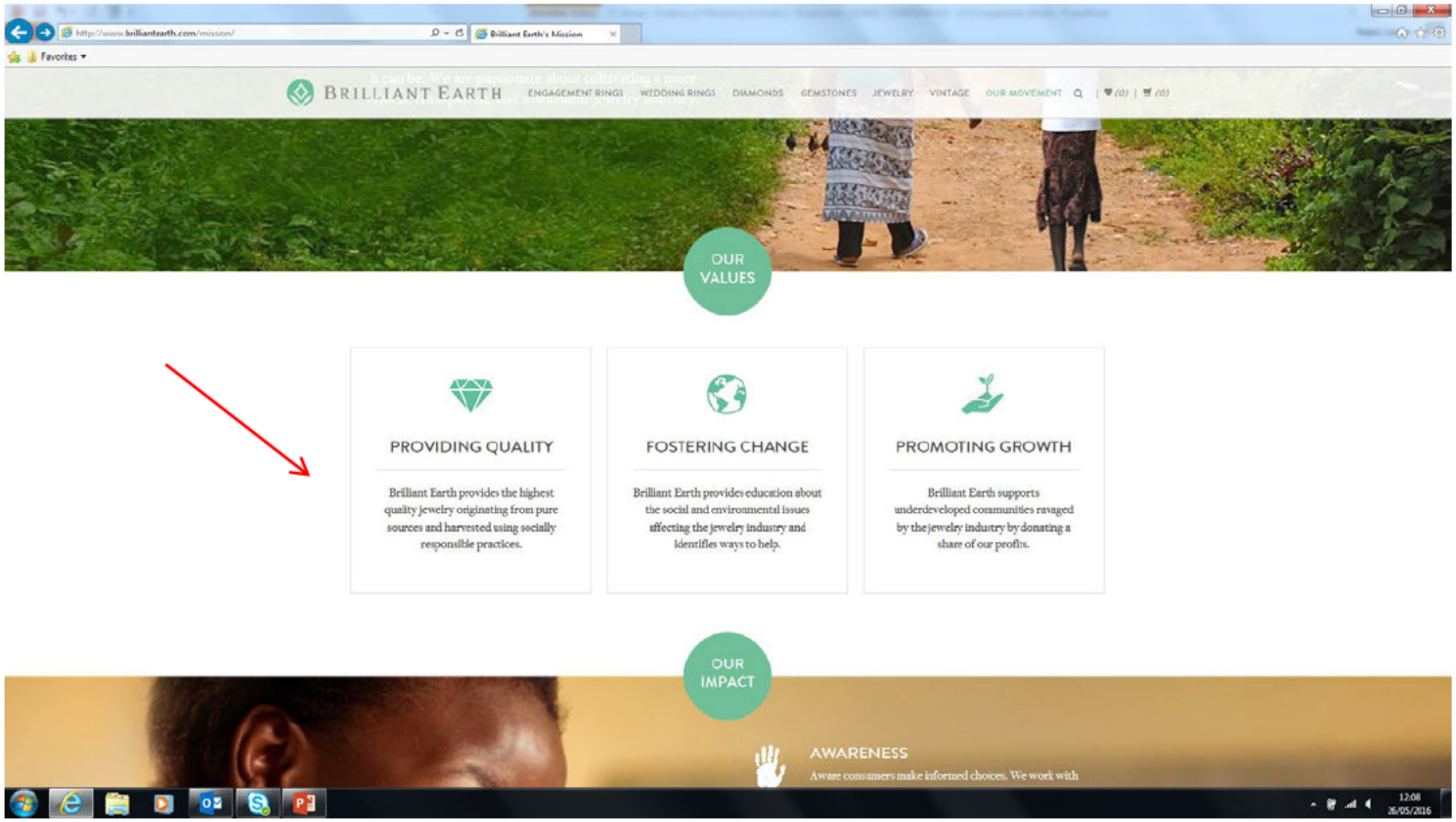
Brilliant Earth (visited May 2016)



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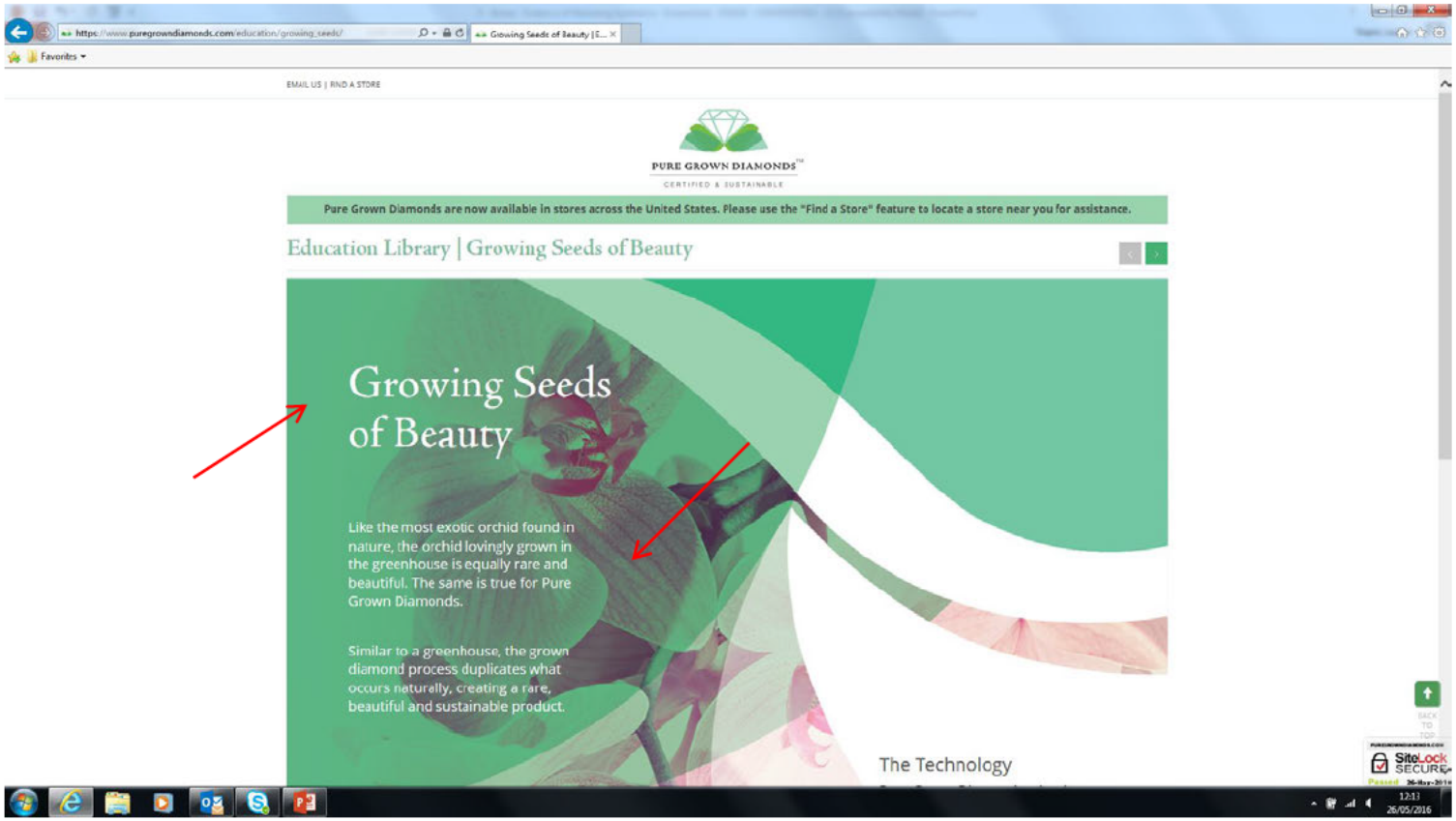
Pure Grown Diamonds (visited May 2016)



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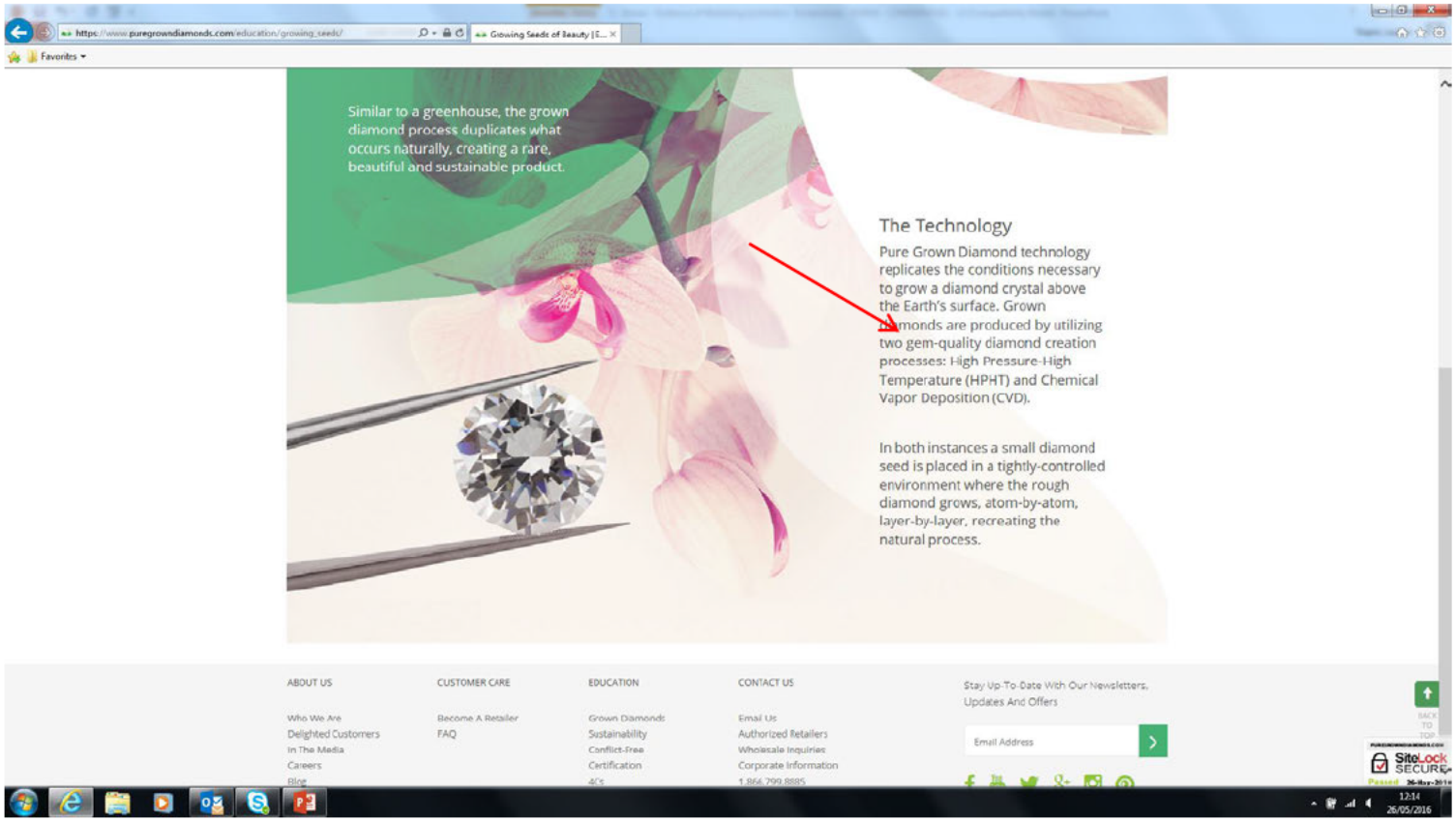
Pure Grown Diamonds (visited May 2016)



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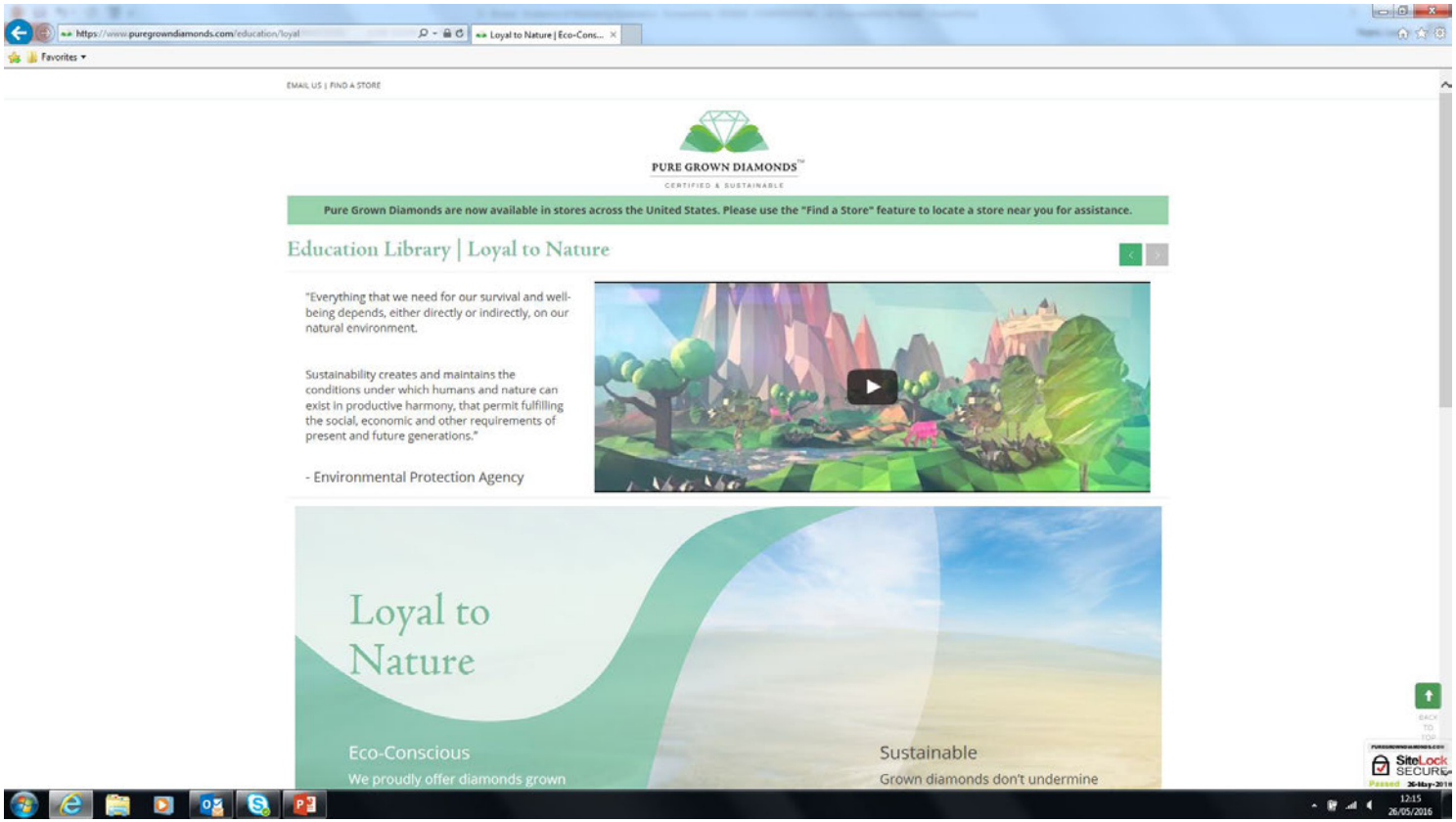
Pure Grown Diamonds (visited May 2016)



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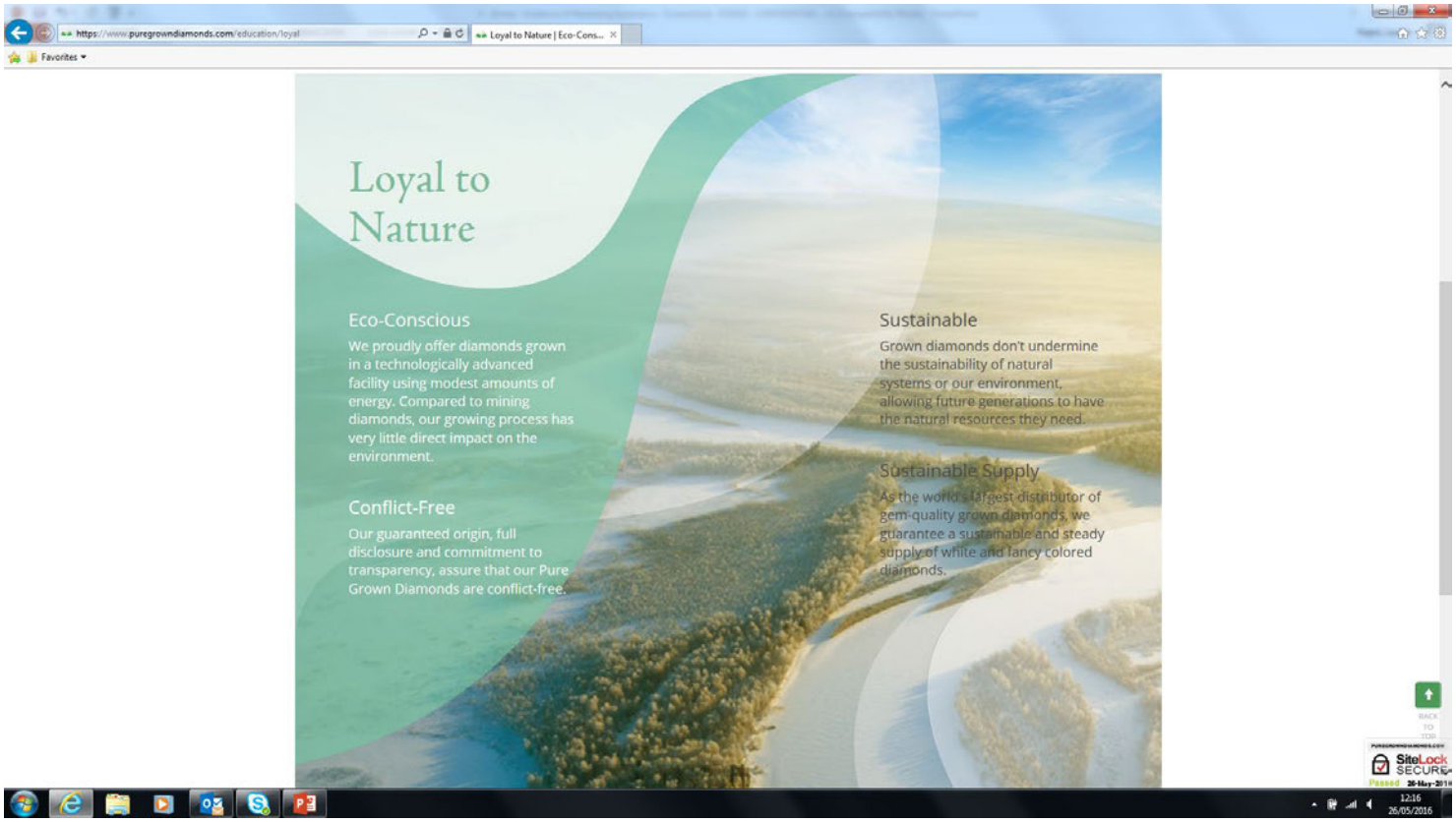
Pure Grown Diamonds (visited May 2016)



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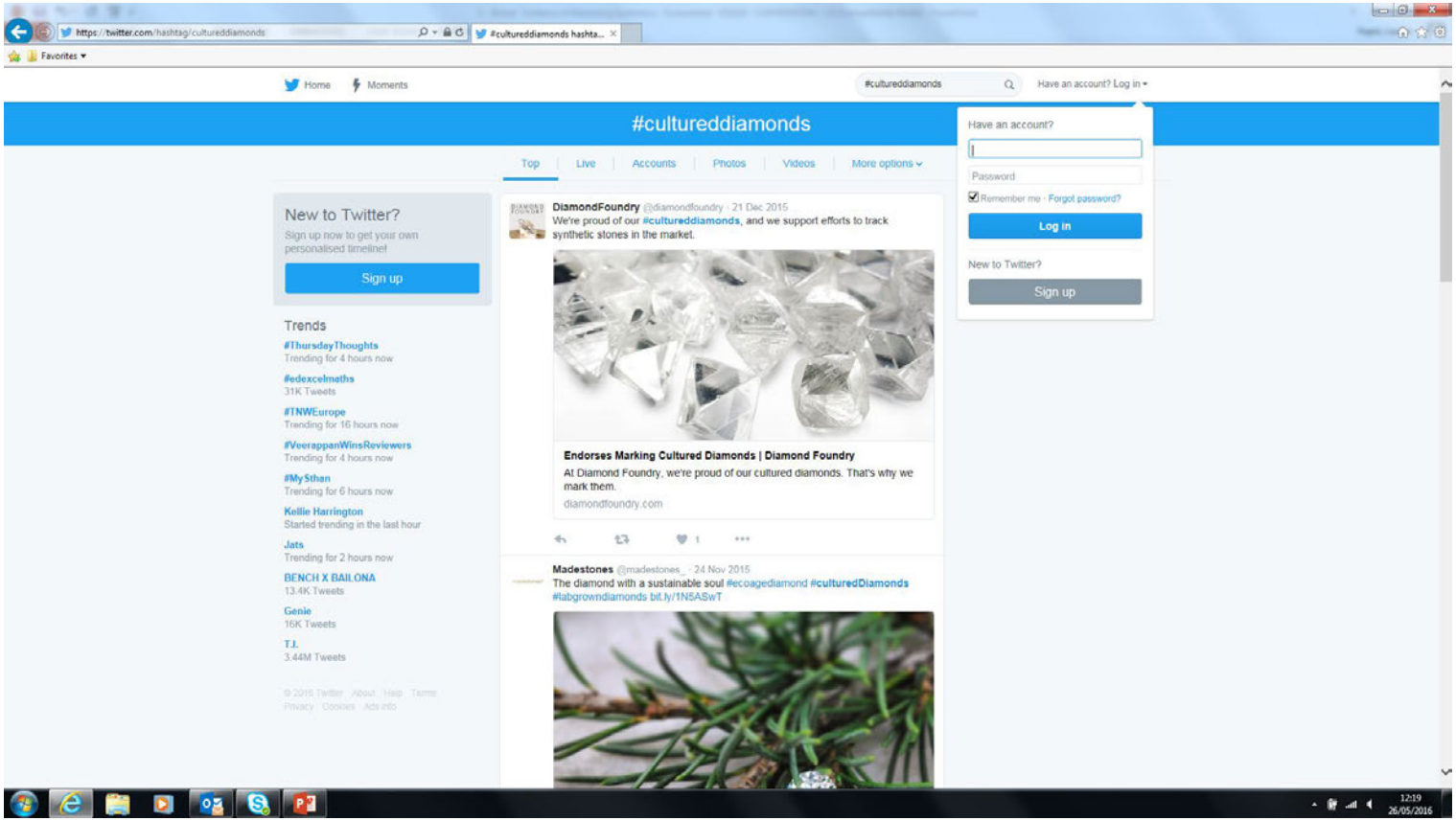
Twitter: #cultureddiamonds (visited May 2016)



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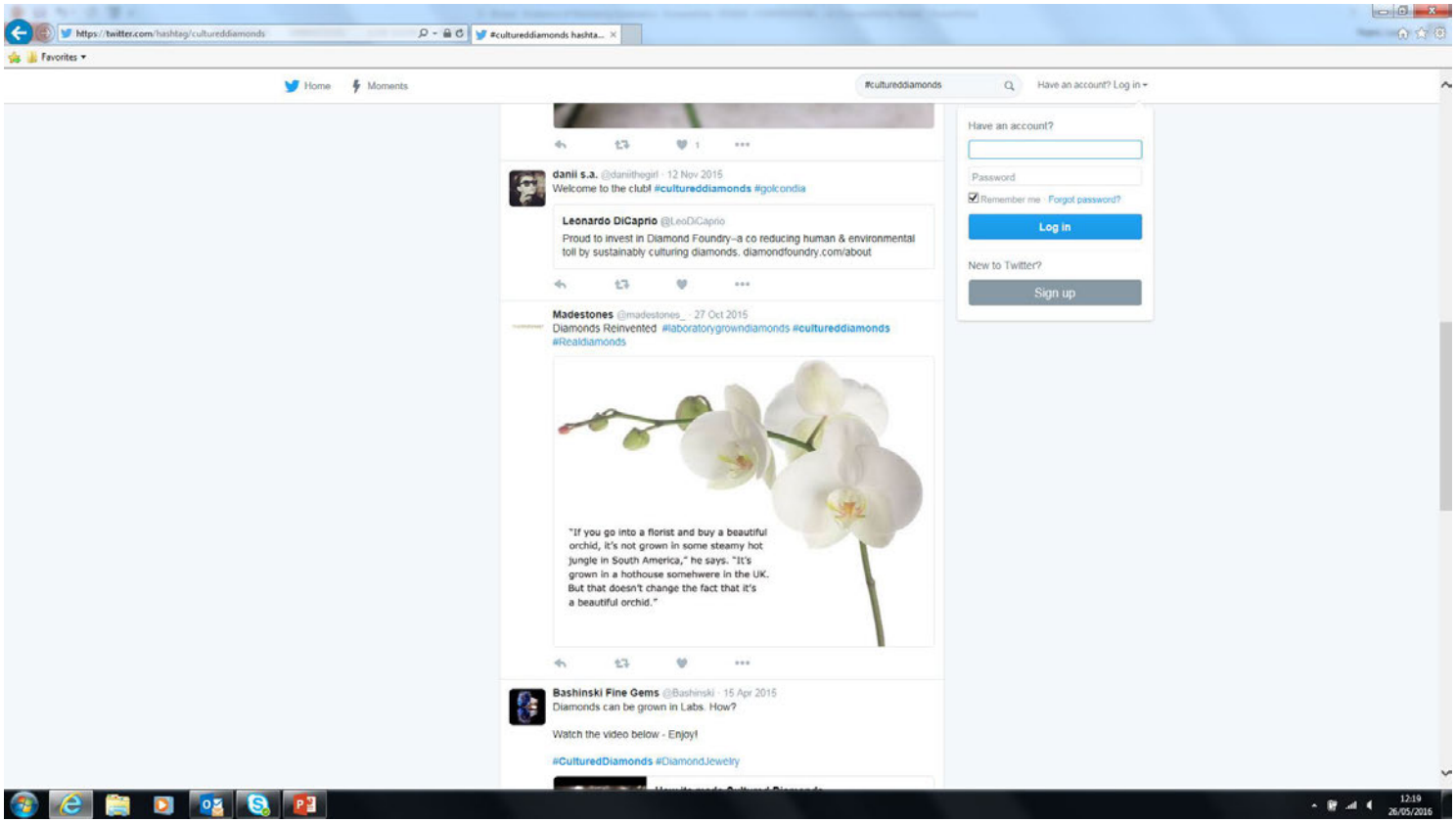
Twitter: #cultureddiamond (visited May 2016)



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