RECONNAISSANCE
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Inside this edition

Authentix Launches Breakthrough Nano-Optic Plasmonic Feature

At the High Security Printing (HSP) Asia 2025 conference in Kuala Lumpur this month, Authentix unveiled PICO secure™, described as the world's first nano-optic, plasmonic optical variable device (OVD) for polycarbonate identity documents. The feature – says Authentix – delivers always-on structural colour and movement, drawing on its award-winning nano-optic technology.

PICO secure provides dual-sided protection for passport polycarbonate data pages and other government documents, with its effects visible from either side. It does this by exploiting the unique properties of surface plasmon polaritons (SPPs) at metal-dielectric interfaces to create angle-dependent or independent, and wavelength-dependent, optical responses that are next to impossible to counterfeit.

During the launch, Alan Newman, Chief Product Officer at Authentix, explained how this patented Level 1 feature enhances public engagement. It also supports any document theme through highly customisable and intuitive authentication effects.

PICO secure is fully customisable for design integration. It can be applied to paper and composite substrates and embedded into polycarbonate using standard, unmodified industry equipment. It uses significantly less material than traditional micro-optics and requires no inks or dyes.

Moreover, the material is produced in Authentix facilities (Thurso, Quebec) that are powered entirely by 100% hydroelectric energy, positioning it as one of the more sustainable options for document security.

Authentix has completed production qualification, confirming industrial readiness through third-party applications and downstream testing. Despite its ultra-thin form, the encapsulated structures support overprinting, polycarbonate lamination, and laser personalisation.

From banknotes to IDs

This is Authentix's second major announcement in recent months. The company recently signed a

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2025: The Year Optical Security Reached New Heights

As we conclude 2025, we reflect on a year that transformed the OVDs sector. Our pages highlighted breakthroughs, bold ideas, and the expanding critical role of OVDs across various sectors. The industry advanced rapidly, and your engagement helped us follow this development with clarity and purpose.

2025 delivered some of the diverse and ambitious product launches we have covered. Innovations spanned holography, micro-optics, nano-optics, plasmonics, and new materials. Companies focused on stronger integration, collaboration, sustainability, and scalable manufacturing.

Key launches

- TOPPAN's colour Illumigram™, redefining phygital OVD authentication with normal mobile light.
- IDEMIA's thermo-reactive liquid crystal ink, a patented colour-shift breakthrough.
- IN Groupe's 'Phoenix', the latest evolution of the DID™ Alphagram™ laminate.
- Covestro Autentium – a next-generation polymer substrate for banknotes.
- Q&T's POLYSECURE® SHIELD, embedding OVDs into polymer substrates.
- De La Rue's optical express label series (OELS) for rapid brand authentication.
- H010's dual-QR hybrid hologram, merging physical and digital authentication.
- Crane's cBREEZE™ and PROFOUND® TruSpectrum™, strengthening micro-optic capability.
- Rolling Optics (Oberthur subsidiary) Fidaro™, adding more micro-optics choices for brand protection.
- Oberthur's Kryptonome, deepening investment in optical watermark science.
- Radiant Opto-Electronics' acquisition of NILT reshaped micro-optics production.
- Sanyo Chemical's HILUCIS enables nano-imprint resins for AR/VR applications.
- IQ Structures Number 1 based on free-form nano DOVIDs.
- Authentix PICO secure™, a major advance in nano-optics plasmonic structures (see page 1) and many others.

Sustainability gained new momentum through hydro powered manufacturing, eco-friendly foils, and material-efficient optical platforms.

Market shifts and industry developments

The year saw major structural shifts as companies repositioned, expanded, and consolidated to meet rising global demand for high-performance optical technologies.

- Crane Authentication unveiled a renewed brand identity.
- KURZ unified SCRIBOS, combining digital and physical brand-protection platforms.
- De La Rue's private takeover reshaped the future of the currency-supply chain.
- K Laser Technology opened a major 52,000 m^2 manufacturing campus in China.
- IN Groupe acquired IDEMIA Smart Identity, scaling its size with a consolidated turnover of more than €1 billion.
- DNP invested in Laxton, strengthening global authentication capability.
- Hueck Folien + IQ Structures expanded their Nanovista partnership.
- Giriraj Foils + Oberthur advanced micro-optics capability in India.
- Canpac acquired Shriram Veritech, signalling consolidation in packaging and authentication.
- Lumenco + XRD Nano partnered to industrialise micro-lens brand-protection features.
- Koenig & Bauer Vision & Protection + Bosch advanced printed-product traceability.
- Authentix + KURZ scaled the QUANTUM™ stripe.
- Toppan increased R&D investment, and its new $55 million secure document facility in Ethiopia is near completion. Toppan's role in Ethiopia is expanding as Ethiopian authorities advance plans for an $85 million digital tax stamp system, in which TOPPAN Gravity is one of the leading participants.
- DNP opened a major R&D centre in Eindhoven, and Toppan Packaging opened a new Lab in Hartsville, South Carolina, to drive further innovation.
- Appotronics + Ceres Holographics accelerated the adoption of HOEs and HUD display systems.
- Crane NXT continued its acquisitions with Antares Vision, expanding into inspection and track-and-trace.
- ZEISS + LG Chem formed a strategic alliance for photopolymer films. ZEISS also partnered with tesa for scaling industrial holography.
- Reconnaissance International rebranded two flagship publications: Holography News™ became Holography & Optical Technology News™. In another development, Tax Stamp & Traceability News™ and Authentication & Brand News™ merged to become Tax Stamp & Authentication News™, reflecting the broader evolution of the industry (see page 4). Both publications are now entering a new phase of growth, expanding to 12 pages to offer deeper analysis, coverage, and richer insights across technologies and markets.
- Reconnaissance also launched DataVault™, the sector's first dedicated, searchable online database of banknotes and coins.

OVDs adoption across the sectors

OVD adoption accelerated across banknotes, identity documents, tax stamps, and brand-protection programmes.

New banknotes and commemoratives from Argentina, Mauritius, Kazakhstan, the Philippines, Kenya, Armenia, the Bahamas, Belize, Namibia, Sri Lanka, Bolivia, Tajikistan, Bhutan, and others introduced advanced optical features across paper and polymer substrates.

Identity documents have also advanced. Japan, Iceland, Cameroon, Congo, Ghana, Kenya, Kyrgyzstan, the Netherlands, and several US states adopted OVDs with improved designs as per ICAO and other regulatory guidelines. Nepal also reveals plans to use ePassports featuring CLIP ID technology, starting in spring 2026.

Hong Kong launched its first OVD-equipped tax stamp pilot. In brand protection, Pokémon continued using optical security for 30 years, while holographic features help detect counterfeit MABTHERA® in Colombia.

These developments reflect a clear global shift towards high-performance, tamper-resistant documents built on trusted optical technologies. The debate over holography's 'WOW factor' re-emerged, yet industry sentiment remained consistent: innovation remains robust, and creativity continues to lead.

Events that shaped 2025

2025 delivered a strong calendar of global events that defined technical direction and strategic momentum.

- CES 2025 in Las Vegas displayed holography's expanding role in consumer electronics and imaging.
- The Tax Stamp & Traceability Forum™ in Cape Town reinforced the growing convergence of optical features with track-and-trace and secure digital platforms.
- The Currency Conference in Bangkok provided a global stage for central banks and suppliers to debate substrate evolution, security, durability, and next-generation optical features.

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IN Groupe Moov™ to Madagascar

The Central Bank of Madagascar (Banky Foiben'i Madagasikara) has enhanced the security of its 10,000 Ariary and 20,000 ariary banknotes with a Moov™ security thread from IN Groupe.

The Moov technology creates animated features based on a combination of micro- and nano-optics, along with a distinct bi-colour transformation when the note is rotated. It was first launched in patch format as an extension of IN Groupe subsidiary Surys' DID™ and Graphic Wave features to provide two high diffractive registered colours at a reflection angle, as well as opposite dynamic effects when the note is tilted top to bottom.

The thread version was introduced as part of the company's first portfolio of optically variable security threads in 2020.

It combines two vibrant colours (green and red, which is the most eye-catching to the human eye) to deliver powerful visual effects and dynamic animation. Fluorescence and magnetic features are also incorporated for machine readability.

The current versions of the two high-denomination ariary notes were introduced in 2017. The Moov threads replace the RollingStar™ threads that appeared on those two versions. The designs remain unchanged.

In addition to Moov, IN Groupe offers several diffractive and nano-structured optical features, available as patches and stripes, for both paper and polymer banknotes. They include the Alphagram™, as used for the patch on the first euro series; the colour-shifting zero-order device DID™; and the Plasmogram™, based on plasmonic technology, with a polymer variant (that currently features in the Philippines 500 and 1,000 piso notes).

New structure to drive transformation

IN Groupe recently announced the implementation of a new organisational structure and the appointment of a new executive committee to support its transformation and growth ambitions .

This milestone follows the completion of the acquisition of IDEMIA Smart Identity (now IN Smart Identity) in July 2025. With this transaction, says IN Groupe, it has strengthened its expertise, expanded its solution portfolio, and increased its international footprint, establishing itself as a global leader in physical and digital identity, serving governments, citizens, and businesses.

Its other affiliated brands are SPS (electronic components), Surys (optical and holographic security), and Nexus (digital identity solutions for people and products).

The new operating model is built on a simplified, integrated, and global structure designed to leverage the complementaries and scale of the enlarged group.

... 2025: The Year Optical Security Reached New Heights

- Security Document Summit, in Beijing and Optical & Digital Document Security™ (ODDS) at Warsaw helped shape the future direction of phygital IDs.
- Intergraf Currency+Identity in Milan showcased best-in-class design and secure manufacturing.
- High Security Printing™ (HSP) conferences across Asia, EMEA, and Latin America continued to play a role in the industry ecosystem and showcased regional advances in banknotes and identity documents (see page 11).

Across these events, one message remained consistent: optical technologies continue to expand their influence across physical and digital ecosystem.

A milestone year for IOTA

2025 marked a defining moment for the International Optical Technologies Association (IOTA). With a refreshed identity, stronger global engagement, and expanding member benefits, IOTA worked throughout the year to advance the adoption, visibility, and value of optical security technologies worldwide.

- In 2025, it participated in more than ten major events across all continents.
- The IOTA seminars and workshops promoted technical dialogue and knowledge exchange.
- Recognising legacy and innovation, it launched its first Excellence in Optical Technologies Awards, replacing the long-standing Holography Awards (see also page 7).
- This year brought strong and diverse membership growth, further strengthening IOTA's global footprint. It welcomed new members from across OVIs, substrates, nano-replication, photonic materials, and secure document production, including Karul Holoscience, NanoSilikhan, Satoris, SICPA, TOPTICAL, Q&T Hi-Tech Polymer, and XRD Nano.
- To deliver more value to its members, it expanded the SIR (Secure Image Register), which now includes holographic images and other optically variable devices (OVDs). The SIR's adoption continues to grow across global government and industry users. More than 490 registrations were completed in 2025 (as of mid-November 2025) – the highest number in the register's history.
- Patent news – as of 30 September 2025, more than 965 patent information items had been shared with members.
- Next year, it will launch a new service, DocCheck.

Themes that defined 2025

- Integration – merging optical, digital, and material sciences.
- Sustainability – reducing material use and energy consumption.
- Accessibility – opening advanced technologies to wider markets.
- Design freedom – from vertical IDs to hybrid substrates and phygital effects.
- Resilience – strengthening banknotes, excise systems, and brand protection.
- Intelligence – with Reconnaissance launching DataVault™, the first searchable banknote and coin database.
- Certification & standards – major milestones from IN Groupe, NASPS, and SICPA.
- Recognition – optical technologies continued to win global awards.

Thank you all

You helped make 2025 a standout year for HOT News, and we thank all our readers, contributors, and subscribers. Your insights, feedback, and support drive our mission to inform, connect, and inspire the global optical-security community.

May 2026 bring new ideas, fresh collaborations, and stronger innovation across our industry.

With season's greetings and best wishes.

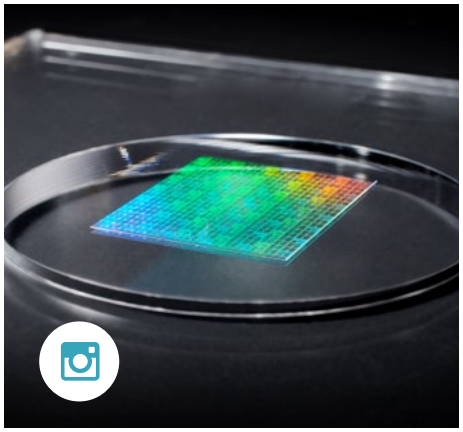
Chander Jeena

Editor

News in Brief

DNP Unveils 10-Nanometre Nanoimprint Lithography Template

Dai Nippon Printing (DNP) has announced the development of a nanoimprint lithography (NIL) template with a circuit line width of 10 nanometres. The template supports patterning equivalent to the 1.4 nm logic generation. It addresses the miniaturisation demands of advanced logic semiconductors used in smartphones, data centres and NAND flash memory.



DNP has worked on NIL templates since 2003. These templates press circuit patterns directly into substrates. This approach lowers energy use during the exposure process. Over two decades, DNP has built strong expertise in high-precision patterning.

The new 10 nm template can replace part of the EUV lithography process. It enables advanced semiconductor manufacturing for customers without EUV production capability. By supplying this template, DNP broadens process options for chipmakers. The solution helps cut manufacturing costs and reduces environmental impact, while supporting next-generation semiconductor production at scale.

Ignetta Holographic Delivers High-Performance Gratings for ISRO Evaluation

Ignetta Holographic, based in India, has received a positive response from the Indian Space Research Organisation (ISRO) for supplying multiple sets of its Volume Phase Holographic Transmission Gratings (VPHTG) to the space applications centre (SAC/ISRO) in Ahmedabad. The delivery included two types of gratings with groove densities of 600 lines per mm and 1,800 lines per mm.

(VTHGs) are primarily used in astronomical instrumentation and earth observation missions for applications requiring high-efficiency, low-stray-light spectroscopy and hyperspectral imaging.

SAC/ISRO has completed its evaluation, reporting that the gratings not only met all technical requirements but exceeded performance expectations. The results highlight Ignetta's capabilities in producing high-quality holographic optical components for advanced scientific use.

ISRO noted that it looks forward to working with Ignetta Holographic on future projects, including both ground-based systems and space-based applications — marking a significant endorsement for India's growing optical and photonics industry.

NASPS Earns Two Global INTERGRAF Certifications

Egypt's National Company for Advanced Industries and Integrated Strategic Printing Solutions (NASPS) has achieved two major INTERGRAF certifications – ISO 14298:2021 and ISO 15374:2023 – only a few years after it was opened in 2021.

With these milestones, NASPS becomes the first company in Egypt to secure the INTERGRAF ISO 14298 G-Level certification.

NASPS is also the first company in Africa and the Middle East to obtain INTERGRAF 15374 certification, covering the production of banknote paper, security paper, security foils, and security threads.

What are INTERGRAF certifications?

ISO 14298 certification has three levels. The Fundamental (F) level sets the baseline requirements for printers supplying commercial security products and items for government use. The Governmental (G) level adds stricter controls for printers producing secure documents such as ID cards and passports. The Central Bank (CB) level represents the highest tier and applies to printers serving central banks, card-issuing authorities, and personalisation centres, covering all F and G requirements with additional high-security measures.

INTERGRAF 15374, meanwhile, defines the security management requirements for suppliers of sensitive materials and services, such as inks, foils, and security substrates used in high-security printing.

Currently, more than 180 production sites in over 55 countries across six continents are reaping the benefits of certification.

Reconnaissance Launches Tax Stamp & Authentication News™ to Reflect Market Convergence

Reconnaissance International – the leading global source of business intelligence on tax stamps and traceability, authentication technologies, identity documents, and banknotes and coins – has merged two of its monthly publications – Authentication & Brand News™ and Tax Stamp & Traceability News™ – into a new publication called Tax Stamp & Authentication News™ (TSAN).

This merger reflects the reality of today's markets, technologies and public policies, where government-led tax stamp and traceability systems are extending beyond excisable goods (in particular tobacco and alcohol) to a broader range of products. In parallel, these systems are embracing additional functions for product authentication and supply chain visibility, which takes them well beyond their original tax collection role.

Similarly, brand owners are increasingly seeking smart solutions that combine authentication, traceability, and consumer engagement, and enable brands to comply with regulations such as the EU Ecodesign for Sustainable Products, which requires digital product passports.

Bringing these different dynamics together under the TSAN banner provides governments, brand owners, technology providers, and enforcement agencies with a more streamlined source of news, analysis, and commentary regarding this rapidly evolving and converging landscape.

TSAN is delivered as a monthly, 12-page publication, supported by a dedicated website (https://taxstampauthentication.news) and weekly news updates.

The editor of TSAN is Nicola Sudan, who is also General Secretary of the International Tax Stamp Association.

Montana Introduced New IDs

Beginning in December 2025, the Montana Motor Vehicle Division (MVD) introduced redesigned driver's licences and ID cards to reduce fraud and identity theft.

With polycarbonate substrates, the cards feature Montana state landmarks, black-and-white laser-engraved images, multi-colour ink, colour-shifting elements, ultraviolet designs, and raised tactile features, making them difficult to replicate. The new credentials will include icons such as a REAL ID white star, a black eagle-in-flight US citizenship marker, and a black organ donor symbol.

Also included is Veridos CLIP ID, which combines laser engraving and colour printing to produce a lifelike image of the ID holder in true, vivid colour. According to estimates, 25 million CLIP IDs have been used over the last five years.

The news follows the Texas Department of Public Safety, which also began issuing driving licences and ID cards in August 2025. Similar to Montana, Texas IDs feature a black, laser-engraved star in the upper-right corner to indicate REAL ID compliance, which took effect on 7 May 2025. Under this requirement, individuals must present REAL ID-compliant documentation for domestic air travel and access to certain federal facilities.

Another commonality is the optical security element. While Montana features CLIP ID, Texas includes OVM™ (Optical Variable Material) from Crime Science Technology (CST), which features a novel blue Texas-shaped icon in the bottom-right corner to aid quick state identification for frontline personnel.

... Authentix Launches Breakthrough Nano-Optic Plasmonic Feature

Cooperation and Licence Agreement with LEONHARD KURZ, centred on QUANTUM™ Stripe, its other patented nano-optic feature. Launched two years ago, QUANTUM uses plasmonics to deliver movement, 3D depth, and multicoloured effects in an ultra-thin form, visible from all angles and under varied lighting.

In 2025, Authentix acquired the authentication operations of Meta Materials, anchored around Nanotech Security Corp (NSC), for approximately $10 million. NSC specialises in nanostructured functional films such as Lumachrome®, used in more than 30 banknote denominations; LiveOptik™ PROTECT, designed for brand protection; and QUANTUM® Stripe, the fully animated nano-optic and plasmonic banknote feature.

Until the acquisition, Authentix was mainly positioned in the covert, Level 3 security feature space. The addition of NSC's portfolio and the launch of PICO secure now place Authentix as a first mover in nano-optic plasmonic security features, strengthening its reach across currency, brand protection, and now identity.

UK Confirms Passport Design Upgrade

British passports will undergo a redesign beginning in December 2025, representing a significant update since Brexit. For the first time, the front cover carries the coat of arms of His Majesty King Charles III. The new design reflects British pride. Inside pages display illustrations of UNESCO-listed landscapes such as Ben Nevis, the Lake District, Three Cliffs Bay, and the Giant's Causeway.

The current passports remain valid until their expiry date, and new designs are issued automatically during renewals.

Thales first secured the contract to deliver the UK's new generation of passports in 2020. Since then, the blue non-EU electronic passport has rolled out steadily. The latest version introduces a polycarbonate data page and a new suite of security features developed by Thales.

The holder's photograph is laser-engraved into the card body and seamlessly integrates with the surrounding secure artwork. Printed features are positioned between the surface of the document and the laser-engraving, making tampering more difficult. The main portrait has additional protective layers, including embedded Diffractive Optically Variable Image Devices (DOVIDs) and positive/negative embossing. CLI/MLI images and tactile laser effects add further complexity, increasing the challenge for counterfeiters.

Source: HM Passport Office.

A Hybrid Breakthrough: H010's Dual-QR Hologram

At the Optical and Digital Document Security™ conference in September, George Hall, Chief Commercial Officer of UK company H010 (pronounced 'holo' but note the two zeroes and the figure '1'), presented this start-up's novel hologram/QR code security label.

Simple in concept but a challenge to achieve, this is a surface relief holographic image of two interspersed QR codes.

At first sight, the hologram shows a classic 2D code as a black and white pattern of tiny squares or dots (Fig 1).

Fig 1 – H010 hologram QR label.

Then, as the hologram is tilted or rotated, two different patterns are revealed in separate holographic channels – each of which is a QR code (middle picture of Fig 2). These codes are specific to each origination. The hologram label also carries an overprinted unique alphanumeric code.

Of course, QR codes are not, in themselves secure, but they are increasingly used for product tracking and tracing, which does require at least a minimum level of security. H010's label is the latest attempt to enhance the codes, and therefore their value in brand protection, by making them secure. Like all holograms, they cannot easily be scanned or otherwise copied, and even if this image were to be copied, it is extremely unlikely that the two codes could be separated for scanning.

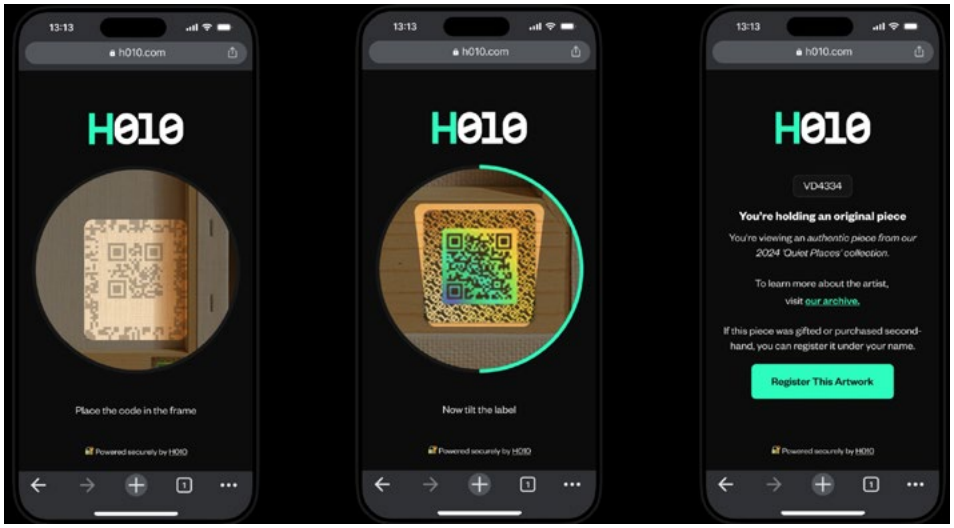


Fig 2 – the stages of verification on a smartphone.

Which is the next step for H010's labels, consisting of the reading of the codes by the camera on a smartphone, in a two-stage process (Fig 2).

The first stage sees the camera scan the code and link to the H010 web authenticator, The authenticator then returns a message requesting access to the phone's camera so it can authenticate the code, instructing the user to tilt the phone so the camera can authenticate both codes. Note that this smartphone action results from the QR scan; no proprietary app is needed.

> *"We provide totally clean analytics with every scan so brands can trust the data they receive*

This approach was developed by Charlie Gale, CEO of the company, with input from holographers, software developers and others. His idea was to take a type of security label that is well-recognised and trusted by consumers and combine it with data-carrying QR codes, which are also very familiar to consumers. The solution is covered by a patent in several jurisdictions, including International Patent WO2019/077376 A1.

Another aspect that H010 set out to overcome is the cost of hologram design and origination for a company requiring a secure product label. For H010, there is only one standard holographic design and QR pairing (the lock and the key), with the unique alphanumeric code providing the individualisation.

Thus 80% of the process of creating each label is in the digital creation and interspersing of the two codes, with 20% in the analogue act of recording these codes as a holographic image, which means there is a negligible origination cost to the company.

This allows H010 to provide small runs economically, so they can offer a service to small and medium enterprises, which Hall describes as a neglected part of the market. In fact, on H010's website it offers various levels of supply, from 100 to 10,000 pieces, via one-off orders or a monthly 'subscription'.

The company chooses the pair of QR codes for each origination, along with the artwork, but the holograms are produced by third party suppliers. H010 also has a small R&D and prototyping holography lab in its basement in West London.

As part of its 'keep it simple and cost-effective' approach, all the labels are the same size (33mm x 27mm). They carry an overprinted alphanumeric serial number, so each label is unique, allowing customisation of the web app at brand, or even product level.

Hall told us that the labels can be smaller if a large quantity is required. On which note, if or when they get a customer with a requirement in the millions or more, they will work with suppliers who licence their technology to meet this request. At present, however, they are focussed on serving the middle-market that existing suppliers aren't set up for.

Innovation Through Integration: Excellence in Product and Document Security

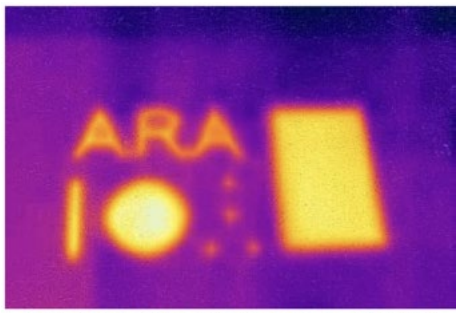
The International Optical Technologies Association (IOTA) announced the winners of its inaugural Excellence in Optical Technologies Awards 2025 during the Optical & Digital Document Security™ (ODDS) Conference in Warsaw, Poland (see HOTN September 2025).

Awards were presented in seven categories: Best Disruptive Technology, Best Innovation in Optically Variable Technologies (OVT), Best Origination, Best Integrated Technology/Best Document Security Application, Best Product Security Application, and Best Decorative/ Packaging Product. In addition, the Lifetime Achievement Award honoured individuals for their lifelong contributions to the advancement of holography, optical security, and the global fight against counterfeiting.

While our previous editions covered the best disruptive technologies, innovations in OVT, and decorative / packaging categories, we are now covering entries for the best product security application and the best integrated technology/document security application.

Best Product Security Application

Amongst the 11 nominations in the category, **ARA Authentic won the award for Checkmyheat** – a thermally active, colour-shifting label produced using a laser-treated PVD coating system.



ARA-checkmyheat® on glass, recorded with an IR camera

Checkmyheat uses a laser-enhanced PVD coating designed to remain a few degrees warmer than ambient conditions. This controlled thermal gradient produces predictable optical colour shifts under directed light. For example, a layer stack that appears blue under normal conditions switches to bright yellow when illuminated.

The system is available as a label format. These labels serve both as an overt security element and as an information carrier. The thermal response, combined with the angle-dependent colour shift, creates a unique verification signature which is difficult to reproduce using conventional coating or laser-marking processes.

Other nominations

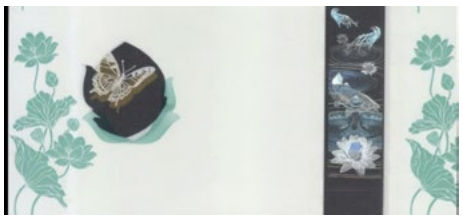
Aurora from ANY Security Printing and Bosch: which integrates optical inspection with digital authentication. The system captures microscopic surface patterns using high-resolution imaging. These stochastic patterns act as natural fingerprints and are linked to a custom VLQR code for authentication and traceability. The process enables secure item-level identification without altering production workflows, relying on physical randomness rather than applied serialisation.

PaperProtect™ from IAI Industrial Systems: strengthens the personalisation layer of passport paper by embedding data within the paper structure. The three variants – PageProtect, TextProtect and ImageProtect – incorporate text or portraits directly into internal paper layers. This method creates natural cross-validation points, improving resistance to data substitution and layer manipulation. By placing personalised data inside the sheet, the technology increases protection against mechanical tampering and supports high-resolution verification under transmitted light.

Flexible hologram sticker for fertiliser sacks from PT Pura Barutama Unit Total Security System: this solution provides a tamper-evident feature for woven fertiliser packaging. The hologram label is sewn into the sack. Opening the pack requires cutting the stitching, which forces the LDPE film to stretch and permanently damages the hologram. The irreversible deformation prevents reuse or reapplication, offering a simple but robust mechanical security mechanism.

e-Lidogram 'HORSE' from Demax Holograms: the HORSE project uses e-Lidogram technology to create a hot-stamped optical security element for paper documents. It combines an achromatic bas-relief horse motif with complex embossing and gold foil stamping. The feature incorporates multi-level authentication elements, structured into overt, semi-covert, and forensic layers. Produced with high-resolution electron-beam lithography, e-Lidogram provides nano-optical detail that is difficult to replicate using standard holographic mastering.

POLYSECURE® SHIELD from Q&T Hi-Tech: embeds an OVD within a polymer banknote substrate rather than applying it to the surface. The integration protects the feature from abrasion and chemical wear, improving long-term performance in circulation. The approach addresses a well-known weakness of polymer notes – surface-feature durability – while maintaining compatibility with established high-speed printing and processing systems.



Polysecure with KINEGRAM embedded inside.

BioSHEAL from Track Pack Innovation: a biodegradable tax stamp based on a non-plastic engineered paper substrate. The stamp uses high-security printing

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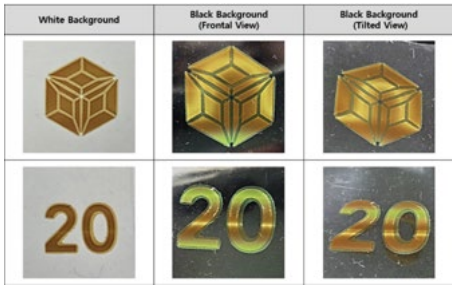
... Innovation Through Integration

on both sides, with embedded optical elements on the reverse using silicone-coated paper—achieving optical effects without metallic foils or polymer layers. The design demonstrates how optical security features can be delivered through environmentally responsible substrates without reducing resistance to counterfeiting.

Direct Integration in medical packaging from Morphotonix: worked with a Swiss medical manufacturer to embed nano-engraved optical features directly into injection-moulded closures. The sub-micrometre structures were engraved in steel tooling and replicated during normal moulding operations, requiring no process changes. The features combine visible and non-visible elements. A roughened area around the nano-patterns supports smartphone-based scanning and authentication. The integration provides a non-transferable security layer that survives sterilisation and production stresses.

Kimble from Holostik: introduces an electrical verification element within a holographic seal. Conductive pathways embedded in the structure break when tampered with, giving instant electrical continuity failure. This creates a clear, measurable and irreversible tamper indicator.

MU-Ink from Nanosilikhan: produces two distinct visual effects from a single printing process: a green photonic-crystal structural colour and a metallic, angle-dependent dynamic effect, such as a moving ring. The system relies on the precise alignment of magnetic nanoparticles and UV curing triggered under magnetic fields. The combination of photonic structures with magnetically directed motion effects produces highly complex optical behaviour that is difficult to replicate with standard printing or coating technologies.



Best Integrated Technology / Document Security Application (Joint Winners)

10 entries were received in this category. The joint winners were Crane Currency for the Beauty of Life house note and IN Groupe for the Plasmogram™ Reverso stripe on the polymer Philippines 500 piso note.

Beauty of Life from Crane Currency: this project demonstrated the use of Crane's micro-optics feature, MOTION SURFACE®, across both paper and polymer substrates. Two versions were produced: one on Crane ENDURANCE® cotton paper, and another on CCL Secure GUARDIAN™ polymer.

The note's design builds a wetland ecosystem narrative through layered motion effects that simulate natural movement. MOTION SURFACE® is deployed in a wide format, producing synchronised, multi-directional animation. The feature uses micro-lens arrays, ultra-microprinted icons and motion-parallax modelling, supported by custom animation software.

In addition to the Level 1 MOTION SURFACE feature, the note includes CCL Secure's UV-fluorescent feature VIVID™ (for the polymer version only), GSI's mouveINK (which combines traditional UV colours/inks with a phosphorescent afterglow), and JURA's ICS® (Information Carrier Screen), a high resolution covert feature hidden within the screen print. The inks and varnish were supplied by GSI and SICPA.

Plasmogram™ Reverso Stripe from IN Groupe / SURYS: the stripe is the result of teamwork involving the central bank (Bangko Sentral ng Pilipinas), the substrate supplier, the printer, and the technical and production teams of IN Groupe/SURYS. This advanced security element, developed by SURYS (an IN Groupe company), features a unique triptych of visual effects, offering distinct optical appearances from the front, reverse, and in transmitted light.

Unlike conventional foils or holograms, the Plasmogram™ Reverso delivers high-definition dynamic effects, including kinetic animations, depth, and colour-shifting features, which are seamlessly embedded into the clear window of the polymer substrate. Plasmogram was also shortlisted in product security category.

Both winning entries highlight how the integration of new generation optical technologies, micro-optics, and plasmonics with print chemistry and substrate engineering.

Other nominations

Tree of Life from KURZ: a series of three notes—Day, Dusk, Night—produced for the company's 30th anniversary. Each

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30 Years of Doing the Right Thing

By Francis Tuffy, Optical and Authentication Technologies Consultant

KURZ marks three decades of security-foil production at Sulzbach-Rosenberg

When LEONHARD KURZ GmbH & Co KG opened its optical film facility in Sulzbach-Rosenberg, few could have predicted how profoundly it would shape the global security-feature industry. To this day, the site remains one of the company's strategic production centres – and an example of industrial renewal, where a region built on coal and steel turned to optics and precision engineering.

Sulzbach-Rosenberg, in the Amberg-Sulzbach district of northern Bavaria, was once defined by heavy industry. Iron ore mining and the Maxhütte steelworks dominated local life for over a century, employing thousands and fuelling the post-war German economy. At its peak, Maxhütte was among Bavaria's largest industrial employers, producing pig iron and steel for domestic and export markets.

By the 1980s, however, the picture had changed. Global competition, lower-grade ore, and soaring energy and environmental costs rendered local steel production unviable. The coal mines closed in the 1960s–70s, and Maxhütte began winding down in the mid-1980s.

The Bavarian Ministry of Economic Affairs, with the Amberg-Sulzbach district council, responded through an ambitious 'Strukturwandelprogramm' — a structural-change initiative designed to replace declining heavy-industry jobs with new, clean, export-oriented technologies.

A calculated leap

Founded in 1899 in Fürth, near Nuremberg, KURZ had long been a global name in hot-stamping foils for decorative, automotive and packaging applications. But by the 1980s, the company was eyeing a different kind of product: optical security features for banknotes and identity documents.

Thin-film coatings, metallisation and optical-variable structures offered an enticing intersection of material science and security. The company's leadership saw Sulzbach-Rosenberg – with its skilled industrial workforce and good infrastructure – as an ideal location for a purpose-built high-tech manufacturing site.

The new facility opened in 1986, establishing the foundation of what would become the group's Security Business Area. Within a few years, the site was producing advanced optical foils for use in banknotes, passports and brand-protection applications worldwide.

KURZ's market breakthrough moment came, in 1988, when it placed KINEGRAM® optical foil on Austria's 5,000 Schilling note – the first mainstream application of the technology on a circulating banknote.

It was a bold step. At the time, holography was still seen by many as decorative rather than secure. An alternative approach, a machine-readable barcode, was under serious consideration as the main anti-fraud device. KURZ's micro-structured optical devices changed that perception by offering bright, copy proof effects that could be mass-produced with consistency and have the visual impact to engage the public.

A disruptive innovator

Within the industry, KURZ occupies a distinctive position. The company has always refused to describe KINEGRAM® as 'another diffractive device' — for very good marketing reasons. Its scientists and marketers have long argued that the design and replication principles behind the KINEGRAM® differ fundamentally from standard holography.

That independent stance has defined KURZ's character as a company: focused, confident, and committed to maintaining the integrity of its technologies.

KURZ's business model differs from that of traditional security printers, as it supplies optical components directly to central banks and issuing authorities worldwide. Its technical rigour, consistency, and customer support are well recognised across the industry, and its close relationships with clients reflect its reputation for reliability and trust.

As one long-time observer in the industry put it: 'They are commercially formidable in every market. Hats off to them.'

Beyond materials

KURZ has never been content merely to sell films and foils. It moved into the sale of application machinery – enabling paper mills to apply foil stripes or patches inline – so that it would better understand the application regimes for its materials.

That decision positioned KURZ among the leading machinery suppliers, such as KBA's, with whom they cooperated on the development of the OptiNota systems, and Gietz. When the company's stripe features were adopted for the euro series, it meant that every European paper mill had the chance to acquire compatible KURZ equipment.

This strategy demonstrated both KURZ's vertical integration and its commercial shrewdness: controlling not just the component, but also the process by which it is applied. It also underscored its independence from the established supply chain of printers and equipment makers.

KURZ has also invested heavily in partnerships across the industry. Despite the fierce competition, it has always collaborated on banknote issues and technology trials with a range of organisations, which in turn demonstrate compatibility of its products with a variety of substrates and production methods.

A culture of quality

Inside the Sulzbach-Rosenberg plant, the production philosophy is defined by quality, precision and care. Marko May, Head of Business Area Security – Manufacturing, explains:

'Quality is the key. Yes, we have camera and sensor inspections throughout the supply and production process, but we also have 100% visual inspection. Machines can't be taught to care about the beautiful images we produce.'

The independent thinking that goes into KURZ's commercial decisions extends into the way it handles its policies on operational resilience and recovery. Marko explained how KURZ gives confidence to its customers to avoid disruption to the supply of vital security elements in the event of an operational catastrophe.

'Rather than having a partner facility that is ready to swing into action in the event of such an event, we have arranged groups of equipment, with each group capable of full production', he said. 'The groups are arranged across separate zones within the plant. The zones are connected by tunnels/fire walls which isolate each zone in the event of fire, explosion or spill, thankfully there has been no major calamity in the past 30 years'.

Aerial view of the Sulzbach-Rosenberg plant (© KURZ).

Behind each patch, thread and stripe of security foil lies an intricate marriage of physics and chemistry. Sulzbach-Rosenberg is where optical originations from OVD Kinegram AG in Switzerland become industrial reality.

Dr Christian Schulz, Head of R&D Banknotes at KURZ, describes the interface: 'I am a chemist by training, but I like the challenge of working with the optical physicists at OVDK. It's my job to

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... 30 Years of Doing the Right Thing

make sure that the complex features they come up with are replicated as faithfully as possible into billions of documents — and that they remain bright and readable throughout the document's lifecycle.'

The replication challenge is enormous: producing structures at sub-micron scale over kilometres of film, ensuring consistency, adhesion and durability through the life of the image.

After working together on many projects, KURZ acquired OVDK in 1999, creating a fully integrated value chain – from optical origination through to roll production and application equipment.

This vertical model allows KURZ to innovate quickly and maintain tight control over feature integrity. Technologies such as KINEGRAM COLORS®, KINEGRAM ZERO. ZERO® and KINEGRAM REVIEW® illustrate the success of that approach – offering combinations of kinetic, colour-shifting and machine-readable properties tailored to paper, composite and polymer substrates.

Sustainability

Environmental responsibility has become one of the defining themes of modern manufacturing and for KURZ it is a responsibility it takes very seriously.

'I've been with KURZ for two years, and I can honestly say it is a company that lives by its values. We make excellent products, that's for sure, but we also try to be good to the environment, and we are an active part of the local community,' Gerben van Wijk, Head of Business Area Security Banknotes, summarises: 'We will be going beyond down-cycling the PET we use into garden chairs and trashcans and into true recycling – to reuse the spent PET as carrier films.'

True PET recycling – re-using recovered carrier film for subsequent production – remains technically demanding, but it represents a real shift toward circular manufacturing. Combined with renewable-energy investments, reducing still further the use of volatile organic compounds and improved filtration to reduce hazardous waste, KURZ's environmental credentials are among the strongest in the sector.

And as Christian Schulz puts it, 'I'm increasingly working on ways to further reduce our impact on the environment. I like that!'

Thirty years and still growing

To mark its three decades of production at Sulzbach-Rosenberg, KURZ and OVDK produced a commemorative Tree of Life note series. Each design interprets the tree motif through different materials and processes — from metallic brilliance to translucent pastel colours.

Tree of Life (© KURZ).

The project also showcased Sulzbach-Rosenberg's technical breadth — combining complex optical structures, perfect registration and precision finishing within a single production line. Talking about the capabilities that he can call on at the Sulzbach-Rosenberg plant, Marko May put it this way, 'We have all of the deposition and coating equipment you would expect. But we continue to invest in other specialist techniques that you might not.'

Few companies in the banknote industry are as commercially disciplined as KURZ. Its market coverage is genuinely global, which demonstrates its adaptability and its deep understanding of both technical and commercial dynamics.

But beyond the business metrics, KURZ's role in Sulzbach-Rosenberg's industrial transformation stands as an example of successful regional industrial policy and one company's commitment to enterprise and to doing the right thing.

... Innovation Through Integration

uses a different KINEGRAM® technology (ZERO.ZERO®, HDM, COSMIC) delivering metallisation, directional kinematics, flux effects and surface-relief depth. The designs show how optically variable elements can be aligned with complex illustration while maintaining verification clarity.

PICO Secure™ from Authentix: uses plasmonic nano-optics to deliver structural colour without inks. When used in a window, the feature gives high public visibility on both sides of a document. Laser personalisation can be applied directly to the embedded structure, linking the feature to document-holder data (see page 1).

Butterfly Effect from Demax: produced as a promotional banknote for the Bulgarian National Bank, this banknote integrates an E-LIDOGRAM® stripe produced with 8 nm electron-beam lithography. The stripe supports the broader design narrative, grounded in Edward Lorenz's work on chaos theory. The nano-optical elements generate high-definition dynamic effects distinct from conventional holography.

Palamuru University certificate and Surgiwear Packaging from Holostik: for the Palamuru University certificate, a 10 mm holographic strip is embedded into the document substrate to ensure strong mechanical bonding. The strip includes features such as Letter Lens, Relief, thermochromic ink, raster elements, foil stamping and covert UV. Tactile embossing supports accessibility and adds a physical verification layer.

For Surgiwear, Holostik applied high-precision OVDs directly onto sterile medical packaging made from maplitho paper – an otherwise difficult substrate for holographic transfer. The solution demonstrates advanced origination control and process adaptation for medical environments.

Applications for PaperProtect from IAI and POLYSECURE SHIELD from Q&T Hi-Tech were also submitted in the category (see page 7).

The next edition will conclude the series by highlighting the Best Origination category.

HSP Asia 2025 Sets a New Benchmark in its 21-Conference Journey

The 21st edition of High Security Printing™ Asia (HSP Asia), held in Kuala Lumpur from 1-3 December 2025, delivered the strongest performance in the event's history. The conference set a new benchmark for the series, attracting 337 delegates from 145 organisations across 51 countries, including 34 governments and central banks. It also raised the bar for high-quality presentations, strategic collaborations, and high-impact new product launches.

Malaysia, hosting HSP Asia for the third time after the successful editions in 2006 and 2010, offered the ideal setting for a conference that continues to shape the region's secure printing landscape. This year's edition reaffirmed HSP Asia as Asia's most trusted platform for innovation, insight, and partnership across currency, identity, and secure documentation.

Engaging programme with key openings

The programme opened on 1 December with two parallel workshops. Entrust led the session on Identity – The Impact of AI in Identity Documents, examining how artificial intelligence is reshaping document security and verification. Running in parallel, De La Rue delivered Currency – The Banknote Balancing Act: Making Informed Currency Choices, addressing cost, durability, security, and environmental considerations.

In the afternoon, John Winchcombe from Reconnaissance hosted the Cash Sustainability Workshop Asia, delivered in partnership with the International Currency Association. The session explored practical steps to reduce the environmental impact of cash and the wider cash cycle. It drew examples from Asia, the Pacific, and beyond, and encouraged open exchange, helping participants identify actionable ideas for their institutions.

The day closed with the exhibition opening and a lively welcome cocktail reception, creating a warm and productive networking environment.

Conference begins with regional trends

The main conference opened on 2 December with welcome remarks from Astrid Mitchell, CEO of Reconnaissance, and Abd Rahman Abu Bakar, Assistant Governor of Bank Negara Malaysia.

A focused opening session followed, featuring four key presentations:

- Shangari Subramaniam Beames and Syahrir Nadzmin Zawawi, Bank Negara Malaysia
- The Identity Landscape in Asia – Samantha Burns, Reconnaissance International (UK)
- Where Tradition Meets Modernity and Security – Ikromi Sirojiddin Salom, National Bank of Tajikistan
- Compass Banknote Intelligence – Ross Knight, Giesecke+Devrient.

After the inaugural joint session, the programme split into two parallel tracks covering currency and identity documents. This format enabled delegates to focus on the subjects most relevant to their work and helped maintain high engagement across both streams.

Record exhibitors showing innovation

The accompanying exhibition brought together the largest gathering of solution providers at HSP Asia to date. Leading names included Giesecke+Devrient, IQ Structures/HUECK FOLIEN, China Banknote Printing and Minting (CBPM), De La Rue, Dai Nippon Printing/LAXTON/MK Smart, EVOCHEM Advanced Materials, KOMORI, Landqart, Oberthur, PWPW, Security Fibres, Jura/Parvis, Koenig & Bauer, OVD Kinegram/Kurz, Luminescence, and PURA, supported by 25 additional exhibitors.

Across two days, the conference featured 38 presentations, including six focused sessions on currency and identity documents in the Asia-Pacific region, and a closing joint session on Counterfeits in Currency and ID.

Speakers examined critical issues such as new security features, ID card design, production processes, authentication systems, and emerging threats. Sustainability, anticounterfeiting strategies, and the regional adoption of new materials and substrates were central themes.

Key product launches and highlights

This year's edition saw an impressive range of products and technology launches including:

- **Number 1** – an IOTA award-winning innovation by IQ Structures' based on free-form nanoDOVIDs (see also HOT News October 2025).
- **PICO** – The nano-optic, plasmonic optical variable device (OVD) for identity documents by Authentix, offering always-on-structural colour and movement (see page 1).
- **CHROMA** – Toppan's new laser colour technology for producing photo-realistic, full-colour portraits on polycarbonate ID documents).
- **DocCHECK** – IOTA announced a new membership service, an online database for banknotes and IDs.
- **Certevo®** – Covestro showcased its latest material innovation for passport covers and data pages, as well as its new prototype vehicle registration certificate, on Certevo, combining high durability with advanced print and laser features.

HID shared a modern, integrated platform that unifies hardware, software, consumables, and services into a single operational environment.

Other highlights

- Reconnaissance, drawing on ID & Secure Document News analytics, presented an overview of secure document trends across India, China, Indonesia, Thailand, Singapore, Australia, Japan, Malaysia, and Vietnam.
- PWPW introduced a vertically oriented ID1-format identification card, designed for modern identity verification needs.
- Jura (Hungary) shared insights on designing secure documents for analogue and digital printing.

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... HSP Asia 2025 Sets a New Benchmark in its 21-Conference Journey

- Angstrom presented the Fusion Security Feature, which combines overt and covert elements through dual UV fluorescent colour shifts and delayed luminescence for multi-level authentication.
- LinkSmart presented its ability to underwrite financial liability for cloning, offering a compelling new approach to security printing.
- Christoph Husmann shared Crane Authentication micro-optics security features.
- Ihar Duboiski discussed protecting the holder's portrait, one of the most forged and sensitive components of an identity document.
- Jean-Charles Devynck examined the transition from paper printing expertise to polycarbonate printing, offering guidance for printing houses entering the plastic substrate market.
- The International Optical Technologies Association (IOTA) highlighted the evolving OVD landscape, new trends, and next-generation optical security solutions.
- Delegates also heard two presentations from physicists on quantum physics, dynamic luminescent inks, and phygital authentication.

A key discussion point throughout the event was the growing use of new substrates, materials, and security technologies to protect polycarbonate data pages, as well as the need for collaboration and partnerships.

Regional awards

A highlight of the conference was the presentation of the HSP Asia Regional Awards (HSPA). Many of them once again highlight how optical innovation and effective collaboration continue to elevate security, sustainability, and user trust across the region's currency and identity systems (see page 7).

Banknote Awards

- **Best New Series** – Bank of Japan and Royal Monetary Authority of Bhutan (joint winners).
- **Best New Banknote** – Bank of Thailand for the new 50 and 100 baht notes.
- **Best New Commemorative Banknote** – National Bank of Tajikistan for the new 100 somoni commemorative note.
- **Best New Housenote** – jointly awarded to KOMSCO for the '80th Anniversary of Liberation' housenote and PERURI for 'Housenote 4.0', designed with a focus on sustainability and environmental awareness.

ID Document Awards

- **Best New Passport** – Japan's Ministry of Foreign Affairs (MOFA) and the National Printing Bureau for the new 2025 Passport series.
- **Best New ID Card** – Immigration Department of Malaysia for the latest generation of the MAL Pass label.

For more information on the award visit https://reconnaissance.net/design-and-innovation-in-banknotes-and-id-recognised-at-hsp-asia-2025/

The next edition of HSP Asia will take place from 30 November to 2 December 2026 in Hong Kong, continuing the conference's goal to promote secure printing across the region.

Events

7 JANUARY 2026
HANDS ON HOLOGRAPHY IAP
calendar.mit.edu

9–11 FEBRUARY 2026
HIGH SECURITY PRINTING EMEA
Rabat, Morocco
hsp-emea.com

11-14 MAY 2026
THE BANKNOTE CONFERENCE
Washington, DC, US
currencyresearch.com

26–28 MAY 2026
SECURITY DOCUMENT SUMMIT
Beijing, China
en.sds-china.com.cn

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