



Twenty years of polymer: Australia's experience

It has been 20 years since Australia's first polymer banknote was launched. The events that triggered the Reserve Bank of Australia's move to a radically different type of banknote can be traced back to December 1966 when a number of very high quality counterfeits of the country's newly issued paper banknote series - regarded at the time as state of the art - began to circulate.

While it was readily understood that the best an issuer could hope to achieve was to increase the cost and time that a counterfeiter had to allocate to produce a counterfeit banknote, the speed with which this counterfeit appeared was disturbing. Reflecting this, the Bank established a 'think tank' of scientists from the Commonwealth Scientific and Industrial Research Organisation (CSIRO),

Australia's national research institution, and the Bank, and charged them with the task of identifying innovative approaches to creating substantially more secure banknotes.

From this work, CSIRO proposed developing a plastic-based substrate as a platform for a new generation of radically different security features. The Bank agreed with the proposed approach and the task became one of determining how to manufacture the substrate and how to use it to produce a new banknote. By the end of the 1980s, the myriad of production issues had been resolved to a point where the Bank was able, in 1988, to issue the first banknote printed on this new polymer substrate.

Feedback about this banknote obtained from circulation trials was generally positive. Initially, there were some

concerns about the feel of the substrate, and comments that the banknotes did not fold like the old paper banknotes, but the Bank was sufficiently encouraged by its success that it decided to

produce Australia's next series of banknotes on a polymer substrate. In July 1992, the Bank

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Australia's first \$10 polymer banknote issued in 1988



Full series of Australian polymer banknotes

launched the first denomination of the new polymer banknote series. The remaining denominations were issued at roughly 12-month intervals, finishing with the \$100 in May 1996.

The main reason for moving to a polymer substrate was to increase security and thus protect against counterfeiting. In the event, Australia's polymer notes have performed exceedingly well in this regard. With only six counterfeits detected

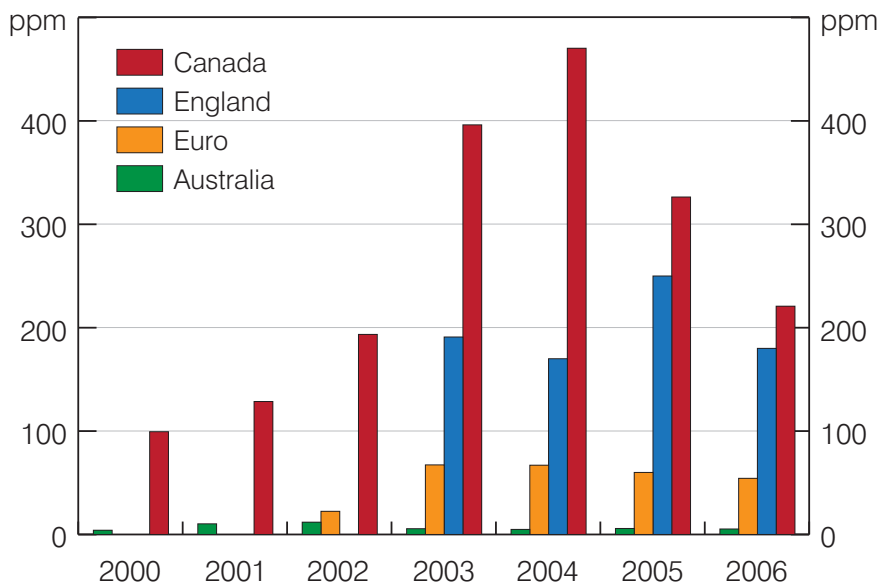
each year for every million banknotes in circulation, counterfeiting rates in Australia are historically very low and are low relative to counterfeiting rates experienced in other countries (Graph 1). As a result of this, it is uncommon for Australian retailers to check the authenticity of banknotes, and for customers to question the authenticity of banknotes given as change, issued by bank tellers or received from ATMs.

While the main reason for moving to a polymer substrate was the security (anti counterfeiting) benefit, the change also provided a considerable benefit in terms of the durability of the banknotes. Although there was an expectation of some durability benefits at the time that the polymer banknotes were introduced, the savings have proved to be considerable. By way of an illustration, around 400 million paper banknotes were produced each year in the decade before polymer banknotes were introduced – about the same as the number in circulation. By comparison, average annual banknote production since 1997 has been less than half this figure even though the number of banknotes in circulation has doubled since the earlier period (Graph 2).

Polymer banknotes have increased the efficiency of, and reduced the maintenance requirements for, acceptance and processing machines such as ATMs. The banknotes' improved durability and security has also meant that the Bank does not need to examine polymer banknotes for fitness and authenticity as frequently as was the case with paper banknotes. This has led to a reduction in the level of banknote processing carried out by the Bank, with commensurate cost savings.

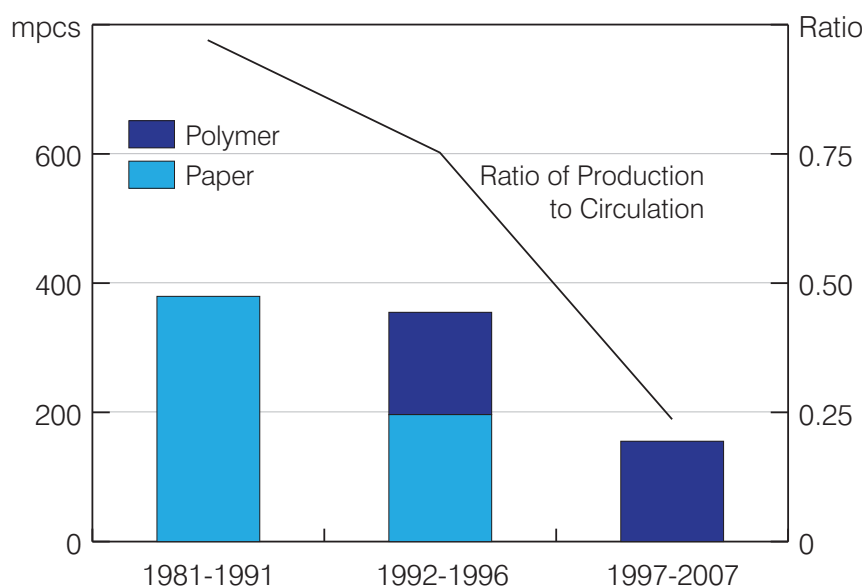
Overall, the Bank's experience with polymer banknotes since their introduction 20 years ago has been overwhelmingly positive, especially with regard to maintaining low levels of counterfeiting and establishing a high quality of banknotes in circulation. The Bank is, however, acutely aware that the sophistication of counterfeiters is increasing and is aware that polymer banknotes cannot eliminate counterfeiting altogether. The Bank continues to believe that polymer is an excellent platform for hosting new security features and continues to work with Innovia Films, Securrency International and Note Printing Australia in developing new features that take advantage of this unique substrate.

Graph 1: Counterfeit Detection Rates (parts per million)



Sources: Bank of Canada, Bank of England, European Central Bank and Reserve Bank of Australia

Graph 2: Average Annual Australian Banknote Production



Source: Reserve Bank of Australia

Polymer notes and the environment

Environmental issues are an increasing concern in today's society and there is increased pressure placed on companies to use recyclable materials when developing products.

Guardian® polymer banknotes not only have an extended lifecycle compared to paper banknotes (which means fewer banknotes have to be printed in the long term), but they are 100% recyclable and able to be converted into other plastic products. There is a distinctive process involved, by which both the spoilage waste produced during printing and the waste generated by the withdrawal of unfit notes from circulation, is collected and sold to recyclers for re-extrusion into a range of useful products. This includes garden equipment, CD cases, coat hangers, slab on ground (bar chairs) used in placement of reinforcement in concrete foundations, and other strong domestic and industrial plastic products.

There are important considerations in product design from an environmental perspective. In regards to banknote longevity, polymer banknotes are proven to have a life at least 4 times that of paper notes.

Paper banknotes are made from cotton. Cotton farming requires high levels of resources such as fertilisers, pesticides, herbicides and water and therefore they are consuming natural resources and chemicals. These chemicals contribute to

waterway contamination and while cotton is renewable it is not environmentally friendly. Out-sorted paper banknotes are burned or buried creating pollution and landfill. This constitutes a waste of resource:

- Burning creates air borne pollutants including CO₂ a greenhouse gas;
- Burial requires secure landfill sites, which are becoming scarce around major cities.

Guardian® polymer banknotes are made from polypropylene. Although from a non-renewable resource, polymer banknotes are recyclable, enabling this product to have more than one life. The manufacture of banknotes from polypropylene does not represent the final consumption of a resource. Out-sorted polymer banknotes and production waste can be recycled into a large range of plastic products. The fact that partially printed production spoilage, waste, or withdrawn unfit banknotes have a variety of inks printed on the polymer, does not prevent the material from being recycled. The entire product (substrate and inks) are blended into a uniform material during the recycling process.

When recycling the banknotes they are:

- granulated
- passed through an extruder
- blended into pellets
- made into useful and durable plastic products.

Securrency International has recently taken a proactive role to assist printers and central banks to implement recycling of polymer banknote waste by developing its



Coat hangers and CD cases

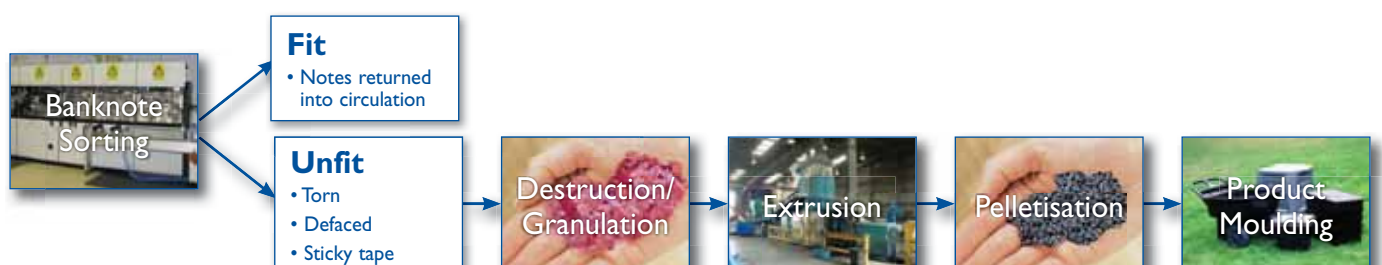
Slab on ground (bar chairs) – used in placement of reinforcement in concrete within the construction industry

Global Recycling Program. This program has been developed by PolyTeQ to overcome the problem that in many smaller countries there is no recycling industry, or the banknote waste volumes are not large enough to be viably recycled. The program addresses these issues by developing a network of regional recyclers in each of the major geographical regions of the world.

Guardian® polymer banknote technology assists central banks to comply with world trends in the efficient use of resources and waste reduction. The simplicity of recycling polymer banknotes presents an opportunity in which governments can lead their communities by example toward environmental stewardship. Withdrawn polymer banknotes generate the opportunity to create useful products rather than being burned or buried. Definitely a better outcome for the environment.

Source: PolyTeQ Services

Recycling process flow



The Bank of Papua New Guinea issues redesigned 20 Kina

On 5 November 2007, the Bank of Papua New Guinea issued the new series 20 Kina Guardian® polymer banknote. This joins the 100 Kina and the 2 Kina of the new note series.

Bank of Papua New Guinea Governor L Wilson Kamit, in his speech at the launch of the 20 Kina, noted the "polymer notes were more durable and lasted longer." Banknotes in paper form could only last for around four months from introduction to the public before it is withdrawn from circulation for destruction. He said "polymer notes could last for up to 14 to 15 months". The launch of the new 20 Kina on 2 November 2007 was timed to coincide with the 34th Anniversary of the Bank.

The main design elements on the front of the new 20 Kina banknotes are the National Crest of Papua New Guinea which is a stylised Bird of Paradise sitting on a Kundu (drum) with a spear and Parliament House, while the back depicts the head of a boar, a toea arm band from Central Province and a traditional necklace.

The substrate security features incorporated in the 20 Kina are:

- **WinTHRU®** – complex clear window incorporating a vignette of the Bank of Papua New Guinea logo
- **SHAD H₂O Switch®** – shadow image of the Bank of Papua New Guinea logo
- **G-switch®** – changes colour from gold to red

- **WinBoss®** – the numeral '20' is embossed in the second clear window
 - **IRIswitch®** – Bird of Paradise in full flight on the back provides a colour change when the banknote is tilted.
- The new 20 Kina will circulate with the existing 20 Kina banknotes until they are phased out over time.



Papua New Guinea's redesigned 20 Kina polymer banknote

International events

Conference	Location	Date	Website
2008			
The Asian Banker Summit 2008	Hanoi, Vietnam	March 16 – 19	www.theasianbanker.com
Banknote 2008	Washington, USA	April 6 – 9	www.banknote2008.com
5th Pan-European High Security Printing Conference	Prague, Czech Republic	April 16 – 17	www.cross-conferences.com
Currency Conference 2008	Prague, Czech Republic	October 12-16	www.currencyconference.com
7th Asian High Security Printers Conference	Bangkok, Thailand	November 11-13	www.cross-conferences.com



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