

# THE LUPO SPECIMEN PROJECT 2015

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**J**ura recently participated in an international collaborative effort to develop a new specimen banknote called “Project Lupo”. The five contributing companies are all component suppliers of great renown. However, none actually produce fully finished banknotes on their own, so it made for a particularly interesting and novel experience for all of us.

## 1. HOW THE IDEA WAS CONCEIVED

The idea to create a new specimen banknote came about during a coffee break at a security printing conference last year. Landqart, the Swiss manufacturer of security paper, and Komori, the Japanese printing press manufacturer, approached Jura, the Hungarian security prepress technology firm, with the idea of creating a specimen note on Durasafe® substrate with a foil from KURZ, the German experts in hot stamping foil. Jura gained the cooperation of GSI, the German security ink manufacturer, and so a multinational and multi-talented team was brought together.

## 2. THE SUBSTRATE (LANDQART)

Durasafe® is the most secure and innovative banknote substrate available today, and it was developed by Landqart at the behest of the Swiss National Bank as a way of incorporating see through windows in a cotton banknote. Two outer layers of 35 g/m<sup>2</sup> banknote paper are fused together with a 35 g/m<sup>2</sup> layer of polymer, creating a material that cannot be delaminated. It is possible to position windows on both sides of the note, affording a view into the material that highlights the security features – traditional watermarks, threads, holographic foils. When the windows are placed in perfect registration to each other, fully see through, crystal clear apertures are created while maintaining the look and feel of traditional cotton banknote.

These windows, as well as bringing unparalleled security to the substrate, afford the designer a new degree of creativity: in addition to creating the print design, the designer can create the

canvas on which it will be printed. This new way of thinking opens up all sorts of new possibilities to bring together the obverse and reverse designs. On the Lupo specimen, this is illustrated perfectly in the interplay of the full Moon on the front of the note, and the wolf howling to it on the reverse. When the note is viewed in transmission, the wolf is perfectly silhouetted in front of the Moon. These elements inspired the design and the name of the “Lupo” banknote specimen.

Because the outer layers are made of traditional cotton paper, all the traditional print techniques can be used without any significant changes to the inks or to the presses. The added stability that the polymer brings to the substrate means that it is ideally suited to show off intaglio print, as it is an ideal medium for both ultra-fine lines, and the deep engraving needed to enhance the traditional tactility of a banknote. The polymer used for the windows is suitable for overprinting without the need for primers, and holds blind embossing very well. Within the substrate itself, there is always space for a traditional portrait watermark, which can be enhanced with Landqart’s Signum™ highlighted watermark. Other security features such as threads, can be applied between the two layers, either fully embedded, to be viewed in transmission, or behind a window, which allows for more thread material to be seen by the public than with a traditional window, and for the thread to





be better integrated into the overall design. Security foils can also be applied to the surface of the note, and with a suitable design, can be secured behind one of the polymer windows to protect the surface of the foil in circulation.

Banknotes like, for example, the Lupo specimen made on Durasafe® are, more than ever before, a true exercise in collaboration and open communication. The substrate maker, the designer, the ink provider, the printer, and the creator of the security features all have to work together to ensure cohesion of design, and to maximize the impact and effectiveness of each component of the banknote. Clear and open communication helps us identify where the boundaries are, and to push past them to create truly beautiful and functional banknotes.

### 3. THE ARTISTIC CONCEPT (JURA)

When the name of the new project was decided, the specialists at the Jura Design Studio started working individually on concept designs around the “wolf” theme. After some time, several discussions, and rounds of voting, the best elements from all the initial designs combined into a common idea.

It was an artistic visualization of the majestic lone wolf – as the main character – on the front of the note, resting calmly in the woods. The reverse of the note has an opposing view, with three wolves running together as a pack. Making the most of the polymer layer of the substrate, the front of the note shows the full Moon and a transparent window in the shape of a wolf’s head, while the print in the same position on the reverse of the note shows a printed wolf howling at the Moon from the edge of a cliff. The background images are composed from a number of different elements including trees and leaves from the forest, and special decorative multi-coloured patterned designs.

The denomination in text and numbers are placed on both sides of the note, and the names and logos of all the contributors are

on the reverse. It was decided to emphasize one of the companies in the top right corner of the reverse, leading to the creation of 5 variations, one for each company.

The preliminary design of Lupo was finished using Jura’s graphic security software with special tools. It is very precise and detailed work that requires great expertise, as it is necessary to take into account the number of printing plates and colours, the interplay between them, the density of the final design, and other important attributes of the note. It helped the designers to keep the difference between the accepted visualization and the final realization at the minimum level.

### 4. FROM GRAPHIC DESIGN TO PRINTING PLATES (JURA)

Jura has a strong reputation as a high-tech developer and supplier, and offers complete security prepress systems of the highest quality, including software and hardware solutions for banknote printers. All elements of these systems were used during the Lupo project.

The suitable preliminary design accelerated the workflow and reduced and simplified the usual problems of the elaboration.

Both the front- and the reverse sides of the note are composed of 3 wet offset, 3 dry offset and a 5-colour Intaglio workings. All the elements were created using Jura’s new generation Corvina graphic security design software family. The concept design was infilled with complex and unique graphic security elements, among which vector- and pixel-based features, line screens, generated patterns, and linewidth modulation.

The “portrait” of the wolf was digitally engraved using freehand tools on a graphics tablet, and the whole digital intaglio artwork was extended with 3D data, such as parameters for line depths and profiles. The result was then processed with Jura’s state-of-the-art DLE® (Direct Laser Engraving) system.

The security colourisation was done by Jura's software module. All offset separations, except one on the backside, are printed with Rainbow colourisation. The intaglio workings are also to be done with more colours: 5–5 both front and reverse, using Orlof-masking. The final look of this complex colourisation was accurately imitated on virtual printing plates on-screen, including the rainbow and Orlof effects. The non-printing elements, like the holographic foil were also simulated. After interactive colour selection and positioning, different colour versions were printed on a high-quality digital proofer to create the final impression of the whole colour artwork and to help to choose the best combination. Finally, the results were given to the ink manufacturer and the printer with exact colour values and splits for printing.



After this, single original plates were created with Direct Laser Engraving for intaglio handproofs. These proofs were also combined with the above mentioned digital proofs. When all parameters were considered to be satisfactory, the step-and-repeat process for the full digital design (5x8, 40 set) was carried out. The wet and dry offset plates were created on high-resolution CTP machines (the Jura JSP Super Secuplate UHR TS and Jura JSP Super SecuDry II UHR), and the print-ready intaglio printing plates were laser engraved by the DLE®.

## 5. THE INK (GSI)

Gleitsmann Security Inks, GSI develops and produces state-of-the-art security inks, incorporating all the latest technical possibilities, for central banks and their printers. GSI's experts attach a great deal of importance to flexibility, short decision-making chains and personal contact. This flexibility and desire for close relationships with their customers was hugely beneficial to this project, and GSI were able to provide all the security inks for the offset and intaglio printing of the Lupo project.

One of their most accomplished and unique products on the market today is Air<sup>GSI</sup>, a series of inks that feature infrared absorption that can be detected with either an infrared image converter camera, or with an infrared radiation source at a single wavelength.

Air<sup>GSI</sup> with its broad absorption band between 800–900 nm is suitable for detection by standard banknote sorting and verification equipment. The security level can be further enhanced by checking at two separate wavelengths. Thus, by making use of the pigment's absorption spectra, an "internal" ink pair is established providing infrared visible and infrared invisible measurement readings from a single ink.

Air<sup>GSI</sup> can be used in combination with colour pigments in order to make infra-red absorbing offset inks with light and bright colour shades. Moreover, infrared absorption can be combined with fluorescence or up-conversion.



F air<sup>GSI</sup> combines infrared absorption with fluorescent pigments. Fluorescent pigments emit yellow, green, blue or red light when stimulated by an ultraviolet light source, usually with a wavelength of 366 nm and/or 254 nm.

Uc air<sup>GSI</sup> combines infrared absorption with up-converting pigments.

Up-converting pigments emit visible light when stimulated by an (invisible) infrared laser. Several emission colours are available. Up-converting pigments in security inks are less widespread than conventional luminescence and therefore significantly more secure.

## 6. THE PRINTING (KOMORI)

Komori, a leader in print technologies, printed the note at their facility in Japan using their state-of-the-art LC–32 offset machine and IC–532III Intaglio press. The LC–32 is a dedicated sheet fed offset press designed for the production of banknotes and high security documents. Both presses are designed to easily handle the variety of substrates available today, such as Durasafe®, and the complexities involved in working with such features as watermarks, windows, and threads.

The LC–32 has been designed to offer banknote printers more offset workings on the front and back of the sheet resulting in equal and increased security on both sides of a banknote, which has

been fully embraced in the design of the Lupo note. With the addition of superior 5-colour Intaglio printing, the end result is a secure and appealing banknote which meets and exceeds industry demands for design complexity and the interplay of fine and deep intaglio lines. In addition, the highly advanced automated systems on Komori presses allow for make-ready times and job-to-job changeover that are considerably faster than on other, more traditional, offset machines.

The LC-32 used in this project is equipped with the Komori Print Monitoring System which allows complete control of the registration on the press. Each sheet is monitored between printing units to guarantee perfectly registered sheets being delivered to one of the



three delivery piles. The press also utilises a Print Quality Assessment Camera system which inspects both sides of the printed sheet at high resolution to ensure superb print quality.

The superior performance and enhanced print quality of the Lupo note can be attributed to the advanced design of the press: double inking ducts on every unit ensure accurate automated ink oscillation control, and Komorimatic dampening systems on each unit allow the choice of wet, dry and waterless printing at a touch of a button.

## 7. THE HOLOGRAPHIC FOIL (KURZ)

KURZ, as the world-leading supplier of foil-based OVD security features, was very pleased to contribute to the project by selecting with the note a non-registered KINEGRAM ZERO.ZERO® foil stripe.

KURZ has successfully worked with designers, banknote printers and Central Banks worldwide to help protect and enhance currencies. Security foils manufactured with KURZ's unique, proprietary KINEGRAM® technology can be applied on banknotes as a foil patch, or as a registered or continuous foil stripe, as demonstrated on many of the world's leading currencies. To name just one example, the European Central Bank relies on KURZ KINEGRAM® foils as one of the main security features for the EUR 5, EUR 10 and EUR 20 denominations of the second generation Euro banknotes ("Europa series").

The desired design features and optical effects of KURZ's foils are always chosen and created in collaboration with customers and/or their appointed designers. In this case, the images on the foil and the denomination were designed to work in harmony with the overall design of the note, and echo the wolf's head shaped windows on the substrate. The diffractive structures of KURZ foils are individually engineered for specific visual effects and optimized for their brilliance and brightness. Also, KURZ invests heavily in Research and Development and is able to offer a wide range of technologically advanced optical effects and features.

One of the biggest R&D successes was doubtless the KINEGRAM ZERO.ZERO®. With this unique process, the registration tolerance between the optically visible diffractive images and the metallization is zero and the form and contour can be designed in any geometry. This means absolute freedom for designers in the geometry of the shapes they create for metallized areas and enables perfect interaction between printed background, foil and overprint. Next to unlimited design possibilities, KINEGRAM ZERO.ZERO® offers an extremely high barrier to falsification and proves to be a tough challenge to even the most capable counterfeiter.

KINEGRAM ZERO.ZERO® hotstamping foil can be either applied onto the banknote surface in classical hotstamping, or – as a novel spin on foil security – can be used as an alternative to a classic embedded security thread. As such, it can act as a transmissive Level 1 security feature with the width of the foil adding significant value and interest to the recognition experience for the end user.

## 8. SUMMARY

The Lupo project was completed in a very short time, just 5 months from the initial discussions, and was a very valuable experience for the five companies involved. Key to the success was a sense of collaboration between all the partners, characterised by clear, open, and regular communication, alongside a real drive for development.

In addition to fostering new relationships, by working together and seeing how the individual contributions of each partner serve to make the initial concept a reality, we have all gained new professional knowledge that will help us to achieve even better results in the future, either on our own, or running together.

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