YEAR 19 JUNE 2016 **ISSUE 68**

INFOSECURA

but it was worth the wait

A magazine for the security printing industry worldwide, published four times a year by Intergraf in Brussels and mailed to named members of the security printing community, such as security printers, their suppliers, banknote issuing, government and postal authorities as well as police forces in more than 150 countries.

INTERGRAF
www.securityprinters.org
www.intergraf.eu

Contents

InfoSecura is published four times a year by Intergraf in Brussels. Information is accepted from industry contributors on a bona fide basis. Signed articles imply the personal opinion of the author and do not necessarily reflect the policy of Intergraf. Information and articles may be submitted to the publisher, who is free to accept or reject any item for publication. The publisher reserves the right to edit all submissions including reader's letters.

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The value of high value notes

The question about the role of cash in a modern economy refuses to go away or to be settled conclusively. In a recent article in the British left leaning daily "The Guardian" entitled " Sweden leads the race to become cashless society" the author Jon Henley reports that "...Sweden launched a new series of notes, cheery affairs featuring 20th-century Swedish cultural giants such as Astrid Lindgren, the creator of Pippi Longstocking, Greta Garbo and filmmaker Ingmar Bergman. But like its Nordic neighbours Norway, Denmark and Finland, Sweden is fast becoming an almost entirely cashless society...."

So far that is a standard position in most newspapers, because they assume that to most readers, a cashless society is still something new and controversial, at least theoretically, and therefore newsworthy. But in the 'comments' section underneath the article, one comment stood out: "It's funny, reading the comments, which are almost entirely sceptical of cashless, and then reading the almost wholly criticism-free article again, especially the headline about Sweden "leading the race ". It really does make you wonder whose interests the Guardian are really trying to represent here." As central banks and banknote printers keep pointing out, the amount of cash in most economies is still rising but the mix of denominations is changing. Looking at ECB figures, between 2002 and 2014 only the €50 and €100 registered a steep rise, but, although much more modest, the €500 rose as well. The other 'store of value', the €200, stayed almost flat in this time span.

Following reports from police organisations and other official bodies, the ECB announced the end of production of the €500 note, because, they claimed, the note is mainly used by criminals and tax dodgers. That may be at least partly true, but there are still plenty of honest citizens that prefer to have some cash somewhere, for a rainy day, or some who remember that e.g when in 2012-2013, as an effect of the Cyprus financial crisis, a one-time bank deposit levy was imposed in Cyprus on all uninsured deposits over €100 000, which amounted to possibly around 48%. That kind of thing is rare, but not impssible. To many people, cash still represents security, safety and certainty.

Following the logic of 'getting rid of high denomination notes make the life of criminals more difficult', Peter Sands, former chief executive of UK-based Standard Chartered bank, now of Harvard University in the US, argued in a paper that he would like to see the ECB scrap the €200 and €100 notes as well, and the Federal Reserve to withdraw the $100 bill. This would almost completely eliminate one of the key functions of currency, to be a store of value. There is, however, plenty of evidence that ordinary, honest citizens like cash. Even in Sweden, the presumed model for the cashless future, close to a thousand dollars' worth of Krona are sloshing around the economy for every Swede. And in Switzerland, where the SFr 1,000 ($1,000) note makes up over 60 per cent of all Swiss cash in circulation, when banks were failing and the value of most assets collapsed in 2008, demand for the note jumped by 16%, having grown by only 1-4% in previous years. The Swiss National Bank emphasized recently that has no plans to follow the ECB or the advice of Mr. Sands. "The SFr 1,000 note remains a useful tool for payment transactions and for storing value," Swiss National Bank spokesman Walter Meier told swissinfo.ch.

The Editor

SECURITY IS A STANDARDISATION ISSUE

The fact that Intergraf organizes the Security Printers International Conferences and Exhibitions is well-known in the industry. A second important and successful activity is Intergraf's work on standardization for security printers.

Security printing is an industry that is obviously based on trust, but this trust needs to be grounded in agreed and verifiable management and manufacturing processes. Many clients of the security printing industry, such as central banks, ID issuing authorities and payment card operators have developed their own procedures for verifying the security arrangements of their suppliers, but Intergraf thought that it would be of great benefit to all actors in the security printing field if there were general and universal standards for security printers. That idea was in 2001 the beginning of a discussion, consultation and development process at Intergraf that also included IHMA (International Hologram Manufacturers Association), UPU (Universal Postal Union), VPGI (Dutch certification experts and auditors) with the support of CEN (European Standardisation Body) and the European Commission as well as experts from European security printers, which led in 2003 to the creation of the CWA (CEN Workshop Agreement) 14641 security management system for secure printing. The main objective of this standardisation and certification system was to create one generic, worldwide standard for security printers, with a focus on internal security processes and not only on the printed security products.

To complete the security chain from end to end, a further certification scheme was added in 2005: CWA 15374 certification for suppliers such as hologram manufacturers, prepress software suppliers, machines, paper suppliers, etc. In the ten years in which it was the only Intergraf developed certification scheme, close to 90 production plants in over 35 countries were certified and the CWA standard was integrated in many tenders in the industry.

The two CWA standards were essentially instruments governed by the rules of the European standardisation body CEN. To gain truly worldwide acceptance, a transposition of the scheme to the worldwide better known ISO format was deemed essential, which would also lead to easier recognition in tender documents. Intergraf together with VPGI started the laborious process of piloting the security printing certification scheme through the ISO Technical Committees and Working Groups, a process that required the cooperation of 25 countries in five continents and that of representatives of standardization institutes and industry experts.

A NEW WORLD STANDARD

The result of this cooperation was ISO 14298 - Management of Security Printing Processes. It refers to a management system that is based on risk management and risk and threat analysis, paying special attention to information and data related risks (related to the ISO 27000 series), building security, including access control, security guards and quality of CCTV systems. There are 12 defined risks pus additional ones for hologram producers, stamp producers and for personalization.

The official ISO 14298 standard can be considered the framework of the certification, setting out those risks. Essential for the quality of the certification are the clearly defined measures to be taken to counter these 12 risks. These measures are detailed in the Intergraf Certification Requirements (ICR), a 70 page document that every company receives once they have applied for certification with Intergraf. With the help of this document and the implementation guidelines the company can set up a high-level integrated system to manage all aspects of security that affect the production process.

TARGETED COMPLIANCE LEVELS

According to compliance levels the scheme has three levels of certification:

- NG (Security Printing/ Non-Governmental) with a minimum set of requirements that need to be fulfilled by all companies in order to be awarded a certificate with the level NG
- G (Governmental): An additional set of requirements need to be fulfilled by all printers certified with the level G
- CB (Central Bank): A set of further requirements for printers supplying central banks or credit card issuing authorities and ID or passport personalisation centres.

The certification procedure starts with screening by Intergraf to ensure that the company is an established player in the security printing market. After approval, candidate firms can obtain ISO 14298 details which are available from all national standardization institutes. Intergraf will provide the confidential document with the Intergraf Certification Requirements and the Practical implementation guideline to help set up the system. This is followed by a full audit by an Intergraf accredited certification body and an annual control audit.

So far production sites in 40 different countries have been certified and over 100 production sites have applied for ISO 14298, of which 55 are meanwhile already certified and the remaining sites are in the process of being certified. ■

Holograms set the standard for security printers

International Hologram Manufacturers Association (IHMA) general secretary Dr Mark Deakes advises security printers to work towards ISO14298 compliance as the updated HIR (Hologram Image Register) goes live to meet growing global demand for improved security.

ISO 14298 – Management of Security Printing (and Security Foil) Processes specifies requirements for the administration of security printing processes with specific goals to improve industry security around high security print production and advance the fight against fraud and forgery. As well as satisfying clients' increasing security needs, it establishes a framework by fostering uniform practices around the world.

It's also the standard through which security printers who achieve certification can come to be seen by end-users and customers as reputable and trusted operators - an essential distinction for those looking to make sure that their products and services are seen as among the most secure and robust on the market.

To understand ISO 14298 better, International Hologram Manufacturers Association (IHMA) general secretary Dr Mark Deakes said: 'As a comparison, ISO 9000 provides guidance and direction to establish effective business processes. ISO 14298 is similar but is focused entirely on the spectrum of security processes'. So clearly achieving ISO 14298 makes an important statement about the values a company shares and its commitments to quality and standards of excellence and is complementary to ISO 9000.

DESIGN CHECK TO CHECK FRAUD

In the realm of holograms, one key aspect of ISO 14298 is the requirement to perform a 'design check' on all new hologram designs to confirm the proposed design is not a duplicate of an existing image. After the proposed hologram is confirmed as unique, the image is also registered in the HIR to provide a future reference for other security printers.

The IHMA's HIR is the only global registry for holograms where manufacturers and producers are able to perform a design check and register their holograms, enabling them to check that production designs do not inadvertently copy existing ones and infringe copyright.

The global registration of custom holograms has been supported by IHMA members for over 20 years and it is a growing point of global interest including for Chinese hologram companies, especially when exporting products.

To help manufacturers move towards ISO 14298, the IHMA has updated the HIR to provide faster online registration and copyright checking of hologram designs. This online resource is a centrally held database operated under the strictest confidence and security.

ONLINE HIR REGISTRATION

Now, in a bid to improve efficiency, HIR registration is a fully online process where artwork can be submitted electronically providing quicker design checks. The registration process is also faster as no hard copy forms are required while internet access via a secure portal provides improved ease-of-use. The enhanced system is a beneficial step forward, representing a major update and redesign of the HIR requirements to encourage more registrations, which further enhances the security benefits of holograms to combat counterfeiting.

DATES TO REMEMBER

05/08/2016
Last day of early registration fee

12/09/2016
Registration closes

05-07/10/2016
Security Printers International Conference and Exhibition in Seville, Spain

After all, pre-origination checks on a hologram register and the registration of holograms onto a register are part of the ISO 14298 certification and the Intergraf Certification Requirements.,Intergraf

The IHMA has also recently updated and strengthened its addendum for ISO 14298 such that where an organisation wishes to exclude registering their hologram, then the organisation has to document the request by an officer/director on the organisations letterhead. The security printer will then be required to retain the organisations documented request for 10 years, or the life of the custom image, whichever is longer.

While wider registration is a key strategic aim for the global hologram industry, it is in China where the greatest changes are likely to be felt. It is widely acknowledged by US Customs and Border Control and other international agencies that China heads the list of countries exporting counterfeit goods – and has done so for some time.

GROWING INTEREST IN CHINA

Indeed, a UN report published in 2013 said that three-quarters of all the fake goods seized worldwide between 2008 and 2010 emanated from China. According to the UN Office on Drugs and Crime (UNODCO), these counterfeit goods make up almost 2% of global trade while organised crime groups, who deal in fake goods and drugs among other items, are pocketing $90 billion annually across the Far East region.

Chinese anti-counterfeiting agencies have been aggressively tackling the problem, adopting holograms as part of effective security strategies to get a grip on the internal counterfeiting problem. But it's the unprecedented level of counterfeit goods flowing out of the country where China faces one of its biggest logistical challenges.

Government agencies in China indicated their desire for closer cooperation and integration on international brand piracy and protection. They are looking at the IHMA HIR as an effective tool to help control and monitor hologram production for products marketed within China, but with export markets in mind. Consequently, the IHMA is starting to work with the relevant Chinese authorities to address the problems and protect those retail brands destined for export markets against the threat of counterfeiting and organised crime.

Indeed, Mr Yin, secretary general of the China Trade Association for Anti-Counterfeiting (CTAAC), commented at the recent Holography Conference in Shanghai: 'We cannot defeat counterfeiting on our own, so collaboration with the IHMA, and what they offer in terms of helping China to tackle counterfeiting has to be welcomed. International communication, open-mindedness and exchange is beneficial, helping us to learn and solve this problem together.'

It's clear that holograms remain to the fore for security printers not only a highly effective overt authentication device but also as multi-function devices, which deliver real added value in the competitive international print arena. In conjunction with the IHMA's HIR, authentication holograms will continue to reinforce their role as an effective security feature as more global printers adopt and embrace the practices outlined in ISO 14298.

The International Hologram Manufacturers Association (IHMA) - www.ihma.org - is made up of over 90 leading hologram companies, producing and converting holograms for banknote security, anti-counterfeiting, brand protection, packaging, graphics and other commercial applications. IHMA member companies actively cooperate to maintain the highest professional, security and quality standards.■

NEWS

The **European Central Bank's** Governing Council decided on May 4th to permanently stop producing the **€500 banknote** and to stop issuing it around the end of 2018, when the €100 and €200 banknotes of the Europa series are planned to be introduced. The €500 will remain legal tender and can continue to be used as a means of payment and store of value.

In April the currency industry launched a new trade association, the **International Currency Association (ICA)** representing all suppliers of currency and of products, technologies, Cash-in-Transit services and equipment used in the design, production, handling, and circulation of currency worldwide. The aim of the new association is to promote the use of cash and to provide a framework that fosters innovation in the currency industry and work alongside other bodies to support business being conducted to the highest ethical standards. *The next issue of Infosecura will publish an interview with leading board members of the association.*

Several news services reported in May that **Zimbabwe** is set to print its own version of the US dollar in order to ease a cash shortage in the country. Central bank governor John Mangudya said the cash, known as bond notes, will be backed by $200m (£140m) support from the Africa Export-Import Bank.

The new Swiss original

Nearly 20 years after the eighth series of Swiss Francs appeared, the Swiss National Bank issued the ninth series. It is unmistakably Swiss, with a highly complex design and an impressive array of security features. Almost coincidentally, long before it appeared, the note also ushered in the era of composite paper/polymer banknote substrates, without becoming the first note to actually use it.

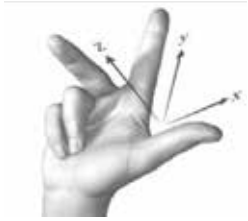
How do you visualize wind? This is not a question that frequently occupies the minds of many banknote designers. They are more used to visualizing national greatness: any number of portraits of national heroes on countless currencies, or national struggle for independence: Ghandi's salt march on the current Indian 500 Rupee note, or even territorial ambitions: Argentina's map of the Falklands/Malvinas on the commemorative 50 Peso note. All of these have been put onto banknotes, but wind? For Manuela Pfrunder, the designer of the new Sfr. 50 note, that came into circulation on April 12, this was not the only conceptual brainteaser. The subject of the other new Swiss Franc notes, to be released successively over the next years, have the subjects of time for the Sfr. 10, light, for the Sfr 20, water, for the Sfr. 100, matter, for the Sfr. 200 and language, for the Sfr. 1000. The way, in which the designer solved this problem, indicates the whole breadth of exploration that went into the note. On the front of the note is a hand holding the seed head of a dandelion, with the little parachutes of the seeds being blown away by the wind. A wider view is given on the back of the note, where a paraglider flies between Swiss mountaintops, of course powered by wind. Around the globe on the front of the note, meteorological arrows indicate the world's great wind currents and some of the background printing on the front of the note and even the hand consists of meteorological wind arrows, in the latter case in micro printing.

DESIGN ELEMENTS

The globe and the hand are design elements that will occur in all denominations of the series, although in different forms and configurations. The idea behind the new series is very ambitious, which is reflected in the very complex graphic design. While the first and second Euro series








The hand as one of the unifying elements of the whole series. From top: Sfr 10: Time, Sfr 20: Light, Sfr. 50; Wind, Sfr 100: Water, Sfr 200: Material, Sfr 1000: Language.

picked just two elements, windows or doors and bridges, which could be found throughout history and which were to symbolize openness and cooperation in Europe, the idea behind the new series of Swiss banknotes is much wider and more ambitious. The Swiss National Bank originally thought of using "Switzerland - open to the world" as over-all subject of the new series, but found that this is too difficult to translate into a coherent visual composition. Instead it selected "multi-facetted Switzerland" as the theme for the series and for the Sfr. 50 note, "Switzerland, a land of experiences or adventures" (the German "erlebnisreich" has no exact equivalent in English and in the French version it simply states 'aventures'). In turning away from the portraits of famous Swiss men and (one) women in the previous series, the Bank left the field of interpretation wide open. SNB President Thomas Jordan remarked that a portrait necessarily looks to the past and the SNB preferred to look to the future. But the traditional preference for portraits on banknotes had good reasons, the 'man in the street" knows instinctively when a portrait looks 'wrong', which is a further challenge for counterfeiters. Portraits also allow for a very simple narrative - a person and what he/she has achieved. "Multi-facetted Switzerland, on the other hand can be almost anything.

The designer Manuela Pfrunder is to be congratulated that she managed to present a very expressive picture of the country that takes in the very personal and intimate as well as the grandiose. And she also loaded the design with a large number of small features that are fun to discover. There is, for example, the globe, which throughout the denominations of the series will turn once around its own axis completing one day. Or the 'wind arrows', small in the texture of the hand, larger in the background of the front of the note. The profile of the Swiss Alps and the name of all their mountains with a height over 4000m is shown in the security stripe, which additionally has a number of kinetic features.

SECURITY FEATURES

The Swiss national Bank lists a total of 15 different security features, some of which are known from the previous series, such as the watermark - in the Sfr. 50 there are two different ones - and the microperf feature. One of the most visible features is the globe, printed with Sicpa's OVMI 'Spark' feature with a colour change from green to gold and an integrated 'curved rolling bar' that shows a golden curve that moves over the globe when the note is tilted. The lower part of the globe, which is overprinted with small meteorological 'wind arrows' in two-colour intaglio, covers a part of the security stripe.

There is also a globe visible only under UV light and an infra-red feature. One of the most clever uses of security features in the notes of the last, the eighth, series was the repetition of the denomination in eight different security elements, including microperf. The new 50 Franc note picks up on this, but instead of using the value number, it uses the Swiss cross, among others, as a full window, a latent image, and a microperf feature. The security stripe - a two-colour Kinegram Volume from Kurz, with another layer, a fine, partially metallized Kinegram on top - is another feature loaded with effects. If the note is tilted from left to right, four lines of red and green numbers appear, with the numbers moving in opposite directions. Looked at straight on, the map of Switzerland, the Alps and the names of all mountains with a height of over 4000m are shown, as well as the number 50. If the note is slowly tilted to the back, the map and the Alps appear in rainbow colours. The number 50 also shows tiny Swiss crosses. In a banknote with this gravity, intaglio printing plays an important part, here, among others, the hand, the large number 50 and the name of the bank are printed in intaglio.

VERSATILE WINDOWS

The feature that will probably attract most attention in the banknote world and relatively little among the public, is the substrate of the new note. The Swiss National Bank was instrumental in the creation of Durasafe, which is manufactured by Landqart in Switzerland, a company that belongs to the Canadian Fortress Group. As Durasafe is a sandwich of 35 gsm paper layers on top and bottom and a polymer core in the middle, there are possibilities to use full widows, where both paper layers are cut in matching, identical shapes, or half windows where only one layer is cut, or in a combination of both, where two different shapes create irregular shaped half windows with a full window in the middle. Although the current fashion trend among banknote issuers seems to be to have windows even in cotton paper banknotes, and for polymer notes for that window to go from top to bottom, such as in the Canadian Dollar series and in the coming Australian Dollar series, the SNB chose discretion.

On the front of the note, there is only one full window, which shows a Swiss cross, overprinted in offset. In the same space on the back of the note, there is a square half window, also overprinted in offset and in intaglio, which, when viewed against a light source, shows the square Swiss flag.

A well as the security stripe, the new note has a security thread, which is embedded between the front paper layer and the polymer core. A triangular half window makes this security thread, which is partially metalized and shows the Swiss flag and the number 50, visible.

In a very dense graphic design, such as that of the new 50 Swiss Franc note, a window represents an interruption, which is not easy to integrate, although in Durasafe, a window does not need to be closed by a transparent strip, such as can be found on the new € 20 note. In the new 50 Franc note, it looks totally logical.

The Swiss have been justifiably proud of their currencies for decades and they don't seem to mind paying for it. While the average cost per banknote in the last series was around 30 Rappen (€ 0.27), the new notes, although they are a little smaller than the old ones, will cost around 40 Rappen € 0.36). But the SNB thinks that due to the new substrate, they will last longer. ■

SWEDEN'S RIKSBANK BACKS LEGAL REQUIREMENT FOR CASH

The news about the death of cash has been exaggerated. Even in Sweden, cash has found a defender in the shape of the country's national bank, the Riksbank. However, reading the Riksbank's announcements closely, it seems more like a stay of execution.

It was quite a shock to those involved in handling cash, when Denmark announced early last year that most shops were no longer legally obliged to accept banknotes. Some Danish bank branches no longer carried cash and the picture in Norway and Sweden was similarly dark for banknote producers. Now, however, the Swedish Riksbank has changed tack and argues against moves to eliminate access to notes and coins in the country.

In March, the Riksbank wrote, that "*the Swedish parliament should introduce a legal requirement for the banks' cash service. This would mean that the banks would have a clear obligation to fulfil their social responsibility and give their customers the service they demand. The payment market has long functioned well, but is now changing rapidly due to digitalisation, among other reasons. New services are appearing and old ones, such as cheques, are disappearing. This development is positive in itself, but needs to take place at a rate that does not create problems for certain groups or exclude anyone from the payment market. It must be remembered that there are still situations in which there are no alternatives to cash. The banks have been too quick to reduce cash handling. This has made it difficult to maintain access to cash services, primarily in sparsely-populated areas, but also elsewhere. If the banks continue to set the pace, there is a high risk that the possibility of using cash will disappear before alternative means of payment have become generally accepted. To restrain this development, the Riksdag (the Swedish parliament) should introduce a clear obligation for the banks to provide basic functions that meet customers' needs.*" This is a clear commitment by the Riksbank to retain cash as long as necessary.

A member of online research company Finextra adds: The Swedish central bank forgot to mention that they some years ago stopped to supply cash from their branches around the country to payment institutions. The central bank cash branches were closed and cash supplied only at factory gate in Tumba outside Stockholm. This heavily increased cost for cash providing payment institutions. Furthermore they forget to mention that the Swedish government closed all the post offices cash tills (hundreds of cash payment/ withdrawal post offices) after ministry of finance analysis that the demand was so low that it did not justify the government taking the cost.

The Riksbank still has a considerable stake in the cash business, having introduced a new series of Swedish Kronor that clearly aims at projecting an up-beat, popular image of the currency. ■

Banknote Horizon 2016

Every four years, to coincide with Drupa in Düsseldorf, KBA Notasys invites its customers from all over the world for an update on its technology. This time the focus was on improvements in efficiency and on cost reduction.

What for commercial printers is Drupa time is for banknote printers Banknote Horizon. Every four years in June, KBA Notasys invites customers, e.g. the important people of national bank's printing works, private banknote printers and a few other industry insiders, to a rolling series of two day seminars, which run throughout most of the month. They consist of presentations of new machine capabilities, printing and security feature developments and – as important as any of the professional stuff – interpersonal encounters with professionals from unexpected and usually far away places. Hong Kong, Russia, Mexico, and the USA were represented at one of these seminars at the beginning of June and representatives of customers from many of the countries, where KBA Notasys machines operate will be there during the three-week event. It is the mix of the professional and the personal, which makes this event priceless and while some of the participants at a recent two day stint seemed to prefer to just listen, other highly motivated and very well informed experts from central bank printing works moved the proceedings to a very high professional level – to the benefit of all, lecturers and participants alike.

MAKING AN INVESTMENT PAY

On a professional level, Banknote Horizon 2016 had the overall title " Efficient Security" but it also served as an introduction to KBA Notasys new 'verbal and visual identity' namely 'Value Beyond Technology'. As a manufacturer of well regarded, but rather pricy machines and systems, KBA Notasys encourages existing and prospective customers to think of investments in equipment not as a single occurrence but to look at "the total cost of ownership". The installation of a totally new line or upgrading an existing line with new components is usually a hefty investment, but looked at over a given timespan, the improvements in productivity and savings in labour and material costs will show the benefits of the investment. If we look at the average cost of 1000 banknotes, nine to 11 per cent will be the cost of machines, 35 per cent raw materials, and 35 per cent the substrate. The rest of the costs are accounted for by labour, utilities, etc. The figures are only a rough guide and may vary considerably with more expensive substrates, etc.

The fact that since the last Banknote Horizon in 2012, KBA Notasys managed to sell 139 systems and machines, is a clear indication that central banks and private banknote printers regard these investments as necessary. This is because technology had developed further but also because margins in banknote printing have become tighter and using inefficient manufacturing equipment or processes is not conducive to staying in business in the banknote printing industry. This years' Banknote Horizon consequently attempted to show the positive link between the investment decision and an increase in security and quality and, crucially, lower production and material costs over a given timeframe through the use of their management tool TCO - total cost of ownership. The basis of calculating TCO is

- one year of production
- one billion banknotes
- two shifts per day
- 15 years for depreciation and
- one complete line.

This method of evaluating the total cost/benefit of investment provided the thread that connected the presentations and workshops dedicated to different production, design and management themes.

MAKING PRINT EXITING AGAIN

Reflecting the general trend in the banknote industry worldwide, which favours brighter and visually more interesting banknotes with an increased number of ever more sophisticated security features, Banknote Horizon used a new series of specimen banknotes to give visual and practical expression to the idea of making banknote production more efficient, more secure and finally more economical.

It is one of the unstated but long-term objectives of the company to return more of the value-added in banknotes to the printing process by means of printed security features, rather than to add non-printing ones. To show how this can be done, KBA Notasys designed a series of specimen notes, the first of which has already been printed. The three different notes represent the human life cycle of childhood, maturity and old age, and the company's designers managed to produce a highly secure banknote that did not have any security features added after printing. Although there are

of course material based features in the substrate, Louisenthal's Hybrid, such as a beautiful watermark, the window security stripe and Louisenthal's "laser cut" feature, a small window in the shape of a bee. However, the 15 security features that the company lists for the note are all created by the extreme accuracy of the printing processes used - offset, intaglio and screen-printing - and the ability of the design software and the engraving process to create extremely fine lines.

It all starts of course with the banknote design, which security and machine-readable features to use, where to place them, etc. Most of the features on the note are variations on the theme of precision register and extreme accuracy in printing. There is e.g. a see-through feature that is made up of four plates front and back in perfect register, or very tight concentric spirals in two colours or negative white lines in a four colour checkerboard design, etc. Trying to copy any of these features, even on a modern offset machine, would give any prospective counterfeiter nightmares. The technical perfection of the printing was not the product of KBA Notasys' champion experts, working under laboratory like conditions in Lausanne. Rather, the simultaneous offset part of the note was printed by the Banknote Factory of the Central Bank of Kazakhstan, screen printing and intaglio printing were done by the banknote factory of the Central Bank of Ukraine and traditional as well as the laser 'Look' numbering was done by Giesecke & Devrient.

MAKING CONTINUOUS IMPROVEMENT A HABIT

Although it may be difficult to arrive at definitive figures as all banknotes and all banknote printers are different, one can assume that around 5 per cent of the production and material costs of banknotes are accounted for by offset printing, the substrate by 19 per cent, the OVD by 26 per cent, screen printing by 22 per cent, intaglio printing by 20 per cent and finishing by 6 per cent. As part of the "Total Cost of Ownership" over a year and one billion notes, even small improvements add up to big savings. Bearing in mind the cost of materials, reducing waste overall and especially detection of any faulty notes early on in the process brings big benefits overall. If e.g. a fault was caused in the offset printing, detecting that note before intaglio, screen and OVD is added, obviously saves costs. By the time intaglio is added to the note, 90 per cent of production costs have already occurred. There is a host of other unexpected measures that lead to efficiency increases and cost savings, such as tighter and more accurate cutting of intaglio "shablones" to reduce intaglio ink consumption by up to 15 per cent a year and super accurate varnishing, which has a similar effect.

Generally it can be said that there are no cost savings without quality control, given that banknotes are increasingly complex, with more security features, more covert features and higher quality requirements. To cover this aspect of production, KBA Notasys is updating its AFX-I inspection platform to the AFX-II platform. The first two of the new systems within this platform will be the NotaSave XT and the ColorSave XT. XT stands for extended technology, which will be the identifier for all systems based on the AFX-II technology.

Technological advances go hand in hand with ecological successes. By introducing its PlateCoat system for chrome plating intaglio plates by using Physical Vapour Deposition instead of the traditional galvanic process, Chromium VI, a hazardous material, which will be banned by the EU in 2017, was totally eliminated.

At Banknote Horizon 2016 there were plenty of such small, but significant improvements, which make banknote production safer, more economical and more environmentally responsive. It is now up to societies worldwide to keep banknotes a vibrant and very common means of payment. ■

MONEY MATTERS

IT IS THE END OF THE LINE FOR THE € 500 ...

The European Central Bank's Governing Council decided on May 4th to permanently stop producing the €500 banknote and to stop issuing it around the end of 2018, when the €100 and €200 banknotes of the Europa series are planned to be introduced. The €500 will, however, remain legal tender and can therefore continue to be used as a means of payment and store of value. The measure was taken to address concerns, by a.o. the European police agency Europol and EU finance ministers that that this banknote could facilitate illicit activities. ■

...BUT THE SFR 1000 KEEPS ROLLING ON

Switzerland does not agree. "The Sfr 1,000 note remains a useful tool for payment transactions and for storing value," SNB spokesman Walter Meier told swissinfo.ch. In late 2014, the Swiss parliament approved new anti-money laundering rules on cash purchases in excess of Sfr 100,000, but did not question the Sfr 1000 note.

There are about 45 million of the notes in circulation, representing about 60% of the total amount of Swiss cash. This makes the Sfr 1000 the highest value note in production since in 2014, Singapore stopped production of $10,000 notes - the highest value note in the world. ■

Queen Elizabeth II on the old (above top) and new AUS $ 5 note (right) and on the new NZ $20 note. No wonder, central bankers prefer dead people on banknotes, they don't change.

NEW ZEALAND'S DOLLAR BRIGHTENS UP

Last year New Zealand began issuing the first notes of its upgraded dollar series, with further releases coming this year. The Reserve Bank of New Zealand has retained the overall design of the notes, e.g. the colour, the persons depicted but changed some of the natural features on the back of the notes and added several new security features and gave the notes a far brighter and more positive image. Details of the update will be given at Intergraf's "Banknotes High Meeting" in Seville in October. ■

AUSTRALIA UPDATES DESIGN OF $ 5 NOTE

In April the Reserve Bank of Australia released images of the new $5 banknote that will be issued from 1 September 2016. Key aspects of the existing design – colour, size and people portrayed – are retained for ease of recognition the bank said. The reaction of the public to the new design has been decidedly mixed, with plenty of jokes circulating about the new design.

The dominant feature on the front of the note is the portrait of Queen Elizabeth II, which is identical to the one on the note it replaces. The portrait was commissioned by the RBA in 1984 and it made the queen look a little older than she was at the time. Now, at age 90, her looks have certainly more than caught up with the portrait. The new New Zealand $ 20 note, which also prominently features a portrait of the queen seems to have been more successful in capturing a more realistic, but also more sympathetic image of the ruler.

The $ 5 polymer note has a large, clear window, which divides the note from top to bottom. In the picture above, this window, and a second, smaller window, appear as blue. In the new series, each banknote will depict a different species of Australian wattle and a native bird. On the $5 banknote, the yellow caterpillar looking things and the little bird are the prickly Moses wattle and the Eastern Spinebill, an Australian newspaper explained. ■

BRITAIN'S NEW FIVER

On June 2, Mark Carney, the Governor of the Bank of England unveiled the design of new UK 5 pound note, which will be issued on 13 September 2016. The note is the first Bank of England note to be printed on polymer and it will feature Sir Winston Churchill on the reverse side.

The Bank of England claims that the new note is expected to last at least 2.5 times longer - around 5 years - even after being folded into wallets and scrunched up in pockets.

The note's security features include:

- A see-through window featuring the Queen's portrait. The border of the window changes from purple to green.
- The Elizabeth Tower (or Big Ben) shown in gold foil on the front of the note and silver on the back.
- A hologram which contains the word 'Five' and changes to 'Pounds' when the note is tilted.
- A hologram of the coronation crown which appears 3D and multi-coloured when the note is tilted.
- A green foil hologram of the maze at Blenheim Palace, Churchill's birthplace and ancestral home.
- Micro-lettering beneath the Queen's portrait with tiny letters and numbers that are visible under a microscope.
- The words 'Bank of England' printed in intaglio along the top of the note.

As announced in April 2013, the note will celebrate the achievements of statesman Sir Winston Churchill. As revealed at the time the design includes:

- A portrait of Winston Churchill from a photograph taken by Yousuf Karsh on 30 December 1941.
- A view of Westminster and the Elizabeth Tower from the South Bank looking across Westminster Bridge.
- The image of the Elizabeth Tower with the hands of the Great Clock at 3 o'clock – the approximate time on 13 May 1940 when Sir Winston Churchill declared in his first speech as Prime Minister: "I have nothing to offer but blood, toil, tears and sweat". This declaration is quoted beneath the portrait. ■

Tubman's in Jackson's out

"We said we'd listen - and we did" US Treasury Secretary Jacob Lew said on April 20, announcing an unexpected turnaround, that will put black slave liberation fighter Harriet Tubman on the front of the US $20 note and relegate Andrew Jackson to the back.

There was a note of triumphalism in the heading of an article in the New York Times on April 20: "Tubman's In. Jackson's Out." referring to a decision by the US Department of the Treasury to redesign the $5, $ 10 and $ 20 and not only to put a woman on a dollar note but to put anti-slavery fighter Harriet Tubman on the front of the $ 20 replacing President Andrew Jackson. This had been the aim of a very vocal campaign by over half a million woman and many men, known as "Women on 20s" as Infosecura wrote in June 2015.

In our March issue we reported that the Treasury had indeed agreed to put a woman on a dollar note but not on the $20, and thus not replacing the unpopular Andrew Jackson. Instead the still popular Alexander Hamilton, the first US Treasury Secretary on the $10 would be replaced by a woman still to be chosen. It was at least a half victory for the public recognition of women's role in the history of the USA.

The reasons given for the decision were mainly operational and the announcement by the present Treasury Secretary Jacob Lew on April 20th came therefore as something of a surprise. The news were even better than expected: on the backs of the redesigned $5 and $10 notes there will be scenes from the fight for civil rights, one of them depicting suffragettes marching to the Treasury Building on the $ 10. It seems like a complete victory for the pro-women, pro equality camp, but there is a subtle irony here. Harriet Tubman, an ex-slave who was known as the "Moses of her people" for leading hundreds of slaves to freedom in Canada, will share the note with Andrew Jackson, a slave owner and persecutor of Native Americans, who will have to make do with the back of the note.

That Alexander Hamilton was saved at the front of the $10 note may well have been due to the unexpected and enormous success of the musical "Hamilton" on Broadway. Secretary Lew certainly saw the musical, but the Treasury will certainly advance a more profound and serious reason for this welcome decision. The final design and issuance of the new note are not expected before 2020. ■

MONEY TROUBLES

Venezuela has money problems. The country has to fight with galloping inflation and shrinking hard currency reserves. The IMF estimates that inflation this year will be close to 500 per cent and may top 1600 per cent next year. Venezuela is largely dependent on oil and the current crisis is a combination of the effect of low oil prices and mismanagement of the economy.

In late April, US business journal Bloomberg News disclosed that in 2015, the Venezuelan government of President Nicolas Maduro tried to ease a currency shortfall by placing orders to print 10 billion Bolivares banknotes with a range of international banknote printers. By comparison, the US Federal Reserve only ordered 7.6 billion notes to be printed this year for an economy many times the size of Venezuela's. The printers delivered, but the government apparently did not - it was unable to pay in full for the orders. The orders started, first with 2.6 billion notes, followed by 3 billion and finally adding up to the mentioned 10 billion.

In March, De La Rue, as the printer of a considerable amount of the currency, sent a letter to the central bank complaining that it was owed $71 million. The letter was leaked to a Venezuelan news website and confirmed by Bloomberg News, the newspaper wrote.

Inflation started in earnest in 2014, when prices in shops rose and supplies of goods declined. Since then, shelves in shops became more and more bare and wallets bulged with more and more paper that was worth less and less. Bloomberg wrote: "In late 2015, the central bank more than tripled its original order, offering tenders for some 10.2 billion bank notes, according to industry sources. But currency companies were worried. According to company documents, De La Rue began experiencing delays in payment as early as June (2015). Similarly, the bank was slow to pay Giesecke & Devrient and Oberthur Fiduciaire. So when the tender was offered, the government only received about 3.3 billion in bids, bank documents show"

The need for lots of paper banknotes is indeed great in Venezuela, as the note with the highest denomination is the 100 Bolivar, which now is said to buy about one single cigarette. Venezuela has its own banknote printer, the Casa de Moneda de Venezuela, but its capacity is nowhere near sufficient. As its traditional suppliers are becoming reluctant, the Venezuelan Central Bank is trying Russia's Goznak and is said to have a contact with American owned Crane Currency. ■

Managing a humanitarian crisis

Managing large numbers of desperate people requires setting priorities. For the German authorities facing a seemingly unending stream of refugees, the priority was to register, to enable provision of urgently needed help.

Photo: Sodelovanje Slovenske vojske pri podpori Policije - fotoreportaža Rigonce, Dobova, Brežice 11

The technical information on the document and its infrastructure is based on a paper given by Dr. Uwe Seidel, Department KT 5 – IT Forensics, Document Systems Forensic Science Institute, Bundeskriminalamt, Germany at SDW in London 2016

The arrival of refugees in Europe could have been expected and to a certain extent it even was, but the numbers of desperate people still caused great shocks in the receiving countries. Although the countries where the refugees from Syria, Iraq and Libya, as well as from other Asian and African countries arrived, were mainly Greece and Italy, where, according to EU regulations, they should have been "processed", a large number of them made it to Germany. Even with a welcoming government and a largely positive attitude of the population, for the authorities, the most urgent question was how to manage the arrivals. How to assure that people received what they most urgently needed; food, shelter and above all safety? Many refugees had no papers at all and among those that had some form of identification, the incidence of false or counterfeit documents was high. Trying to establish a verifiable identity is a lengthy business and the needs of refugees were too great to spend a lot of time on that.

The German Ministry of the Interior decided to issue a (deceptively) simple paper document as proof of registration, without trying to establish a verifiable identity. Since January 2016, the "Ankunftsnachweis" (proof of arrival, or Asylum Seeker Certificate) is being issued to all asylum seekers arriving in Germany at the first registration office they encounter. It is not an identity document nor an indication or promise that asylum will be granted, but it is the only means of receiving any welfare benefits for refugees in Germany and it is given before an official demand for asylum is made. The document is roughly based on some of the preliminary residence status documents already in circulation in Germany and the German Federal Ministry of the Interior had placed an order for 2 million documents to be printed by Bundesdruckerei in Berlin.

The German Ankunftsnachweis, the asylum seekers certificate (photo: BKA - KT43

Behind the document itself is of course a system to administer it. As registration is done in a large number of reception centres all over Germany, security of blank documents, the process of registration and personalisation and the linking of data to an integrated identity management system had to be faultlessly organized. At the point of registration, the applicant gives the standard information of name, date and place of birth, etc. and a photograph as well as fingerprints of all ten fingers are taken. Before the document is issued, the fingerprints are checked against the central database via the Fast Identification System (Fast ID), ensuring that any attempt at double registration and "asylum shopping" will be detected. The database also provides information on country of origin, contact and health data and education and qualifications. The data is accessible for German federal authorities and security agencies as well as municipalities. The German authorities had to establish registration points and equip them with full-page document readers for document authentication and automated data retrieval, digital cameras for photo enrolment, certified fingerprint scanners for biometric matching of national and EU databases and inkjet printers with document ink for personalization. The Ankunftsnachweis document itself is a paper based secure document that complies with EU und ICAO minimum security standards. The paper carries a watermark and coloured fibres, the printing includes guilloche patterns and micro text. Under UV light, the German eagle, as sovereignty symbol and coloured guilloches appear. There is also letterpress numbering and secure personalisation by inkjet. The personal data is protected by a Kinegram foil.

The security feature that is new is the Visible Digital Seal, a 2D barcode that contains the machine-readable information as plain text, a digital signature of the MRZ and a registration number. ICAO approved this feature for use only in April 2016. The digital seal can be used for offline scanning and opening the data file, offline scanning and input of biographical data and online and offline verification of signature. The verification can take place via Smartphone app, document reader or barcode scanner. ■

NO CHIP - NO SECURITY?

Modern, electronic passports and other ID documents have become exceedingly difficult to counterfeit. This turns fraudsters to seek genuine documents on the base of false breeder documents. Here is the attempt of one company to plug this loophole as well - without using chips.

Of all security documents that are issued to a person in his/her lifetime, the birth certificate probably has the longest life expectancy. Unfortunately it has also often the lowest level of security. In many countries, but not in all, there are centralized registers of births and deaths to back up a paper document, but they are often not accessible to searches from abroad. There are at present often not even national and certainly no international standards for these documents and the variety of documents issued the world over is simply bewildering and most of the documents issued have no in-built security at all. In addition, if a birth certificate is presented outside its country of issue, no one knows what the original should look like. Add to that the fact that birth certificates have unlimited validity, which in practice can mean well over 80 years. This renders many modern technological security systems impractical.

Today, with high levels of migration between EU countries and from and between countries outside the EU, birth certificates and other breeder documents are especially important when persons move from one country to another, change nationalities or even apply for a simple passport. The question therefore is, how can simple paper documents that do not have a chip and do not come equipped with the technical and electronic bells and whistles of, e.g. modern ID cards or passports, be secured?

The Veridos Ankunftsnachweis

German ID document company Veridos claims to have come up with a cost-efficient and effective method to increase the security of breeder documents, such as birth certificates, and visa stickers. A birth certificate is a good example of a public document, which is used to apply for other personal credentials such as travel documents, national ID cards or to open bank accounts. Once verified, this data becomes the trusted anchor for issuing new security documents. Hence, the issuance of a birth certificate must be trustworthy and fraud-proof, otherwise travel or other documents that are issued on the basis of falsified information can be used to establish fake identities.

The EU funding project FIDELITY has created an invaluable proposal on how to counter ID threats by increasing the security of and harmonizing breeder documents in the EU. In addition, the ICAO NTWG is working on a new Technical Report to increase the security of visa stickers by including signed barcodes, following an initiative by the German Federal Office for Information Security (BSI). Veridos has incorporated these proposals into a practical solution not limited to the requirements of EU member states but fit for every country in the world.

The FIDELITY strategy for increasing long-term security and harmonization of the format and the integrated security measures in breeder documents within the EU, proposes the use of a server with stored hashes of biometric data, which prevents the manipulation of data within the birth certificates. The breeder document is further strengthened with a 2D barcode that contains the printed information in machine-readable form and which is printed on the birth certificate.

The Veridos IMAGO Document Lifecycle System uploads the document number with a hash to the Document Verification Server. The hash is calculated on the basis of the enrolled data. To make the document compatible with existing passport readers, the final format has been defined as twice ID-3. When the information on the birth certificate is needed for issuing a passport or ID card, the IMAGO system can transfer the information directly from the barcode to the application for travel or national ID documents, thus eliminating the risk of typing or transcription errors. The cryptographic hash function is calculated on the base of the data contained in the bar code and is sent along with the document number to the Document Validation Server which compares the hashes and gives a positive answer when they match.

There is also a VeriGO Breeder Document Verification App, which can be used to verify the birth certificate data using a smart phone. The app is compatible with almost all Android and iOS-based smartphones and capable of verifying the signed barcode on the visa sticker as well.■

TOWARDS INTEGRATED DESIGNS IN GOVERNMENT DOCUMENT SECURITY

The author of this article is John A. Peters, OVD Kinegram AG, Switzerland

This article discusses new document design possibilities using technological advances in diffractive optically variable devices, laser personalization and antenna manufacturing. These key security features of government documents can be designed simultaneously to create an integrated functionality which enhances visual recognition and counterfeit detection.

During the document design process some mandatory features such as optically variable devices, laser-engraved images and the electronic components are often introduced as "add-ons" that should not detract from the aesthetic appeal of the pre-printed substrate. This approach can lead to the inclusion of "disconnected" features which are more susceptible to replacement or removal to create a new counterfeit document. In the case of optically variable devices, if the image portrayed by the feature exhibits no obvious relation to the rest of the document design, the inspector must have prior knowledge of the security elements in order to gain confidence in its authenticity.

INTEGRATION BY DESIGN

New security laminate designs using the KINEGRAM ZERO.ZERO technology provide unique opportunities to combine dynamic images of the diffractive OVD with the static pre-printed design on the substrate. The use of an open structure of fine metallic lines with brilliant kinematic movement, truly perfect registration and high-resolution allows for the creation of images which are relatively easy to combine with the underlying pre-print and biographic data. Since the combination of features exhibits the complete image, manipulation or removal of any single element becomes more noticeable even without prior knowledge of the design.

The high resolution fine-line metallic structures in perfect registration with the diffractive elements exhibit the optical brilliance of 100% metal combined with the transparency of high-refractive index non-metallic coatings. These are ideal conditions for optimizing the integration of the KINEGRAM with the background document design so that counterfeit attempts become easier to detect.

Fig.1: Background card design

By way of example, Fig. 1 shows an arbitrary background card design with fine pre-printed lines and open areas to accommodate the primary photo and its shadow image. Also to be seen in the bottom right corner is the shadow of a tree without the tree. During the personalization process, the photographs as well as the biographic data are printed together with any additional document design features such as the colourful header with the ID number or other personalized information.

In contrast to the conventional approach, the KINEGRAM ZERO.ZERO laminate not only protects the personalized data but now also completes the document design, as depicted in Fig. 2.

(right) Figure 2: Personalized card with KINEGRAM ZERO. ZERO overlay

The fine-line metallized structure overlapping the printed photo and biographic data cross-hatches with the pre-printed lines and depicts the image of a bird flying from the bottom left into the flock which expands, contracts and changes shape.

A metallized image of a tree to pair with the pre-printed tree shadow envelopes the secondary image with an overlying lens effect. The flying birds are depicted with Surface Relief structures appearing to protrude from the surface. The metallized header has unmetallized text which appears colourful, deriving the colour from the printed header design.

Finally, the right hand side of the metallized header has just the right degree of transparency to allow the pre-printed ID number to become visible only after tilting the card to a certain angle.

Therefore, we have the choice of completing the document design and then introducing the security features as add-ons, or we can make the security feature an integral part of the document design. Clearly, using the latter approach, the task of the counterfeiter is much more difficult while the document examiner can gain more trust in the authenticity of a document even without detailed knowledge of the security features.

INTEGRATION DURING SYSTEM PERSONALIZATION

Another example of design integration is now possible thanks to technological advancements in the KINEGRAM ZERO.ZERO technology and laser personalization techniques.

Figure 3: Embedded KINEGRAM ZERO. ZERO in polycarbonate. The metallized crown overlaps the primary photo area.

A product called KINEGRAM ZERO.ZERO Combi is embedded in the polycarbonate card body and positioned so as to overlap with the primary photo (Fig. 3). The metallized fine-lines as well as the metallized crown image are enclosed in the 6-sided polygon. The remaining KINEGRAM structures are transparent, that is prepared using non-metallic coatings.

Figure 4: Metallisation and diffractive movements are destroyed

As shown in Fig. 4, when the polycarbonate card is personalized using conventional laser processes, the metallized zones overlapping the photo area are evaporated due to the laser energy. This results in a loss of the optical structure in the personalized zone.

However, using a specially development laser engraving process, the card can be personalized beneath the KINEGRAM layer without evaporation of the metallized diffractive structures. Thus the original structure and visual appearance of the KINEGRAM is retained. (Fig. 5)

(right) Figure 5: Laser engraving without ablation of the metal

As can be seen in these images, the laser engraving has occurred in between the metallized structures without ablation of the metal. OVD Kinegram acknowledges the support of IAI Industrial Systems for producing the sample cards to demonstrate this technology.

Since any attempt to laser personalize the photo without the use of the process key will lead to destruction of the metallization and diffractive movements, this solution provides protection against the fraudulent personalization of lost or stolen card blanks, as well as against fraudulent laser tampering to modify a personalized image.

INTEGRATION OF ELECTRONIC COMPONENTS

Further design integration using the components of the RFID inlay is possible thanks to the use of a new antenna manufacturing technology.

In typical document designs today, the physical security features are on the outer layers and as such they are totally divorced from the electronic components, namely the chip and the antenna, which are concealed in the core. However, the antenna could be designed to exhibit a characteristic and customized image which is specific to that document.

Furthermore, this characteristic image could also be made visible from the outside through a transparent window in the document, as shown in Fig. 6. In such a case it becomes a lot more difficult for the counterfeiter to substitute the electronic components.

In addition to forming the antenna with a customized form and shape, this document specific form may include a KINEGRAM inlay (Fig. 7) or a KINEGRAM diffractive image integrated in the antenna material (Fig. 8).

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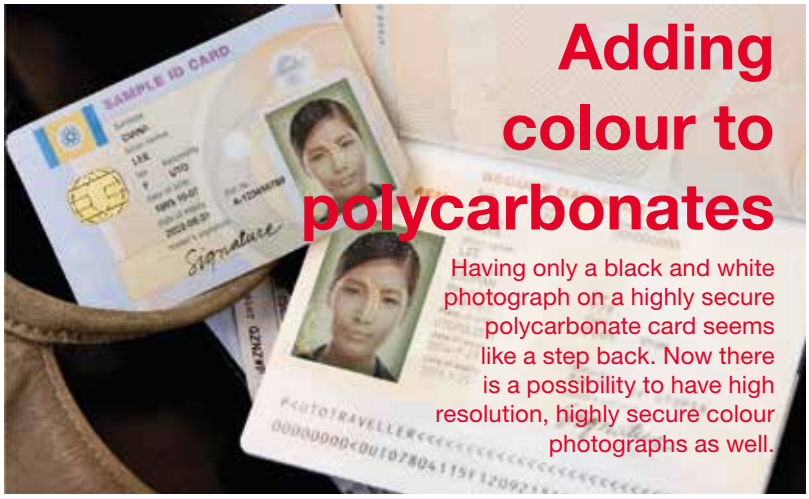
Figure 6: Customized Antenna
Figure 7: Customized Antenna with KINEGRAM Inlay
Figure 8: Customized Antenna with KINEGRAM Image

There is yet another benefit in using this approach. As shown in Fig. 9, with prudent positioning of the customized antenna image, this feature can be used to protect the photograph from tampering attempts from the rear of the card. Attempts to remove the photograph from the rear will result in destruction of the customized image and will also disengage the electronic functionality.

In summary, we have shown that thanks to innovative developments in the KINEGRAM ZERO.ZERO technology, advanced laser engraving techniques and novel antenna manufacturing processes, there are new opportunities to simultaneously design these elements to create an integrated functionality which enhances visual recognition and counterfeit detection. ■

However, a prerequisite to achieve this design integration is the early involvement of all component providers in the document design process. ■

Fig. 9: Protected photograph



Adding colour to polycarbonates

Having only a black and white photograph on a highly secure polycarbonate card seems like a step back. Now there is a possibility to have high resolution, highly secure colour photographs as well.

Earlier this year Gemalto published a 'Position Paper' that sets out to explain how the advantages of a polycarbonate substrate and high-resolution colour photography can be combined. Polycarbonate is not new. It was introduced 25 years ago and it has become the substrate of choice for high-end ID documents, such as passport data pages, ID cards, driving licences, etc. The material is highly durable and resistant to fraud, but among the long list of positive characteristics, there is one drawback. Until now, only black and white photographs could be satisfactorily represented on a polycarbonate body, although the high resolution and high contrast of laser imaging, when compared to ink jet and retransfer, partially made up for this.

In the paper "The best of two worlds" Gemalto sets out its claim that it has found a way to embed a high-resolution colour photograph within a polycarbonate body. Again, other techniques have been tried to do this, but according to the paper, the results have not satisfied the requirements, namely, security, durability, flexibility and picture quality.

Security means that a colour picture should offer maximum protection against forgery and fraud. It should be well-protected and difficult to change or imitate. As for durability, the colour picture should remain unaltered under all circumstances for at least 10 years, and to satisfy flexibility, personalisation should be possible at a stage after manufacturing. As for picture quality, the colour photo should have the highest possible resolution to allow

detailed reproduction, offer a good uniformity of colour, and excellent contrast and colourfulness.

The existing techniques incorporate colour images either inside the document or on its surface. Most are complex and present numerous restrictions, ranging from diminished durability and security (colour photo protected by an overlay) to lack of flexibility (personalization at the time of manufacturing). The former typically results in compromised document integrity, while personalization at the time of manufacturing leaves no room for flexibility.

The level of security in existing b/w polycarbonate cards is already impressive. The bearer's photo is incorporated inside the document in a so-called 1-block concept: all features, the secure element and ID document holder data are integrated in such a way that they protect each other from any fraud attempt. For example, the holder's photo is fully or partially interlocked with the secure artwork, printed features are in between the document surface and laser engraved layer, the photo side can be protected by tactile features such as positive/negative embossing, Changeable or Multiple Laser Image (CLI/MLI) or tactile laser, and the photo can be protected by embedded Diffractive Optically Variable Image Devices (DOVID). Any attempt to change the photo destroys a portion of the printed features. The same is true for attempts to separate the document surface and the laser-engraved layer.

COMBINING ADVANTAGES

The challenge therefore was to devise a technique that retains all the security measures of the old system and additionally delivers a high resolution colour photograph that is, just like the old black/white one, embedded in the card body.

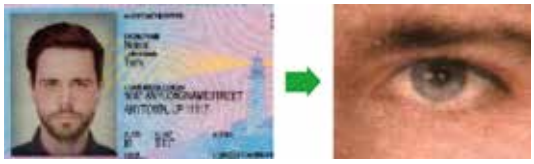
Gemalto claims that it has developed a new personalization solution based on a new printing technology: "Sealys Color in PC", which offers the contrast and high resolution of current black-and-white laser-engraved polycarbonate photos, the same security and durability as polycarbonate laser engraving technology and flexibility at personalization during a separated step.

THE PROCESS

The new technology uses three lasers. The colour marking occurs through a non-destructive and contactless process, in which the marking is inserted clearly, permanently and irreversibly inside the material under a transparent layer. Colour laser marking is based on the principle of selective bleaching. Special pigments (ink) fade when irradiated with laser light at a specific wavelength and strength. Each primary colour (magenta, yellow and cyan) is bleached through different laser wavelength. By mixing the primary colours, a variety of colours can be produced in photographic quality. The Colour Laser Marking Technology uses three lasers (blue, green and red) with three different wavelengths for all primary colours. An optical system bundles the laser beam, which is controlled through a deflection system, inside the target material. The colour of every picture element can be achieved through the use of a different intensity of the laser beam. Any primary colour can be split into 256 levels.

The picture is embedded inside the document and, given its high resolution, cannot be simulated using existing digital printing technology. In contrast to traditional ink jet technology relying on half tone technique (juxtaposition and overlapping of CMY pixels) the "Color in PC" solution is a continuous tone technology offering at any pixel position the adapted colour tone. Continuous tone print produces prints that are close to traditional photographs.

When comparing to other technologies using half tone principals as for ink jet, the Color Laser Marking solution yield a higher resolution with up to 1200 DPI, giving full details within the photograph. High resolution also offers the possibility of including personalized irreversible laser marked security features in the photo, such as variable micro text.



(right)
1200 dpi resolution offers exceptional details and clarity

SECURITY AND FLEXIBILITY

Blank documents cannot be easily fraudulently personalized, as the creation of the photo requires a high level of expertise and the usage of lasers with specific wavelength that are not available in the commercial market.

Security of the blank document is further enhanced by the black CMY panel, which can only be bleached by relevant lasers and requires complex expertise to avoid carbonization and clear tamper evidence. The Sealys Color in PC process offers the high durability of a 100% polycarbonate document structure, with a perfect resistance to peeling and delamination. The colour photo passes the critical qualification tests regarding 10-year durability, including adhesion of layers and colour aging.

As the colour photo is created during a separate personalization step, the the process offers very high flexibility. The laser module is adaptable to most standard personalization machines. ■

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