

B T R

ISSUE  
01.15

# BANKNOTE TECHNOLOGY REPORT

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ARJOWIGGINS SECURITY  
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FNMT



It is our goal to create a platform where the latest technological developments and features are centralized on a regular basis.

## WELCOME

# LEADING TECHNOLOGIES

Our daily life is a complex structure with modern technologies making our globe, people and technologies more connected than ever. Banknotes are trustful relationships between people, making transactions possible or payment processings anonymous whilst we are observed in every second and corner.

To keep the value of banknotes at the highest possible level it requires second to none anti-counterfeit technologies which are durable and made for harsh circulation conditions.

With the Banknote Technology Report it is our goal to create a platform where the latest technological developments and features are centralized on a regular basis. As a leading news provider, Banknote Industry News is proud and honored that leading banknote component manufacturers present their latest developments within this 1st Issue of the Banknote Technology Report.

Enjoy reading,



PHILIPP GREULICH  
Managing Director



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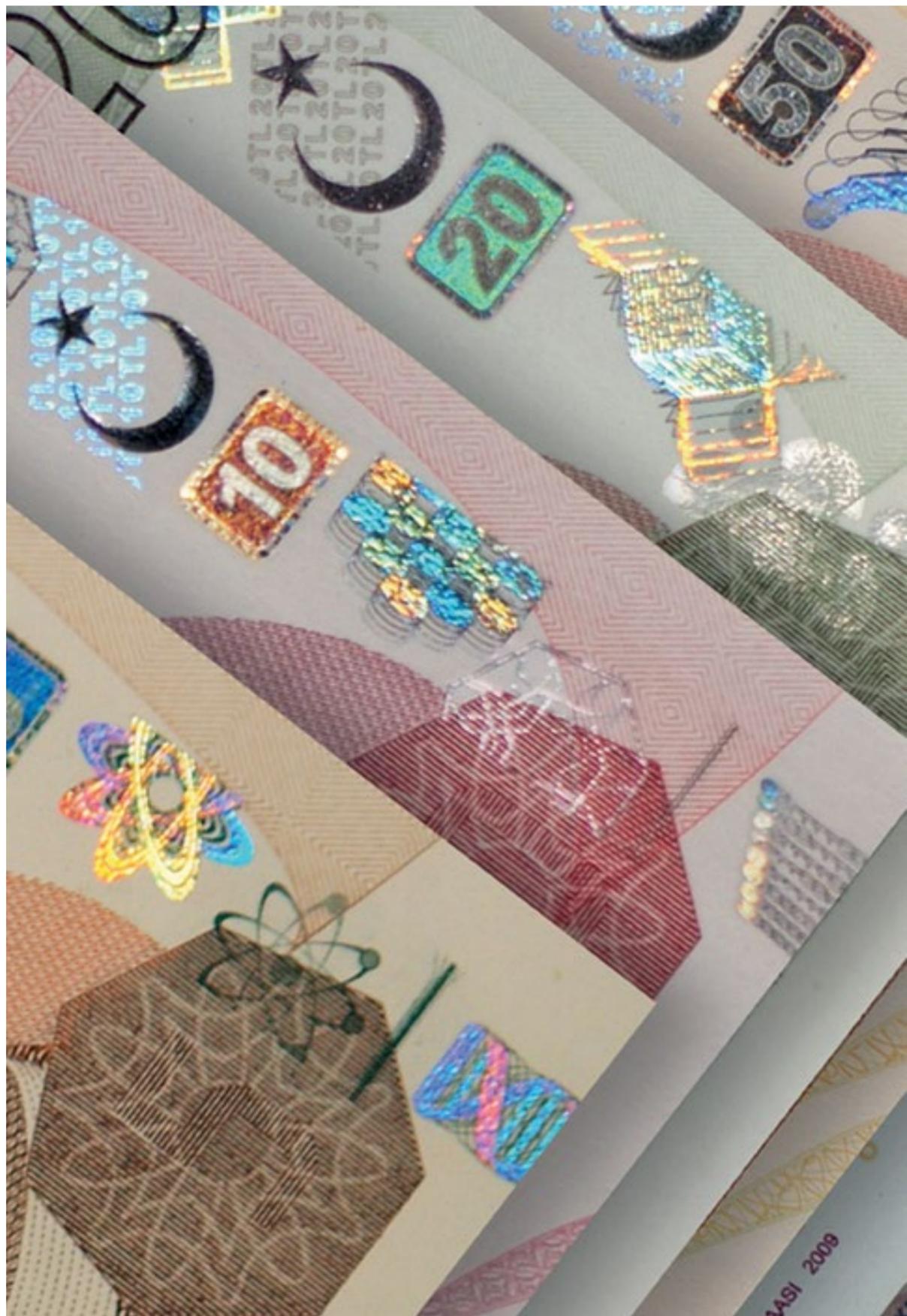
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Banknotes Life Cycle



KURZ

# BANKNOTE SECURITY FROM KURZ – AUTHENTICATION AT A NEW LEVEL.

# Banknote Security from KURZ – Authentication at a new level.

KURZ

Bold optical attraction combined with immediate instinctive recognisability by untrained members of the public is the foremost aim of Level 1 security features. New features are constantly being introduced, claiming to easily integrate into the banknote design, maximize recognisability and discourage the counterfeiter. However, only very few features excel in all three categories.

Undeniably, KURZ hot stamping foils stand out from these successful few, as confirmed by a striking list of references – among these, some of the world’s most important currencies such as the Euro, Swiss Franc, Turkish Lira, or the Canadian Dollar.

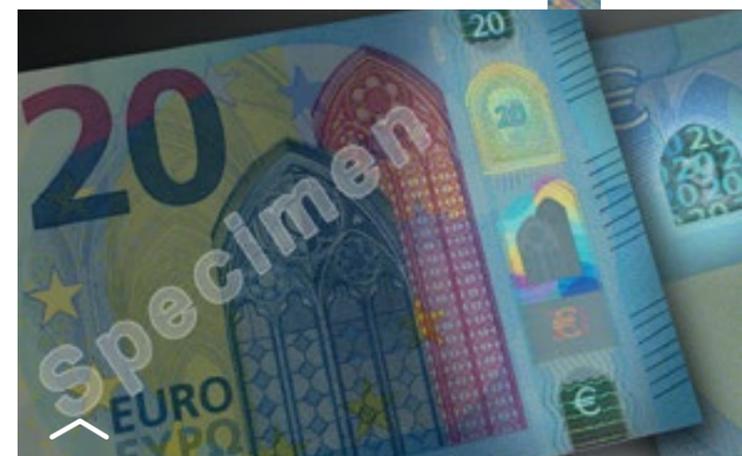
The question of people’s awareness of a genuine banknote’s look and feel has been investigated extensively in recent years, particularly with reference to the Euro. The prominent studies of De Nederlandsche Bank’s Hans de Heij, but also research done by the Bank of Canada and the U.S. National Research Council have shown that a holographic stripe is both widely remembered and intuitively recognized by untrained members of the public. Considered by experts to be both striking and unique, KINEGRAM® security foils have successfully contributed to banknote security for Central Banks on all five continents for nearly thirty years.

## DEVELOPMENT OF KURZ SECURITY FOILS

The first ever foil patch on a banknote, a KINEGRAM® from KURZ, appeared on the Austrian Schilling in 1988. Since then, KURZ has been the forerunner of many important developments in foil-based optically variable devices (OVDs). The continuous (i.e. with repeating images along the length of the stripe) KINEGRAM® stripes on the first issue of the Euro in 2001, with elaborate design elements, have been replaced by a registered KINEGRAM® stripe in the new

“Europa” series with larger elements and a greater range of optical effects. Registration ensures that the diffractive images appear in the same position on all banknotes produced. Furthermore, the images need not to be repeated, but in fact several different images can be incorporated into one single foil stripe.

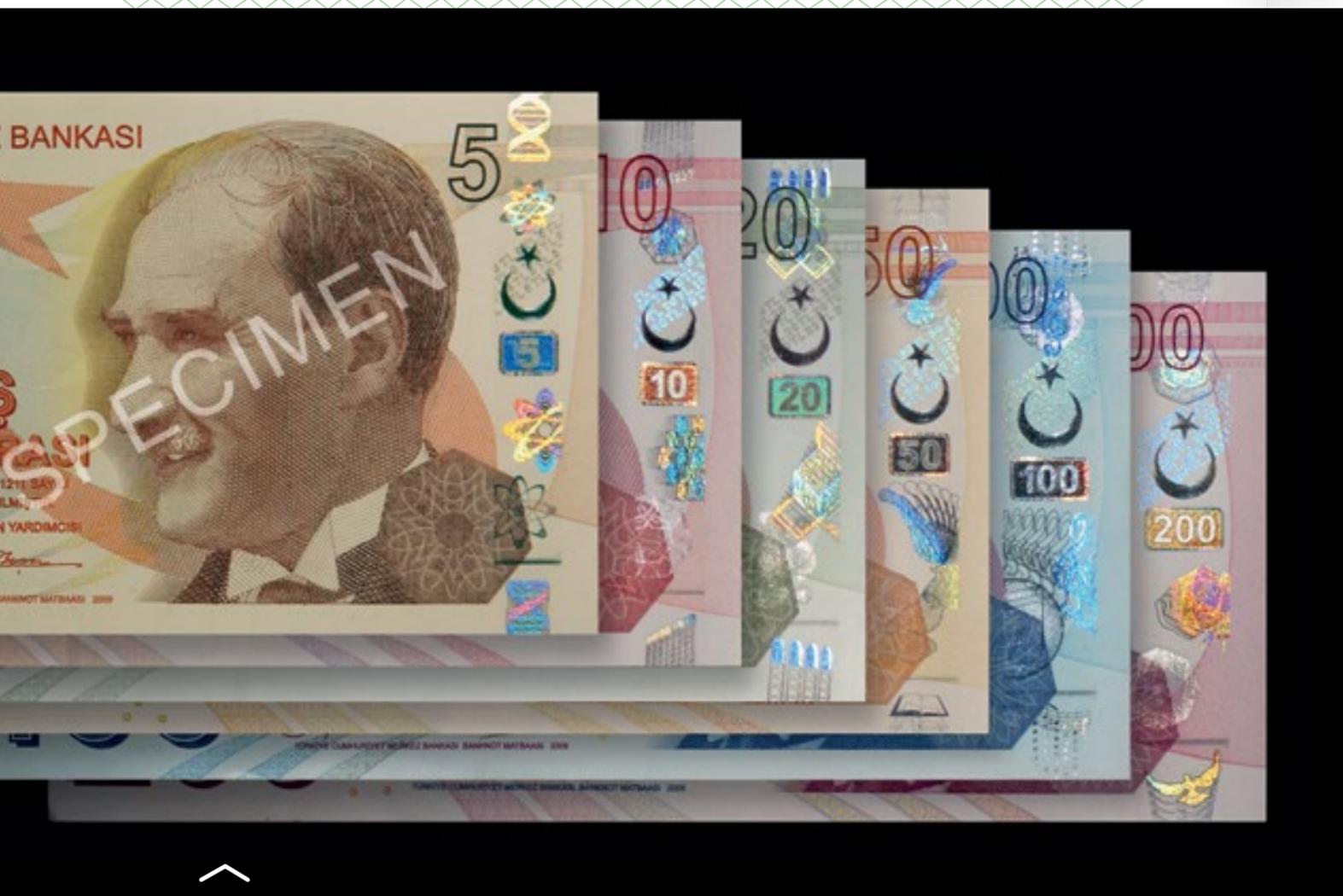
The next major upgrade was the incorporation of windows in the paper, whereby the foil operates as a transmission as well as a reflection feature. KINEGRAM REVIEW® technology offers the possibility of different effects at front and back, which puts extra barriers in the way of the counterfeiter. Next to paper banknotes, polymer notes with their built-in transparent areas are



KINEGRAM REVIEW® FOIL STRIPE ON THE NEW EURO 20 BANKNOTES. IMAGE SOURCE: EUROPEAN CENTRAL BANK 2015.

very well suited to this kind of advanced foil security. A further milestone development has been the perfect registration of the optical with the metal content of the foil, a unique achievement by KURZ that allows for greater prominence of certain optical effects such as Surface Relief. This option, KINEGRAM ZERO.ZERO®, has been adopted by several Central Banks since 2009.

Registered stripes directly aim at banknotes to be more recognisable. Larger design elements allow more prominent optical effects, and having them in a consistent position improves both the aesthetic quality of a note (or a series) and its memorability. The perfect register achievable with KINEGRAM ZERO.ZERO® gives even greater design freedom to Central Banks, as



KINEGRAM ZERO.ZERO® REGISTERED FOIL STRIPES ON ENTIRE SERIES OF TURKISH LIRA BANKNOTES.  
IMAGE SOURCE: KURZ 2010.

it allows maximum emphasis on the most striking and most important aspects of the OVD feature.

## LATEST INNOVATIONS FROM KURZ

KURZ continues investing heavily in research and development, which enables Central Banks to equip their banknotes with the most advanced security features and stay far ahead of the counterfeiter. Indeed, two of KURZ's latest developments take the feature choice for Central Banks and the recognisability of foil based OVDs to a completely new level.

### KINEGRAM® COLORS: MULTI-COLORED ATTRACTIVENESS AND SECURITY

Bi- or multi-colour foils are in themselves not entirely new. In the security sector, holograms using more than one metal in the foil metallisation process to create truly bi-metallic OVDs have been around for some years. Also, additional colour elements can be incorporated into aluminium-only OVDs which, for durability and other technical reasons, are the standard for the banknote industry.

Unlike these variants of multicolour foils, KINEGRAM® COLORS is a new feature incorporating different diffractive elements in different colours within a classic banknote-standard partially-demetalised foil. What this means in practice is that the end user sees the expected KINEGRAM® image with its metal and transparent areas in mul-

tle colours, corresponding to parts of the design. For example, the denomination numeral can be designed in a colour matching the offset print, complemented by a national crest in gold, and surrounding elements in another colour, or in classic silver.

With this development, the foil OVD is not a separate feature in an isolated position on the Central Bank's checklist of features. A Central Bank or a security printer's designer now has even more freedom for creating a fully-integrated design.

Most importantly, the new KINEGRAM® COLORS foil OVD is a major step towards automatic and instinctive recognition by the general public. The OVD can very easily attract the viewer's attention, by incorporating clearly differentiable, multiple colors, while at the same time containing all the characteristics of a high-security foil OVD. To maximize the possibilities of this technology, KINEGRAM® COLORS is also available as laminate foil for window banknotes with even further color options.

### VIBRANT, VIVID, KINEGRAM VOLUME®

KINEGRAM VOLUME® uses a technology that was until very recently not possible to be applied onto banknotes. The KURZ Group undertook intense efforts to adapt this technology for use in banknotes and also developed its own highly sophisticated production equipment and materials. Due to these high technological barriers, the feature is near-impossible to counterfeit.

The KINEGRAM VOLUME® is created by laser technology. It does not display the chromatic rainbow color effects we know

KINEGRAM VOLUME® DEMONSTRATION SAMPLES,  
AS FIRST PRESENTED AT CURRENCY CONFERENCE 2015  
IN VANCOUVER.  
IMAGE SOURCE: KURZ 2015.



from a KINEGRAM® or hologram, but shows single, vibrant, pre-defined colors. KINEGRAM VOLUME® images are very highly visible, but as an element of surprise, they can be seen only at a sharp and well-defined viewing angle, almost like an on/off switch.

The attendees of the Currency Conference held in May 2015 in Vancouver had the chance to witness the unveiling of KURZ's latest developments for this impressive feature.

To date, KINEGRAM VOLUME® was available in bright single colors, or in combination with a demetallized KINEGRAM® structure. This already provided more elaborate design opportunities for Central Banks. Now, KURZ is taking this development a huge step further by offering the possibility for registered images and designs, and by using

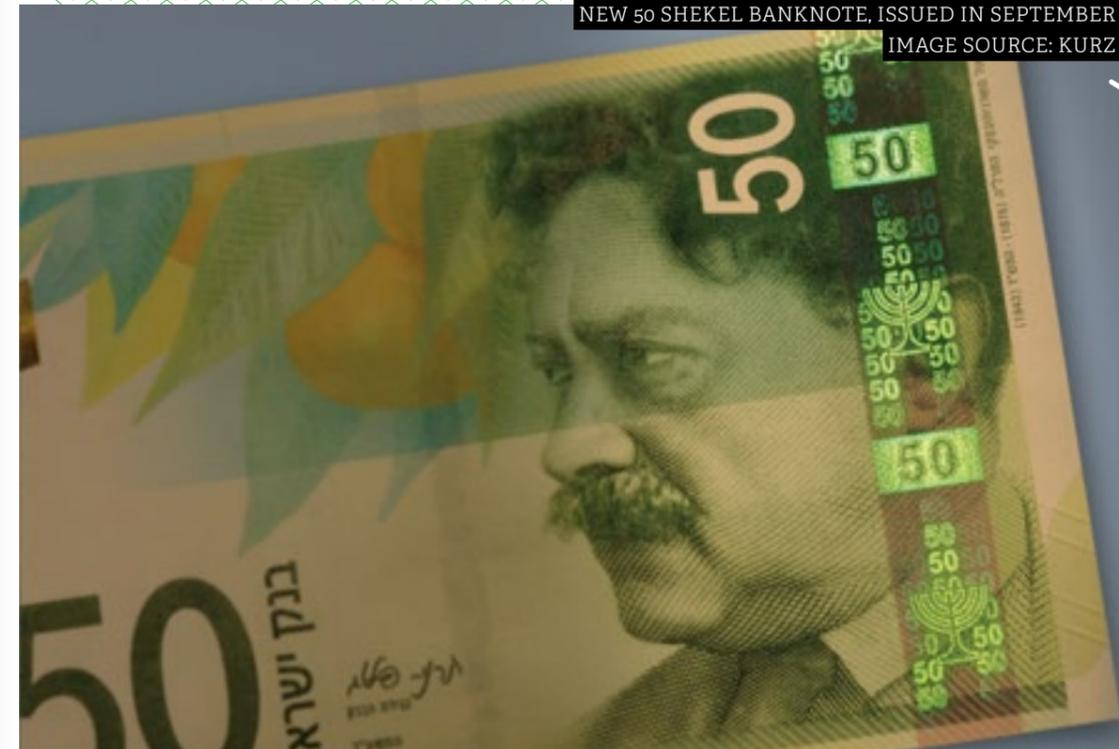
a wider palette of clearly visible movements and effects. Striking highlight is a foil stripe with two colors in superimposition, with a permanently visible 3D background pattern and a distinct image in the front, visible in the typical on/off-manner of classic KINEGRAM VOLUME®.

Several Central Banks have already expressed their interest in this new benchmark security feature and a specific project with KINEGRAM VOLUME® technology is under way in Europe at this very moment.

## CONCLUSION

If we accept that recognisability is linked with ease of explanation, then both KINEGRAM VOLUME® and KINEGRAM® COLORS make life a lot easier for Central Banks, as both features provide

KINEGRAM VOLUME® STRIPE ON ISRAEL'S  
NEW 50 SHEKEL BANKNOTE, ISSUED IN SEPTEMBER 2014.  
IMAGE SOURCE: KURZ 2014.



a very distinct visual expression alongside striking and unique effects. Therefore they can very easily be described in central bank communication campaigns – or indeed, will probably be intuitively recognized by the public without further explanations.

Central Banks should not underestimate the interest of the general public in authenticating their banknotes. Only very few people actually don't care or do not take an interest in their own money. The correct assumption is therefore that people are prepared to make sure that they are handling only real money. KURZ is proud to support Central Banks and currencies worldwide for many years in making banknote authentication both very safe and very easy. KINEGRAM VOLUME® and KINEGRAM® COLORS are significant steps towards this goal. «

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THE FAMOUS BELVEDERE PALACE  
 (HOME TO THE PRESIDENT OF POLAND)  
 IN GUARDIAN LATITUDE®.

INNOVIA

GUARDIAN  
 LATITUDE®:  
 A SILVER LINING  
 FOR COUNTERFEIT  
 RESISTANCE

# Guardian LATITUDE®: A Silver Lining for Counterfeit Resistance

INNOVIA

Innovia Security's R&D scientist Odi Batistatos explains how the LATITUDE® security feature is taking diffractive optical effects to a new level by using silver nanotechnology as a medium that creates not only high-visibility optics but provides the added dimensions of total design freedom and extremely high durability.

The idea of using silver nanoparticles as a medium that could be used on a polymer substrate was a light-bulb moment. Up until 2010, we had been working and experimenting with aluminium as a printed medium that had synergy with diffractive gratings.

However we felt the results, while showing great potential, could have been better. In a separate project, we were working with radio frequency identification (RFID) technology in 2011, and realised that the silver nanoparticles we were using in that project could be applied to diffractive optically variable devices (DOVDs). From that point on, the potential for LATITUDE® took off.

Pleasingly, focus groups in different markets around the world have responded very positively to the feature. The beauty of this medium is that silver nanoparticles are not restricted to patch or stripe formats of the more traditional DOVD mediums.

As opposed to the original aluminium base we were working from, which then had promising but limited reflectivity, the corresponding brightness of the silver base for LATITUDE® delivers strong optical effects and quite stunning colour shifts. For example, examine the LATITUDE® feature on the Bee Hive Guardian® Note by PWPW. You'll notice on the wings and abdomen of the large bee some dramatic whole-of-shape colour shifts. In this instance, rather than a diffractive rainbow effect, a largely red wing becomes a green wing at a slightly different angle.

On the same banknote, a separate design has been created depicting a bee hive, illustrating how the feature can be applied in any design formation on any location across the note. This capability raises the complexity for potential counterfeiters well beyond the usual challenge; due to the transparent substrate, there are now four locations across the note for counterfeiters to simulate.

The diffractive binary structure of LATITUDE® is approximately 500 nanometres in height and is covered with silver nanoparticles. A clear varnish is applied on top of both the structure and the silver nanoparticles for protection against physical damage and counterfeit attacks.

Opacified coatings can also be applied to create a "half window" on the opposite side of the substrate in which LATITUDE® is embedded, enhancing the integration of the feature to the banknote's design. Perhaps one of the most appealing aspects of the feature is the fact that, as a printed feature, it is totally congruent with the opacification ink layers that are printed around LATITUDE®, which ensure the DOVD is seamlessly integrated in the note design.

LATITUDE® offers complete freedom and



enormous design possibilities due to manipulation of shape, size and position on the banknote. A wide range of optical effects can be achieved by manipulating the structural characteristics.

The use of silver nanoparticles in LATITUDE® is a superior solution for hosting DOVDs because it is a printed feature incorporated into the substrate design that unlocks many of the constraints that apply to other DOVD mediums, including production efficiencies.

A perfect example of LATITUDE® in the market is the commemorative Polish 20 Złoty polymer banknote, issued on 5 August 2014 by Narodowy Bank Polski (or NBP, the National Bank of Poland). The banknote, which commemorates the centenary of the formation of the Polish Legions, features an image of the famous Belvedere Palace (home to the President of Poland) in LATITUDE® – the world's first substrate-integrated diffractive optically variable device (DOVD) using silver nanoparticles that are not restricted to patch or stripe formats to create stunning visual effects.

## HIGH DURABILITY:

The high durability of LATITUDE® extends to both the physical structure of the feature, as well as the striking visual effects it delivers. Additionally, LATITUDE® is highly resistant to chemical attacks and mechanical damage.

## DESIGN FREEDOM:

As a printed feature, brilliantly integrated designs are possible with LATITUDE®. The feature allows for multiple design possi-

bilities through the manipulation of size, shape and positioning. LATITUDE® can even be placed in two positions on the note.

## INSTANT AUTHENTICATION:

LATITUDE® delivers eye-catching effects in both reflection and non-direct light transmission allowing for instant authentication by the user.

## COUNTERFEIT RESISTANT:

LATITUDE® is extremely difficult to counterfeit due to its complex DOVD capability, which becomes even more complex when integrated into the substrate, making it beyond the capability of professional counterfeiters.

The Polish 20 Złoty has received wide industry recognition and multiple awards such as the Pan European Banknote of the Year 2015 and IACA's Best New Commemorative Banknote of 2015. The Pan European award recognises outstanding achievement in the design, technical sophistication and security of a banknote or banknote series, with the key judging criteria being that successful banknotes should combine visual artistry and high levels of technical and security sophistication, with considerable emphasis placed on reflecting the cultural heritage of the issuing country in the note, and the relevance of the overall design and symbolism to the issuing country. «

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COMMEMORATIVE POLISH 20 ZŁOTY POLYMER BANKNOTE ON GUARDIAN® SUBSTRATE FEATURING LATITUDE®



ARJOWIGGINS SECURITY

# INTRODUCING THE NEW WINK® THREAD

# A new dynamic optical effect security thread.

ARJOWIGGINS SECURITY

Launched in May at Vancouver at the Currency Conference 2015, the Wink® security thread offers a totally new dynamic optical effect. To protect their banknotes, many Central banks have adopted windowed security threads. To meet these requirements, Arjowiggins Security has developed the Wink® security thread with a totally new dynamic optical effect.



WINK® THREAD

**S**imple, secure and long-lasting, security threads are totally or partially embedded in the banknote paper, making them very difficult to imitate. This in turn makes them an indispensable security feature for banknotes.

The Wink effect is distinctive, intuitive and visible at normal transaction distance with a slight tilt. Non-professional users can authenticate bank notes in two seconds under most lighting conditions.

## SIMPLE AUTHENTICATION

The Wink security thread consists of two parallel strips, each one carrying colour and/or text that can be entirely customizable. When the banknote is tilted, the information on one strip is revealed while the information on the other stripe is hidden by an eye-catching silver layer. This silver layer appears to jump from one side of the thread to the other, giving movement and dynamism to the thread.



## WHAT IS WINK® THREAD TECHNOLOGY EXACTLY?

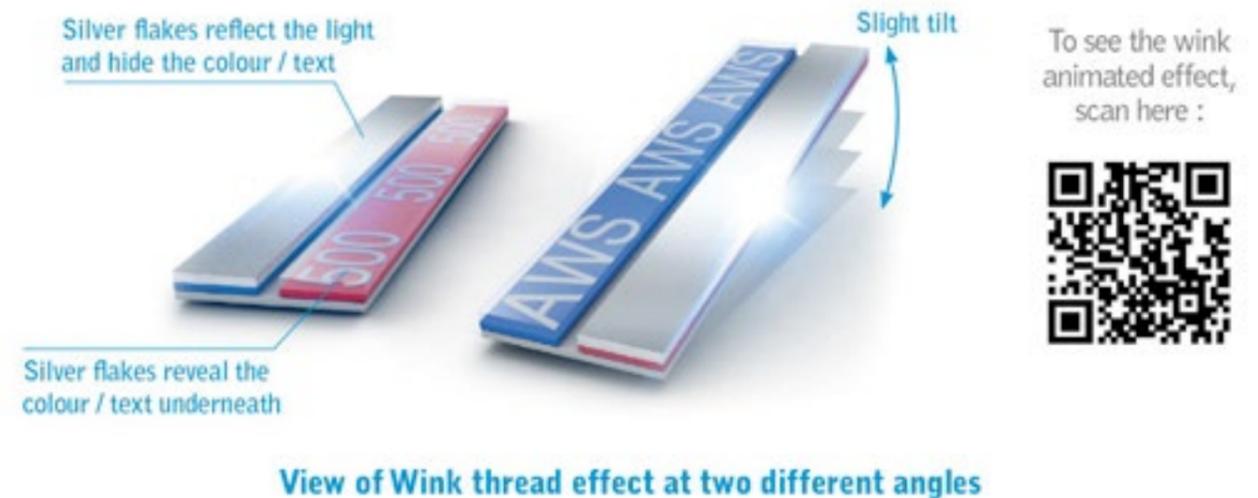
The Wink thread was a co development by Arjowiggins Security and JDSU Optical Security and Performance Products, global specialists in optical coatings and anti-counterfeiting technologies. The techniques and highly controlled materials used, designed for banknotes, cannot be reproduced as the source of the supply materials is protected.

The innovative Wink effect is made possible with a layer of highly engineered and

precisely oriented silver micro flakes that cover each strip of printed information. Depending on the viewing angle, the flakes reflect the light in a precise manner to reveal or hide the information printed on the strip.

## EXCELLENT ROBUSTNESS

Wink thread is highly resistant to wear and tear and can withstand difficult circulation conditions. Wink threads were subject to rigorous soiling and crumpling tests and the effect remains intact. The metallic effect re-



mains unchanged as does the information underneath the flakes. Wink threads will last as long as the banknotes themselves.

Wink is also resistant to physical and chemical attack.

## OTHER ADVANTAGES

Wink's elegant two-strip structure is eye-catching and blends harmoniously into any banknote design style. Each strip is customizable with a coloured background, text and UV fluorescence and comes with a wide choice of colours. In one obvious application of this design flexibility, banknote design-

ners can match the colour of the strip to the colours of their national flag, for example.

It adapts easily to paper, printing and sorting machines.

To find out more about Wink® thread, contact Arjowiggins Security at: [banknote@arjowiggins.com](mailto:banknote@arjowiggins.com)



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▼  
KBA NOTASYS

SUPER SIMULTAN  
IV (SUSI IV)

—  
SUSI FLIP:  
NEW LEVEL 1  
SECURITY FEATURE

—  
COMBINING  
SECURITY FEATURES  
IN A NEW SERIES



## Super Simultan IV (SUSI IV)

KBA NOTASYS

Since the introduction of the Super Simultan IV (SUSI IV) in 2005, over 40 machines have been sold to banknote printers around the world. Of these installations 26 were in a 10-color configuration. A great achievement and a clear sign that simultaneous offset printing is still regarded as the most secure and efficient way of applying offset designs and features to a banknote.

In the past 9 years we have made great progress in further evolving the Super Simultan platform, adding additional features to the 9th and 10th colour imprinter, the development of the semi-automated plate clamping system, as well as the recent introduction of the Super Orlof Simultan press which integrates the orlof principle, best known from the Intaglio process, into offset. **All the new features and improvements come together in the 19th series of SUSI IV of which the first will be delivered early in 2015.** More specifics on each of the main improvements are described in this article. You will also find some interesting information about new security features which are enabled by the new improvements.





## THE BASIS

The SUSI IV is a state of the art 10 colour offset printing machine capable of printing the entire range of current and future banknote features with an accuracy never before achieved in the banknote industry. The new high precision plate clamping launches a new era for banknote features and designs through simultaneous printing and guarantees print consistency on each note, on each sheet, on each job. **The fast plate change ensures make-ready times are significantly reduced increasing productivity**

**while at the same time waste is reduced through our highly efficient inspection system.**

## SEMI-AUTOMATED HIGH PRECISION PLATE CLAMPING

As of the 19th series all SUSI IV presses will be equipped with the new high precision plate clamping system. This new, operator friendly device is designed to improve the performance of the SUSI IV by

” A job change in 3 hours and 16 minutes: On the current generation of Simultan presses a job change could easily take multiple shifts depending on the design of the banknote that needs to be printed. In an effort to reduce make-ready times and increase productivity we have developed our semi-automated plate clamping system and first tests in our training centre in Lausanne have shown that a job change with this new system can be done in around 3 hours. At the Banknote Conference in Washington Technical Director Johannes Schaeede showed a video in which KBA NotaSys instructors Julian Stewart and Mike Edgecumbe performed a job-change from the Cash Cycle Specimen to the Flower Power specimen in 3 hours, 16 minutes and 29 seconds. Quite an achievement since the Flower Power specimen is very demanding in terms of the registration requirements in the offset design. We are currently studying possibilities to even further decrease the time and feel confident that we can do this in less than 3 hours. “

enhancing both the accuracy and speed of plate mounting. Register accuracy is improved by removing the manual plate handling variations performed by different operators and the **new plate punching and bending procedures which are accurate to within 5 µm in relation to the images on the plate ensure dry and wet plates can now be fitted and positioned with minimal operator interaction to within 20µm across the entire sheet.** The plate clamping system is not only designed to increase accuracy but also to increase productivity; **the entire process of plate mounting and getting the who-**

**le design into register takes less than 3 hours.** This means that an average job change will not take longer than 4 hours.

The improved register accuracy means that existing offset security features can further evolve and it also opens a scope for a whole new range of security features which will support the ongoing battle against the counterfeiter. A new thermoregulation unit has been introduced to control individual plate cylinders and side frame temperatures, ensuring print register can be further controlled with thermal expansion.



## 9TH & 10TH COLOUR IMPRINTER

The 9th and 10th colour imprinter adds additional functionality to the SUSI IV by allowing two further inking units to supplement the 8 simultaneous inking units in the main printing unit.

Two different types of imprinter module are available giving additional flexibility to the banknote printer :

- > 2 plates / 4 colour Simultan module allowing additional visible or invisible inks to be printed in conventional offset
- > 2 schablone / 1 plate / 4 colour Orlof module allowing unique features to be printed in Orlof offset, this can also incorporate the 2D Iris module



QUALITY CONTROL

## UV TECHNOLOGY

The SUSI IV comes pre-disposed for full UV capabilities. UV ensures a faster turnaround of printed substrate is possible reducing work in progress and also protects polymer substrates with offset printing in windows from set-of and sticking.

2 conventional medium pressure mercury lamps can be fitted into the imprinter module, which also includes extraction and cooling for the impression cylinder while 4 conventional medium pressure mercury lamps can be fitted into the delivery for recto/verso curing LED technology for the imprinter module is planned to be available towards the end of 2014, further enhancing the capabilities of the SUSI IV.

## QUALITY CONTROL

The increased accuracy of the press demands additional support tools for the operator to control the quality. We have developed the ColorControl system as the quality guardian for the offset process. **The ColorControl system is build-up of our ColorSave inline inspection system, the ColorCheck III measurement table and the ColorTronic ink-key control system.** All three systems are linked and work together to ensure that the applied design and features are up to the pre-defined standards.

## ECONOMICS

The economics of banknote production start to play an ever more important role. We have made various calculations which have shown that because of the **increased productivity and reduction of waste and work in progress investing in a new Super Simultan IV press results in significantly lower production costs per 1000 notes. We will be happy to make a bespoke calculation for you.** ‹‹

## SUSI Flip a novel new level 1 security feature

KBA NOTASYS

Alexander Fellmann is best known for his work with Jörg Zintzmeyer on the 8th series of Swiss banknotes issued in the mid-1990s and still in circulation today. He has worked as a designer for a number of renowned Swiss design agencies and has been working for KBA NotaSys for nearly two years.

He is currently a member of the R&D department and his main responsibility is to create new security features. By analysing existing security elements, he is also investigating how to make best use of their potential. His expertise, perseverance and passion for design all helped him create the new **SUSI Flip security feature**, based on the use of UV inks, which is something he has been working on since he joined KBA NotaSys.

The original idea for the project came from previous research done a few years ago at KBA NotaSys by Technical Director Johannes Schaeede - **to create a security feature based on the effects of overprinting**. This is much like the principle of mi-

xing two colours together to create a third one. **By overprinting two colours, you create the visual impression of a new, third colour.** This was an **interesting starting point**, but it was soon abandoned as it was too easy for commercial printers to reproduce and so did not offer any added value for the security of a banknote.

When developing the **SUSI IV with the option of a 9th and 10th colour**, KBA NotaSys always intended using the two optional slots for a special feature. Based on the earlier research and with this in mind, Alexander Fellmann and his team started working on the project. With a view to exploiting the full potential of the SUSI IV, **the idea evolved from overprin-**

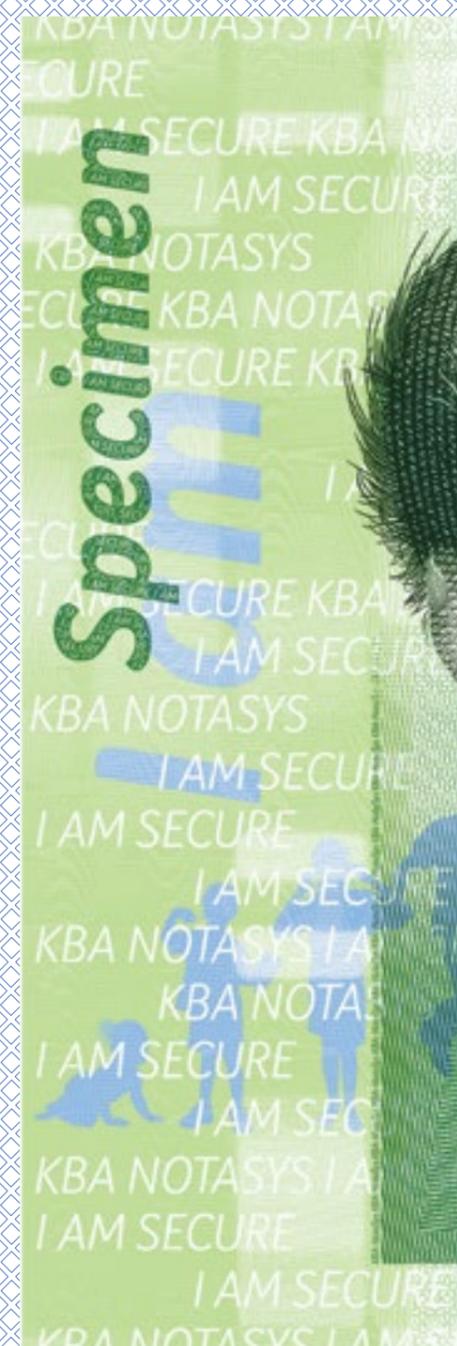
ting to juxtaposing different colours to create an optical illusion. As it is possible to achieve extreme precision of print with the SUSI IV, it is possible to print lines close enough together, instead of a full block of colour, to create an overprinting effect and so create a third colour. As commercial machines cannot achieve the same precision of print, it is very difficult to counterfeit this feature, so it offers added security for central banks and state printing works.

By working with several sets of adjacent lines, it is possible to create different geometric shapes. For example, you can create the number "1" by associating horizontal and vertical lines as shown in the example in the image. However, as this would be so small on a printed banknote, it would be impossible for the human eye to detect the two sets of different lines. So the research team decided to try the same idea but to separate the two sets of lines with an unprinted border to highlight the shape of the geometric shape. This creates a visual aid for the human eye and makes the shape clearly visible even when small in size.

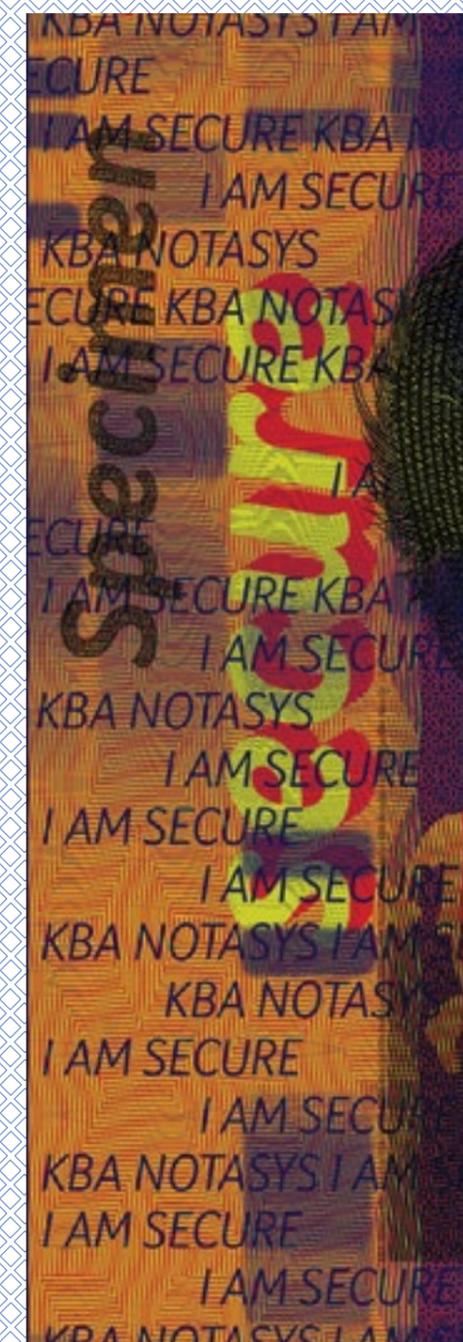
It was important for the team to create a feature that would add value to security of a banknote. To make it even more difficult to counterfeit the feature, the idea was then developed to create a first design element, formed visually by a high number of lines separated by unprinted areas, which would have the same or much the same optical appearance when illuminated with visible white light. But to really make it different, the printed security feature also has a second distincti-

ve design element when illuminated with Ultra-Violet (UV) light. By applying this UV light, the first element would then flip to create a second shape completely different from the first one. It was discovered that this could be achieved by having two inks in each adjacent line, so that each line element is actually comprised of two lines. When looking at the feature under normal white light, the two inks cannot be distinguished and they produce the first design element. The feature, composed of two inks which respond differently to fluorescent light, then exhibits the second design element with a third fluorescent colour which is created by juxtaposing the two inks as seen in the image.

A key advantage of this invention is the fact that it requires high precision printing to print the first and second inks in adequate register. Poor register between the colours will result in the boundaries of the latent design element becoming visible in normal light, thus revealing the existence of the second design element which is normally hidden in normal light. It is difficult for counterfeiters to reproduce this effect with commercial offset machines. It can only be achieved with a machine such as the SUSI IV which prints in perfect register and has the optional 9th and 10th colours which make it possible to add the flip feature to further enhance the security of the banknote. «



SUSI FLIP DAYLIGHT



SUSI FLIP UV

# Combining security features in a new series

KBA NOTASYS

**”** We have discussed the value of combining security features numerous times. It is generally accepted that a single security element alone does not add value to a banknote, no matter how technologically advanced it is, and that true value only comes from combining several elements. So how does this really work? What are the key deciding factors when creating a new series of banknotes? And how does a central bank decide which feature to incorporate in their new series? **“**

KBA NOTASYS

## DEVELOPING A NEW SERIES OF BANKNOTES

In many places around the world, banknotes remain the preferred method of payment for the public, retailers and businesses. Universality of acceptance, convenience and security are amongst the key characteristics that give banknotes their appeal. Banknotes and security documents play an essential role

in our day-to-day lives as they enable secure payments, identification, tax revenue collection and protection against fraud or illegal trade. The development of a new banknote is a milestone that will have a lasting impact on the nation and also marks a new chapter in the nation's cash cycle. Retailers, commercial banks and, of course, the public will examine the new note closely. Developing a new series of banknotes is a complex process that requires harmonious synergy between security,

aesthetics and functionality. As a nation's cash cycle evolves and the transaction landscape develops in line with technological progress, the expectations placed on banknotes increase. Banknotes must meet these changing demands and overcome the threat of counterfeiting and new alternative forms of payment. The growing plethora of substrates and security features makes choosing the best solution even more confusing and difficult. **As our company has assisted central banks all over the world to develop around 500 series of banknotes since the early 1950s, we have considerable expertise to offer.** Over the years, we have perfected our methodology in practice and a specific department has been created, Banknote Services, to provide expertise and independent, impartial advice to central banks issuing new series of banknotes.

A central bank may decide to develop a new series of banknotes for a range of reasons, either to update an ageing series or in response to specific counterfeiting problems. Whatever the reason, **the decision process can usually be split into 3 distinctive phases: analysis of the national context, technological advances, and the final selection of security features.**

## NATIONAL CONTEXT

When creating a new series of banknotes, it is important to understand the nation's specific needs. The banknote series, like any other product, must be designed and produced according to these needs. Several factors influence the decision, so it is important to analyse the national context carefully right at the start of the process. This analysis will help collect a

lot of valuable information on the nation's cash cycle which in turn will help determine which approach to take. For instance, the decision will be very different if the new series is needed because the actual series is under attack from counterfeiters, as this will mean that the development will have to be completed fast as a contingency plan. If the new series replaces an ageing series without any counterfeiting problems, more time can be devoted to its development. This phase includes all the variables on the country such as the culture, how banknotes are treated in daily life, the level of security needed, whether or not the country has its own printing works, the banknote processing equipment used, the level of expertise, the production volumes, durability, security, etc. The various denominations in the new series also have to be considered. These are often referred to as the "market", "transactions" and "savings" banknotes to represent the low, medium and high denominations respectively.

Different security features are selected for the different uses. The major issue for low denominations is usually durability whereas the threat of counterfeiting is more important for higher denominations. All this has to be considered at the very start of the development.

## TECHNOLOGICAL ADVANCES

Technological advances are evaluated in the second phase of the process. New security features are launched every year, all claiming to be **the** solution. Evaluating the relative merits of these is a complex and time-consuming process. At KBA NotaSys,

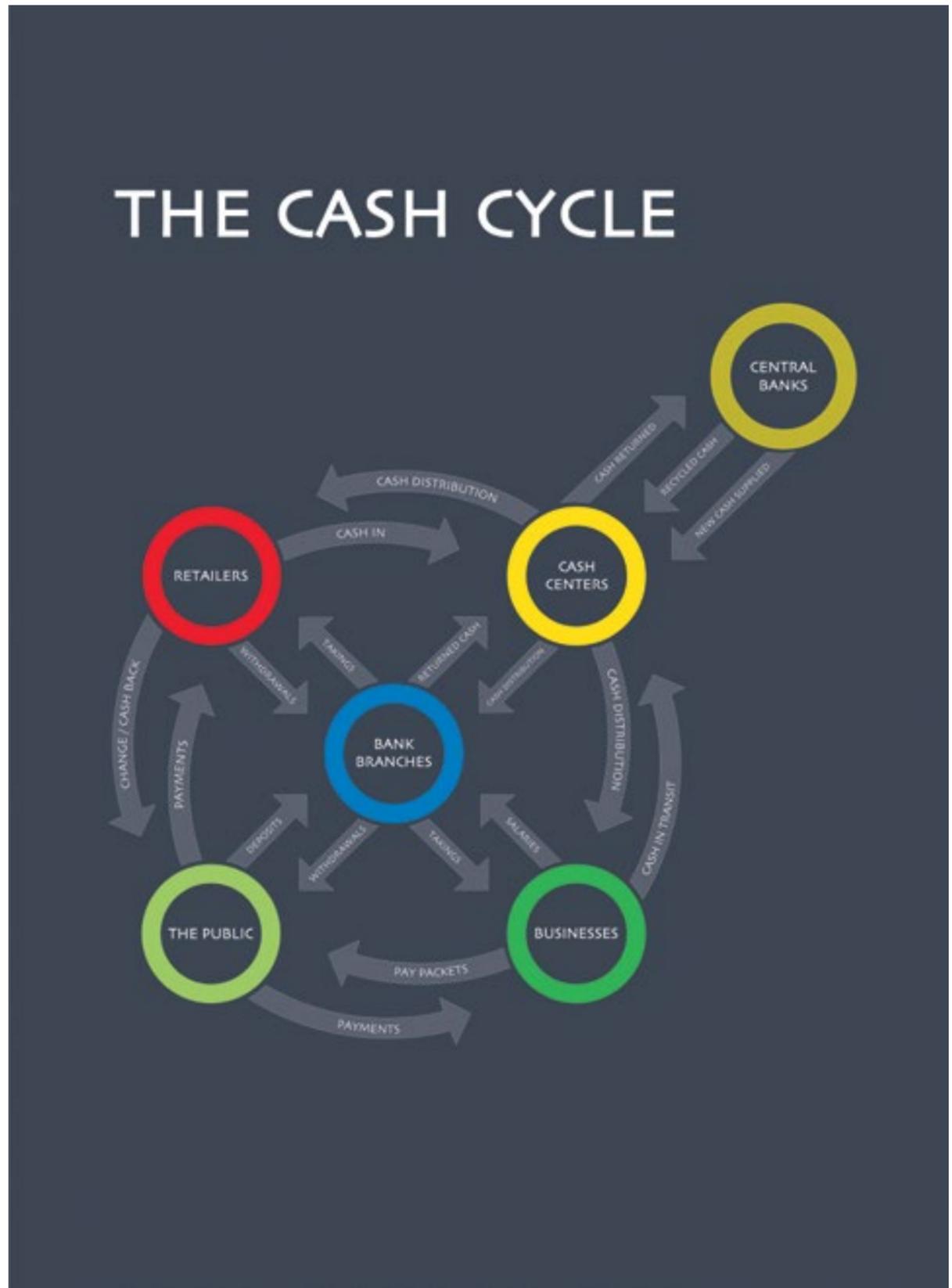
we have the expertise required to evaluate the latest technological developments and to advise the central bank in the decision-making process. The Banknote Services team has a database of security features at its disposal, which has been compiled on the basis of past experience over the years, and which highlights the merits and potential issues of each security feature. Central banks can also request suppliers to present their latest technologies to them, so that they have all the information they need to make an informed choice.

## FINAL SELECTION OF SECURITY FEATURES

The central bank makes the final selection of security features for each banknote in the new series on the basis of their national context and the technology available to them. Other important factors to be taken into consideration include, for example, the budget for the new series, which is often a major constraint. It is essential to find the right balance between the features required to add true value to the banknote and features which are superfluous to the country's needs and the threat of counterfeiting. No unnecessary costs should be added to the banknote. The central bank also has its own opinions and desires with regard to the selection of features. KBA NotaSys only seeks to provide advisory services, the final decision rests with the central bank. Central banks will often contact other central banks for more information on the printability of features. Throughout the process, it is essential to consider not only the relative merits of any security feature, but also on how the various features selected

will work together and how they can be communicated to the public. The value of any first level security feature is inextricably linked to the public's ability to recognize it and a communication campaign should be planned right from the start of the development, not as an afterthought.

This is a process which has neither beginning or end, as banknote performance needs to be evaluated constantly against expectations and risks. The central bank's ultimate responsibility in this respect is to ensure absolute public confidence in their nation's payment systems and, by extension, in their nation's banknotes. This is something which should not be left to chance, as the consequences of getting it wrong are unthinkable and the effects will be felt for years. Careful consideration of the requirements and risks will be rewarded with the issue of a robust, secure and functional series of banknotes which will overcome both the current and future challenges and meet the expectations of all those using the nation's cash cycle. «



# KBA NotaSys SA

## PROFILE

Ever since our company was founded in 1952, we have sought to enable any country in the world to independently produce its own banknotes. Providing the necessary machinery to do so was and is only one part of the equation – equally important is the transfer of the knowledge, skills and expertise required to successfully run a printing works.

KBA NotaSys has been involved in the design and construction of virtually every banknote production facility in the world. The experience gained throughout the past 60 years enables us to offer complete turnkey project management solutions for countries wishing to create and run their own banknote printing facilities. Our dedicated team of experts will ensure a seamless transition from banknote pro-

duction to independent banknote production and will assist you in every step until you become completely self-sufficient.

Recent success stories include the full re-design of the South-African Rand banknote to feature the portrait of Nelson Mandela which was developed in close cooperation between KBA NotaSys the South African Reserve Bank and the South African Bank Note Company. Another success story was the introduction of the latest series of Hong Kong Dollars where KBA NotaSys supported the Monetary Authority, three Note Issuing Banks and the Hong Kong print works to introduce five denominations that all are clearly differently in their design but have the same machine readable characteristics.



## GLOBAL FOOTPRINT

We service global high security printers from our three main centres in:

- › LAUSANNE, SWITZERLAND  
KBA NotaSys HEADQUARTERS  
Centre of Expertise for R&D,  
Demonstration and Training, Design and  
Pre-press Services, and Administration
- › WÜRZBURG, GERMANY  
KBA GROUP HEADQUARTERS  
Engineering Department for security  
printing machines
- › MÖDLING, AUSTRIA  
KBA-MOEDLING AG  
Production and assembly of security  
printing machines

And local offices in India, China and the USA.

## STRONG SENSE OF ETHICS

Working with governments it is of the utmost importance that a company abides to the highest standards in Antitrust, Anti-Bribery and –Corruption. KBA NotaSys is a proud that it is an accredited member of the Banknote Ethics Initiative which audits organisations on their processes and procedures to prevent illegal practices taking place. «

### KBA NotaSys SA

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ROLIC TECHNOLOGIES LTD.

# HORIZONS – CREATING SECURITY

SECURITY +  
TECHNOLOGY =  
SOLUTIONS



# Horizons – Creating Security

ROLIC TECHNOLOGIES LTD.

Rolic Technologies works together with Central Banks and State Banknote Manufacturers in order to develop personalised security solutions for future upgrades and new banknote series.

Several of the world's largest Central Banks are already enjoying the benefits of exceptional and innovative security features created in Rolic's laboratories, and brought to production through strategic partnerships and cooperation.

In partnership with the Issuing Authorities of the world, Rolic Technologies reaches new horizons through the power of innovation. Central Banks and Issuing Authorities increasingly understand that today's complex and technically intelligent world has changed the dynamic of banknote security. No longer can they rely on one-source solutions. Instead Banks are increasingly working directly with technology developers and innovators, whether via Universities, Research & Development teams or technology-driven SMEs, to scan the market for new ways of combating counterfeiting and fraud.

Rolic's background from the cutting-edge of Liquid Crystal Display, Organic Electronics and Photo-Voltaics provides the background to assist the banknote policy-ma-

ners to direct resource towards future-proof solutions. By working jointly to explore and develop nascent and developing technologies, forward-thinking Central Banks are able to lock-in and control the upper hand in the fight against counterfeiting.

Rolic works to explore with Central Banks the various options. **Already this has led to new solutions for the largest banknote issuers in the world, and will put Rolic technology in an increasing number of circulating banknotes worldwide over the next 5 years.**

## ABOUT ROLIC

Rolic Technologies Ltd. is a globally active innovative Swiss high-tech company headquartered in Switzerland, with affiliates in Eindhoven (The Netherlands) and Shanghai (China). Rolic develops and sells ready-to-use coating materials as well as functional optical foil products for displays, security elements and for sealing of high sensitive devices. The core competence of Rolic is light management. With its proprietary LCMO technology (Light Controlled Molecular Orientation) Rolic modifies surfaces on a nano scale with polarized light to achieve unique optical effects and to manage light. **«**

# Security + Technology = Solutions

ROLIC TECHNOLOGIES LTD.

## PROTECTION AGAINST FORGERY WITH OPTICAL SECURITY ELEMENTS

Rolic Technologies creates highly secure and innovative optical elements based on its Light-Controlled Molecular Orientation (LCMO) of Liquid Crystals. These security elements are easy to recognise and verify, whilst at the same time, they are proved and tested to be extremely difficult to imitate and highly resistant to forgery.

Rolic's LCMO technology is currently available in three technically distinct variants: **SHINE, HIDE** and **NICE**. These technology platforms have been designed to create

high-resolution optical security elements for use in banknotes and other monetary documents.

## INTELLIGENT SECURITY SOLUTIONS FOR BANK- NOTES AND MONETARY DOCUMENTS

With its ROLIC SECUNOTE elements, Rolic offers original and intelligent security solutions to governments, ministries, central banks and security printing and substrate maker companies globally; to protect their banknotes and monetary documents with sophisticated stripes, threads and patches, available at three different security levels both individually and in combination with each other.

**SHINE, HIDE** and **NICE** meet the stringent demands of the banknote market.

Rolic's security technology and supply chain are strictly controlled meeting international standards. Proprietary materials are used and developed. They are manufactured exclusively for Rolic and are commercially unavailable.

## NICE – CONFIDENT SECURITY

Rolic's NICE technology allows bright and impressive colour changing effects to be

created, both in the visible and invisible colour spectra.

NICE can include Level Three highly-covert Central Bank security elements based on selective reflection patterns within a defined wavelength band. This can also allow high-speed authentication and sorting. «

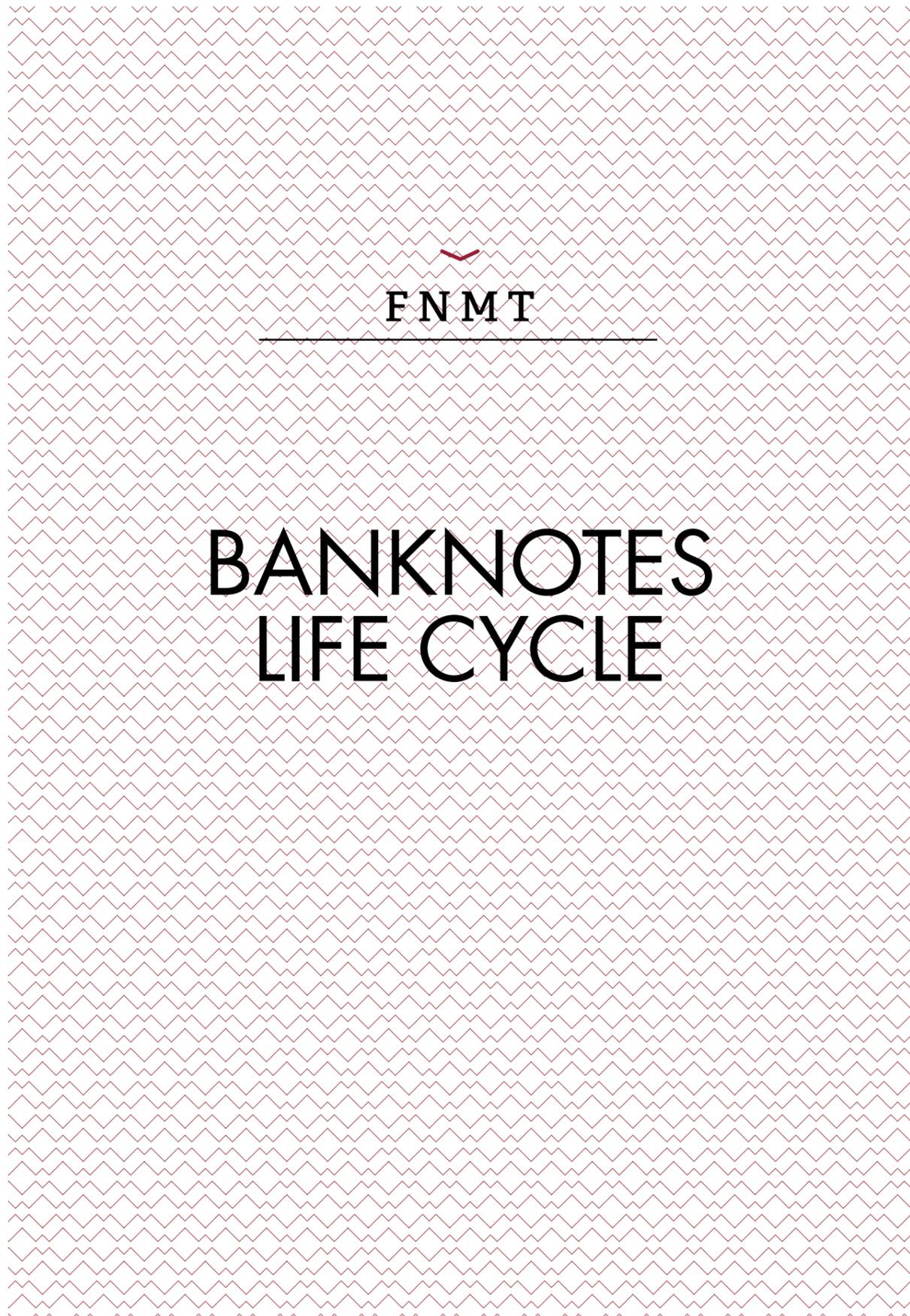
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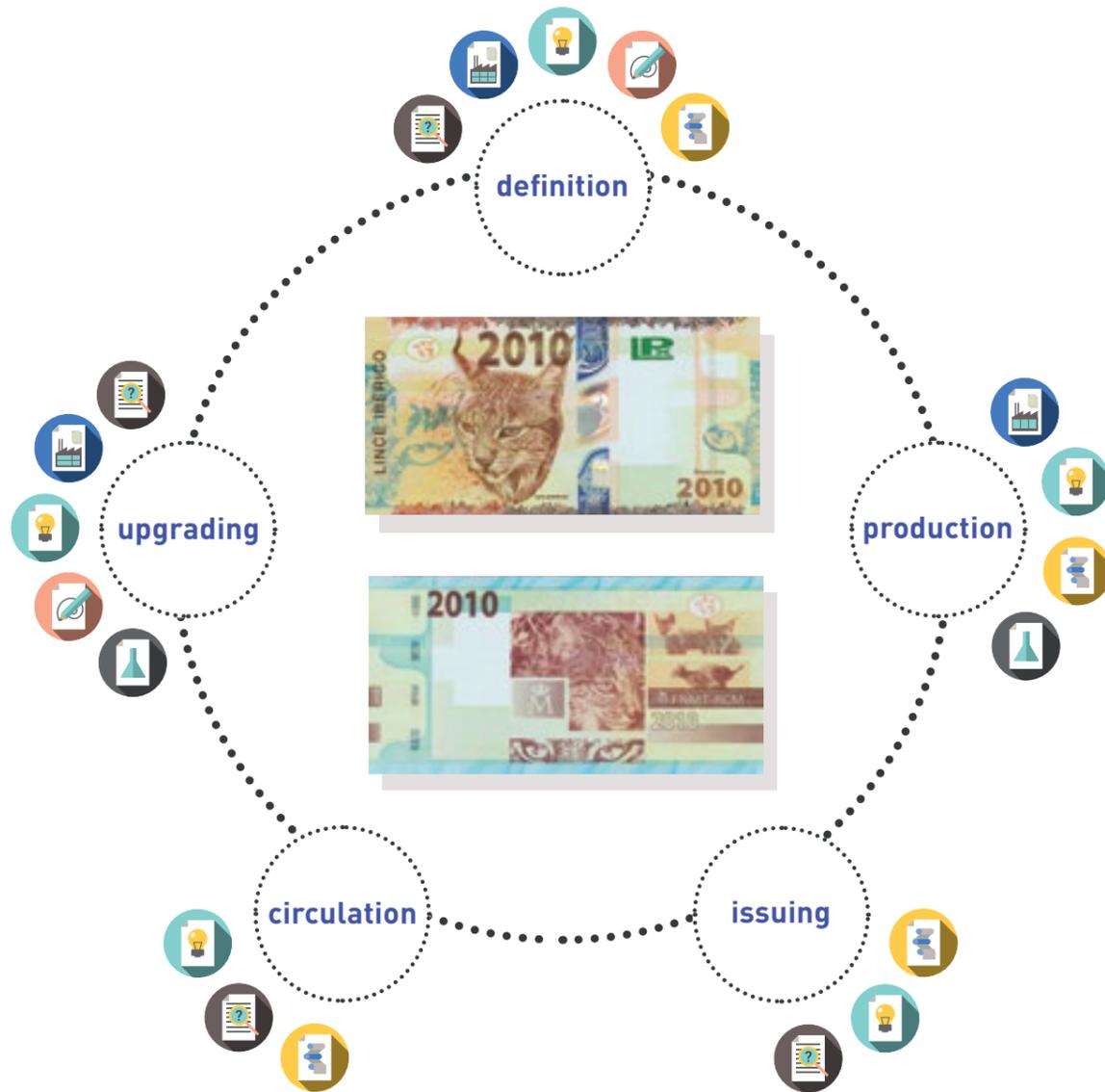


FNMT

# BANKNOTES LIFE CYCLE



# FNMT-RCM and the Banknotes life cycle



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## A High Security solutions provider



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> ABOUT US

# B@nknote Industry News

+++ Daily news from the banknote industry +++

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In addition to creating and publishing the Banknote Technology Report, **we deliver the latest news and insights from the banknote industry on a daily basis.**

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HIGHLY DURABLE PAPERS	 <p><b>Pixel watermark™</b> Enhanced identification <span style="float: right; font-size: small;">Best New Currency Feature in 2010</span> Pixel watermark is the latest generation of watermarks combining improved authentication by the public and higher security. It is a very white area with grey dots which creates a strong contrast. It can be associated with multitoneal or electrotype watermarks.</p>
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