

# THE QUESTION OF COUNTERFEIT PROTECTION

Arne Müller of the Fogra Research Institute for Media Technologies, shows how easy it is to produce see-through window effects and explores whether they are a safeguard against counterfeiting



Arne Müller

See-through window features are frequently demanded in tenders for security documents such as banknotes and ID documents. This is because they are expected to provide optimum protection against counterfeiting. Fogra's extensive experience and connection with key players in the security market, together with expert interviews and a comprehensive internet search, reliably proved that there are over 1,000 system combinations available nowadays that can easily produce see-through window features.

### SECURITY WINDOW FEATURE

A security see-through feature is a sharply or relatively well-defined transparent area in a security document or banknote. Forga's research focused on digital-manufacturing systems and their finishing processes,

because of the widespread availability of different transparent polymer films. For example, BOPP, PE, PET, PP and PVC, for this printing sector. A market survey showed that film materials and printing processes for applying a white ink film are widely available.

### MEASUREMENT METHODS

The following measurement methods were used to assess the suitability of a particular printing technology:

#### White ink opacity

This method is based on the reflectance of a substrate's printed and unprinted areas or on the measurement of the regular transmission. Opaque white inks are designed to be relatively opaque in order to hide underlying materials, as opposed to 'transparent' white inks, which are designed to be translucent.

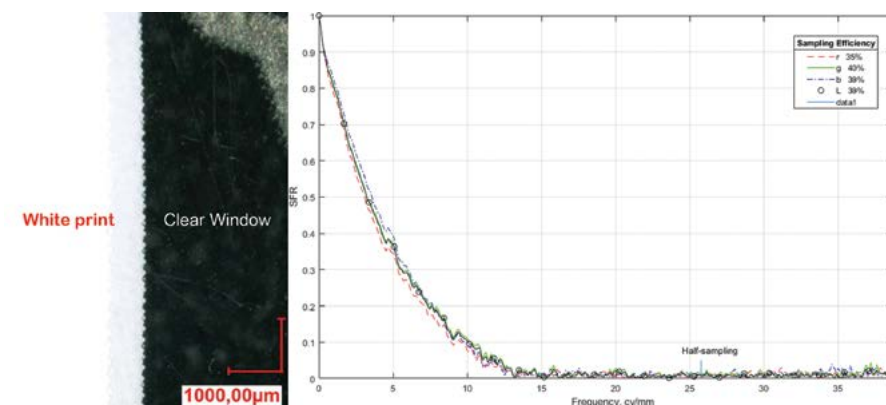
#### Spatial resolution

The ability to perceive fine details, tests the system's full performance. It depends on the characteristics of the printing system – not only its addressability – but also the substrate, the viewing conditions and

*“Our findings showed that there are over 1,000 combinations available that can easily produce see-through windows. This clearly undermines the intended security of such a feature”*



Equipment worth only €400, can produce the necessary quality and opacity



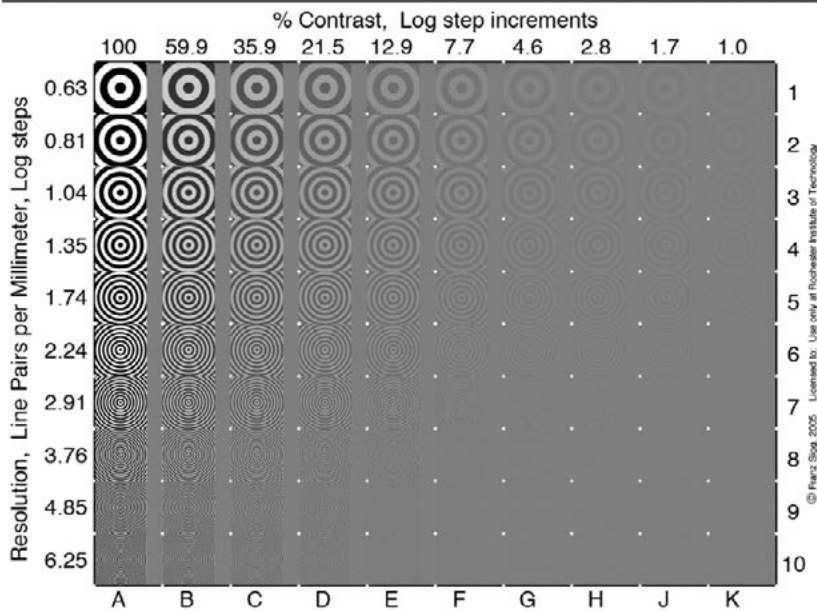
Selecting a slanted edged (tilted straight line) and corresponding spatial response (down) by means of modulation via the line pairs per mm (cy/mm) on an original banknote



Sample of a security windows feature using the German passport

## Contrast-Resolution Test Target Ver. 1.8

Output device: Acrobat Distiller 10.1.3 Addressability: 600 spi, 42.3µ/spot



The contrast-resolution test target

### ***“A market survey revealed that film materials and marking processes for applying white ink film are widely available”***

the viewer. Perceived resolution depends critically on the tonal differences between the elements of an image. A special contrast-resolution test chart can be used to accurately characterise digital prints. The evaluation is based on a scan with a qualified scanner but can also be assessed visually.

#### **Oblique edge**

To compare the originals and collected samples with the same method, the oblique edge evaluation was performed according to the ISO 12233:2017 standard. This analyses the spatial frequency response (SFR) of an edge and correlates it with the resolving power of the sample being tested. As part of the qualification process, the sharpness of detail was also evaluated via the L-score values (ranging from one [insufficient] to 100 [perfect]) to better understand the perceived uniform dispersion within samples.

#### **EXAMINATION BY FOGRA**

Measurements and visual inspections were carried out regarding colour tone, opacity (show-through) and sharpness of detail. It was shown that for all three of these benchmark criteria, many available digital-printing combinations meet the typical specifications for see-through window features. It is, therefore, relatively easy to produce clear windows using materials and production technologies that can be freely obtained globally at low cost. This is the case with most professional printing systems and, increasingly, with office equipment. This trend towards ubiquitous and easy-to-use techniques is also supported by the

fact that there is an increase in thermal-transfer technologies for home purposes. Additionally, white ink is being used in the growing label-printing market. Conventional printing techniques, such as flexography and gravure, that apply white ink to clear films, are also becoming more common.

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#### **CONCLUSION**

For the above reasons, a see-through window alone cannot be considered the primary security feature of a banknote or identity document. The argument that complexity of printing on polymer substrates serves as an inherent security feature, was clearly rejected by Forga's research. Printing systems from only €400 are available that can be used to replicate a see-through window feature. ■

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