

B T R

ISSUE  
03.17


# BANKNOTE TECHNOLOGY REPORT

CONTENTS

HUECK FOLIEN  
ARJOWIGGINS SECURITY  
LANDQART  
CRANE CURRENCY  
KURZ  
NOTE PRINTING AUSTRALIA  
SURYS  
PWPW

Created by

 Banknote Industry News  
[www.banknote-industry-news.com](http://www.banknote-industry-news.com)



The Banknote Technology Report  
is a platform where the latest  
technological developments  
and features are centralized on  
a regular basis.

WELCOME

## TRUST IN BANKNOTES

Confidence in the value and authenticity of money is critical for trade and a functioning society. Each banknote is like a piece of trust, reflecting a country's identity, its culture, its values and its people. In a world increasingly looking for dematerialized solutions, banknotes continue to be one of the pillars of the stability of countries.

Banknotes must carry the most efficient, latest state of the art and robust security features, integrated in the best fit-to-market substrate and printed by a high security printer to have a constant trust by the public in their banknotes (refers to Surys, page 51).

All banknote technologies covered in this report contribute to be ahead of counterfeiters and to fulfill customized requirements



## IMPRINT

Banknote Industry News  
Am Sportplatz 1 | 82041 Oberhaching / Munich | Germany

info@banknote-industry-news.com  
www.banknote-industry-news.com

## DISCLAIMER

The information contained in this Banknote Technology Report is of general information purposes. The information, pictures, drawings, text are provided by the respective companies and we do not take any responsibility or warranties of any kind, expressed or implied, about the completeness, accuracy, design, data, reliability, suitability or availability with respect to the information of the Banknote Technology Report.

## CONTACT US

Philipp Greulich | Managing Director  
philipp.greulich@banknote-industry-news.com | +49-(0)173 964 3913

Donald Scholz | Managing Partner  
donald.scholz@banknote-industry-news.com | +49-(0)178 478 8008

# > CONTENT

## > HUECK FOLIEN

Novel optical effects for banknotes

## > ARJOWIGGINS SECURITY

Vision™ watermark: Security, Definition, Beauty

## > LANDQART

Durasafe®: The platform for secure and durable banknotes

## > CRANE CURRENCY

The future of micro-optics and state-of-the-art security

## > KURZ

Optical Technology and Foil Know-How for Maximum Security –  
The KINEGRAM® Universe

## > NOTE PRINTING AUSTRALIA

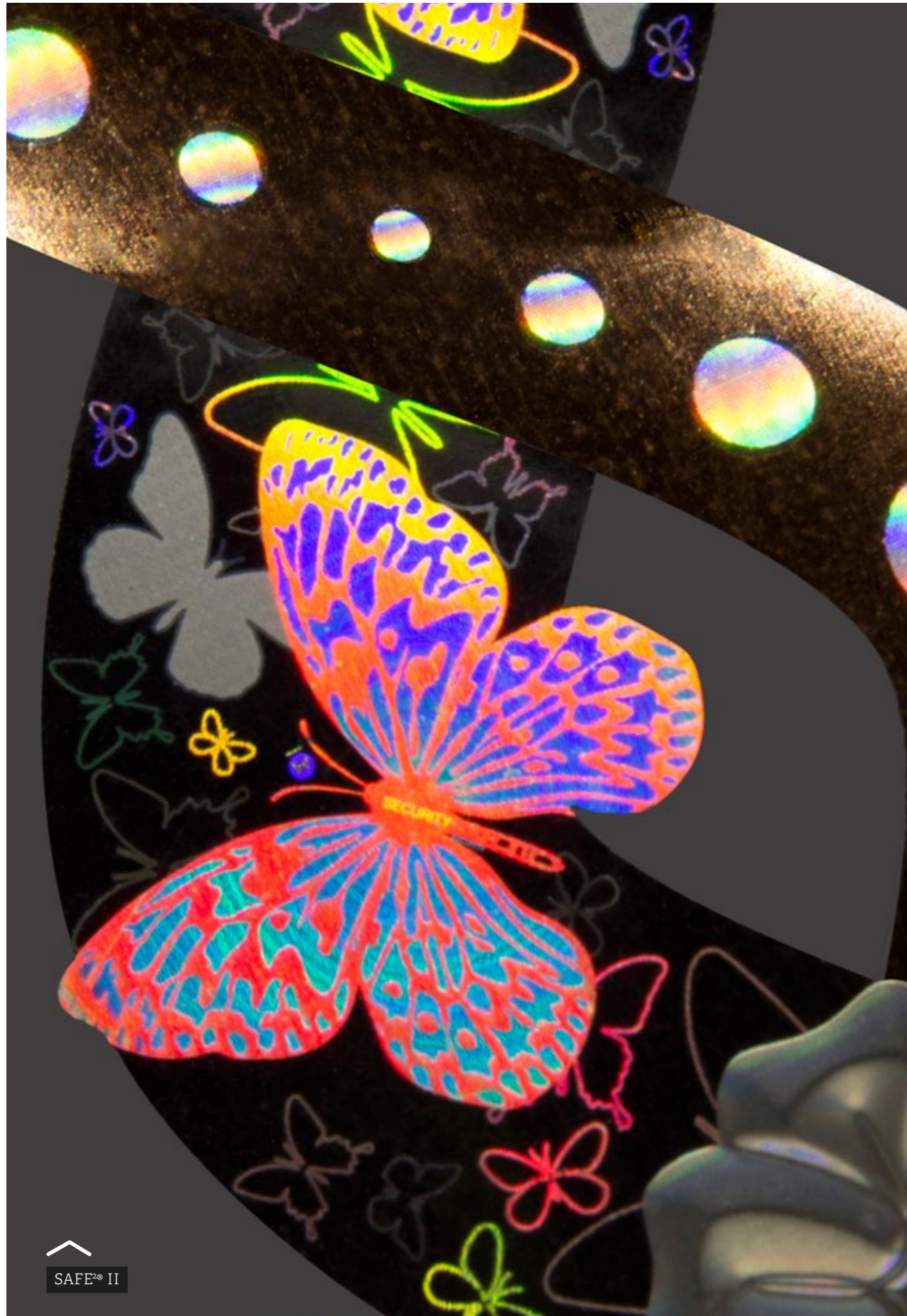
The New Australian \$5: Printer's Perspective

## > SURYS

DID™ reaches 5 Billion+ in circulation

## > PWPW

“CHESS” – new promotional note of PWPW  
(in cooperation with SICPA and JURA)



SAFE<sup>2</sup> II

HUECK FOLIEN

# NOVEL OPTICAL EFFECTS FOR BANKNOTES

# Novel optical effects for banknotes

HUECK FOLIEN

## THE PROMISE

“Creating unmistakable identity” – the claim of the security foil manufacturer HUECK FOLIEN is a clear and promising message. By integration with products from HUECK FOLIEN any high security item is representing this claim. Focused on the implementation in banknotes the company is the expert for security foils and threads in the banknote industry. HUECK FOLIEN is presenting a novel type of optical effects for security features on banknotes.

## THE COMPANY – EXPECTING MORE

The family-owned company HUECK FOLIEN, based in Austria, is the high-end partner for any solution in security foil manufacturing. The products of its portfolio segments are in circulation in paper banknotes and high security documents all over the world. The customers are either the Central Banks directly or their suppliers, the well-known partners in our industry, like banknote papermills or printers. Products like the EURO series I and II as well as the actual new Swiss Franc series have incorporated security products from HUECK FOLIEN.

With an R&D rate of 10%, the product portfolio is extended permanently. One of the main strengths and special skills of HUECK FOLIEN is the possibility to provide individual tailor-made solutions for satisfying the customer.

Design competence and the possibility to cover several types of foil manufacturing processes made the company the well acknowledged expert in the banknote production industry. HUECK FOLIEN is autonomous from any distracting interests of full service providers. The product portfolio and company policy are geared to operate with every papermill and printwork worldwide. Therefore the natural interest of Central Banks to be independent and selecting out of a variety of qualified suppliers is assured.



HEADQUARTER OF HUECK FOLIEN

### INDIVIDUAL CUSTOMIZED PRODUCTS

An actual example for an enhanced individual customer project is the current new Swiss Franc series printed on Landqart's Durasafe® substrate. Together with the paper mill and the printing company, HUECK FOLIEN developed an individual solution with the first security thread in banknotes worldwide which is not required to move within the production volume. Within each production of banknote paper the horizontal positioning of the security thread is exactly identical at the same position and in this case always visible centered inside the small triangle Durasafe® window. This extraordinary innovative solution improved the design restrictions as well as the machine reading detectability. In fact this property is one of the features which make the new Swiss Franc unique among other banknotes.

### MULTIFLY®

During the past Intergraf conference in Seville HUECK FOLIEN presented a completely new top product called MULTIFLY®: A new technology in the banknote industry for the optically variable moving effect in window threads and foils with easy recognition for the public.

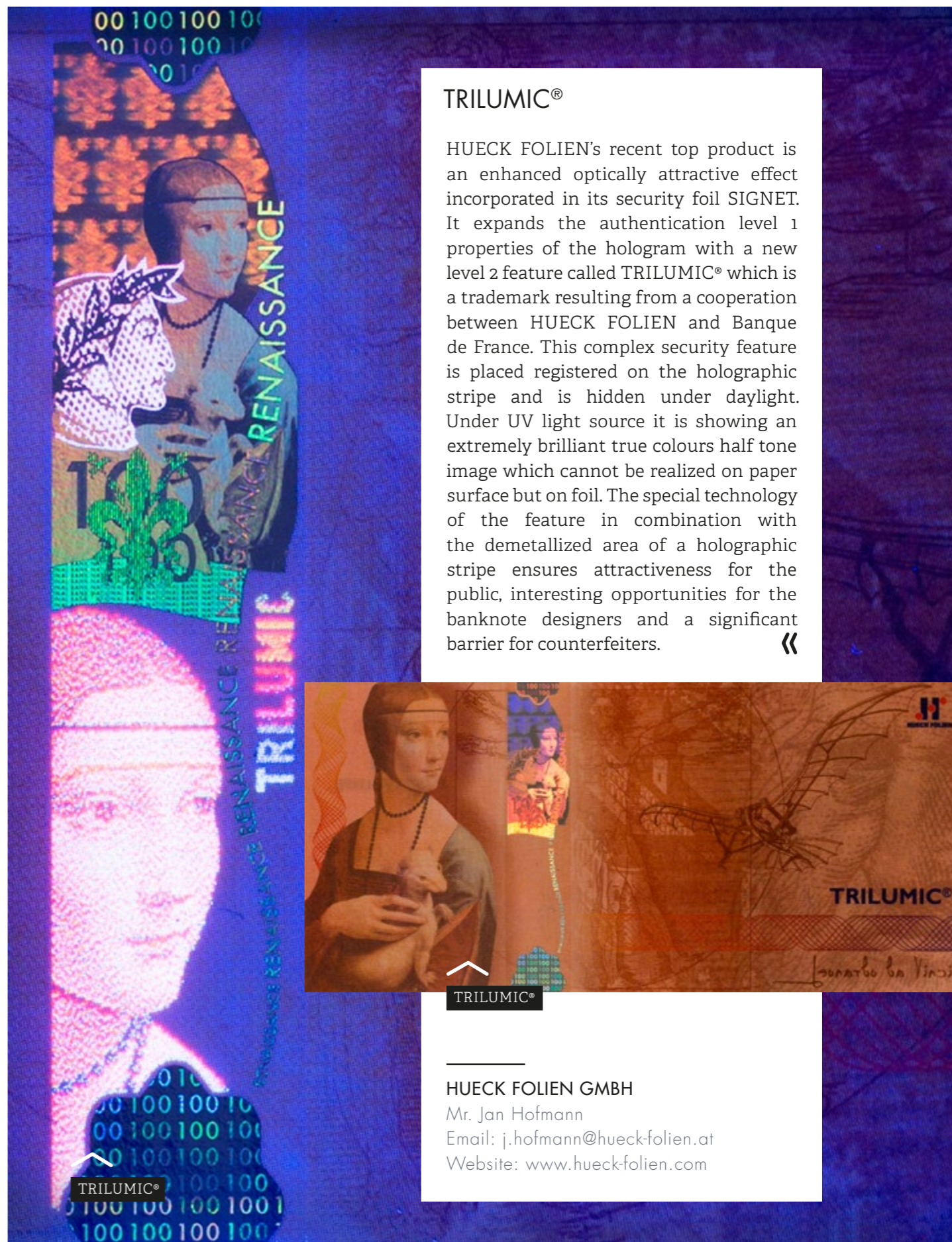


MULTIFLY®



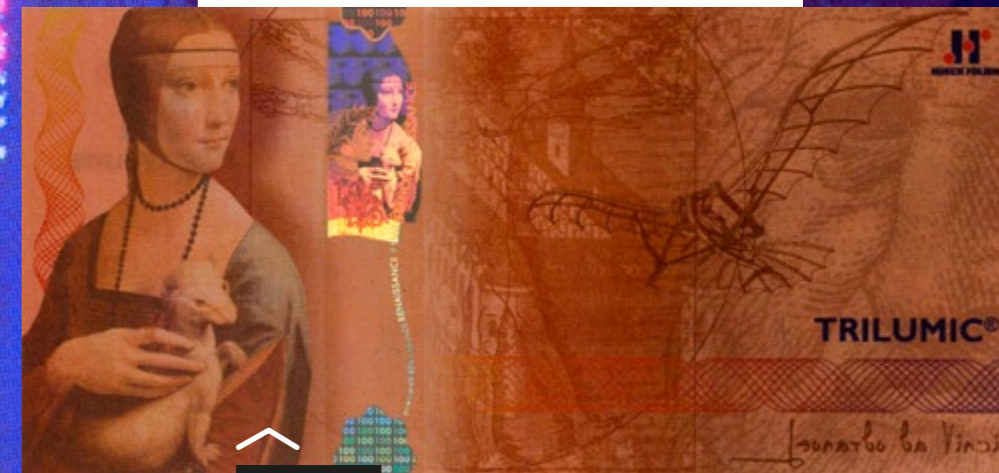
POSITIONED THREAD ON NEW CHF 50

MULTIFLY® is a security feature based on specially arranged nano-structures which create a novel optical effect in the 3rd dimension. Multiple moving icons seem to be flying above and below the image plane, rotating one against the other depending on the light sources around. The feature shows good brightness, attractively high moving mobility and optical depth of the chosen design element. MULTIFLY® can be used on high security threads or foils on banknotes and is due to its new nano-structure different from holograms and therefore another step ahead of counterfeiters.



### TRILUMIC®

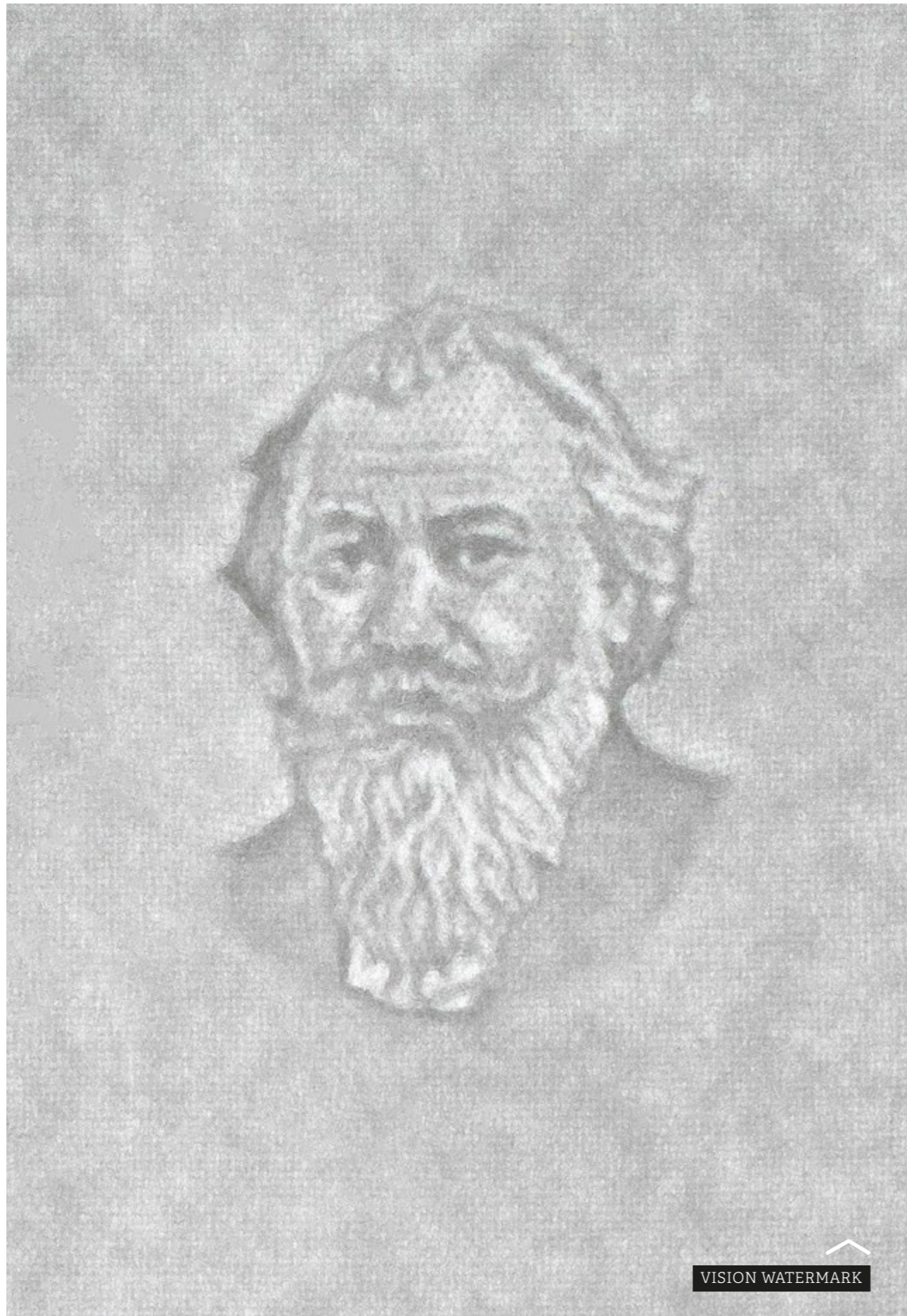
HUECK FOLIEN's recent top product is an enhanced optically attractive effect incorporated in its security foil SIGNET. It expands the authentication level 1 properties of the hologram with a new level 2 feature called TRILUMIC® which is a trademark resulting from a cooperation between HUECK FOLIEN and Banque de France. This complex security feature is placed registered on the holographic stripe and is hidden under daylight. Under UV light source it is showing an extremely brilliant true colours half tone image which cannot be realized on paper surface but on foil. The special technology of the feature in combination with the demetallized area of a holographic stripe ensures attractiveness for the public, interesting opportunities for the banknote designers and a significant barrier for counterfeiters. <<



TRILUMIC®

### HUECK FOLIEN GMBH

Mr. Jan Hofmann  
Email: j.hofmann@hueck-folien.at  
Website: www.hueck-folien.com



ARJOWIGGINS SECURITY

VISION™ WATERMARK:  
SECURITY, DEFINITION,  
BEAUTY

CYLINDER MOULD PROCESS

# Vision™ watermark: Security, Definition, Beauty

ARJOWIGGINS SECURITY

The watermark is the most essential and reliable security feature for protecting banknotes against counterfeiting. Used in banknotes for a long time, the public has become familiar with it, and it is the first thing they look for when checking a note. This is confirmed by many perception studies.

The watermark is the result of variations in paper thickness. The image is created during the paper manufacturing process through the use of a cylinder covered by a wire mesh embossed with the watermark design. Portraits, animals, flora, landmarks ... the watermark can represent many types of image. Cylinder mould technology is used in order to reproduce the fine detail in the design.

## ARJOWIGGINS SECURITY, A PIONEER IN WATERMARK TECHNOLOGY

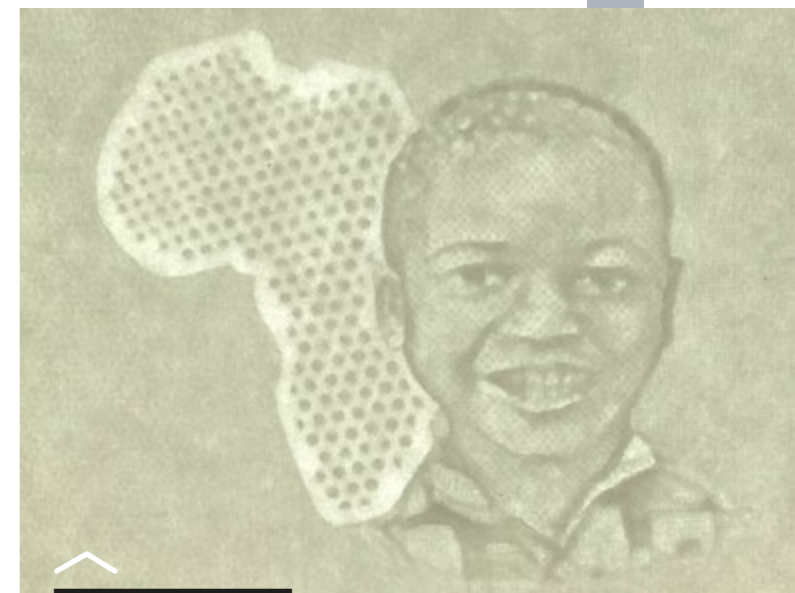
Arjowiggins Security is a specialist in banknote papers. Its savoir-faire dates back to 1791 when it manufactured the paper for the first French Franc, the "Assignat". The watermark is an essential feature for paper makers and the company works continuously to improve its quality and its security.

In 2006, Arjowiggins Security launched Pixel™ watermark, a watermark made up of a pattern or array of dots on a light background that creates a three-dimensional effect. A high level of contrast with the background can be observed. The improved visibility of the Pixel watermark makes it easier to identify and authenticate. It can be combined with multitone and electrotype watermarks.

In 2010, Pixel watermark was awarded "Best new security feature" by the International

association of Currency Affairs (IACA). It has been adopted by ten countries. Thirty billion notes with Pixel watermark have been put in circulation.

After the success of the Pixel watermark, Arjowiggins Security has continued to explore new ways of improving watermarks.



PIXEL WATERMARK

## VISION™ WATERMARK, A BRAND-NEW TECHNOLOGY FOR HIGH DEFINITION

Vision™ watermark is the latest development in watermark technology. It is an attractive watermark with greater definition and more detail than conventional mould multitone watermarks. The outlines of the images are finer and sharper. The watermark becomes closer to reality offering better



authentication and improved security. Vision watermark provides higher contrast thanks to the enhanced intensity of the black and white areas. It is remarkably luminous and bright.

An innovative manufacturing method has been developed to attain this level of precision. Through this technique, it is possible to control the distribution of the fibres better as well as their accumulation on the mould cover.

### A USER-FRIENDLY SECURITY FEATURE

In addition to the proven security benefits provided by all watermarks, the Vision watermark brings more realism and allows better image recognition. Authenticating a banknote becomes easier. Aesthetic enhancements are stunning and make the Vision watermark an even more user-friendly feature for banknotes.



VISION WATERMARKS

Vision can be combined with a classic multitone watermark, Pixel and electro-type watermarks. It behaves like a traditional watermark and is compatible with all printing processes and banknote processing machines.

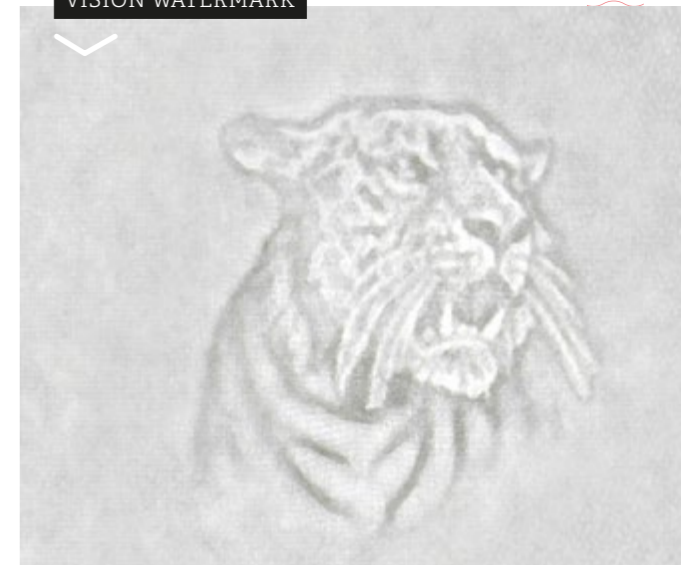
### A DESIGNER-FRIENDLY FEATURE

With its endless design possibilities, the Vision watermark will inspire banknote designers. It can be integrated smoothly and easily in an existing or brand new note, enhancing the overall banknote design. Vision watermark brings more value to the design and creates confidence.

The watermark remains a reliable and proven security feature. To fight against counterfeiting, innovation must be continuous. With the Vision watermark, a new era of high definition security features has arrived, keeping up with the observed trend for more realism and aesthetics in

banknote design. With Vision watermark, authentication is easier and security is increased. «

VISION WATERMARK



ARJOWIGGINS SECURITY  
Ms. Thavi Kingsada  
E-Mail: [thavi.kingsada@arjowiggins.com](mailto:thavi.kingsada@arjowiggins.com)  
Website: [www.security.arjowiggins.com](http://www.security.arjowiggins.com)

### ABOUT ARJOWIGGINS SECURITY

Arjowiggins Security is a recognised expert in the currency industry, with more than two centuries of experience in designing and manufacturing banknote paper. Our mission is to enable central banks to maintain public confidence in their currency. We strive to offer to central banks state-of-the-art paper that will meet their needs with the highest standards of security, quality and durability.

Technological innovation is a priority for us. The expertise of a dedicated research center and the know-how of our papermakers allow us to propose a wide range of products, from high durability substrates and innovative watermarked papers to security features such as threads that integrate the latest technologies in optics and security. Arjowiggins Security is the trusted partner of over 140 countries.



LANDQART

DURASAFE®:  
THE PLATFORM FOR  
SECURE AND DURABLE  
BANKNOTES

TENGE 20,000 KAZAKHSTAN

# Durasafe®: The platform for secure and durable banknotes

LANDQART

By the time you're reading this article, there will be more than a quarter of a billion banknotes printed on Durasafe in circulation – the 25 Dirham in Morocco, the 20,000 Tenge in Kazakhstan, and the Swiss 50-franc, which was joined on May 17th by the 20-franc banknote, the second denomination of the ninth series to be issued. It's an encouraging start for our paper-polymer-paper composite substrate. But it's just the beginning, and with each conversation we hold with our existing and potential customers we learn new lessons. We would like to share with you some of these experiences.

## LESSON 1:

**Durasafe is a technology platform, not a product**

As a material, the three layer structure offers nearly infinite possibilities for incorporating design and security features. Whether, as in the 20,000 Tenge, it is different paper tints on each side of the note to compliment the design, or different security fibres on each side, or the way the windows and images on the obverse and reverse come together in transmission to form a third image, Durasafe lends itself to creativity. This unique structure means that Durasafe is an ideal platform for using tried and tested security features in novel ways – and for developing new ones. Picture, if you will, a wide security foil that is inside the substrate, revealed by a series of windows along its length making it visible in reflection, while the demetalisation appears in transmission. Or imagine using the manufacturing process to add covert taggants, such as Authentix's Jewel, into the polymer core. This would reduce the risk of uprating denominations by stripping and re-applying the print, and would maximise the detectability of composite counterfeits. And all this is before we start to explore the

possibilities offered by the window itself as a carrier of diffractive structures, printed lenses, printed moiré screens, and how it can be used to integrate them into the overall design of the note.

## LESSON 2:

**It is a substantial material, but it still feels like paper.**

Durasafe is a 105gsm substrate. While it feels more crisp, it still has the traditional tactility that the public is so accustomed to noticing. The crispness does not detract from the public's experience with the note, on the contrary, the notes are resilient, stack neatly, and fold into pockets and wallets just fine. From a machine handling perspective, the experience in Switzerland has been positive: the notes are accepted and processed by banknote counters and sorters with minimal adjustments (to account for the new size of the notes, and co-circulation with the previous series of notes). Handling in ATMs and accepting/dispensing/ recycling mechanisms has been trouble free, with no need for mechanical adjustments, and an additional bonus that in free-drop note accepting units the greater rigidity helps the notes to stack well as they don't fold over as they drop.

It has been noted that a stack of 50-franc notes is taller than the old series. However, this may be in part due to the particular complexity of the Swiss note, and experience suggests that this change has been taken in stride. The similarity to regular cotton banknotes means that the costs and disruption involved in changing substrate are kept as low as possible.

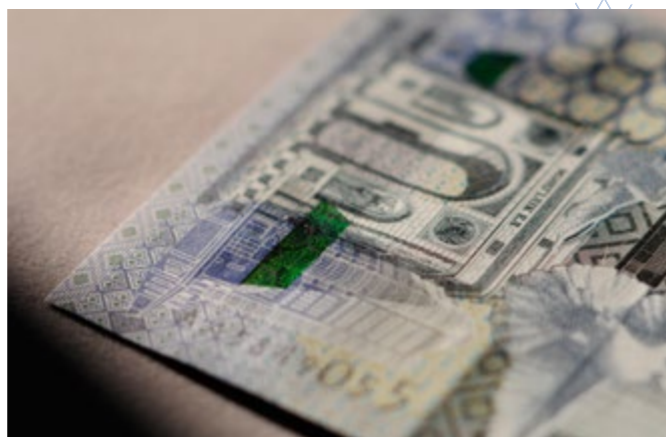


**LESSON 3:**

**You can use regular threads in Durasafe**

As with regular cotton banknote paper, the unintended consequence of keeping the

thread in a single position is that the ream shape can become uneven, the cut notes adopt a wedge shape when stacked, and it can complicate cutting the ream into notes. To overcome this, as with regular cotton paper, the thread should be oscillated to ensure a smooth and even printing surface. This allows us to incorporate almost any thread that is available in the market into Durasafe. What's more, because the windowing of the thread is achieved by creating a window in the paper layer to expose the thread, there is huge flexibility around how many windows are used, what shape they are, and where on the note they can be. As a result, it is possible to better integrate the thread into the overall design of the note, all the while ensuring a smooth and flat printing surface.



**LESSON 4:**

**It's a very strong material, but you can get rid of it!**

While it would be nice to say that Durasafe banknotes last forever, unfortunately it's not the case. Like all notes, they deteriorate over time, and will eventually be removed from circulation and shredded. Extensive testing, and real life experience, has shown that the notes can be shredded using on- and off-line systems with little to no trouble. The type of polymer used in Durasafe means that the shredder blades don't gum up in operation. The fact that the polymer is fused with the paper means there is less dust generated when shredding the notes, and the relatively small quantity of polymer used in the notes allows the waste to be briquetted in the same way as cotton notes. Use of landfill is not permitted in Switzerland, as a result, the majority of our experience with Durasafe waste involves incineration.

We have found that the shred lends itself well to use in thermo-electric plants: the energy content of Durasafe is approximately thirty percent greater than plain cotton banknote paper. The shred can also be used as a supplementary fuel in cement kilns (it has roughly half the energy content of the heavy fuel that is normally used), where the ash is highly compatible with cement. In both applications the shred is superior to the traditional raw materials as it is free of heavy metals and other noxious substances, and the emissions (water, CO<sub>2</sub> and NO<sub>x</sub>) are also non-toxic. Looking ahead, we have identified waste management technologies that would allow the shred to become a raw material for biochar, or high value chemicals, making a waste product into a potential source of revenue.

**LESSON 5:**

**It may be the best of both worlds, but one-size does not fit all**

The original concept for Durasafe was to find a way of integrating clear windows into a paper banknote in a way that allowed them to be located anywhere on the note. Research indicates that seethrough windows offer a strong level of security, something that the proliferation of window technology for paper banknotes appears to support. In addition, the security of Durasafe windows is reinforced by its structure: it cannot be copied by applying a film over a hole in the substrate without looking and feeling immediately suspect. Viewing Durasafe as a platform for the development and implementation of novel, emerging technologies, directly addresses the security requirements of high denomination (store of value) banknotes.

These security benefits may resonate for high denominations, where the stakes are highest, but they may seem over the top when considering market (or transaction) notes. In this context, a Central Bank's requirement is often to maintain a suitable level of security, while enhancing durability as much as possible. Durasafe's polymer core greatly enhances its mechanical strength: compared to regular cotton paper, tear resistance is more than two times greater, double fold resistance is six times greater, and porosity (even after crumpling) is zero. After a year in circulation it is too early to tell what impact this has had on the Swiss franc, but the experience of the Moroccan 25 Dirham showed that it took more than three times longer for the note to be deteriorated (torn, folded,

limp) to the point of withdrawal from circulation than the plain paper equivalent. And even then the Durasafe notes could be machine sorted.



familiarity it offers all the stakeholders in the cash cycle. For the general public, it retains all the features – watermarks, thread, and intaglio tactility – that they have always been taught to check for as the front line defence against counterfeits. Cashiers and cash handling professionals also benefit from this continuity, but in addition they receive a more robust substrate that will perform well in cash handling machinery for a longer period of time, and that will be quicker and less costly to adapt for than the alternatives. The printers will welcome the ease with which they can work with Durasafe on their presses, and the speed with which they can transition an existing banknote design onto Durasafe; they are, after all, printing on a better version of the cotton they know so well. For the Issuing Authority the benefit, beyond greater security and durability, lies in reduced change management brought about by this familiarity. Durasafe banknotes can be as simple or as complex as they wish, but the finished product will always retain the fundamental characteristics that they have relied on for so long. «

Durasafe as a platform is flexible enough to address both ends of the banknote spectrum, but what makes it the best of both worlds is the ease with which it can be integrated into a family of notes, and the

**LANDQART AG**

Mr. Richard Perera  
E-Mail: richard.perera@landqart.com  
Website: www.landqart.com

ADVERT



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

*The definitive forum on emerging trends and leading technologies in the banknote industry*

*Registration is open!*

**BANKNOTE 2018**  
May 21–24, 2018  
Dallas, Texas | USA

Join your fellow international industry stakeholders at Banknote 2018 in Dallas, Texas from May 21–24, 2018, as we deliver in-depth insight and expert knowledge encompassing critical aspects of banknote design, production, issue, and usage.

*Banknote 2018 Highlights*

- Presentations and panel discussions from Central Banks, Issuing Authorities, industry experts, and leading industry suppliers, focused on banknote-related technology
- Tour of the Bureau of Engraving and Printing, Western Currency Facility in nearby Fort Worth
- Tour of the Federal Reserve Bank of Dallas' 11th District cash operation
- Presentation of the International Association of Currency Affairs (IACA) Excellence in Currency Awards | Technical Awards
- Generous time allotted for connecting with peers
- The Fairmont Dallas Hotel, located in the lively Arts District in the heart of cosmopolitan Dallas—close to restaurants, shopping, and more.

Visit the website for more information:  
[www.banknoteconference.com](http://www.banknoteconference.com)



CRANE CURRENCY

THE FUTURE  
OF MICRO-OPTICS  
AND STATE-OF-THE-ART  
SECURITY

# The future of micro-optics and state-of-the-art security

## CRANE CURRENCY

Since the first launch of MOTION® security technology, Crane Currency's micro-optics solutions have been universally recognized as the state-of-the-art counterfeit deterrent technology. MOTION has never been counterfeited or even successfully simulated, despite being in some of the world's most valuable banknotes.

### AN INDIFFERENT FIRST LINE OF DEFENSE

The public is widely regarded as the first line of defense against counterfeiting. Yet central banks know that the public is reluctant to play this role. Moreover, the public has limited knowledge about the security features they should check.

A central bank's investment in public education produces an increase in knowledge of a banknote's security features, but studies show that this knowledge lasts only as long as the educational investment continues. Trust in banknotes is generally high and the motivation to authenticate them is low. Accomplished counterfeiters understand this and seek to exploit it. This characterizes the challenge of central banks: to seek out and deploy security feature technology that is an effective first line of defense.

The design of the modern banknote should therefore present clear and

significant obstacles to the would-be counterfeiter and provide the public with unambiguous and simple means of verifying authenticity.

### SECURE MATERIALS, SECURE PROCESSES

The engineered raw materials and production equipment which Crane uses to produce micro-optic features do not exist elsewhere. This means that a would-be counterfeiter has no starting point, no commercial materials available to simulate the feature credibly.

These secret, purpose-built processes produce billions of lenses per minute. Each lens shaped specifically to focus on an even smaller, customized icon below it. Unvarying separation and angular control over these components ensure focus and legibility. The result is an optical system that achieves what the security feature industry has sought for decades: distinctive image animation and fluid movement.

## MOTION

MOTION incorporates a micro-optic structure that includes three optical components: a micro-lens array, an optical spacer and an image array. The MOTION images you see when you tilt the banknote are actually smaller than any micro-print. The secret is that precise alignment of the micro-optic lens array with the image array makes the images appear hundreds of times larger than their actual size.

MOTION is woven into the paper, its moving images are framed within rectangular windows, appearing and disappearing from within the center of the substrate. The high contrast images are visible in any light.

## RAPID®

RAPID® is the result of continuous technology development and gives additional optical effects in a highly durable and soil resistant feature.

### SOIL RESISTANT AND DURABLE

RAPID® uses a sealed lens array that allows the use of both top side adhesives and post-print varnish. This allows banknotes with RAPID® to be especially useful in harsh circulation environments and in lower denomination, high volume transactional banknotes.



MOTION



RAPID®

Patterns that move opposite to one another in a quick and captivating manner are possible. Numbers, letters, pulsing shapes, custom images, and a variety of colors are all possible with RAPID®, making each application unique but still easy for the public to authenticate.

## VARIOUS OPTICAL EFFECTS

Crane Currency micro-optic features create eye-catching images and intuitive effects to provide central banks with easy public authentication solutions:

**Linear image movement** where images move in response to banknote movement

**Rotational movement** where images appear to rotate when the note is tilted

**Image changes** where images appear to turn 'on' and 'off' or to change to another

image, either immediately or gradually, when the note is tilted.

**Depth** where images appear to lie either above or below the plane of the banknote.

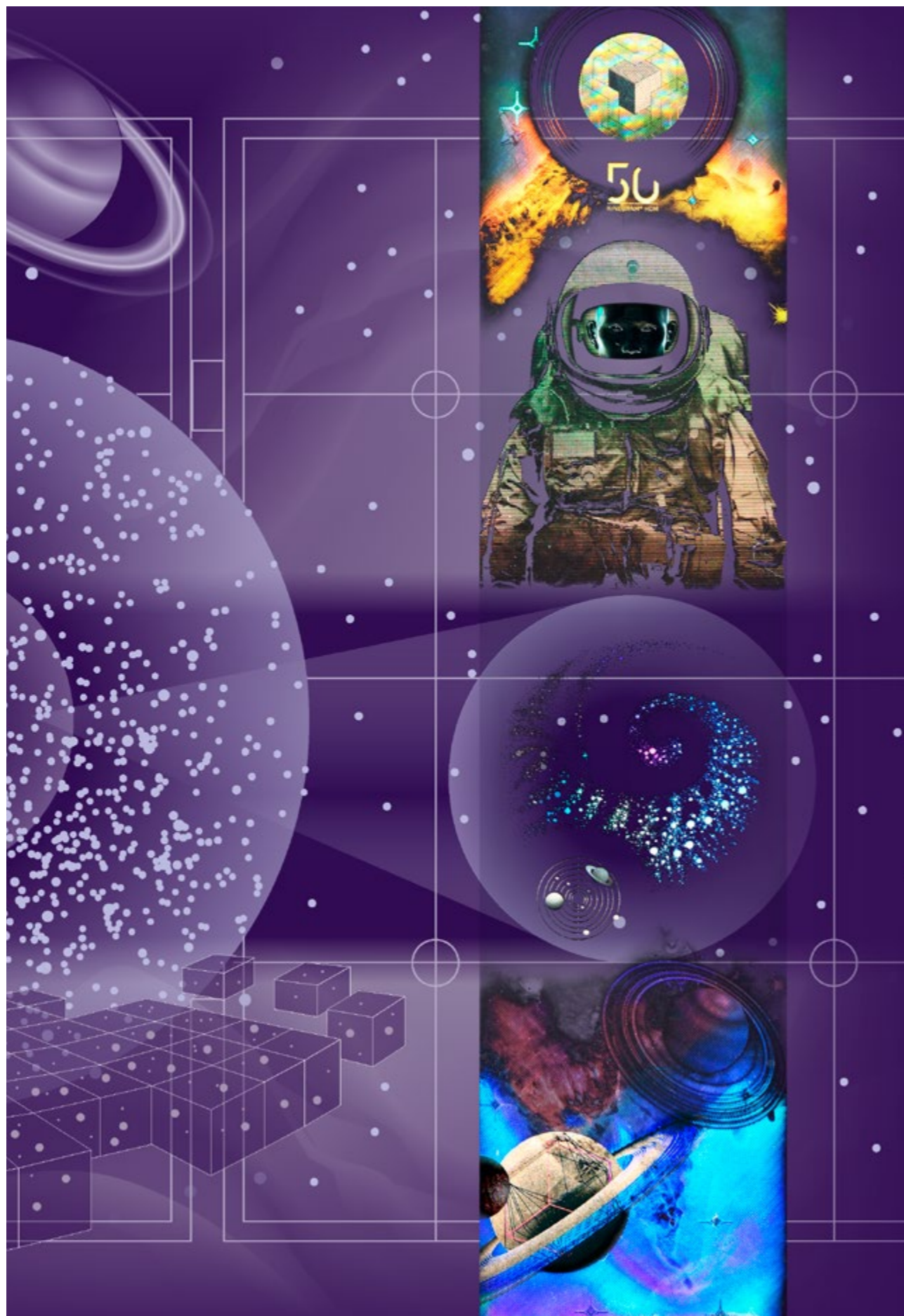
**Topographic effects** where images can appear to take on a three-dimensional representation, and move as if being viewed underneath a magnifying glass, or flowing along a complex surface. <<

### CRANE CURRENCY

Mr. Craig Conrad  
E-Mail: [craig.conrad@cranecurrency.com](mailto:craig.conrad@cranecurrency.com)  
Website: [cranecurrency.com](http://cranecurrency.com)

Crane Currency has been awarded 'Banknote and Currency Service Provider' of the year 2017 by Central Banking Publications





KURZ

OPTICAL TECHNOLOGY  
 AND FOIL KNOW-HOW  
 FOR MAXIMUM SECURITY –  
 THE KINEGRAM® UNIVERSE

# Optical Technology and Foil Know-How for Maximum Security – The KINEGRAM® Universe

KURZ

Whereas “digitization” and “going cashless” seem to be the new buzzwords in media all across the globe, and some central banks are publicly supporting a reduced use of cash in favor of other payment means, nevertheless the actual number of banknotes in circulation continues to remain stable, or is even on the rise in many countries. Consequently there is a continuous need to secure cash against the threat of counterfeit, not least against the growing misuse of technological advances in our digital age.

The banknote industry has reacted by launching more and more security features at ever shorter intervals. Established companies are trying to diversify their portfolios by venturing into the manufacture of previously unfamiliar security features, and new players are trying to enter the field with apparently interesting, but often technically unproven innovations. Promises and claims about the uniqueness and security of the underlying technologies need to be evaluated with caution.

It is reassuring that few, if any, central banks have been seduced with a dubious new feature, as they understand that there is much more to a security feature than its novel look or innovative character. The majority of new banknotes or banknote series issued over recent years

are equipped with reliable and well-tested, state-of-the-art security elements which can easily be communicated to the public and used to check the authenticity of banknotes. At the same time, they do not compromise on presenting an ever-higher barrier to the counterfeiter.

## INNOVATION BACKED BY EXPERIENCE

A quick look at two examples, the “Brighter Money” series in New Zealand and the new 20 Euro note of the European Monetary Union, illustrates this point. In both cases, the issuing authorities were looking for highly innovative, groundbreaking security features. Hundreds of available features were critically evaluated under various categories such as difficulty

of counterfeiting, ease of verification, durability and cost. Among the most important factors were also the track record and experience of the features' suppliers. Besides the novelty and merits of the feature itself, the resilience of its supply chain is of major importance. This includes the reliability and the production capacity of the potential supplier. Is there a proven track record of successfully bringing novel features to market within reasonable timelines? Can the company produce high quantities of the feature in reliable quality and within tight schedules?

The third factor to take into consideration is the know-how and technological expertise of the supplier. A central bank can both demand game-changing new security features to stay far ahead of the counterfeiter, and remain confident about their supply chain, by teaming up with the right industry partners. As such, these partners will distinguish themselves by proposing features created with the use of one or more highly sophisticated, well-established and unique platform technologies.

### INDISPENSABLE ASSET: AN UNIQUE TECHNOLOGY PLATFORM

The KINEGRAM® technology proposed by KURZ is a paradigm technological platform. Firstly, at its base are the proprietary origination process used to generate optical structures which cannot be created by any commercially-available means. It is important for a Central Bank to ensure that the optical structures and technologies in a security feature are not available for commercial, nonhigh-security applications. Secondly, the structures and technology are

unique, as should be the case to allow for maximum security, and are able to create correspondingly inimitable optical effects. Generally, the versatility of optical effects is greatest in surface applied foil features because of their diffractive structures which can be combined with further effects, and their large and prominent visual areas. Thirdly, an optimal technology platform such as the KINEGRAM® must be capable of offering multiple possibilities for constant evolution and innovation, resulting in a wide choice of very different security effects. This means that even the most demanding design or production requirements can be met with a suitable product from the extensive portfolio of options.

However, it is not only the optical technology which counts. The reliability and competency of a supplier can be assessed by its track record, i.e. by the number and quality of its references in live banknote projects. KURZ is not only one of the world's largest producers of foil for surface applications, but is also preferred foil supplier for many important banknote series such as the Euro, the Swiss Franc and the English Pound. These leading issuers judged the company's capabilities with an assessment of its strong expertise in the chemistry of foil formulation and in foil application technologies. Central banks should ensure that their supplier has the required high level of expertise and experience in this regard. Surfaceapplied foil, and indeed any surfaceapplied security feature, requires very complex technical know-how and sophisticated skills in project management.

For every banknote project the foil chemistry must be formulated precisely to

fit the banknote substrate, the application equipment, the printing process sequence, and the specific circulation conditions. In order to avoid problems in circulation, the foil formulation and the durability requirements should be individually defined for every new banknote or, far more complex, entire new series. Above all else, the adhesive strength of the foil, only one among many requirements, must be ensured. The individual circumstances of where the foil will be applied – at either the paper mill or the banknote printing

plant – and the machine used for the foil application must also be taken into account by the foil supplier, in order to ensure a smooth and stable workability of the foil during the application process. Finally, but very importantly in view of today's typical public procurement and tender procedures, it is preferable for a central bank to work with independent foil suppliers, who can deliver their features to any private-sector or stateowned banknote printer or substrate producer, or to their production process and application machinery.



NEW SAMPLE NOTE WITH KINEGRAM® HDM TECHNOLOGY. ©KURZ 2017

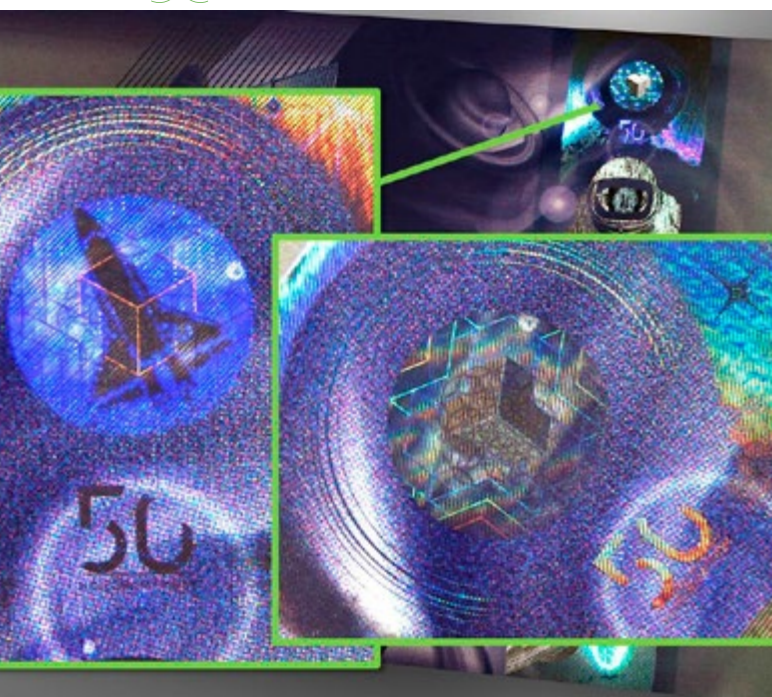
## NEW DEVELOPMENTS ON A STABLE BASE OF EXPERTISE

The Currency Conference 2017 will see the unveiling of a variety of newly developed KINEGRAM® products. Among these is a sophisticated, innovative technology for partial metallization of foil features called KINEGRAM® HDM. This High Definition (partial) Metallization technology opens up new possibilities for integrating a foil feature into the banknote design, allowing, for the first time ever, the creation of metallic designs and patterns with a line resolution down to 10 microns. This is a significant novelty in the security foil industry and proposes greater freedom for banknote designers. Even more importantly, the technology allows the inclusion of first, second and third line security in a single feature. The new technology will be presented by KURZ on a new house note.



KURZ is collaborating with KBANotaSys, LenSys and other industry partners on the new SUSI Optics™ feature, by incorporating perfectly shaped lenses onto a surface-applied foil. The resulting security feature is currently aimed at polymer banknotes, and provides a unique optical appearance distinguished by fully customizable multi-color designs and a range of visually striking effects including color switch, 3D movement, morphing, and depth.

The FLUX effect is a further novelty to be unveiled at the conference. This bold eye-catching feature is a complement to the portfolio of KINEGRAM optical effects and allows for a wide range of very pronounced movement effects to be incorporated into foil devices. The technology is uniquely eye-catching and enhances the intuitive recognition of the security feature by the general public. It can be combined with color and is suitable for all types of banknote substrate as well as window solutions.



SAMPLES FOR KINEGRAM® FLUX EFFECT. ©KURZ 2017

Finally, KURZ will be presenting the COSMIC effect, a metallic color shift integrated into the KINEGRAM® design, adding a further security component into the foil. The technology offers a large variety of different color shifts and can easily be combined with other optical effects. It is even possible to realize several different color shifts in one single security element. Very easy integration into a modular banknote concept is a further advantage.

## EXPERIENCE MAKES A DIFFERENCE

From both a technological and a security point of view, teaming up with experienced partners is the key to a successful launch of new banknotes and banknote series incorporating new and innovative security features. This is especially true for complex security features such as surface-applied foil devices. Central Banks should select

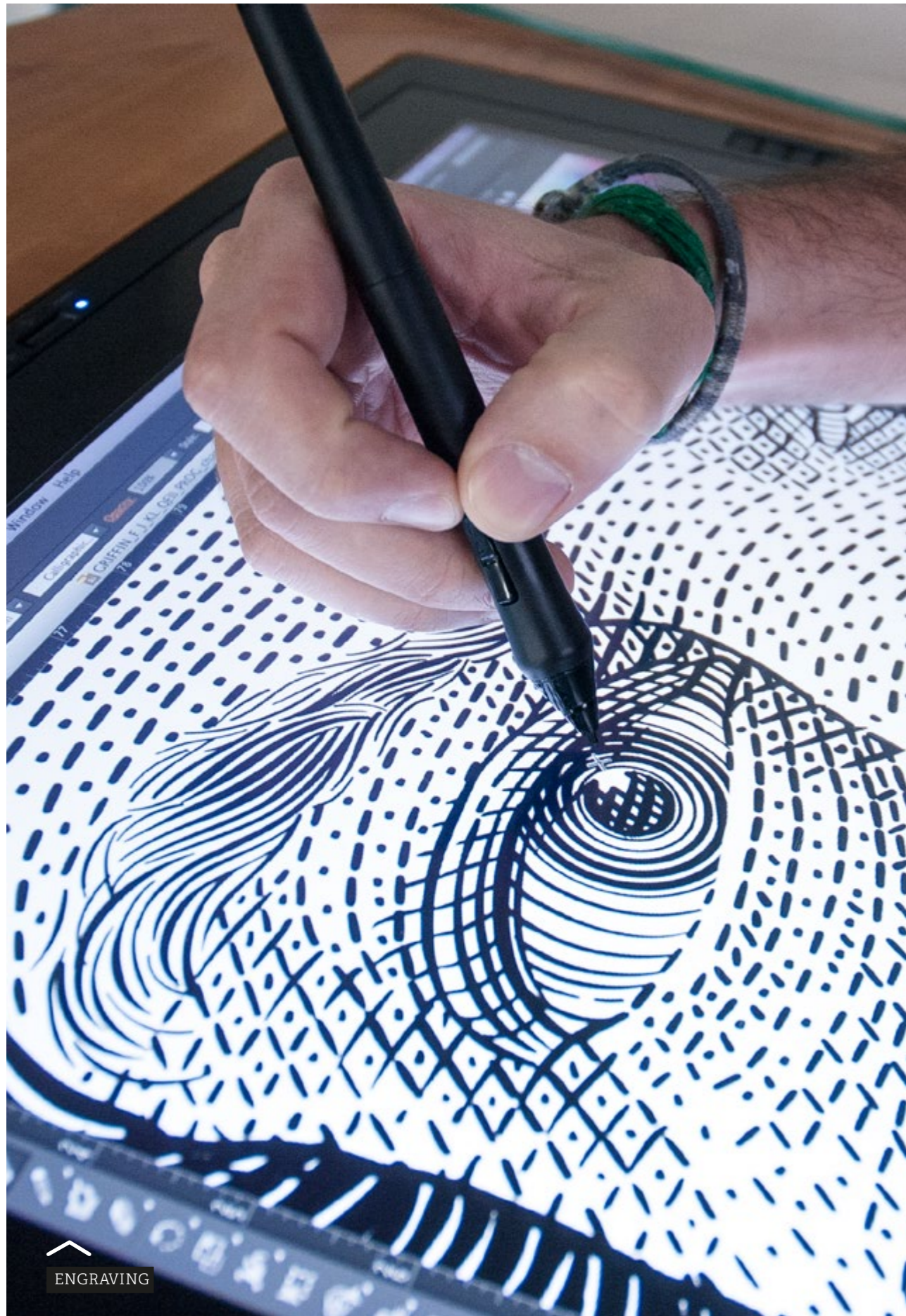
partners who have a proven track record in bringing robust and innovative security features to the market in relevant volumes, on time, and in conformity with all the quality and performance expectations of the bank and its banknote printer. The supplier should have a technology which is suitable for adaptation to different conditions and the corresponding know-how to do so, experience in live projects, and the production capacity to accommodate several large-volume, maximum priority projects at any given time. An analysis of the core know-how, references and capabilities of the potential suppliers will enable a central bank to identify the right partners. «

LEONHARD KURZ Stiftung & Co. KG

KURZ Banknote Security

E-Mail: [banknote.security@kurz.de](mailto:banknote.security@kurz.de)

Website: [www.kurz.de](http://www.kurz.de) | [www.kinegram.com](http://www.kinegram.com)



ENGRAVING

## NOTE PRINTING AUSTRALIA

# THE NEW AUSTRALIAN \$5: A PRINTER'S PERSPECTIVE

# The New Australian \$5: A Printer's Perspective

NOTE PRINTING AUSTRALIA

Australia's new polymer \$5 banknote, issued on 1 September last year, is a shining example of innovation that pushes technological boundaries. It was recently named 2016 Regional Banknote of the Year at the HSP Asia conference in Singapore for its effective integration of complex security features with designs that reflect the country's cultural heritage.

The successful production of one of the most technologically advanced polymer banknotes in the world was not the only rewarding outcome. For Note Printing Australia (NPA), the challenges encountered and dynamic solutions using complex manufacturing processes achieved along the way were invaluable.

The new Australian \$5 banknote is the first denomination in a new series being rolled out by the Reserve Bank of Australia (RBA). The new series includes a range of cutting-edge security features that will help to keep Australia's banknotes secure against counterfeiting.

Being the first new series to be developed in almost 25 years, the project entailed a number of challenges. In response to the RBA's complex requirements, NPA has embarked on a journey to utilise its full production capability.

These requirements provided challenges across the entire supply chain. In every case NPA was able to rise to the challenge and provide innovative solutions to contribute to the successful release of one of the world's most ambitious, complex and unique banknotes.

A major achievement has been the introduction of a new tactile feature, consisting of raised bumps along each

of the long edges of the banknote, to assist the vision-impaired community. Additionally, the complexity of windows on the banknote also required NPA to adopt new production processes in order to screen print the SICPA SPARK Live® patch over a half window and to apply KURZ KINEGRAM ZERO.ZERO® foil on the world's first top-to-bottom window.



COLOUR CHANGING EASTERN SPINEBILL



SPARK LIVE PATCH

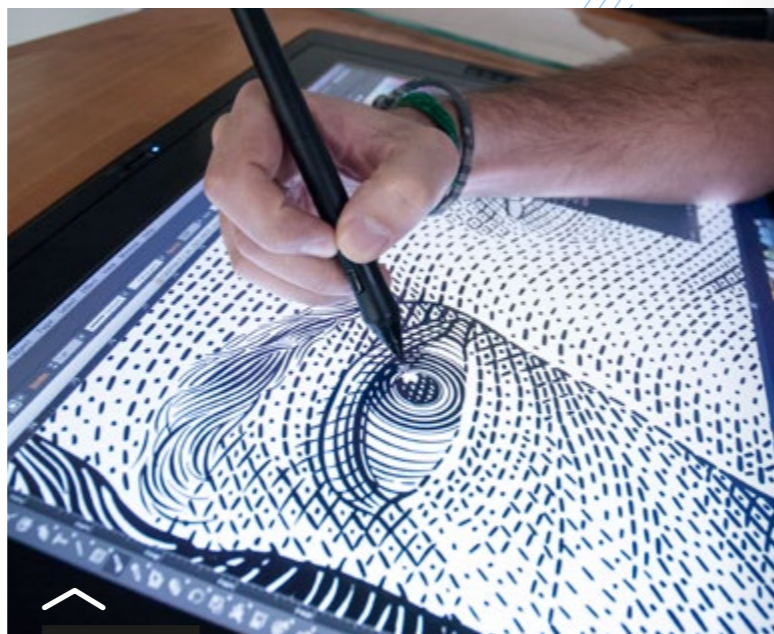
## DESIGN DEVELOPMENT

NPA's design team was tasked with designing a production-ready banknote from conceptual design developed by an external studio in Australia on behalf of the RBA. While the trend, internationally, in polymer banknotes has been towards larger windows, a complete top-to-bottom window design had not been successfully achieved before. Not only was the inclusion of such a window a world-first, the original wattle design that was proposed proved impossible to interpret for the gravure process. As a result, NPA had to simplify the detail and generate a composition that was more recognisable and manufacturable.

A secondary complex window was integrated with gravure, offset, intaglio and screen (Optically Variable Magnetic Ink) processes to produce a new level of complexity relating to the SPARK® feature, which appears in the shape of an Eastern Spinebill. The patch was upgraded to SPARK Live® shortly after its introduction by SICPA and the new \$5 was one of the first

banknotes in the world that showcased the rolling colour effect from both sides of the banknote. Overall, registering multiple processes in one feature was iterative and complicated, but resulted in a cohesive and layered design solution.

A new approach was also taken for the intaglio artwork for the portrait of Queen Elizabeth II and Parliament House. The original reference photograph for the Queen from the existing series was used to produce new hand drawn engravings with finer line fidelity.



ENGRAVING

Extensive experience and knowledge in maximising intaglio print volume and quality on polymer substrate has always been one of NPA's strengths. With the use of Computer to Intaglio Plate (CtIP) technology and numerous trials, NPA has been able to achieve a high standard of intaglio volume, height and tactile performance on the new \$5 banknote.

## PRODUCTION CAPABILITY

### / OFFSET

The production artwork developed for the new series was engineered to exploit the full registration capability of the pneumatic clamping system on KBA-NotaSys's Super Simultan IV, which is the first of its kind. The press has additional ultra-violet (UV) cure print units as well as the capability to print both wet and dry offset, all of which were utilised in the new designs. The plate-to-plate system allowed for near perfect plate registration and efficient setup. Through numerous iterative trials, NPA was able to achieve secure line work and registration that is extremely complex. The print output positioned the new series in a realm of registration and print fidelity that simply could not be achieved utilising commercial offset printing equipment.

these elements glow green under UV light and the year of print is phosphorescent yet invisible in daylight. One of the main challenges in this process was defining the upper and lower limits for the year of print feature while optimising the capabilities of the KBA-NotaSys Super Numerota III press. By studying the optical chemistry in relation to the background offset colours, not only was production capability maintained but the year of print was rendered an additional security validation tool alongside the serial number.



YEAR OF PRINT



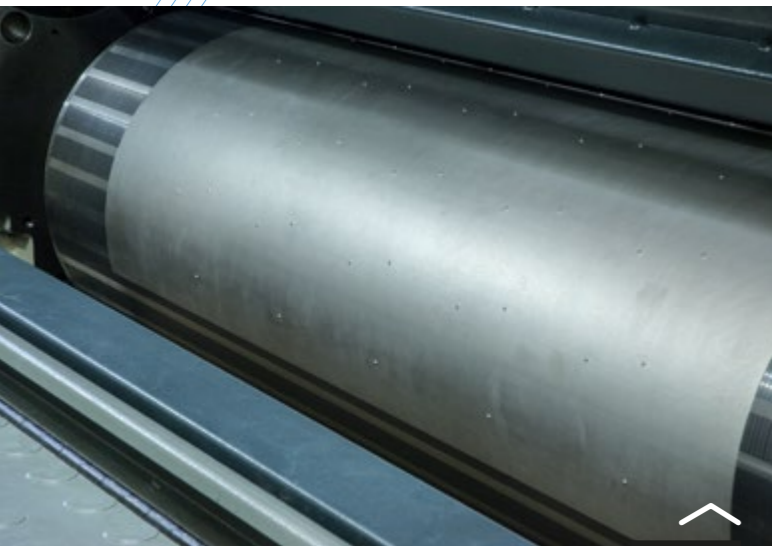
UV PHOSPHORESCENT PATCH

### / VARNISH

The bespoke, 22-metre long NotaProtector has the capability of applying three security features consecutively. These include two UV phosphorescent patches and an infrared-absorbing overcoat varnish over the window and foil. In addition to this, another coat of varnish is applied to the opacified area rendering a complex design at the intersection of the two coatings.

### / LETTERPRESS

The serial number and the year of print are printed at the numbering process. Both of



EMBOSS

been retained, but the new \$5 banknote goes another step further with the introduction of a tactile feature.

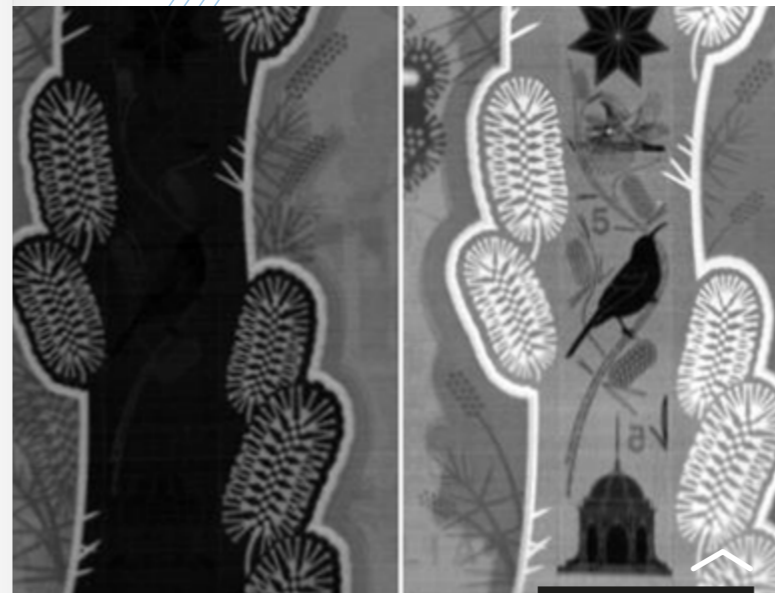
While the tactile feature is not braille, NPA sought guidance from Vision Australia to better understand the community's needs in relation to braille standards when developing the feature. The effectiveness and durability of tactile features produced with intaglio, screen printing and embossing substrate directly with metal were compared. Feedback from focus groups conducted by the RBA, led to the implementation of an embossed production process. NPA worked in collaboration with three suppliers sharing its know-how and experience on the tooling and press conditions to finally develop the very first KBA-NotaSys NotaEmboss machine. Now a dedicated press, the NotaEmboss can apply emboss elements in any position on a banknote, at full line speed.

**/ TACTILE EMBOSS**

Australia's banknotes have long included features to assist the vision-impaired community, such as size differentials, strong colour contrasts and large bold numerals. These existing features have



NOTAEMBOSS



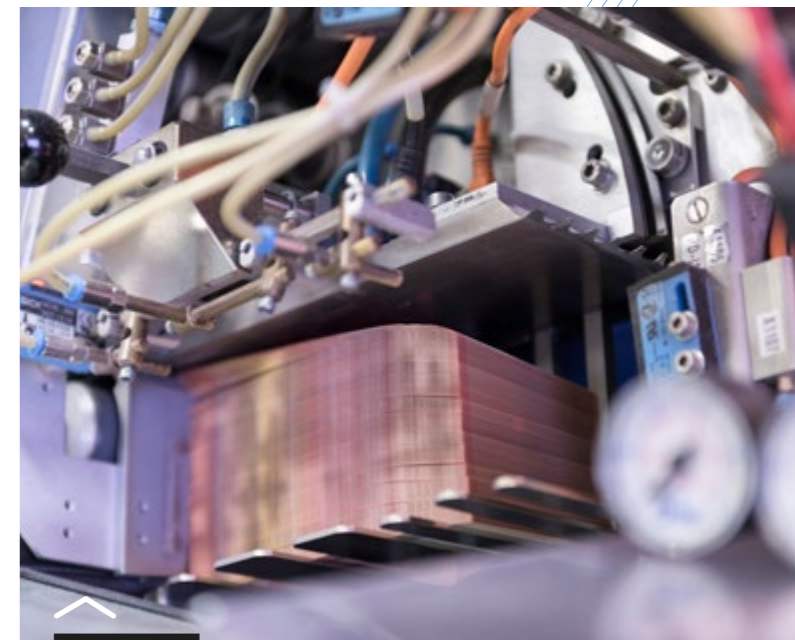
FOIL INSPECTION

**INSPECTION**

The new \$5 banknote features KURZ's KINEGRAM ZERO.ZERO® partially demetalised foil that contains a number of dynamic diffractive elements in the top-to-bottom window. These elements are visible on both sides of the banknote and change colour as the banknote is tilted. Besides aiming for consistent application at press level, the capability of out-sorting defects in the foil was a challenge due to reflection of light. It was important for NPA to maintain high quality standards, and so resolving the challenge of foil and top-to-bottom window inspection became paramount. An in-house solution was developed whereby the image, taken by the Banknote Processing System's camera, was improved significantly by manipulating the direction of light towards the sensor. Not only was this technology cost-saving, but it has also allowed NPA to maintain existing inspection capabilities. This includes retaining the ability to out-sort scratches, scuffs and surface defects in the foil and overcoat.

**THE FUTURE**

The Australian \$5 banknote is the first denomination in the new series, with the remainder to be released in subsequent years. It has been a stimulating journey and a project that has tested and proven NPA's capability in many different aspects. Innovative thinking and collaboration within a team that hold a variety of different skills has allowed NPA to solve many challenges that will set the foundations for the future. Consequently, NPA has been able to deliver a state-of-the-art banknote and created another timeless legacy. <<



FINISHING

**NOTE PRINTING AUSTRALIA**

Mr. Nuwan Kalpage  
 E-Mail: [Nuwan.Kalpage@npal.com.au](mailto:Nuwan.Kalpage@npal.com.au)  
 Website: [www.noteprinting.com](http://www.noteprinting.com)





PHILIPPINE 500 PESO NOTE

SURYS

DID™ REACHES  
5 BILLION+  
IN CIRCULATION

PHILIPPINE 1,000 PESO NOTE

# DID™ reaches 5 Billion+ in circulation

SURYS

15 years after its original launch, the DID™ still fascinates experts with its exceptional easy to catch/easy to authenticate properties based on a two color permutation when rotated at 90 degrees.

Over the years, SURYS has adapted this unique nano-technology to mass production and made it compatible with the durability properties required for banknotes. By the end of 2017, there will be more than 5 billion devices in circulation.

## HOW DOES SURYS CREATE GREATER CONFIDENCE IN THE VALUE AND AUTHENTICITY OF MONEY?

Confidence in the value and authenticity of money is critical for trade and a functioning society. Each banknote is like a piece of trust, reflecting a country's identity, its culture, its values and its people. In a world increasingly looking for dematerialized solutions, banknotes continue to be one of the pillars of the stability of countries. Therefore, banknotes must be not only produced safely in very large volumes,

but must also carry the most efficient and robust security features, easy to control by the general public.

SURYS has recently added movement and 3D effects on the DID™ in order to make public control again easier and more effective. The Wave and Virtual effects have been introduced in the Polish 20 Zloty commemorative note.

## TRANSCENDING COLOR PERMUTATION

### Wave effect

When the note is tilted up and down, the wave effect simulates a ripple effect over the patch, stripe or thread giving the impression of continuous movement. Rotated at 90°, the two colors permute and maintain the wave effect. This additional visual effect can be integrated in a patch, stripe or thread, to enhance an easy to authenticate design.

**Visual effect**

Combining DID™ nanostructures with ultra-thin reflective Fresnel micro-optics brings a captivating 3D animation to the DID™ color permutation when rotated at 90°.

This virtual 3D effect maintains the first level of security with the color permutation properties of the DID™ and the polarization control as the second level security feature.

These optional effects – Wave and Virtual – reflect our passion for easy-to-control visual elements, based on deep R&D,

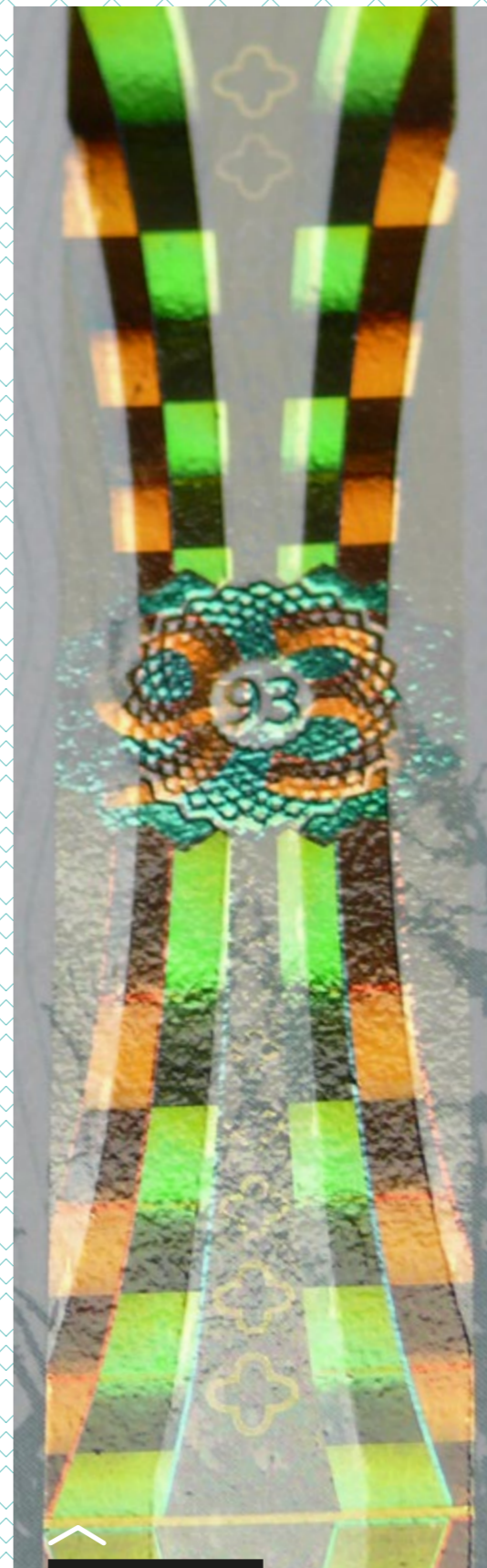
which is in our genes. Launched in 2016, the Collector Banknote for the 1050th Anniversary of the Baptism of Poland combines these two optional DID™ features.

SURYS is convinced that the capabilities of mass production of nano-structures based DOVID's will play a major role in the authentication of banknotes in the future.

Being already a pioneer in that field, SURYS is committed to continuously invent, develop and offer new high security solutions for banknotes. ‹‹



COLLECTOR BANKNOTE, 1050TH ANNIVERSARY OF THE BAPTISM OF POLAND



DID™ WAVE STRIPE

**SURYS**

Ms. Marie-Sophie Bellot  
E-Mail: [contact@surys.com](mailto:contact@surys.com)  
Website: [www.surys.com](http://www.surys.com)



P W P W

# "CHESS" – NEW PROMOTIONAL NOTE OF PWPW

(IN COOPERATION WITH SICPA AND JURA)

# “CHESS” – new promotional note of PWPW

(in cooperation with SICPA and JURA)

PWPW

The latest promotional banknote produced by Polish Security Printing Works shows how to get a completely new security features via using conventional printing techniques.

‘C’hess’ note shows the design and technological potential of PWPW, the use of special inks manufactured by the world leader in this industry – SICPA and broad possibilities offered by JURA software. International cooperation of three well-known and respected players in the world has resulted in a unique product.

Promotional or test note printing not only creates unlimited possibilities in the design, but above all, it gives an opportunity to show a completely new security features, not used in circulation

and collector notes so far. Such banknote is the best reference for PWPW – it presents technical and technological advancement of the company in a unique way.

Graphic design of the entire banknote is maintained in the theme of the game called ‘chess’. Among the graphic elements there are chessboard, chess pieces and portraits of the White Queen and the Black King. The choice of such unusual theme allowed for a different perspective on classical security features and, at the same time, introduction of their gentle combination with completely new solutions.



On the front – with the White Queen – there is a variety of elements, decorative and gentle. The reverse of the banknote – with the Black King – is more dark and mysterious. Portraits of the King and the Queen are intaglio printed, as is the case in circulating and collector notes. Totally new feature is a combination of printing techniques, which result in new security. For example, the silkscreen rainbow print elements are covered by intaglio (left side of the dress) or the color elements printed in offset are overprinted with white intaglio ink (the right side of the dress).

Additionally, the portrait of the Queen includes the metamerism effect achieved by using a pair of intaglio inks of the same color in visible light. At the same time, there are visible and invisible in the near infra-red light (SICPATALK®). The portrait of the King is steel engraved, but not in the classical way. Plates to print the portrait of the King are prepared in three different techniques of intaglio. There is traditional one – consisting of lines, but also raster is used ('dots'), which allows to obtain depth and the third technique – the imposition of a grid to highlight the portrait. As a result, the intaglio portrait looks like a photo.

Multitone and electrotype watermark showing chess pawn on ornament background, localized in the exposed area, is visible from both sides of the banknote.

the soft magnetic and machine readable solution (possibility of detection and authentication).

The suitable for laser engraving paper used for note printing is a kind of special substrate – developed and patented in PWPW. This is a paper which can be engraved by a laser without the risk of burnout. The note is engraved with a QR code which leads to a PWPW website and the numbering of the height modulation, positioned at the curve. Also, the banknote is coated with a special varnish.

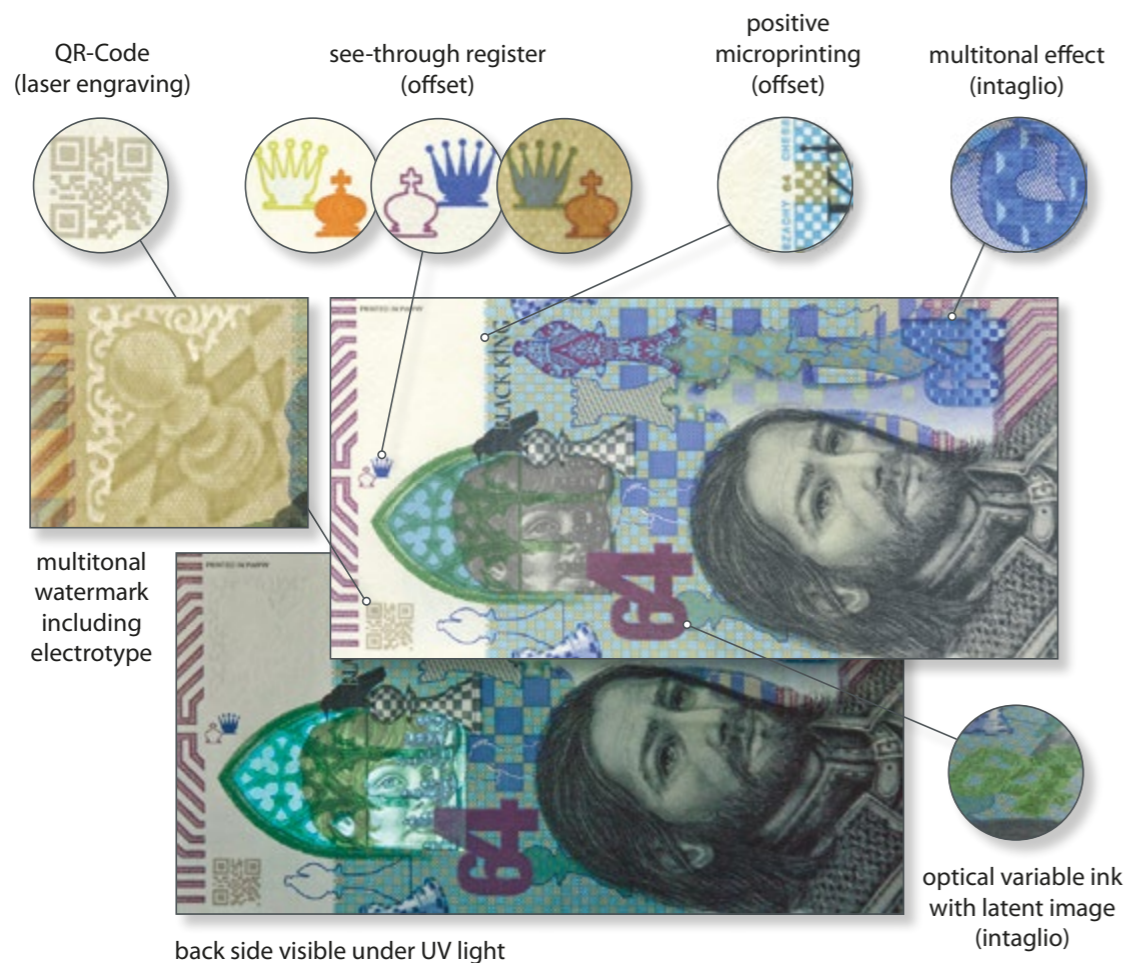
The theme of a pawn deserves a special attention – it is intaglio printed with a double latent image. At a specific viewing angle of the banknote the pawn covers the chessboard theme or the word 'CHESS' is shown. This effect is possible to obtain by using a different inclination of the relief lines of both patterns to each other and to the relief foreground line. The theme of checkerboard-floor – it is a intaglio element with multitone effect, the effect of three shades of blue is obtained by the modulation of the intaglio depth by using one color of ink. There is also security element called SPARK® (SPARK® Live ink), additionally enriched by steel engraving overprinted elements – feathers in the tail of a peacock.

On the front of the note, in addition to security features generally used in banknotes, there are several completely new ones applied. Banknote contains an intaglio element printed in NEOMAG® ink by SICPA – it is a unique, based on

## THE GAME "CHESS"

"Chess" is a game present in many cultures. It requires concentration, knowledge and tactics – in the era of globalization and continuous rush, these are rare and desirable characteristics. The symbolism of the board – a set of white and black squares – for centuries symbolizes the

ideal stability between the forces of good and evil, night and day, life and death. Modern graphic design of the banknote perfectly captures the symbolism and the duality of chess by contrasting beauty, color and delicacy of its front side with a cool and dark reverse.



On the reverse of the banknote there is a characteristic color element in the form of number '64' – the quantity of squares on a chessboard, printed in optically-variable ink – OVI®, the color goes smoothly from purple to green. The number '64', repeated in the corner of the note, is intaglio printed with multitonal effect. Guilloché background includes special raster pattern and iris color transitions corresponding with intaglio prints. Between the lines of the offset background there are hidden microtexts referring to the theme of the

banknote (positive and negative). The theme of the Boy (color image in the UV) curiously looking out the window into the dark side of the banknote, is made with the offset technique using selected inks which are active in UV. <<

—————  
**POLSKA WYTWÓRNIA PAPIERÓW  
 WARTOŚCIOWYCH S.A. (PWPW)**  
 Mrs. Grażyna Rafalska  
 E-Mail: sale@pwpw.pl  
 Website: www.pwpw.pl

> ABOUT US



> ABOUT US

 **B@nknote Industry News**

# The latest news from the banknote industry. On a daily basis.

Sent to you directly via email. Quick and easy.

## YOUR BENEFITS

- > Always up-to-date
- > Summarized news, quick reading
- > Easy handling
- > Early access to pictures of banknotes



## QUOTE FROM OUR CUSTOMERS

“Your news-emails are one of the first things everyone reads once we arrive to the office!”

**GET EXAMPLES OF OUR NEWS-SERVICE**

Visit [www.banknote-industry-news.com](http://www.banknote-industry-news.com)

 Publisher of the **BANKNOTE TECHNOLOGY REPORT**







*The*  
**Banknote  
Conference**

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

*The definitive forum on emerging trends and  
leading technologies in the banknote industry*

*Registration is open!*

## **BANKNOTE 2018**

**May 21–24, 2018**

**Dallas, Texas | USA**

Join your fellow international industry stakeholders at Banknote 2018 in Dallas, Texas from May 21–24, 2018, as we deliver in-depth insight and expert knowledge encompassing critical aspects of banknote design, production, issue, and usage.

### *Banknote 2018 Highlights*

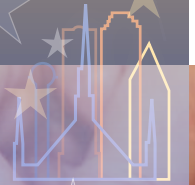
- Presentations and panel discussions from Central Banks, Issuing Authorities, industry experts, and leading industry suppliers, focused on banknote-related technology
- Tour of the Bureau of Engraving and Printing, Western Currency Facility in nearby Fort Worth
- Tour of the Federal Reserve Bank of Dallas' 11th District cash operation
- Presentation of the International Association of Currency Affairs (IACA) Excellence in Currency Awards | Technical Awards
- Generous time allotted for connecting with peers
- The Fairmont Dallas Hotel, located in the lively Arts District in the heart of cosmopolitan Dallas—close to restaurants, shopping, and more.

**Visit the website for more information:**

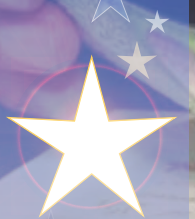
[www.banknoteconference.com](http://www.banknoteconference.com)



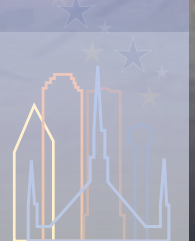
2018



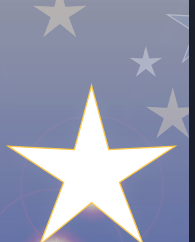
2018



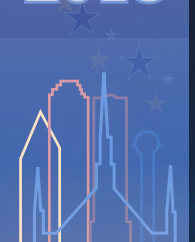
2018



2018



2018



2018

