

## Geola Introduces Security Digital Mastering System Using Pulsed Laser

Lithuanian company Geola Digital uab has joined the small club of companies making high-resolution digital mastering system for security embossed holograms with the introduction of its mastering system which uses the company's own *BlueBird* pulsed laser which it has developed specifically for photoresist exposure as masters for embossed holography. This follows its experimental work to test the use of pulsed lasers to expose pixelated holograms on photoresist (the most common photosensitive material for mastering for surface relief holograms), as the usual exposure method is to use continuous wave (CW) lasers.



*An 80 x 60 mm shim of a full colour hologram produced by Krypten from a Geola master shot with a pulsed laser. Seen in diffuse light (L) and point light source (R).*

Geola has found that, using a pulsed laser with output at 440 nm (indigo/blue light), with test photoresist samples from Shipley and Micro Resist Technology, it can expose holographic pixels ('hogels') at a fifth of the

exposure energy of a CW laser. It's variation of the direct write digital holography (DWDH) technique means requires a single hologram exposure to create a white-light viewable hologram, as the hogel records the calculated diffraction pattern of the H2 master (the white light viewable hologram). This calculation establishes the information that is required based on the perspective of the image from each hogel in the H1 to H2 transfer. This means that each hogel has 800-900 individual perspective views.

According to Dr Stanislovas Zacharovas, executive director at Geola, the pulse beam technique is means shorter exposure times and simplified

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## MTM's Trackable HoloTag

Turkish embossed hologram producer MTM Holografi Guvenlikli Basim ve Bilisim Teknolojileri San.ve Tic. A.S (MTM) has been producing holographic tax labels for the Turkish Ministry of Culture for several years, and the current version is a sophisticated label with taggants and tracking features, with the ability to be read by a specialist reader or a smartphone. The company is extending its reach by offering this type of label under the name *HoloTag* as a product protection or tax label that carries a 2D bar code and an authentication taggant.

MTM, based at a Tecnopark sponsored by the Turkish R&D Centre in Kocaeli, about 80 km southeast of Istanbul, was founded in 1997 and now comprises three companies: MTM Holography Secure Printing and Informa-

tion Technologies Inc; MTM Marketing and Trade Inc and MTM Information Technologies Inc, which between them employ around 88 people, most of them involved with holography one way or another. Currently there are six people in R&D, around 55-60 people in hologram manufacturing and the remainder in management and sales. Production capacity is 100000 sq m of holographic foil per month.

The company is certified to ISO 9000 and Intergraf's CWA as a security printer and security hologram producer, and proudly told *Holography News®* that it will shortly be certified under ISO 14298 (management of security printing processes). As well as its security holograms it is working with the General Command of

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## Convergence: Good For Holography!

The number of companies producing holograms with some kind of encrypted serial number continues to grow, as reflected in this issue of *Holography News*® in the article about HoloTag from MTM in Turkey.

Market interest in this type of combination label is high, as shown in the growth of Holoptica, driven by its *HoloQR*® hologram, also reported in this issue. And we have previously reported on combination hologram/codes from Andrews & Wykeham, Kurz, tesa and others – it is almost invidious to name these companies as so many hologram companies are now making such holograms.

Is this simply a bandwagon that many companies are jumping on? Is it a case of my competitor is doing it, I'd better as well? Or my customer is about to move away from holograms to 2D data matrix codes for track and trace, so I'd better find a way to keep them? If you can't beat them, join them?

Obviously, there is some of that at play. But we see something more fundamental playing out here. Yes, it's true that many brand owners and industry associations are turning to encoded track and trace systems, so hologram producers need to find a way to provide something that meets their perceived requirements. But note that this is hologram producers *responding to markets*.

### From Technology Driven...

This is something different; not new, but certainly the most clear manifestation of a trend in the holography industry. This is still a young industry – it's barely 40 years since the first embossed hologram went on sale – and for most of its group life, certainly in its infancy and mid-years, it has largely been technology driven. As holograms were a new product this has been inevitable; its inventors and its entrepreneurs (often but not always one and the same) wanted to show what could be done with the product. They devised better and better techniques to make holograms more acceptable to the public, who were sometimes their customer directly, more often indirectly. So the most commercial type of hologram, surface relief, has progressed from spectrally coloured science-fiction images that were difficult to see in all but controlled lighting conditions, to colour controlled images and designs that appear bright and viewable under ambient lighting.

All, though, driven by what was coming out of the lab and off the holography table.

Meanwhile, and usually with more resources, other companies have been developing ways to track products through the supply chain, delivering better inventory control and supply chain monitoring to manufacturers, brand owners and retailers for whom excess stock is money tied up, money not working, and shortage of stock is even worse. Not to mention diversion and the infiltration of counterfeits in to the supply chain.

These developments became formalised in the black-and-white zebra-stripe bar code, the now ubiquitous

machine readable numbering system that was codified, controlled and promoted by industry/brand owner associations that have morphed in to GS1. And as those associations have morphed in to GS1, so the standard linear bar code has morphed in to encrypted 2D, data matrix and QR codes, patterns of (usually) black and white squares which contain a very substantial amount of information about the item they mark – encoded of course.

And which therefore allow even tighter control of inventory and supply chain. So it is understandable that increasingly cost-conscious brand owners and retailers have taken matrix-based track and trace systems to their heart. A move in which they have been encouraged by very influential bodies such as the US

Food & Drug Administration and recent EU legislation on marking of medicines and tobacco products.

We surely don't need to remind our regular readers that,

while these tracking and tracing methods provide excellent supply chain control and monitoring, and they thus help to avoid product diversion and infiltration of counterfeits, they do not actually provide *authentication* of the item they are on. We have covered this ground too often to repeat it here, but it is relevant to what is happening in the security hologram business.

### ... To Market Led

While these matrix codes provide excellent tracking ability, holograms provide excellent authentication ability. An obvious overt feature, they can also contain covert features, from optical features that need special tools to detect them (such as a laser pointer or a polarising filter) to taggants and coatings that have nothing intrinsically to do with holography, but which can be worked in to the manufactured hologram to provide additional covert security characteristics.

Put the two feature sets together – matrix codes and holograms – and the result comes pretty close to the ultimate product security feature. It can deliver overt security, visual covert features, machine readable covert features, tracking, tracing and product monitoring. If the matrix code is incorporated in to the hologram optically, rather than being printed, it raises another barrier to the counterfeiter.

The security hologram companies have recognised this. OK, maybe they needed to in order to keep their customers, but this demonstrates a level of market responsiveness that was not typical of the hologram industry 20 or even 10 years ago. These hologram producers have taken a market trend, worked it in to their holograms in sometimes ingenious ways, and come out with a product which both meets perceived market needs and goes a step (or even two steps) further. The convergence of hologram overt security and matrix codes can only be good for the industry and demonstrates its greater level of market awareness and sophistication.

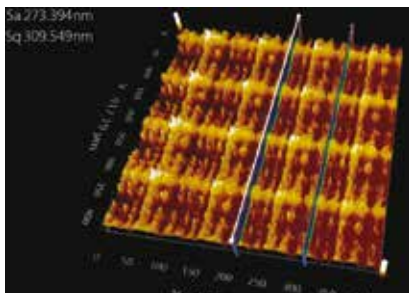
*The convergence of hologram overt security and matrix codes demonstrates the industry's greater level of market awareness and sophistication.*

## Geola Introduces Security Digital Mastering System... cont'd

recording schemes without the need for vibration isolation and plate stabilization. In its experimental set up it has recorded holograms of 100 sq cm (10 x 10 cm) with hogels of 200 x 200  $\mu$ m in approximately 180 minutes. The test sample full-colour hologram of butterflies illustrated, which is 8 x 6 cm, took 90 minutes to record.

### Solid State Pulsed Lasers in Mastering System

The BlueBird range of solid state pulsed lasers has been designed specifically to exploit this process for mastering surface relief holograms, and Geola has incorporated this in to its new digital mastering system for security or other surface relief holograms. The calculated diffraction pattern for each hogel is displayed on an LED screen operating as the spatial light modulator (SLM), which the laser object beam passes through before being focused on to the photoresist plate, with the refer-



An SEM profile of a photoresist master exposed with pulsed laser.

ence beam also focused on the same spot. The plate is moving at a constant speed in the  $x$  direction, as a line of hogels is exposed. After each line is exposed the plate is moved 100  $\mu$ m, the size of the hogel, in the  $y$  direction.

There are three BlueBird models (simply 1, 2 and 3), which is a solid state laser operating at 440nm, with output power of 2, 6 and 15 mJ respectively (equivalent to 60, 180 and 450 mW), at a pulse duration under 50 nanoseconds

and a pulse repetition rate of 30 Hz, so there are no stability issues in the exposure. Coherence length is over 3 metres with peak pulse power at 40, 120 and 300 kW respectively.

Using the BlueBird laser, the mastering system will record 1 sq cm in six minutes, on hologram sizes from 10 x 10 mm to 1.5 x 1.5 metres, with 1000 frames per pitch. The holograms can be full colour, achromatic or combination designs, with an image depth up to 75% of the hologram width.

Geola is pricing the base level digital mastering system at around €115000, depending on the specific configuration requested. This includes the controlling software, laser, opto-mechanics, plate holder and precise x-y movement stages. It offers the 60Hz laser at an extra €20000, and an option for a microtext embedding feature at €30000.

[www.geola.it](http://www.geola.it)

## Protection for Registration Documents in Ecuador



OpSec's Signature Protectors

country. It wanted to ensure that once signed, official signatures could not be removed or edited without significant damage to the document.

OpSec's *Signature Protectors* ensure these legally binding signatures can be fully protected. The product is a self-adhesive tamper evident label which offers overt, covert and forensic authentication, using the company's Advantage™ liquid crystal technology. In normal lighting conditions, both daylight and artificial, the image switches from green to orange, depending on the viewing angle. Head-on, the image is transparent, allowing it to be placed directly over sensitive information.

The contract was won through an open tender process, and the Signature Protectors will protect an initial 1.4 million signatures, with every protector being individually and sequentially numbered for added traceability and security.

Commenting on the contract, Jason Cook, Sales Director for OpSec South America, said: 'by combining tamper evidence with high security design features and traceability, the risk of signature or document fraud is greatly reduced - providing the ideal solution for the Registor Civil.'

[www.opsecsecurity.com](http://www.opsecsecurity.com)

## Pure Holography at Brighton Fringe Festival

During the Brighton (UK) Fringe Festival there will be an exhibition of multi-colour holograms under the title *Pure Holography*. Described as 'An exhibition of the stunning single and multi colour 3D holograms of Inaki Beguiristain', it will be at the Friese-Greene Gallery at the Brighton Media Centre from May 3rd to June 1st 2014, with free admission. There will be a series of young people's holography workshops and other demonstrations to complement the exhibition.

Beguiristain first came across holograms while studying for his physics degree at London's Imperial College, setting up his own studio soon after graduating. He also became a holographer at Light Impressions, and has worked with OpSec and Colour Holographics. He is described as 'one of today's most talented holography artists' and he strives for purity and clarity in his holograms, which will be seen in this show.

The exhibition will include a demonstration holographic table, with workshop classes for five-year olds and above taught by Pearl John, an experience hologram artist and educator.

An intriguing aspect of Pure Holography is that it is being produced and promoted by John Brown, founder and former managing director of Light Impressions Europe, who retired from the field after selling the company to OpSec in 2008. He is, as he put it, 'going back to the past'.

[www.pureholography.com](http://www.pureholography.com). [www.displayhologram.co.uk](http://www.displayhologram.co.uk).



Coloured Lines, one of the holograms in the show.



## Corporate News

# Holoptica's Rapid Expansion

Holoptica, the California embossed hologram producer set up in February 2012 by Jiri (George) Perkous (see HN Vol 27 No 4), is experiencing rapid market growth, mainly driven by its *HoloQR* security hologram label which incorporates a unique QR code for track and trace capability, with DNA taggants as an option. HoloQR is supported by the *verifythisnow* website, where consumers can enter a serial number or scan the QR code using a smartphone.

As reported in *Holography News*® in April last year, Perkous (who got involved in holography in the Czech Republic with Optaglio and Lightgate) established Segment Security in 2011 with co-investor Ron Taylor, to produce microdots, then set up Holoptica to make holograms so that Segment



*An example of a template or standard HoloQR design.*

could focus on the dots. HoloQR, for which Perkous has applied for a Czech and World patent (see box), was introduced last year and is rapidly gaining customers, so that the company will be expanding its production capacity later this year and is opening offices and agencies around the world.

The first large order for HoloQR was for merchandise protection for the 2015 Rugby World Cup (in England). Ron Taylor, is the owner of Australian company Brand Integrity Pty Ltd, whose customers include domestic rugby and cricket tournaments as well as The Americas Cup. Taylor was also involved in securing the licensed merchandise for the Sidney Olympics, so he has a comprehensive appreciation of what is required for major tournament merchandise control projects.

### Offices Around the World

Market success has continued, with the company opening sales offices in South Africa, the Czech Republic, and the UK, as well as its existing operations in the US and Australia. It is now looking for an agent or sales person to strengthen its team in the US, and is planning to open offices in Canada, South American and Philippines next year. The group – including Segment Security – now has around 55 staff.

Perkous attributes this success to the quality and characteristics of the product, as it combines overt security, covert security (the taggants, provided by DNA Technologies Australia, another of Taylor's companies) and tracking, with ease of consumer use, and the way the company makes ordering its holograms, including HoloQR, straightforward through its website. This offers several different 'standard' HoloQR designs, which can be customised and varied, with the customer's requirements for the serialisation specified via the website. The site gives up-front pricing for various order quantity and sizes, with prices for additional requirements – from colour overprinting to additional covert lacquers.

Holoptica designs holograms with space for the code in the hologram, then in production creates the serial number for each item, generating the QR code and adding this to the hologram by laser or print. It loads the codes to *verifythisnow.com*, which can be customised to reflect a customer's branding, so that when an end customer users a scanner or smartphone to read the code, it links to the

### The HoloQR Patent

HoloQR (although that word does not appear in the text) is covered by:

**CZ20070874 and WO2009074122 (A2): Security element with static identification pattern, particularly for protecting objects and documents**

Priority Date: 20071213

Inventors: Fiala Pavel, Ekeren Marek, Najdek David, Jiri Perkous, Repta Jaroslav

**Applicant: All In Security**

#### Abstract:

The solution refers to the protective element with static identification pattern, namely for protection of subjects and documents where the identification pattern 2 remains static at turning of the protected subject along the axle 3 perpendicular to the level of protective element 1, and is characterised by a fact that each image dot (4) of observed identification pattern (2) generated by the protective element (1) is created by the original group (5) of micropoints of which at least one or more micropoints (6) of the original micropoint group (5) is contributing to the image dot (4), while at turning of the protective element (1) around the axle (3) perpendicular to the level of the protective element (1) the given image dot (4) of identification pattern (2) is created, subject to relation  $\varphi_x = r \cdot \varphi_a$ , by turned group (7) of micropoints, while again at least one or more micropoints of the turned group of micropoint (7) is contributing into observer's eye by the same information as one or more micropoints (6) of original group of micropoints (5) do. Some micropoints (6) are alternatively created by the micrograting diffracting the incident light into selected direction subject to grating equation (M). The protective element according to the solution is dedicated mainly to the verification of the origin of the subjects and documents by the visual checking, where the watched identification pattern remains static in its original position even under rotation of the protected subject or document.

#### Claims:

There are five claims, of which the head claim is:

The protective element with static identification pattern, namely for protection of subjects and documents where the identification pattern (2) remains static at turning of the protected subject along the axle (3) perpendicular to the level of protective element (1), and is characterised by a fact that each image dot (4) of observed identification pattern (2) generated by the protective element (1) is created by the original group (5) of micropoints of which at least one (6) of the original micropoint group (5) is contributing to the image dot (4), while at turning of the protective element (1) round the axle (3) perpendicular to the level of the protective element (1) the given image dot (4) of identification pattern (2) is created subject to relation  $[\Delta]x = r \cdot [\Delta]a$  by turned group (7) of micropoints, while again at least one or more micropoints of the turned group of micropoint (7) is contributing into observer's eye by the same information as one or more micropoints (6) of original group of micropoints (5) do.

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## ISO Holography Characterisation Standards for National Consultation

The International Standards Organization (ISO) has drafted two related standards to give some consistency to the measurement of key characteristics of transmission and reflection holograms, in particular their diffraction efficiency. These standards were proposed by the Japanese Standards Body from an original proposal drafted by Prof Hiroshi Yoshikawa of the OptoElectronics Lab at Nihon University for HODIC, the Japanese holographers' society. They have been drafted by ISO Technical Committee 172, which covers standards for electro-optical systems. Sub-Committee 9 has been the drafting group for these standards.

The two proposed standards are ISO 17901-1 - Holography - Part 1: *Methods of measuring diffraction efficiency and associated optical characteristic of holograms*, and Part 2, titled *Methods for measurement of hologram recording characteristics*.

Prof Yoshikawa gave a description and explanation of his rationale for the standards at the IHMA Annual General Meeting in 2009. The IHMA Board then canvassed members and considered the proposed standards, concluding that, while the IHMA was sympathetic to the motivation to standardise the measurement of hologram characteristics, the measurement characteristics as proposed were not appropriate to commercial holograms, particularly surface relief holograms. However, the Board recognised that there was momentum behind the proposal and it did have merit for some types of hologram. It therefore sought representation on the ISO committee working on these standards, to endeavour to ensure that they did not contain anything that could work negatively for commercial hologram producers.

### Outline of the Standards

The intention of the Part 1 standard is to establish the terms by which to characterise transmission and reflection holograms and a method to measure these characteristics. The main characteristic is the diffraction efficiency which is a term widely used in the optical industry to measure grat-

ings, but often confused by variance in its definition. The proposed standard makes clear the definition of absolute and relative diffraction efficiency and describes clear methods for their measurement. The proposal makes clear the standard is appropriate for classical two beam holography and also direct write e-beam generated holograms, i.e. sinusoidal or binary gratings/fringes.

Another characteristic of a hologram or holographic grating to be measured is the ability to split light into its spectral colours. The spectral distribution can be used to measure the diffraction efficiency and is also described. The power to diffract (bend) the light is known as angular selectivity and this characteristic and the wavelength selectivity are also defined and measured.

It should be made clear that the measurement methods described assume the area under analysis is a uniform grating pattern, meaning that the grating/ fringe spacing is uniform as a plane wave or non-plane wave. The method analyses a single grating (or hologram) element and this point became key in the development of the standard. Holograms and diffractive images used as anti-counterfeit devices are by their nature increasingly complex arrays of multiple gratings / holograms. Such devices can vary in frequency, depth, curvature, cross-sectional profile etc. to provide unique visual effects that cannot be easily replicated by counterfeiters. This point was raised under comments by more than one country and the author revised the scope of the proposed standard accordingly. An addition to the scope was included to read:

Practical value of the diffraction efficiency is obtained only when the hologram gives simple diffraction patterns, which means the reconstructed wave can be clearly separated from other diffracted and non-diffracted waves. This implies that this standard / method is not appropriate to many or the majority of holograms used for anti-counterfeit security applications.

The proposal does offer a method appropriate to many other products and applications.

### Exposure Characteristics

The Part 2 standard covers the exposure characteristics for the recording of the hologram, specifically the exposure characteristic curve, exposure at half-maximum, R-value, and the amplitude of refractive index modulation. As with all ISO standards, a key part is the definition of terms used in the standard, so these terms are defined within 17901-2, but it also refers to the definitions and processes given in Part 1. It then goes on to specify the exposure conditions necessary in order to provide consistent measurements, covering the exposure geometry (giving layouts, for transmission and reflection holograms), dark room requirements and the x-y-z co-ordinates.

Having established the exposure characteristics, the standard then describes the methods for measuring the various defined characteristics, again specifying different geometries for transmission and reflection holograms. To ensure the consistency of described characteristics the standard also prescribes how the measurements shall be presented, including a table of the information to be reported to support the measurement data. This ranges from the details of the recording material to the specified details of the method of measuring the amplitude of the refractive index modulation of the hologram.

### Participant Countries

This proposal (1 & 2) is now a Draft International Standard (DIS) for discussion and comment by the national standards bodies.

These standards can be downloaded from the ISO website and they are now open for comment. However, any comments you have on the draft must be directed through your national standards body, and a list of those participating in Sub-Committee 9 can be found on the ISO website.

[www.ISO.org](http://www.ISO.org)

## Stockwatch

# Markets All Fall on Ukraine Uncertainty

World markets are affected by political and economic problems and during this last month we have seen all markets fall as the crisis in Ukraine deepened and the West's relationship with Russia deteriorated over the sovereignty of the Crimea. The outcome looks set to be sanctions by the USA and Europe against Russia, so Russia will retaliate, and trade between the two blocks will suffer. Hence, the fall in the markets – mostly 2 to 3% in the USA and Europe but larger in China with the FTSE Xinhau 200 falling 6.5% but the Hang Seng only 3.5%. Despite these falls, three of the six companies we cover gained value this period.

### De La Rue Improves Despite CEO's Resignation

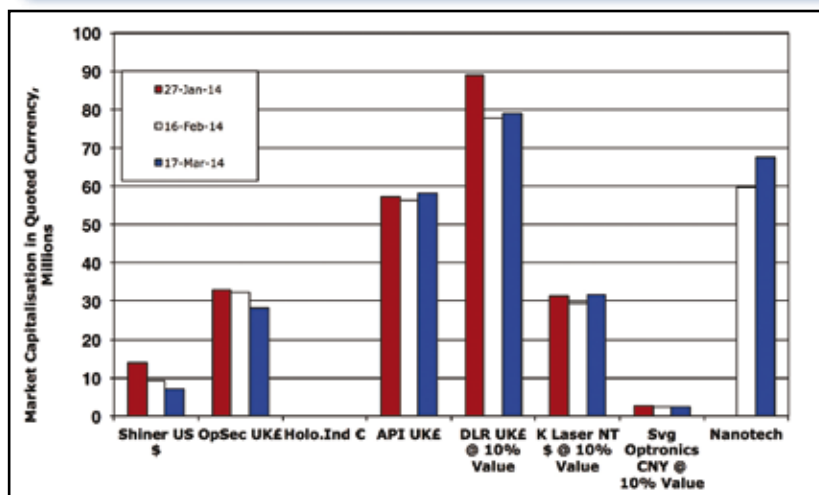
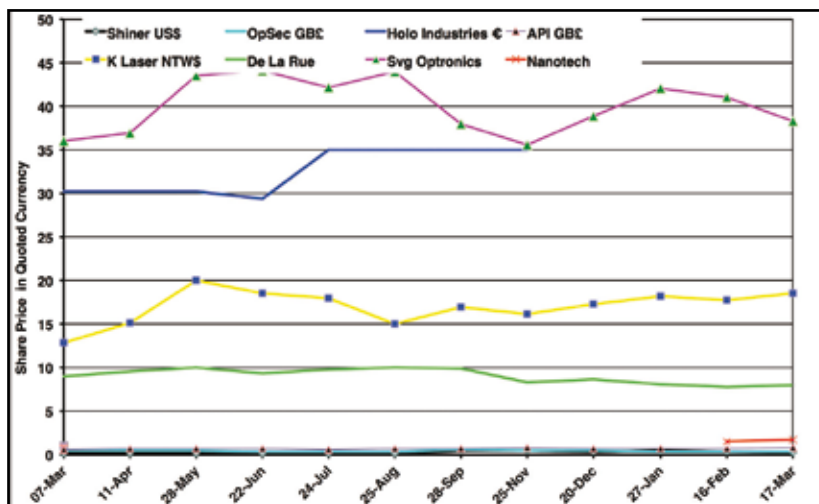
The CEO of De La Rue handed in his resignation this period - not because of the company's performance, which will most likely be £10m short of the £100m operating profit forecast, but because he was taking up another job. In fact, under CEO Tim Cobbold's management, the company has significantly improved its performance and his departure could have resulted in uncertainty and the share price falling. As it happened the impact was muted and the share price followed the market trends for the most part and actually finished up 14.5p at 793p, just under 2% ahead in the period. At this price the company's PE is 21.5, and in the last three and twelve month periods the company has underperformed its market by 11% and 15.5% respectively.

### OpSec's Value Unchanged

OpSec's share price fell sharply this period from 40.5p to 35.5p, a fall of 12.3% which reduced its market value by £4m to £28.4m. Its recent share price decline started with a 12% fall from 49.5p to 43p just prior to Christmas followed by a 7% decline at the end of January and now to its current value. There have been no announcements or news releases since the Interim statement that provide any reasons for the decline. In the last three and twelve month periods OpSec has underperformed its market by 28% and 20.5% respectively.

### API Stable

API's share price gained 3.4% this month to 76p, increasing its market value by £1.8m to £58.2m. In the last



three months it has underperformed its market by 2.0% but, in contrast, has outperformed its market by 29% in the last 12 months.

### K Laser's Sales Down on 2013

K Laser's January sales were 11.6% down on January 2013, and they fell again in February – this time by 9.8% bringing the deficit for the first two months compared with last year to 10.8%. Despite these latest figures, K Laser's share price increased by 4.5% in the month to TW\$18.55, which is 38% higher than a year ago.

### Svg Optronics Falls Again

Svg Optronics Co. fell back 2.4% last month after three months of gains totalling 18.25%. It fell again this month – by 6.8%. It issued a forecast in January stating that its net profit for 2013 would be between 35 and 65% below that of 2012, which is undoubtedly the reason for the decline.

### Shiner Loses Value

Shiner share price has been volatile

for well over a year now and many of the changes have not been small increments in percentage terms. This monthly period was no exception, nor was the last. It fell 32% last period and this period it fell by 23.5% to 26 cents, a 48% decline in two months. This reduced its market value from \$9.4m to \$7.2m. In the last three months it has underperformed its market by 40% but in the twelve months it remains ahead by 55%.

### Nanotech

We reported Nanotech in Stockwatch for the first time last month and gave some background (see HN No 27, Vol. 2). The company started 2014 with a share price of C\$1.75 and, after falling 12% to C\$1.54 in January, it regained most of that loss in the period. At a share price of C\$1.74 its market value is currently C\$67.5m. In the last three months it has underperformed its market by 10% but over the 12 month period it has outperformed it by 109%.



## Holography Conferences Call for Papers

The Holography Conference and HoloExpo, the global and the Russo-philic holography conference respectively, have issued their calls for papers for this year's events, both of which take place in the autumn. HoloExpo takes place in Sochi, September 16-17 2014, with a visit to the Sochi Winter Olympic facilities on September 18, while The Holography Conference takes place in Istanbul, Turkey, December 3-5.

HoloExpo, with Russian/English/Russian simultaneous translation, aims to discuss the latest scientific and technological developments and technologies in the field of holography in Russia, Ukraine, Belarus, other CIS countries and elsewhere, as well as market assessments, holographic technologies and products and their development. More specifically, high-

lighted topics for papers include: Engineering and technology in the field of security holograms; Imaging and display information using holographic optics; Graphic holography and photosensitive materials for holography; Holographic and diffractive optical elements, methods of computer synthesis technology of their manufacture and use; Holographic interferometry and Technology of holograms for scientific and technical research, and Optical-holographic memory systems, optical information processing and holographic filters.

Abstracts for proposed papers should be submitted by June 30<sup>th</sup>, comprising up to 10 pages in Russian or three pages in English.

### The Holography Conference

In line with the new name for the conference (it was formerly Holo-

pack•Holo-print®) topics of interest for The Holography Conference include all aspects of innovation, development and application of holograms and holographic techniques. Subjects likely to be of particular interest to conference participants include customer case-studies and attitudes towards security holograms, packaging materials and HOEs, as well as reports from researchers and manufacturers on their latest developments in these and related subjects. Recent announcements about real-time holographic visualisation, micro- and nano-optics, photopolymer and colour display holograms suggest these would also make valuable contributions to the conference.

In addition to papers on the latest in holography, delegates will be interested to hear about competing or disruptive technologies and how these are or might impact the markets for holograms and holographic products.

To submit a proposal for a paper, please send an abstract of around 200 words to Reconnaissance International ([info@reconnaissance-intl.com](mailto:info@reconnaissance-intl.com)), with information about you and your organisation.

### Registration Opens April 7

Registration for The Holography

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### 10 YEARS AGO

#### Nanoventions Unveils Micro-Optical Film

In March 2004 *Holography News*® reported that Nanoventions, a new company in Atlanta, USA, had shown at the Optical Document Security conference a new ultra-thin security film, called Unison, which appears to have exceptional depth and can present a number of different visual effects, including three-dimensionality and movement. According to the company the film had been developed as a replacement for holograms.

The film contains high-precision multi-element micro-optic systems to create the floating images in the film, which appear to move within, under, or over the print. It has more than one billion micro-optic systems per square meter. A complete image is typically formed by hundreds of thousands of micro-optic systems acting in unison, hence the name.

A typical Unison film presents synthetic images at a resolution of greater than 800 dpi. Each micro lens is about 30 microns in diameter. The original images are printed at a resolution of greater than 100,000 dpi, and the Unison optics magnify them by as much as 1,500 times. Another Unison effect, called Motion, presents graphics that move in the perpendicular direction to how you tilt the film - if tilted up, the graphics move side-to-side; if tilted to the side, then the graphics move up-and-down. It can be seen in all lighting conditions and can be created as a two-sided film that shows a totally different image or graphical effect from each side. And the visual effects are independent of illumination angle and lighting conditions.

### 20 YEARS AGO

#### Polaroid's Future Vision

In March 1994, Polaroid's Holography Division launched reflection image hologram stickers made on its Mirage® holographic photopolymer in to the retail market, under the name *Future Vision*. The holograms were distributed through the company's worldwide sales force with a retail price of \$2.49 per pack in the USA, a price-point suitable for drug stores, chain stores and toy shops. Polaroid planned to supply retail display units.

There were eight images in the first series, including a dinosaur, Pegasus and an earth globe, in sizes from 1½ to 3¼ inches square. The stickers were aimed at 6-12 year-olds and Polaroid was hoping for sales of \$13m annually.

### Diary

## EXHIBITIONS, CONFERENCES and MEETINGS

#### Banknote 2014

April 7 - 10

Washington, DC

[www.banknoteconference.com](http://www.banknoteconference.com)

#### Interpack

May 8 - 14

Düsseldorf, Germany

[www.messe-duesseldorf.de](http://www.messe-duesseldorf.de)

#### Security Document World

June 16 - 18

London, UK

[www.sciencemediapartners.com](http://www.sciencemediapartners.com)

#### June 19 - 20

3<sup>rd</sup> Laser Display Conference

Hsinchu, Taiwan

[ldc.nchu.edu.tw/](http://ldc.nchu.edu.tw/)

#### July 13-17

Digital Holography & 3-D Imaging

Seattle, USA

<http://www.osa.org>

## Coded Holograms

### MTM's Holotag... cont'd



MTM's headquarters on the Gebze Tecnopark

Mapping on the development of holographic maps (see HN Vol 27 No 7).

MTM first worked with InkSure's optical taggants in the early noughties on a hologram for transport tickets for the Turkish transport authority. It has since produced the holographic tax stamp issued for consumer electronics items such as TVs, phones and radios, and the tax stamp on cultural items including books, DVDs and CDs incorporating InkSure's taggants.



The Turkish cultural tax label

The new tax stamps for the Ministry of Culture and Tourism, which issues 400 million annually, were introduced in January 2012. The new system enables publishers and brand

owners to check the label using a smartphone, while Ministry inspectors can use the InkSure dedicated reader to gather more information from the label.

#### Tracking and Reporting

A 2D barcode is generated for every culture-related product that is produced for the Turkish market and the tax stamps include this barcode, a serial number and a hologram with a taggant for authentication. The items can be tracked throughout the supply chain via *Holotag*, MTM's web and phone-based track & trace software, and checked at an item-level via *Scan Sure*, InkSure's hand-held reader, which in two seconds authenticates the barcode and the hologram in the tax mark simultaneously. This determines whether a tax mark is counterfeit, diverted, illegitimate (ie not in the database), or part of a 'third shift' operation (unauthorized production). This information is constantly updated in real time and sent back to *HoloTag* via the GSM technology in *ScanSure*. The Ministry has seen a significant increase in its identification and prosecution of counterfeiters and other tax avoiders since the introduction of this Holotag stamp.

This is the system that MTM is now offering to other tax authorities and for product protection. Alper Goknar, in the marketing department, told us that they are in final negotiation with several tax authorities at present.

[www.mtmbilisim.com](http://www.mtmbilisim.com)

### Holoptica's Rapid Expansion... cont'd

appropriate page on the website.

In a related move, Holoptica has joined the World Customs Organizations' *Interface Public-Members* (IPM) database, a system that provides customs officers with rapid

access to information to help them authenticate suspect products. IPM links customs, brand owners and authentication suppliers.

[www.holoptica.com](http://www.holoptica.com), [wcoipm.org](http://wcoipm.org).

### Holography Conference Call for Papers... cont'd

Conference opens on April 7, when sponsors, exhibitors and delegates can register online at significant savings for early registration. The exhibition at the conference is the only event focused on the supply needs of commercial hologram producers, with

exhibitors including origination system suppliers, materials and production equipment suppliers.

[www.holoexpo.ru](http://www.holoexpo.ru),  
[www.theholographyconference.com](http://www.theholographyconference.com),  
[info@reconnaissance-intl.com](mailto:info@reconnaissance-intl.com).

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PUBLISHERS AND CONSULTANTS

Publisher:  
Reconnaissance International Ltd.

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Holography News® is published monthly by Reconnaissance International to report on developments of importance to investors, producers, marketers and users of this dynamic technology.

Annual subscription rate:  
£473, €615, \$780

Discounts for multiple subscriptions available. For details contact Reconnaissance International.

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