



Polymer Innovations

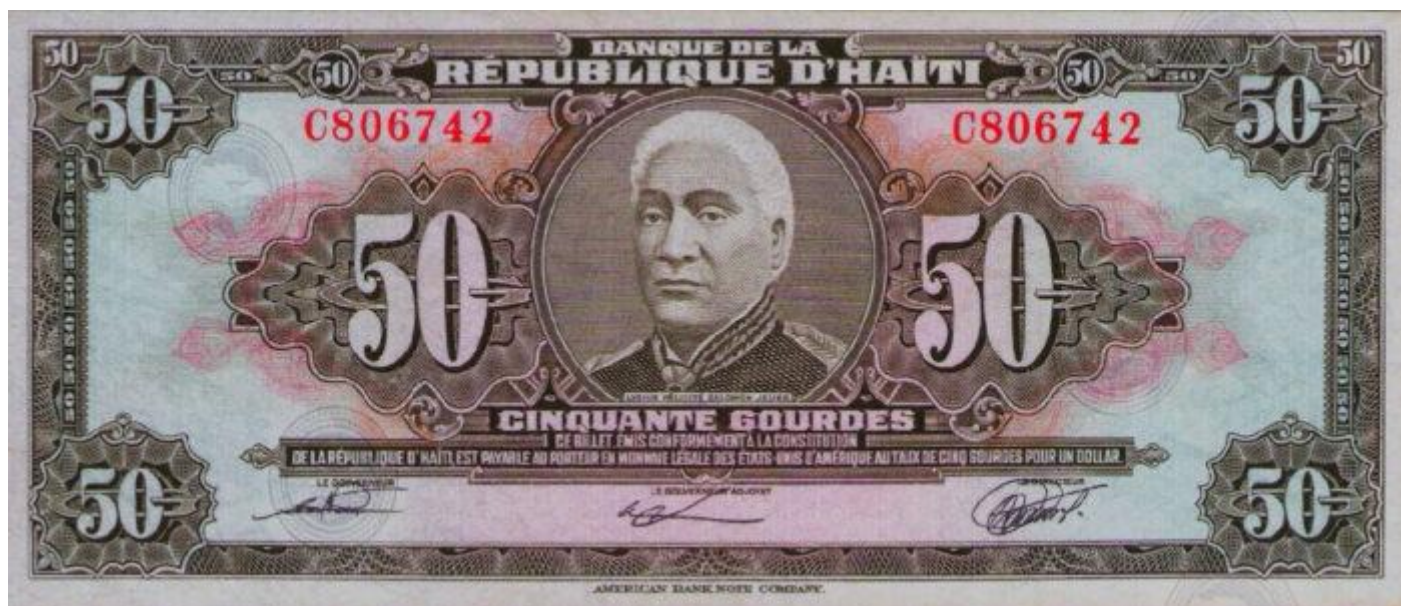
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By Roland Rollins

The first polymer bank note commercially produced was not the 1988 \$10 Australian bank note. This well-documented commemorative note was the culmination of multiple attempts to produce a viable polymer substrate for paper currency use. The firms that produced these substrates also made test or house notes to tout the new product to potential customers, generally central banks.

Tyvek

The first plastic utilized as a bank-note substrate was a high-density polyethylene (HDPE) thermoplastic polymer made from petroleum. It was patented by the DuPont Company in 1956 with the trade name Tyvek. American Bank Note Company (ABNC) produced a Tyvek four bank-note set for Haiti in 1982, followed by a single note for Costa Rica in 1983. The experiment was abandoned following reports of ink smudging in the hot and humid climates of these countries.



Haiti 50

gourde (P235Aa¹/B807²) (Photo: Roland Rollins)

A Liberty 1929 series of test notes, first produced in the 1960s-70s, was chosen to be printed on the Tyvek substrate in the late 1980s. ABNC engraver Alfred Jones created the image of Liberty with Phrygian cap in 1894. The portrait was used on Brazil P73 200 *mil reis* of 1892 and 1919 Banque de Indo-Chine 500 *rubles*. The test note has four main types, with 49 variations I have attributed. The Tyvek substrate was used for 10 of these test notes.



American

Bank Note Company 10 specimen note (ABNC-102a1³) (Photo: Roland Rollins)

Bradvek

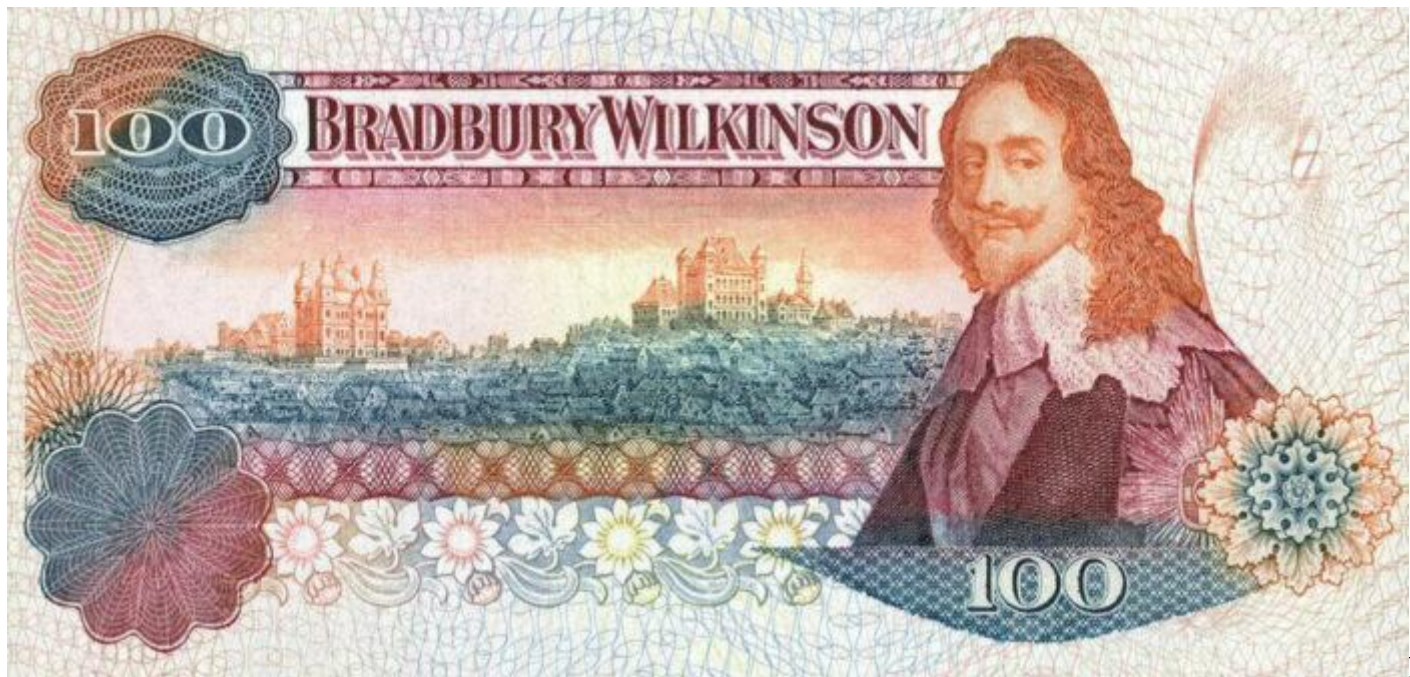
Bradbury-Wilkinson, a wholly owned subsidiary of ABNC, produced a polymer bank note using a DuPont formula similar to Tyvek for the Isle of Man in 1983 under its trade name Bradvek. When the Tyvek experiment was abandoned, so was the Bradvek option.



Isle of

Man 1 pound (P38¹/B112²) (Photo: Roland Rollins)

Bradbury-Wilkinson produced 14 uniface test notes, 4 with the Bradvek substrate, featuring King Charles I.

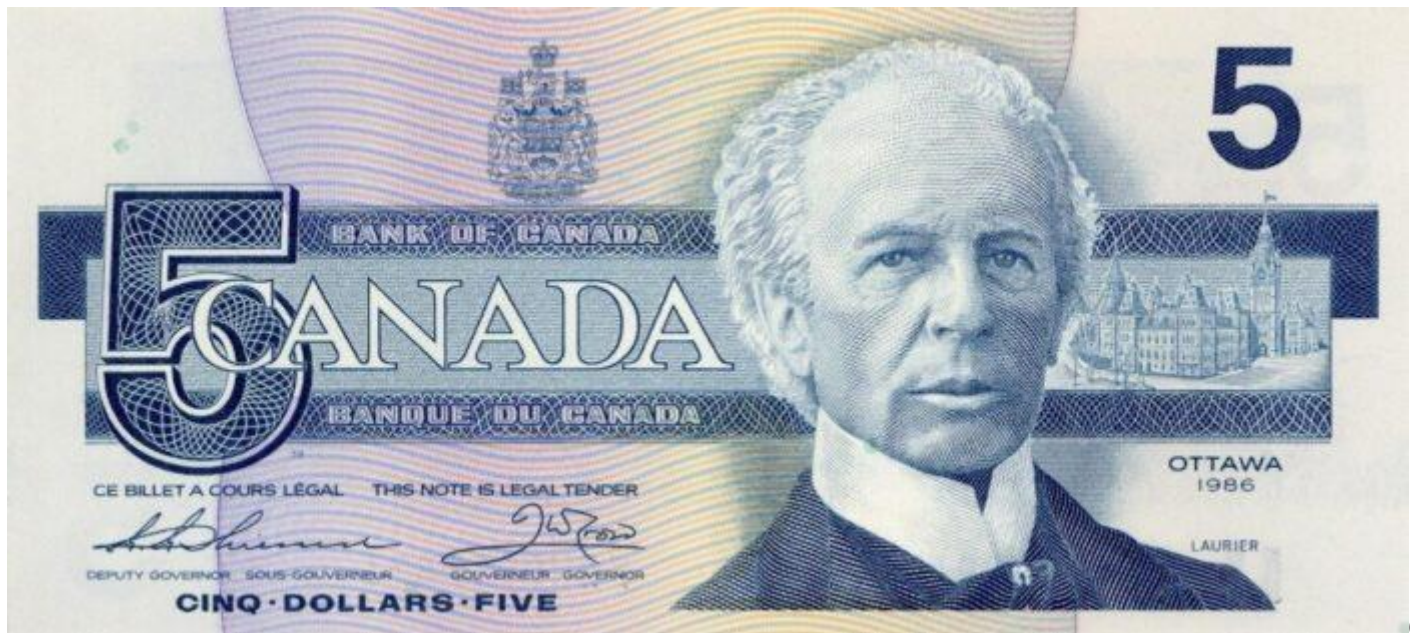


Bradbury-

Wilkinson 100 test note (BW-221a³) (Photo: Roland Rollins)

Luminus

The Canadian firm Domtar, Inc. holds the patents for a paper currency replacement trademarked as Luminus. Luminus is a paper sandwich—a three-layered laminated product: paper, polyester polymer, and paper. The middle layer can contain a color image over the entire note as well as security features. The Bank of Canada obtained the rights to Luminus and used the substrate on select Canada \$5 notes of 1986 with the prefix GOGO, which were tested in circulation. The note shown here is the more common type produced with a cotton substrate, different signatures, and a different reverse serial number prefix from the Luminus version that last sold for over \$22,000.



Canada 5

dollars (P95¹/B358c2²) (Photo: Roland Rollins)

Domtar released 6 test notes with 11 variants to promote the product.



Domtar

100 test note (at bottom is the same note when viewed under a backlight (DOM-101a1a³) (Photo: Roland Rollins)

DuraNote

Silba was formed in 1984 as a joint venture between Mobil Oil and another Canadian firm AgraVadeko. They developed an oriented polypropylene (OPP) product. With 21 ultra-thin layers of OPP film, adhesive, coatings, and printable surfaces, the thermoplastic polymer product was given the trade name DuraNote.

Trial notes were printed from the late 1980s to 1998 for at least 21 countries using their regular bank-note printing plates. No bank-note issuing authority chose to test the substrate with a standard issue.

Test notes were also produced in 14 types, with an amazing 80 variants! Here's a representative example with an ocean oil-well drilling platform on the front and a vignette of a horse-drawn oil tank—apropos for an oil company such as Mobil. Note the Pegasus in the center, the symbol of Mobil.



DuraNote

100 test note (SIL-103i³) (Photo: Roland Rollins)

Guardian

The first commercially successful polymer note was produced and released in 1988—an Australian \$10 commemorative printed by Bank Note Australia. The Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) was tasked with developing the substrate. After being introduced in circulation, it was soon withdrawn because the optical variable device (OVD) on the see-through window was easy to rub off.



Australia

10 dollars (P49b¹/B217²) (Photo: Roland Rollins)

CSIRO patented what is now Guardian in 1973. In the interim years, the company produced several notes for internal testing. They also released a CSIRO 80-year commemorative note for the organization's employees and dignitaries. The assumed population is 6,000. The note is nearly twice as thick as normal bank notes. (The black circle at the front right and reverse left is transparent; I took a photo using a black background for clarity.)



CSIRO

80-year commemorative note (CSI-101³) (Photos: Roland Rollins)

Durasafe

Another “sandwich” substrate called Durasafe was patented by the Swiss firm Landqart in 2012. A Morocco 25 *dirhams* bank note of 2012 was the first use of the substrate. Durasafe has been used on bank notes of Algeria, Switzerland,

Cambodia, Kazakhstan, Morocco, and the Bahamas. The top and bottom layers are bank-note paper, but Landqart uses polymer material as the center layer.

Vingt Francs
Venti Franchi



202020 202020 202020 202020 202020 202020 202020 202020 202020 202020

Switzerland 20 francs (P76¹/B356²) (Photo: Roland Rollins)

Here is a test note used as a promotional piece to taut the advantages of this substrate. Landqart, Jura, GSI, Kurz, and Komori contributed to the note and all issued their own versions of the note with their name placed at the top right on the front.



Durasafe

105 test note (LAND-181³) (Photo: Roland Rollins)

Safeguard

The world's largest bank-note printer, De La Rue (now owned by Atlas), formulated and holds patents for a polymer very similar to Guardian and registered as Safeguard. The differences are subtle. Each polymer allows ink to dry in different manners, which can be visibly noticeable. The first country to use the substrate was Fiji on a \$5 note of 2013.

Here is an Angola 500 *kwanzas* from a 2020 series with Safeguard substrate.



Angola

500 kwanzas (P-NL¹/B558²) (Photo: Roland Rollins)

A De La Rue test note used as a sample of Safeguard substrate.



De La Rue

100 test note (TDLR-623a³) (Photo: Roland Rollins)

Hybrid

Another “sandwich” layered substrate named Hybrid was developed by Louisenthal. It has a cotton center with polymer outside layers, and this combination extends its lifespan over three times that of conventional cotton bank notes. The engraving and security devices are applied to the cotton layer before the polymer layers are added. The first bank note to

use this product is the Bahamas \$1 of 2017. Armenia, Bahamas, Tajikistan, and Bulgaria also utilized the Hybrid substrate on their bank notes.

Here is an Armenia 500 *dram* from 2017 with Hybrid substrate.



Armenia

500 dram with Hybrid substrate (Armenia P60¹/BNP301²) (Photo: Roland Rollins)

Here is one of several test notes promoting this substrate.



2010

Hybrid test note (LOU-141³) (Photo: Roland Rollins)

The evolution of polymer bank-note substrates reflects decades of experimentation as companies worked to create notes that are not only harder to counterfeit but also more durable than paper.

Sources

- ¹ Schmidt, Tracy L. *Standard Catalog of World Paper Money*. Iola, WI: Krause Publications, 2019.
- ² Linzmayer, Owen W. *The Bank Note Book*. London, England: Spink & Son, 2025.
- ³ Rollins, Roland R. *Catalog of Printers Promotional Sheets & Test Notes*. Roland Rollins, 2025.