

## Technology

### DISRUPTION

# What it will take for the synthetic diamond industry to be (un)successful

'Lab-created' diamond producers are hard-pressed to challenge the precious stones, but that could change

Paul Zimmisky

I have been getting asked a lot of questions about synthetic diamonds of late. I can say there is a diverse mix of intrigue, concern, and enthusiasm.

Whenever synthetics are mentioned, identification and disclosure always seem to be the immediate go-to topic of conversation.

The implication of mixing synthetic with natural continues to be discussed at length by the industry, even though there is technology capable of distinguishing between the two.

The challenge at the moment is the technology is cost prohibitive for many industry players.

However, as this technology progresses it will become more affordable and available – it is just a matter of time before distinguishing between synthetic and natural becomes a non-issue.

Personally, I'm more concerned with looking past identification and focusing on what I think will be the two primary drivers of the synthetic industry: pricing and distribution.

An interesting proxy for the synthetic diamond market is the precious gem market: rubies, emeralds, and sapphires.

The synthetic market for these gems matured years ago and is now larger than the natural equivalent, which has been stymied by trade restrictions and other challenges resulting in contracted supply and higher prices. In recent years the synthetic production of these gems has increased, and the product has been accepted by the downstream jewellery industry.

The result has been a favourable price differential for synthetics relative to natural and a robust distribution channel led by the largest national retailers.



Higher-quality synthetic diamonds only trade at a discount of 2-20% to the real thing

At the moment, the diamond industry is reversed: a relatively healthy mining industry, albeit a downward sloping supply trend since production peaked in the mid-2000s, and a relatively non-existent synthetic retail distribution channel.

I estimate that gem-quality synthetics represent about only 1-2% of the global diamond-jewellery market (that is, 1-to-2 out of every 100ct sold is a synthetic).

Even though synthetic diamond technology has existed for almost 65 years, it was not until recently that 1ct-plus engagement-ring-quality colourless synthetic was available.

For example, in early 2013, Gemesis, now known as Pure Grown Diamonds, produced a 1.29ct E colour, VVS2, emerald-cut diamond that at the time claimed to be the "world's largest, whitest, lab-created diamond".

Traditionally, the synthetic diamond industry has focused production on smaller gem and industrial-quality product, with the latter catering to over 99% of global industrial-diamond demand.

However, even with the recent progress, the technology to produce larger gem-quality diamonds has not yet advanced to the point where the industry can afford to

Synthetic v natural diamond production				
Gem diamonds (jewellery quality)				
Method	2015 estimate		2025 estimate	
	Volume (Mct)	Share (%)	Volume (Mct)	Share (%)
Natural production (mining)	54	98	52	95
Synthetic production	1	2	3	5
Total	55	100	55	100
Industrial diamonds (abrasive quality)				
Natural production (mining)	<100	<1	<00	<1
Synthetic production	4,500	>99	5,000	>99
Total	4,500	100	5,000	100

Natural diamond production forecast based on independent itemised mine-by-mine analysis. Synthetic gem diamond production forecast based on an annual growth rate of 12% as capacity expands and lower prices drive new demand, until market share reaches 5%. Synthetic industrial diamond production forecast based on global construction expenditure forecast and World Bank data. Note that industrial diamonds are consumed. Production of natural industrial-quality diamonds is strictly a by-product of gem-quality diamond mining. All data is based on Paul Zimmisky estimates.



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### Synthetic vs natural diamond price consumption

	Comparison 1		Comparison 2		Comparison 3	
	Synthetic	Natural	Synthetic	Natural	Synthetic	Natural
Carat weight	1.77	1.77	1.27	1.27	1.05	1.05
Shape	Round	Round	Round	Round	Round	Round
Clarity	VVS2	VVS2	VS2	VS2	VVS2	VVS2
Colour	H	H	J	J	J	J
Cut	Ideal	Ex	Ideal	Ideal	VG	VG
Price	US\$16,873	US\$19,800	US\$5,070	US\$5,157	US\$4,963	US\$5,333
Price/ct	US\$9,533	US\$11,186	US\$3,992	US\$4,061	US\$4,727	US\$6,783
Certificate	IGI	GIA	IGI	GIA	IGI	GIA
Seller		James Allen	Brilliant Earth	Blue Nile	PGD*	Blue Nile
Date	4/22/2015	4/22/2015	4/22/2015	4/22/2015	4/22/2015	4/22/2015
Price difference	-14.78%	17.35%	-1.69%	1.72%	-6.94%	7.46%
	Comparison 4		Comparison 5		Comparison 6	
Carat weight	0.91	0.91	0.72	0.72	0.51	0.51
Shape	Round	Round	Round	Round	Round	Round
Clarity	VS2	VS2	VVS2	VVS2	VS1	VS1
Colour	I	I	H	H	J	J
Cut	VG	VG	VG	Good	VG	VG
Price	US\$3,245	US\$4,060	US\$2,748	US\$3,216	US\$1,066	US\$1,147
Price/ct	US\$3,566	US\$6,783	US\$3,817	US\$4,564	US\$2,090	US\$6,783
Certificate	IGI	GIA	IGI	GIA	IGI	GIA
Seller	Brilliant Earth	James Allen	PGD*	Helzberg	PGD*	Blue Nile
Date	4/22/2015	4/22/2015	4/22/2015	4/22/2015	4/22/2015	4/22/2015
Price difference	-20.07%	25.12%	-14.55%	17.03%	-7.06%	7.60%

\*PGD is Pure Grown Diamonds, known as Gemesis prior to June 2014. All data retrieved on April 22, 2015 from public websites of respective companies. Note cut variance in comparison 1 and 5. Analysis by Paul Zimmisky

significantly undercut the price of a natural equivalent.

While synthetic rubies, emeralds and sapphires can sell at as much as a 90% discount or more to a natural equivalent, higher-quality synthetic diamonds only trade at a discount of around 2-20%.

There is a lot of room for that margin to widen.

As synthetic diamond production technology continues to advance, incrementally higher output and lower prices are inevitable – the key word being ‘incremental’, as the industry’s high barriers to entry, due to high capital investment and R&D costs, will limit the pace of quality advancements and capacity growth rates.

Right now, demand for synthetic gem diamonds is being driven almost exclusively by the environmentally and ethically conscious customer and to a lesser extent the millennial that sees “futurology” appeal in synthetics. These customers are buying online.

The largest potential for the industry coming is from the indifferent diamond customer that can be persuaded by a lower relative price if access to product is convenient enough.

The pricing of synthetics is not yet attractive enough to convert the indifferent customer, nor is the product accessible enough for the unwilling e-shopper.

Until there is at least one display case

**“Even though synthetic diamond technology has existed for almost 65 years it wasn’t until recently that 1ct-plus engagement-quality colourless synthetic was available”**

devoted to synthetics in the national jewelry chains and department stores, synthetics’ reach may be limited to being just that of a specialty item.

Even as prices come down and distribution improves, the synthetic-diamond market share will not get anywhere near that of the other aforementioned synthetic gems.

The synthetic diamond industry is up

against a market that is primarily driven by bridal, and when it comes to bridal in particular, there seems to be a discriminatory desire for natural stones (thanks De Beers).

In addition, lower-priced synthetics may actually have an adverse effect on a diamond’s appeal.

According to the economic theory of a Veblen good, the demand for an exclusive good increases as the price increases due to the associated exclusive nature and status appeal of the good. If the price of a diamond falls from three months of salary to two-week’s salary, the desire to own one might fall as well.

That said, over the next decade or so advances in production technology and improved accessibility could drive synthetic diamond demand to as much as 2-5% of total diamond market share, however, gaining additional share from that point will require some very successfully branding and distribution.

Lastly, it is amusing that the synthetic industry carefully refers to its product as “lab-created diamonds”, whereas the mining industry explicitly refers to them as “synthetics”. I guess it is just a game of semantics. ▼

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