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**From the Editor’s Desk**

**Inspiring Leadership Drives the Industry Forward**

For an organisation that for decades walked a lonely pathway as a fledgling substrate alternative growing its market slowly but surely, leadership is a common topic at Innovia Security. What actions make for effective leadership? Our belief is that leadership is situational.

Through the company’s trials and tribulations, Innovia Security has emerged as an organisation hardened in its resolve to demonstrate leadership in all its forms: in products, in management and organisational terms and, most critically, in moral leadership. The achievement of Banknote Ethics Initiative (BnEI) accreditation in mid-February by Innovia Security was an important milestone for the company. For an organisation dedicated to establishing a world-class approach to integrity and ethics over the past three years, passing a comprehensive and rigorous audit carried out by GoodCorporation – who left no stone unturned – was extremely encouraging.

Product leadership is evident throughout this issue of SPECIMEN magazine. From long-term commitments in research and development in such areas as applying electronics or diffractive gratings to polymer substrate (facing page) to breakthroughs in manipulating angular metamerics that create brilliant new visuals using high-sensitivity ink (page 20), R&D scientists are leading from the front and breaking new ground in discovering innovative ways to apply technology to polymer substrate.

Effective leadership, however, also involves knowing when to follow. The six companies that founded the Banknote Ethics Initiative demonstrate outstanding leadership, not just for our industry but for the global business community – a fact that emerges upon reading SPECIMEN’S exclusive interview with BnEI chairman Antti Heinonen (page 8), conducted days after the announcement of the first three BnEI-accredited members. As Antti says: “... it is a totally different prospect when a third party assesses the policy and procedures in place to enforce high ethical standards and that is what makes BnEI unique. Knowing when to follow is also highlighted in this issue’s feature story, which involves the process by which a central bank can benefit greatly from drawing on the experience and know-how of experts to make a smooth transition from paper to polymer (page 12). R&D scientists are leading from the front and breaking new ground in discovering innovative ways to apply technology to polymer substrate.

**Effective leadership, however, also involves knowing when to follow.**

**Keeping You Notified**

**Multilevel DOEs Light Up Future Effects**

At January’s Optical Documents Conference, staged in San Francisco, Innovia Security R&D scientist Michael Hardwick detailed the latest technology breakthroughs in diffractive optical elements (DOE).

Mr. Hardwick presented the new methodology being used to create multilevel and multifunctional DOE structures – a giant leap forward in the effects that can be achieved compared to the binary structures used in previous denominations. The Mexican 50 peso note, released in May 2013, was the first use of a multilevel DOE to create an asymmetrical image. Mr. Hardwick also revealed that ‘multifunctional DOEs’ would be applied to the ECLIPSE® feature in the years ahead.

The DOEs: Mr. Hardwick is now working on include frequency selective, broadband, and reflective/transmissive DOE effects. Frequency-selective DOEs will produce different images when viewed using light of different wavelengths. These will be produced via careful manipulation of the DOE structure to achieve two different DOEs in a single structure.

Similar to these DOEs, broadband DOEs will produce multiple images according to the wavelength of the light. However, in this instance, one image is reconstructed in visible light and another in the infra-red region of the colour spectrum. The overall effect is a semi- overt/ covert feature where one can be used by the general public, and the other can be read by a machine, either at the retail level or at the high-speed note inspection level.

Finally, a reflective/transmissive DOE will produce two different images depending on the viewing method. Similar to the frequency-selective DOE, a careful manipulation of the DOE structure in combination with a semi-transparent metallic coating will allow one image to be verified in transmission and a different image to be seen in reflection.

Mr. Hardwick says one of the keys to producing such high quality, complex images is structure height and correct replication of the structural design. DOE efficiencies are enhanced by having accurate gratings etching depths, quality side walls, and negligible surface roughness within the nano-structures. The new manufacturing method not only satisfies those requirements but also delivers structures and high-fidelity imagery when combined with the protective overprint layer.

**Tune in to Radio Frequencies – Via Your Banknote**

P rinted as far back as 10 years ago as a prospective method of microchip banknote authentication in the Euro, Radio Frequency Identification (RFID) remains an intriguing option.

RFID, as applied to banknotes, is technology that would enable a signal to be sent or received by a printed microchip embedded in the polymer substrate.

The technology offers some exciting possibilities in instantaneous and discrete authentication; large premium department store retailers, for example, would be highly receptive to lowering their risk and overturning their long-held policies of accepting customer currency without question – if there was a socially acceptable way to immediately and unequivocally identifying a banknote as counterfeit.

Two types of RFID technology are possible: active and passive. Active involves the use of a chip that emits a response to a reader, while passive methodology responds to an incoming signal.

Some key issues have emerged in progressing the technology: preserving the anonymity of cash, the cost, the physical size of the chip, and durability.

“A number of these issues are being addressed based on overall advances in microchip technology,” says Innovia Security’s director of R&D, Gary Power. “However there are certain areas that when it comes to banknotes we need to be highly innovative to succeed.”

The challenges RFID poses are numerous. For instance, having the same signal for each denomination and restricting the read distance to point of transaction contact are potential requirements. Similarly, the microchips are expensive – for passive process chips around A$0.08 per unit.

“If we can find economy in the raw materials we use and then design to maximise efficiency, we might be able to reduce the cost below the one-cent mark,” says Mr. Power. “In the same vein, microchips for active use are still too thick – about 50 microns – especially when embedding and antenna technology has to be added.”

A passive RFID solution may offer more promise: passive layers can be as low as 5 microns and can be incorporated into foldable printed electronics. With print thickness directly related to conductivity, the material used must be highly conductive. If this equation can be satisfied, printed RFID will have close to a zero impact on the note profile. “This is potentially a breakthrough technology for Level 1 banknote authentication,” says Mr. Power.

“We’re interested in the banknote industry’s view: should banknotes incorporate radio frequency identification? To register your feedback, scan the QR Code with a QR reader (available free in the App Store).”

https://www.research.net/s/IS-RFID-survey
Design Integration: An Anti-counterfeit Essential

Staying ahead of banknote counterfeiters is a balancing act between adopting the latest technology and ensuring the public understands the change and knows what to look for. The key to a successful banknote design, therefore, is to address both these challenges simultaneously. While engaging with the design, the user must be able to intuitively authenticate the note.

Design integration is the final act – the sting in the tail – of an anti-counterfeit strategy for Guardian® banknotes that combines Clarity®C base film with security features that are printed on and embedded within the polymer substrate. The security created by these two elements includes a complex window and other features that deliver strong security in their own right. Anti-counterfeit effectiveness is greatly enhanced when the design of the note integrates these features to create a single visual narrative.

Given the design expertise required, the print services division of PolyTeQ Services, a subsidiary of Innovia Security, spends much of its time working with central banks to make sure this aspect of the transition to polymer substrate is a successful one.

The banknote designer’s challenge

Design is critical for the success of any new banknote. It impacts on note security, durability, machine processability, production efficiency and, ultimately, public acceptance.

Banknote designers have two goals. The first is for the public to understand intuitively whether or not a banknote is real. The designer has to think almost like a psychologist about how the community will interact with the notes. The notes need to engage with the senses – which generally involves either looking at, looking through, tilting, or feeling the surface. The effects that these security features elicit should be intuitive so the user authenticates the note without even noticing.

The second goal is to deter counterfeiters by creating designs of such technical complexity, using technology available only to central banks, that they simply can’t keep up.

Taking secure design to a new level

The Bee Hive Guardian® Note by PWPW is a great example of integrated design. The design team pushed the current boundaries of substrate and print integration using the latest design know-how, manufacturing techniques and security features.

PWPW developed the concept design for the new note, featuring bees and beehives, with a “window” that exploits the key security features of polymer substrate. PolyTeQ worked with the design team at Innovia Security to revise the concept design to feature multiple areas of transparency. Many of the visual elements in the note are built into the substrate, from flowers and background patterns to the bees and beehive.

In addition, the note looks different from front to back. On the obverse side the observer looks into the beehive, whereas on the reverse side the observer views the beehive’s exterior.

Adding gold Metalix® to the flowers in the design, and a diffusive optical effect in the bees and the beehive using LATITUDE®, further enhanced the complexity. A colour-shifting image using AURORA® on the honeycomb unifies the bee narrative of travelling from field to home.

Advanced printing

Creating such captivating designs also requires outstanding printing technique and capability. Today’s Guardian® banknote printers are always pushing the boundaries to incorporate the tight tolerances that these designs demand.

In addition, banknote designs incorporate a range of materials and printing techniques that add further complexity, from Level 1 to Level 3 effects, all of which are incorporated in a specific sequence. The ‘layering’ of these designs are therefore at the heart of a design on polymer substrate.

Achievable design

As intricate and clever as banknote design must be, banknotes must be efficiently printed in huge quantities. A banknote will go through the printing presses many times, and designers can use every stage of production and printing to build in security features. But there is a limit.

The design needs to be reproducible in order to ensure billions of notes can be printed. Every single one needs to be identical, inconsistencies undermine the whole effort – quite the opposite security philosophy of paper banknote printing.

The production of the new note includes a full training and accreditation program, delivered free by PolyTeQ. The banknote, with all the embedded and printed substrate features, was then printed as a finished note by PWPW.

Education: the final security measure

The final link in secure banknote design is to educate the public about security features whenever new notes are introduced.

In terms of public acceptance, design integration has a strong role to play in engaging the public. Central banks whose designs are well-known and traditional often face the challenge of an apathetic public who have become disengaged with the design and therefore become more vulnerable to passing a counterfeit.

Re-sparking public interest in a denomination by using a polymer substrate that boasts a highly engaging design with a range of security features and effects to consider can be a breath of fresh air for a central bank: a public that is once again engaged with the effects that should be observed, and becoming more inherently vigilant to counterfeiters in the process.
Accreditation Ensures Print Quality & Open Tenders

When banks make the decision to adopt Guardian® polymer substrate for their banknotes, the printer that wins the tender needs to be experienced and proven: printing banknotes on polymer is a very different process from printing on paper substrates.

One of the big differences for printers that are used to the absorbent properties of paper is the different preparation and pressure needed to print on a non-absorbent, water-resistant substrate. The lines are sharper, for example, and have to be printed slightly thicker to achieve the same colour results.

The almost-indestructible polymer substrate requires different techniques to feed it into and remove it from machines, responds differently when coated with inks, requires different temperatures for the printing plates, cylinders and blankets, as well as different conditions and times for drying.

All banknotes are printed many times over to achieve the final design and security features, which incises the print into the surface of the polymer – foil stamping, intaglio printing – which requires different techniques to feed it into and remove it from machines, responds differently when coated with inks, requires different techniques to feed it into and remove it from machines, responds differently when coated with inks, requires different temperatures for the printing plates, cylinders and blankets, as well as different conditions and times for drying.

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The Accredited Guardian® Printer (AGP) process mitigates the risk of the new notes failing performance standards by training printers to adhere to proven finished product standards. PolyTeQ Services, a subsidiary of Innovia Technology transfer PolyTeQ, shares all the information required to use inputs, processes and systems to produce Guardian® banknotes. For example:

A detailed look at all the material properties of Guardian® polymer, including its stiffness, absorbency, tensile strength, transparency, colour, load profile, dusting and edge profile, feature registration, thickness, and capacitance (ability to store an electrical charge).

The training included in the accreditation process is carried out on the job by PolyTeQ. “It normally involves the company printing up the design and going through the stages with our support,” says Mr. McDonald. “We keep it practical – it is the way people learn.”

The accreditation training covers every stage of production, from pre-press to the finishing varnish, and typically takes about six months. PolyTeQ provides 20 reams of substrate for the print trial, working on site to support the printer as they go through the stages to print up the design. The path to accreditation involves the following steps:

1. **Technology transfer**
   - PolyTeQ shares all the information required to use inputs, processes and systems to produce Guardian® banknotes. For example:
   - A detailed look at all the material properties of Guardian® polymer, including its stiffness, absorbency, tensile strength, transparency, colour, load profile, dusting and edge profile, feature registration, thickness, and capacitance (ability to store an electrical charge).

2. **Audit**
   - There is a procedure that allows printers to maintain accreditation even when introducing new inputs – such as inks that are not approved, because they have not already been proven by previous experience.
   - After notifying PolyTeQ, the printer is able to test and implement the variation to produce a note. If the test meets the required standard, the variation can be included in the schedule.

3. **Plant review and gap analysis**
   - This stage ascertains if all the equipment, processes and systems are available and working to the required standard.

4. **Specimen test and monitoring**
   - There are 16 Guardian®-accredited printers across the world, the most recent addition being the Polish Security Printing Works (PWWP).

5. **Monitoring and testing**
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5. **Monitoring and testing**
   - Training in recording the operating conditions and monitoring the performance is included at every stage. The finished banknotes are counted and tested against Guardian® banknote specifications and the test results confirmed during accreditation.

6. **Risk management**
   - Successful completion of risk management due diligence is provided by Innovia Security’s risk management department.

7. **Maintaining accreditation**
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In an exclusive interview with SPECIMEN magazine, Banknote Ethics Initiative (BnEI) chairman Antti Heinonen provides an insight into this groundbreaking integrity and ethics framework, which looks set to propel the banknote industry into a true leadership position in the global business community.

What challenges does the Banknote Ethics Initiative present for the industry?
A major challenge in creating this kind of initiative is to enlist the support and commitment of a critical mass of companies to achieve credibility, but at the same time balance this with a core group of companies in order to be able to agree on the governance structure. The work of those who collaborated to consider what was best for the industry cannot be underestimated. Another challenge is building the profile and credibility of the program in the industry. It is fully evident to me as a central banker that nothing happens overnight. However, the initiative has gathered momentum over the last 12 months and more and more companies are beginning to realise how serious this initiative is.

What reaction did you receive from central banks when first learned of the Banknote Ethics Initiative?
The reaction was very positive. When it was launched at the Currency Conference in Athens in May 2013, several of my central bank colleagues asked how they could support the initiative as an industry. Even as an industry initiative, BnEI was a new angle: a whole new way for a central bank to consider the industry. After a while, it became clear there was unilateral approval from central banks to support this initiative. But like any effective group, they wanted to see the results. Now, after the first accreditations in February, I have been widening my discussions with central banks because they can see things are happening and central banks recognise the importance of proactively addressing ethical issues.

Do initiatives such as BnEI exist in other industries?
Definitely. These three companies did a great job to fulfil the criteria, but having now both independent assessors – GoodCorporation and KPMG Brussels – fully operational, I expect another six companies to be assessed and apply for full membership later this year.

During the inaugural meeting of the BnEI Accreditation Council in mid-February, the council accredited its first three members. Do you anticipate more companies submitting applications for membership in 2014?
There are very some good reasons to embrace BnEI. From a commercial perspective, BnEI membership may become a point of competitive difference. I have discussed this prospect with some central banks and they say that in the past they wanted suppliers to provide ethical bone fides, but they couldn’t articulate exactly what that meant. BnEI provides this framework and now that it is in place, it is only a matter of time before this starts being factored into industry requirements. From an industry integrity perspective, BnEI creates credibility which positions us in a very strong

BnEI: Integrity & Ethics in Sharp Focus

BnEI: LEADERSHIP ON A GLOBAL SCALE

The Banknote Ethics Initiative (BnEI) was established to provide ethical business practice guidelines – with a focus on the prevention of corruption and compliance with anti-trust law – within the banknote industry. Membership is open to all organisations across the industry, irrespective of their size and experience. Each organisation is expected to follow a code of good practice developed by the Institute of Business Ethics. The code has been translated into an audit framework by GoodCorporation, recognised worldwide as a leading company in the field of assuring corporate responsibility and business ethics.

Members must adhere to a strict Code of Ethical Business Practice. All organisations that have signed the code must become accredited after passing an audit carried out by a third-party auditor – either GoodCorporation or KPMG Brussels.

Antti, you are well known for your long career as a central banker at the ECB and Bank of Finland, but when did your interest in governance develop?
It is likely that my career as a central banker combined with coming from a Nordic culture has meant that public service has always been important to me. Issues of good governance, even if not under that title, started becoming topical in central banks in the eighties. In the Nordic countries we recognised that consideration of the core activities, effectiveness and efficiency were also relevant concepts in a central bank. From these concepts, creating a governance framework was not a big step. Ethical issues are an important part of that framework. The public sector should be very sensitive to what happens in society, and in a similar way, good governance in the banknote sector should be acting in the best interests of the industry.

How did the opportunity to move into the position of BnEI chairman come about?
I became involved in BnEI in early 2013 but before that six of the leading companies in our industry decided it was time to develop a rigorous framework for promoting and maintaining high ethical standards in the industry. It took time to develop the governance structure, the operating principles, and the audit framework in partnership with the Institute of Business Ethics and GoodCorporation. From Central Bank of Finland, I stepped forward towards the position and was appointed by the nine signatories of the Declaration of Business Ethics. The idea was to create a code of practice, but somehow the project grew and eventually became an audit framework around the code.

What are the benefits of joining BnEI?
Membership in BnEI is open to all organisations across the industry, irrespective of their size and experience. Each organisation is expected to follow a code of good practice developed by the Institute of Business Ethics. The code has been translated into an audit framework by GoodCorporation, recognised worldwide as a leading company in the field of assuring corporate responsibility and business ethics.

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The third element in all its glory: Design integration

Introducing the Bee Hive Guardian® Note by PWPW

The two major security elements of Guardian® polymer substrate – the unique base film and leading-edge security features – already make it the most effective anti-counterfeit banknote substrate available today. Yet the third element of security – integrated design – takes anti-counterfeit effectiveness to a new level. Beautifully demonstrated in this stunning Guardian® house note, the LATITUDE® bee and honeycomb integrates perfectly with the AURORA® honeycomb design, which is further integrated into the note using a Shadow Image of increasing opacity. A glorious design for an inglorious foe.

To understand how design integration can be used to greatest effect in your next banknote, meet with a director from our Business Development team by contacting Commercial Services at: commercial.services@innoviasecurity.com

LATITUDE®
Silver nanotechnology that creates high-visibility diffractive optical effects, with the added dimensions of total design freedom and extremely high durability.

AURORA®
Large and obvious visual effects using leading-edge ink technology that delivers multiple colour shifts across the life of the note.
The move to polymer substrate is not taken lightly by any central bank. A comprehensive and systematic transition process is needed to build a reliable pathway to greater security and cost-effectiveness in managing a nation’s banknotes.
The Changing of Guard is an apt analogy for the transition that any central bank makes when moving from paper to polymer substrate. Like any facility of national or cultural importance, a central bank has in place a network of currency security that needs to be maintained. In the process of Changing the Guard, the transition from one security detail to another must be orderly, clearly defined, and in keeping with the methods familiar to the central banks’ procedures and processes.

In short, the risks associated with any change must be identified and anticipated in advance in order to give a bank the confidence and assurance it needs to know that the move to polymer will be smooth and orderly. The team assigned to manage such a critical transition must therefore be highly experienced, with the process and methods developed predicated on years of experience in managing exactly the same transition with other central banks. When it comes to making the transition to Guardian® polymer substrate, PolyTeQ Services, a subsidiary of Innovia Security, is a highly experienced team of banknote industry professionals charged with this important role.

While polymer behaves very similarly in general circulation to paper, the different composition means the substrate has nuances that must be accommodated by a currency management system. These adjustments are made as part of a three-phase polymer-introduction process of pre-launch, implementation and post-launch activity.

As in any productive partnership, the process begins with the central bank being able to lay any concerns on the table. For Guardian®, the transition to polymer has been completed so many times — with each transition documented in detail — that any concerns common to banks have been resolved. In fact, PolyTeQ has answers to questions banks may not have yet considered.

Confidence in making a transition typically starts in contemplating and addressing the bank’s biggest concerns when it comes to polymer. For example, having a single supplier for substrate must be managed correctly through supply agreements that ensure the bank will not be disadvantaged in any way. Guaranteeing continuity of supply is also a vital issue in which a bank must be shown precisely the plans in place to ensure that it will never be short of stock.

Communication is also a vital ingredient in building trust during the transition process. Ensuring that a process is in place that allows regular and immediate commentary and feedback for all parts of the process is vital.

Critically, identifying early on the resources a central bank has available to it to manage the transition to polymer will reveal varying levels of functionality and assistance required, such as the relationship and support from the commercial banking sector, the presence or otherwise of a communication department, or the number of staff available for the project itself.

Another area that requires clear communication is ensuring the bank’s expectations are clearly understood in relation to the currency system gaining the maximum possible benefit in moving to polymer substrate. This starts with an agreed approach to security across the note family and the method by which the new note or note series will be brought to the market. For instance, is the bank interested in a set level of security across the note family, or does it graduate its security depending on the level of threat to a particular denomination? Is the bank planning to release all denominations at once, or will it stagger the release of the denominations — and in what order will these be released? A well-considered and clearly articulated strategy in these areas sets the basis for a successful transition from paper to polymer.

Further, in quantifying the direct benefits in the adoption of polymer, the bank will consider with the transition team how it will substantiate durability as a cost benefit and the mechanisms it should integrate to measure progress towards actual note life. Similarly, measurement of the clean and green aspects of polymer must be agreed: how do the benefits of significantly lower bacterial counts on polymer notes apply to public hygiene, and how will the eco-friendly benefits of polymer substrate be measured?

Other considerations in establishing the partnership include issues such as liaison with industry stakeholders and working to meet their needs as part of the adoption of polymer substrate into the system, assurance of continued support from the polymer substrate service provider for both the bank and printer, monitoring of cash processing in both manual and automated machines, the ability to monitor progress throughout the transition and beyond, end-of-life issues such as the destruction and recycling of notes withdrawn from circulation, and identification and attainment of key performance indicators for the project. A strong partnership develops between a central bank and the polymer transition team when these questions and more are satisfactorily answered. In moving into the three-phase process of pre-launch, implementation and post-launch, some of the key activities to be considered are as follows:
Pre-launch

Printworks accreditation
Ensuring the state printworks is ready to print on polymer is typically a six-month process in which an AGP (Accredited Guardian® Printer) rating is achieved (for more detail, see ‘Accreditation ensures print quality & open tenders’ on page 6).

New opportunities for printworks
In moving to polymer, State-owned printers will in time reduce their production requirements for banknotes thereby reducing the total work requirement. This provides an opportunity for printworks management to work through how its increased capacity can be utilised, such as pursuing export opportunities.

Print tender and appointment
If a commercial printer is being used, a central bank will want to reduce costs by taking print to open tender. Considering which AGP commercial printers to approach based on relevant polymer printing experience will ensure high quality and competitive tender submissions.

Central bank project team
A multi-functional polymer transition team from across the bank would likely include representatives from cash management, R&D, auditing, transport, communications, production and security. The project leader would be likely to come from the note issue area. The key is to get the right combination and balance across the team.

Consultation with key stakeholders
Commercial banks, CTS, retail associations and BEMs must all be consulted to understand their specific stakeholders’ needs in adjusting to polymer substrate. The central bank would like these stakeholders to “champion” their decision. It is important that central banks engage early in the process: in the order of 18 months ahead of launch, if feasible.

Stock for test purposes
For education and testing purposes, a supply of generic polymer notes for testing in ATMs, vending machines, and any other equipment that processes notes including high-speed machines and desktop machines is made available. Time must be allowed for software patches to be developed to enable acceptance and dispensing adjustments.

Special interest groups
From a user perspective, people who are blind or vision-impaired are the most common special interest group that must be engaged in the transition to polymer. Banknote design decisions are also an area where indigenous groups or groups with technical relevance should be consulted to ensure the accuracy of design, and in some cases, to request permission.

Public education and awareness
One of the biggest issues. The public must be informed and anticipating the release of the new currency. In addition to creating awareness through the banking industry, there are a wide range of ways this can be achieved such as communicating through primary schools or staging education roadshows to introduce the public to polymer substrate. A wide range of media channels can be used.

Banknote supply management
Thought must be given to the stock of existing paper banknotes and establishing a policy for their management: how will co-circulation of polymer and paper notes work, how and at what rate will paper notes be withdrawn from circulation, how will polymer notes be circulated, and how will the old paper notes be stored and destroyed?

Implementation

Project planning
Establishing a launch date is valuable as it enables the transition team to work backwards from date to develop a process and timeline. The volume of notes required, access to substrate, state printworks accreditation or commercial printer tendering, the production time for printing, external approvals for design and many other elements need to be factored in.

Public engagement
To engender public engagement, there are various approaches a central bank can utilise. The new polymer note series may be used to commemorate a special event in the country’s history or a date associated with the portrait on the banknote. Clever ideas such as a special note with an additional design element, intermingled with general notes, also peaks interest in public engagement.

Method of launch
On the day of the announcement, decisions need to be made on whether all notes are ready for distribution from commercial outlets or whether they will start being distributed from the central bank. Will multiple events be staged throughout the country, or will an event of single national significance occur?

Numismatics
Consideration needs to be given to these passionate collectors of notes and coins who are looking for first-day issues. This is a small group who are highly engaged, active and vocal about new banknotes in the market.

Use of media
Whether the governor gives the president the very first note, or a person of national importance presents the note to the public, the central bank has a range of interesting and inspiring options to create a huge amount of free publicity.

Post-launch

Immediate commentary and feedback
During the post-launch period, the transition team will be very active in assessing acceptance of the new substrate from across the nation. The team will be looking to gain a balanced view, both positive and negative, from various industry and lead user groups, as well as consulting the public.

Continued support
Central banks need to know that ongoing technical expertise and advice is available as it continues its journey in either expanding its polymer note program or ensuring that the banknote series is working as effectively as possible in benefiting the monetary system.

Monitoring of cash processing
Identifying and understanding any teething problems being experienced with cash processing equipment, both manual and automated, is an area of particular focus. Similarly, monitoring the performance of the polymer notes in circulation in order to assess durability and anti-counterfeit effectiveness will involve regular dialogue with key stakeholders within the system.

Recycling
Preparing for end-of-note-life as early as possible is recommended, in particular the method of recycling that will be used. The central bank has a growing network of regional recycling programs that it can access, and the contribution of stock volumes to the programs assists not only itself but other central banks in the region who benefit from economies of scale.

In fact, PolyTeQ Services has answers to questions banks may not have yet considered.
ICS: Benchmarking the Industry

Francisco Lopez had been around the banknote industry long enough to recognise a gap in the market for independent data-gathering and analysis of banknote fitness. The managing director of ICS (Intelligent Currency Solutions) doesn’t claim it is an easy road to travel, but he believes it’s a cause worth fighting for – and one that is a growing focus for central banks and cash processors.

What are the origins of ICS?

Originally, Rick Haycock and I realised there needed to be a level of independence in banknote sampling and the assessment of banknote sorting machine performance. As a sales director at De La Rue, and then in heading a software division at CSi, I could see there wasn’t an independent route for a cash-in-transit (CIT) operator, central bank, or a substrate provider to transparently assess banknote life cycle and performance. The assessment tools and information were being provided by the suppliers of banknote sorting equipment and we saw it as critical to remove this conflict of interest in reporting. In addition, with mergers and acquisitions we were seeing a far greater mix of equipment being used for banknote sorting, which then makes the assessment process very difficult to manage – and potentially inconsistent. ICS was born from a vision of providing a unified method of assessment from an independent source irrespective of equipment type, model and location.

What was the reaction to ICS when you entered the market?

The response was one of confusion. Is this a tool for a central bank or a CIT? The truth is that each has a problem to be solved, and there are value-added opportunities when working together, as we are increasingly seeing. In a lot of countries we’ve seen central banks outsource the banknote management and sorting function. This, in turn, has created the need for the bank to maintain a high level of visibility of its banknote supply, even if the bank doesn’t physically handle the notes as much as they used to. In addition, the commercial sector needs to prove a level of compliance, and without independent assessment methodology there are very few ways to demonstrate that compliance – it is simply not a transparent and accountable situation. Furthermore, while we have seen many central banks introduce frameworks and policies to govern note fitness, the procedures for policing this have yet to be fully implemented.

How does the mobile Note Wear Analysis software fit into the picture?

We’d had conversations with Innova Security to clone a lab application that we could convert to a client application where the client could undertake independent assessment of note fitness out in the field. We wanted to provide the commercial world with access to note wear analysis capability at the same level of quality as is available to a central bank. We also came at the problem wanting to provide suppliers with a value-add opportunity with their central bank clients for critical fitness assessment data, proven accountability and product validation or improvement for suppliers. In addition to this we saw a need for a tool which inspectorate teams and staff could consistently use to monitor the quality of currency in circulation and track the life cycle of the currency to see rates of degradation in the field and build up empirical evidence for the durability of their notes.

The Note Wear Analysis software automates and standardises the note fitness analysis process. This methodology enables assessment of a note’s in-situ performance, which can provide insight into the rate of degradation – for example, is fitness declining in a linear progression, or does the rate of degradation change over time? In addition, the mobility of the system enables regional analysis, which helps a bank to better manage the note quality in different parts of the country, thereby maximising the useful life of its banknotes. Furthermore, by enabling the system to assess both paper and polymer notes, we are able to assess the relative rates of note degradation so that accurate assessments can be made directly by the client to inform future decision-making.

How does this insight impact a central bank’s capability?

This information can either prove or disprove assumptions that may exist in a central bank by taking subjectivity out of the process. It allows a true statistical base to assess the fitness of the note supply and real-time insight into how banknote quality is tracking. Once a bank understands the data on degradation rates of the polymer or paper substrate, this sharpens the focus and effectiveness of the banknote fitness strategy, which maximises the value return for each note printed by the bank. This information can either prove or disprove assumptions that may exist in a central bank by taking subjectivity out of the process.

Why are your systems more relevant today than, say, five years ago?

ICS was founded based on a new need in the market. The banknote management environment has changed rapidly in the last five years. The trend is clear that we are increasingly seeing a lot more banknote circulation management occurring away from the central bank due to outsourcing contracts and the emergence of new recirculation technologies. This enables the processing of banknotes to be done in the most cost-effective manner, but data capture is about time efficiency. Traditionally a data-reporting package from the supplier was one and the same – now we can separate the two things. The bank may not need to physically have the notes but it does need the data so it can drive operational issues of the cash cycle.

Is benchmarking of banknote performance across a region or by banknote environment profile possible?

Analysis of country versus country or across a group of like-countries is a huge prospect for the future and a key benefit for clients looking at new or revised note issuing policies. For example, a central bank wanting to compare its note performance benchmarked against the experience of five other countries of similar profile would provide outstanding analytical value. This could only be achieved through independent and consistent analysis and certainly a supplier that could offer independently-derived, equipment-agnostic data would be offering a strategic capability viewed very positively by banks.

You mention central banks, but how can banknote suppliers use your technology?

The technology enables a value-added route for the supplier of a central bank by moving from a product to a strategic focus. ICS technology enables a supplier to be the first to understand the performance of its product in the market, even before a central bank. This is a powerful retropective tool to ensure that a supplier’s original objectives are being met, for a denomination, or maybe to assess the performance of a specific feature or substrate.
Metamerics Shine a New Light on Security Inks

Constant R&D innovation continues to push colour-switching technology to its limits. R&D scientist Chris Tierney explains how AURORA® is an evolution from the original G-Switch® feature.

AURORA® is a revolutionary colour-switching effect that uses leading-edge, high-security inks that project a rich pearlescent colour when viewed in reflection and a strong, bold and contrasting colour when viewed at other angles or in transmission. When three colour pairs are designed in combination, AURORA® is a highly aesthetic feature that displays large and obvious colour switches.

A fellow switching effect, the G-Switch® feature generally uses a single colour on most banknotes. When two or more colours are used, the G-Switch® colours are usually chosen to fit the customer’s banknote. As a point of difference, AURORA® colours have been developed using a range of new pigments that allow colour pairing with improved brilliance and intensity.

In its beginnings, AURORA® was developed to address a problem common in the car repair industry: when a vehicle respray does not match at all angles – a particular problem with metallic and pearlescent paints. The AURORA® range allows for two colours to be similar at one angle and totally different in transmission and at other angles. AURORA® achieves leverage on this problem by pushing the limits of colour-switching technology to achieve outstanding results.

The secret behind AURORA® is a phenomenon called “geometric metamerism”. Geometric metamerism differs from standard metamerism, used traditionally on banknotes, as the latter relies on a light source change for colour variation: two colours look the same under one light source, and different under another. AURORA®’s geometric metamerism works with angular change to achieve colour variation and does not require different light sources for the effect – it works well in all good light sources.

The feature works best by having two optically-variable colours that are similar when viewed in reflection, but completely different when viewed from other angles and in transmission. A third optically-variable colour is also incorporated into the design. It looks opposite to the first two colours from one angle, but similar to one of the colours at other angles and also in transmission.

Another way to use AURORA® is to have two distinct colours in reflection that switch appearance at other angles and in transmission. Adding a third colour in reflection which is similar to one of the other colours in transmission, enhances and further complicates through offering many different colour combinations to achieve stunning effects.

AURORA® has a range of 10 colours that can be mixed and matched to fit or complement the colours of a note. The first colour quoted in the AURORA® colour range description indicates the colour seen in reflection, while the second colour can be seen from other angles and in transmission. Designers can get the best out of this feature by integrating the best colour combinations of AURORA® in the overall note design to enhance, complicate and create effects not previously available on banknotes.

AURORA® can be printed under the white opacity layer, maximising the benefits of the transmission colour while obtaining perfect registration when running from the window. The combination of the above factors increases the complexity of this feature.

AURORA® is effective in both window and half window, with the possibility of incorporating both options in a single note for greater effect. The best way to view this effect is to find the gloss angle of the film, which is the same angle to see the reflective colour of AURORA®. Additionally and similar to the G-Switch® feature, AURORA® passes all banknote physical and chemical tests, and will withstand all of the varied conditions a banknote is likely to encounter.

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AURORA®

Complex window: The shape of this window with the addition of G-Switch® remains a brilliantly executed design effect in the circulating Nicaraguan 200 Cordobas note.

World-class effect: The design integration and high visual impact of AURORA® offers a path to greater public engagement.

Sparkling options: The jewel description indicates the colour in reflection.
