

# Global currencies continue to bank on the benefits of holography

*The annual global volume of banknotes produced is more than 125 billion\*, so the reward for hologram producers capable of providing the technology to overcome the technical challenges is potentially highly lucrative. Here, Ian Lancaster of the International Hologram Manufacturers Association traces the growth of holograms for banknotes and looks at the future for this highly versatile technology.*



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The history of holograms on banknotes can be traced to the 1980s when the Australian commemorative \$100 and the Austrian 500 Schilling were issued in 1988. The latter – a paper note on which a hologram was applied as a hot-stamped foil patch - is credited with paving the way for the subsequent development of the market.

These early successes were followed by Kuwait and Poland adopting holograms for their paper currencies before Bulgaria introduced the first holographic stripe on a banknote – on its the 2000 leva note. Over the last 15 years growth has been steady with patches initially the preferred method of applying holograms to notes before being overtaken by stripes. Holograms can also be incorporated into the windowed security threads that are

increasingly making an appearance in banknotes. (See Fig.1 and Fig. 2)

By the end of 2007, holographic patches and stripes accounted for more than 80percent of all holographic features on banknotes with more than 90 currencies featuring them on one or more circulating denominations. It is estimated that of the 125 billion notes produced in 2007, 42 billion featured a hologram as either a foil or a thread while the banknote market for hologram producers in the same year was worth \$136 million.

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Fig.1: The new Bangladesh 1,000 Taka with 4mm wide holographic windowed thread. Bangladesh was one of the first countries to put holographic thread into its banknotes



Fig.2:  
This banknote produced for Bank of Guatemala shows two versions. The first with holographic stripe. The second, which replaced it just a couple of months ago, minus the holographic stripe but with a holographic thread instead.

Today the technology remains very much to the fore as part of an array of overt features which make it quick and easy for people, not only the general public and but also cashiers and those operating cash tills in stores, to recognise whether or not a banknote is bonafide.

The banknote market is something of a ‘holy grail’ for hologram producers due not only to the very large volume of notes produced but also the technical challenge it presents, requiring new techniques, many of which have been successfully adapted and reinforced holography’s capacity for innovation and ability to find new commercial applications.

### Early challenges

The history of holograms for banknotes is one of quiet evolution. Once the early technical complexities of producing high volumes of foil with the necessary properties of adhesion and durability to bond the substrate and withstand the rigours of application and wear and tear in circulation were solved, it became easier for holograms to be integrated

into the overall banknote design. This required complex and sophisticated demetallisation to register along with overprinting and the development of ever wider threads and stripes for better visibility but nevertheless laid a platform for success. Nowadays, the shift is towards the development of optically variable features which not only change according to the viewing angle but can also be viewed from the front or the reverse of the note, or in reflected versus transmitted light. This development is being driven by the papermakers seeking to emulate the transparent window in polymer substrates - the patent on windows in banknotes has expired and a number of suppliers are now taking advantage by developing their own versions.

These involve an aperture on the banknote either formed during the papermaking process or cut afterwards, with an overlaid film to cover the aperture and create the window. If this film is holographic then demetallisation to register is vital to providing the required combination of diffractive effects together with their viewing access from either side of the banknote.

Louisenthal is a leading manufacturer of banknote and security paper for global markets, supplying over 100 countries worldwide with high-grade products as well as a major supplier of euro banknote paper to many central banks. It pioneered the use of holographic stripes on banknotes, and its range of holographic and related optically variable devices for banknotes now include Varifeye - a feature comprising an aperture which is created during the papermaking process with a film overlay, which can incorporate holographic effects. (See Fig.3a and Fig. 3b)

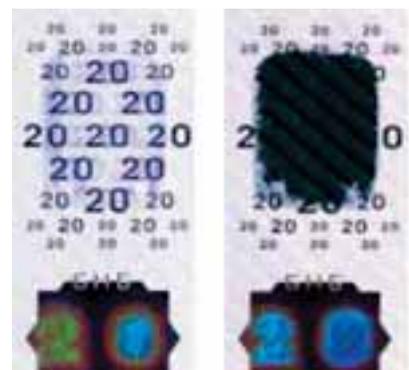


Fig.3a: The heart of varifeye: The design in the foil of the banknote window changes depending on the background.



Fig.3b: Forgery-proof and high quality: To commemorate the 120th anniversary of the first issuance of lev bank notes, Bulgaria's 20-lev bank note was fitted with the new security feature varifeye® — thus creating a fusion of the historical with the modern.



Another technology is Optiks™ from De la Rue la Rue, the world's largest banknote printer. Optiks™ is a super wide thread (18mm) which contains a transparent area that is viewable from both sides of the note and can, if required, incorporate a hologram, (Fig.4). De La Rue, through its subsidiary De La Rue Holographics, is also a major supplier of 'conventional' holograms (patches, stripes and threads) for banknotes.



Fig.4: An 18 mm wide Optiks™ security thread on the Fiji \$ 100 note

Hot stamping specialist Leonhard Kurz is also an innovator in the field of holograms for banknotes. The company, which pioneered holographic hot stamping foils for currency and still retains the largest market share, has recently launched a number of new features specifically for use in conjunction

with windows or apertures. One example is Kinegram recolor®, which provides a fundamentally different, and unexpected, effect depending on whether the note is viewed from the front or reverse.

Also new is Kinegram voLume®. Images are mass produced by coating a laminating film with photopolymer, passing this through a unit where a laser exposes the image onto the film, UV curing this and then applying adhesive in the same way as conventional foil. This is then combined with surface relief features. The foil for the former is fully or partially demetallised to provide transparency and the voLume layer is applied underneath. The result is a kaleidoscope of images and effects offering dynamic movement, animation, pop-ups, impressive three-dimensionality, single and multiple colours.

These effects can be further enhanced by the combination of the Kinegram voLume with the company's zero. zero® technique, which offers an exceptionally precise level of demetallisation to register. The overall thickness of the film is less than 40 microns. Kurz has worked with Swiss papermaker Landqart on the integration of the Kinegram volume into the latter's new Durasafe paper, using the OptiNota-H from KBA GIORI for application.

Other developments include foils and threads from Louisenthal and Hueck Folien which combine colour shift and holograms and a new security thread

from Russia which is anchored in the paper down its edges rather than by the layer of paper fibres on its reverse. This means that it can be viewed from both sides of the note and, as with the window or aperture, offers the opportunity for different diffractive and other optically variable effects to be created that vary according to whether the note is viewed from the front or reverse.

**Future growth**

Projections suggest the market for holograms used on banknotes will be worth \$205 million in 2010, which is 36percent increase on the 2007 figure – an average of 7percent per annum. The future of holograms for banknotes will be, to a large extent, determined by the ability of new forms of optically variable technologies to displace them as a highly effective and low cost authentication device but other factors are in play too, including their continuing use on existing notes despite the emergence of competing technologies. Here, the capacity for holography to hold its own against other technologies will depend on pushing the boundaries of innovation even further. For example, its ability to display effects on either side of the note through windows or threads will be a useful benefit.

The biggest opportunity will come through growth in the overall usage of banknotes as larger issuing authorities either adopt holograms for the first time or extend their use to further denominations. Countries like India, where the focus in recent years has

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been meeting the demand for clean banknotes for a rapidly expanding economy, also offers opportunities. Although self-sufficient in banknote printing, it currently imports more than 90percent of its paper requirements but with two new paper mills being built, the country may use the opportunity to install short formers for wide thread integration and/or foil application equipment.

India’s emergence as an Asian powerhouse could prompt the authorities to upgrade the security of the rupee in a bid to thwart criminals who will undoubtedly be tempted to fill the gap in banknote capacity with counterfeit ones. This is true of other fast growing economies as well as places like Russia, Iran, Indonesia and Brazil where the focus could switch from meeting banknote demand to greater security – opening up opportunities for holography.

Predictions that cash would be displaced by alternative transactional devices – mainly card and electronic payments, particularly in the more advanced Western economies, have failed to materialise and banknote volumes have averaged 5-7percent during the period of global economic growth over past 10 years or so. And, even as economies struggle to emerge from recession, there doesn’t appear to be a corresponding decline in banknote demand – indeed, year on year growth of around 3percent is predicted. Although lower than previous volumes, these is clearly good news for banknote hologram suppliers.

### Tackling counterfeiting

However the biggest incentive for keeping holograms on banknotes, and thereby offering reassurance that holography will have a role to play well into the future, remains their use in the on-going battle against counterfeiting. There are no global figures for counterfeit losses but, for example, the losses from counterfeit Euros in 2007 were around \$47 million and for the US \$ approximately \$62 million. So, although counterfeiting of banknotes in itself is not of particular grave concern, the real motivation for governments to keep the issue within sight is to maintain public confidence.

Currencies lubricant the wheels of industry and society and any loss of confidence – even

the slightest – can cause disproportionate amounts of damage which take years to rectify. That’s why banking authorities and governments go to huge lengths to maintain the integrity of their currency; devising sophisticated security and anti-counterfeiting strategies where the hologram has, and will undoubtedly continue to play, a significant role in preventing criminals from reproducing fake banknotes.

And to reinforce its importance, holography was recognised in a 2007 special report by the US National Research Council as having a definitive role in the fight to combat banknote counterfeiting. The report, entitled *A Path to the Next Generation of U.S. Banknotes: Keeping them Real*, ‘identifies’ 21st century materials and technologies to deter 21st century counterfeiting of banknotes. Included in the comments was a recommendation that currency features should be combined in different ways to provide a layered defence against counterfeiters. This included ‘the addition of high technology optical devices that produce dramatic visual effect, such as diffractive optical variable devices’ (the generic term for high security holograms).

The report further cemented the position of holograms and related devices as a fundamental security measure for banknotes and, by extension, other government issued documents that require protection against counterfeiters.

So, with the seemingly remorseless march of technology and the resolve of governments, anti-counterfeiting agencies and companies around the world to remain one step of the counterfeiters, as well as the casual opportunist, there’s no reason why the hologram will not continue to evolve and continue to be an instantly recognisable feature on today’s and future generations of banknotes.

1 *The Holo-pack•Holo-print® Industry Study & Market Report 2007-2012, Reconnaissance International.*

2 “*A Path to the Next Generation of U.S. Banknotes: Keeping them Real*”, *Committee on Technologies to Deter Currency Counterfeiting, US National Research Council.*

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