



First full polymer banknote series issued in Europe

The National Bank of Romania (NBR) issued its fifth polymer banknote in December 2001, making Romania the first country in Europe to have a complete series of polymer banknotes.



Romanian 50,000 lei, released in December 2001.

The 50,000 lei joins the 2,000; 10,000; 100,000 and 500,000 lei to complete Romania's polymer currency family.

An official from the National Bank of Romania stated that the changeover of all denominations from paper to polymer would enable NBR to achieve maximum cost and operational savings in both note issue and note handling, and provide clean and secure banknotes to the public.

The first polymer banknote, the 2,000 lei, was launched to commemorate the total solar eclipse in 1999. The solar eclipse, the last of the millennium, was most visible from the territory of Romania. The note was the world's first self-authenticating polymer

banknote, featuring a coloured window as a metameric filter.

Satisfied with the benefits derived from the durability and security of the polymer banknote, the NBR sought to gradually replace its paper banknotes. Initial Romanian polymer notes were printed in Australia, but after training was provided to the team at NBR Printing Works, printing of polymer banknotes commenced in Bucharest in April 2001.

This successful transfer of technical skills and knowledge to the NBR Printing Works establishes Romania

as the first European banknote printer operating in full production on polymer.

The new polymer 50,000 lei was released into circulation on 14 December 2001, replacing an existing paper banknote. A portrait of Romanian musician and composer George Enescu (1881-1955) graces the front of the banknote, with the reverse showing the National Athenaeum building that hosts the annual George Enescu festival.

The transparent clear "window" – a familiar security feature of polymer banknotes – has been integrated into the design, carrying a tactile emboss of the number '50,000'. Key security features also include intricate printing, a portrait that displays a colour shift when the note is tilted at an angle, and the

shadow image of George Enescu and the NBR logo – visible only when the banknote is held up to the light.

The polymer banknotes have demonstrated exceptional resistance to the soiling and crumpling that otherwise dramatically reduces the life of banknotes in circulation. Polymer has also proven an extremely effective deterrent against counterfeiting due to the ability of the polymer substrate to incorporate sophisticated and effective security features.



Romania's polymer lei - the first complete series of polymer banknotes in Europe.

From oil to banknotes

Did you know that polymer banknotes are derived from the fractionation and cracking of crude oil?



In this edition of *IPCA Bulletin*, Technical Director of UCB Films (Asia Pacific), Dawson Sowerby, explains the first stage of the process of polymerisation of a crude oil fraction into banknote film.

Crude oil is the common name given to the liquid form of petroleum.

Petroleum, a mixture

of hydrocarbons, forms the building block for a range of products such as adhesives, cosmetics, explosives, pharmaceuticals and resin solvents to name a few. One of these products is Polypropylene. Polypropylene is recognised as a robust, durable and lightweight product and as such is an ideal carrier for security documents such as banknotes.

Drilling is the most common way to extract deposits of petroleum from the earth.

It is then processed by the methods of separation and distillation, to base chemicals – one of which is propylene.

This is the product that is polymerised and pelletised to produce the raw materials for the polypropylene films produced by UCB Films.

These specialty grades of polypropylene are then formulated into polypropylene pellets which in turn are converted into film using the proprietary UCB ‘bubble process’.

Polypropylene pellets are fed into a heated extruder and the molten polymer is snap cooled on a brass mandrel. At this stage the polymer exists in the form of a “cast tube” approximately 1mm thick. The bubble’s

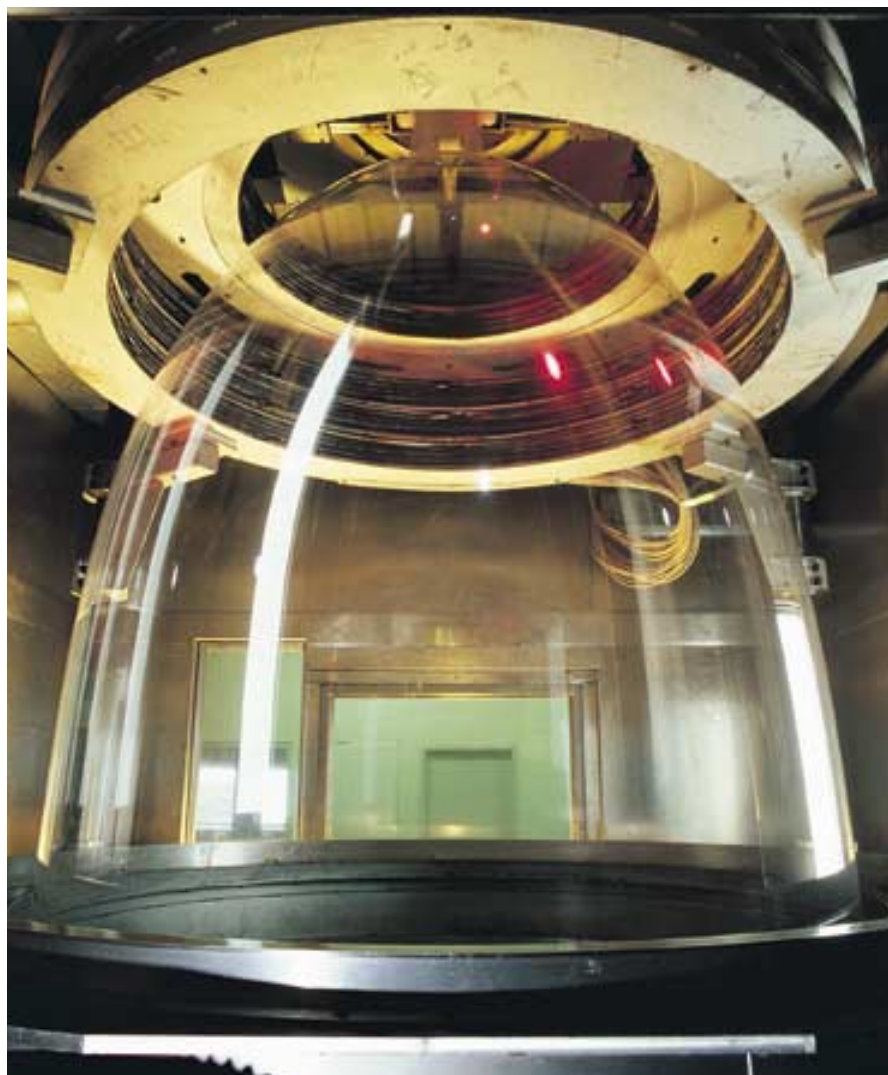
rapid heat transfer mechanism, in particular the cooling process, is the key to achieving specific grade and clarity. The cast tube

is then reheated and, with a combination of temperature and air pressure, the tube is blown outward creating a large ‘bubble’.

The bubble process produces **B**iaxially **O**riented **P**oly**P**ropylene film with balanced orientation in the machine and transverse directions.

This bubble process gives the unique physical properties essential for processing banknotes – the properties being inherent flatness, stiffness and dimensional stability

ensuring efficient conversion through the printing and guillotining processes. A further significant advantage of the film is that it is readily recyclable.



The heated polymer material is blown outward – creating a large “bubble”.

UCB is a Belgium-based globally specialised group active in three different industrial sectors: pharmaceuticals, chemicals and film production.

As the world’s leading producer of specialty cellulose (Cellophane™) and **B**iaxially **O**riented **P**oly**P**ropylene (Propafilm™) film, UCB operates a total of five manufacturing facilities on three continents - Europe, America and Australia. It is the R&D leader in its fields and has developed innovative products such as the Cellopore™ osmotic sachet which contains membrane that converts biologically contaminated water into drinking water.

For further information visit the UCB website www.ubc-group.com



New Zealand reaps financial benefits

The introduction of polymer banknotes in New Zealand has been a resounding success.

In its latest annual report, the RBNZ stated that overall cost savings in currency operations (which include note purchase, processing, distribution and inventory management) for the current year were significant when comparing paper notes in 1997 and polymer notes.

RBNZ Governor Don Brash made comment that the very satisfactory results made for the financial year were largely due to the significant contribution made by a sharp drop in the costs associated with note and coin issue.

With only 93 million notes in circulation, the RBNZ states a current year saving of NZ\$7 million – indicating remarkable

potential savings to countries with much larger note volumes.

The report also discussed the RBNZ's greatly reduced role in daily retail distribution of currency. Since mid-2000, the banks and

Total Cost in Currency Operations NZ\$ (year ended June)	
1997	15.8 million
1998	14.0 million
1999*	19.6 million
2000*	19.2 million
2001	12.9 million
2002	8.8 million (budget)

* Includes one-off costs for purchasing polymer note stock, introduced polymer notes and funding Y2K stand-by requirements.
Source: Reserve Bank of New Zealand, Annual Report 2000/2001



Packaging of NZ dollars for distribution.

security companies had been working together to re-distribute cash among themselves instead of using the Reserve Bank as a clearing house. This change has resulted in some banks holding higher stocks of banknotes than under the previous system, but general distribution is functioning well.

Changes to the role of the RBNZ, including the function of daily retail distribution being re-allocated to a Wellington base only, leave RBNZ free to operate as a wholesale supplier – replacing damaged stock and meeting seasonal demands from cash reserves.

Longevity, security, durability: the keys to success

The 15th PRBPC, held in Thailand in November 2001, brought together representatives from the central banks and printing works of 15 countries to exchange information on currency issues.



Delegates from the XV Pacific Rim Banknote Printer's Conference, Thailand, representing 15 countries and more than 50% of the world's total volume of circulating banknotes.

One recurring topic of discussion was the desire to improve the quality of banknotes in circulation. While banknote appearance and cleanliness is important, the increased incidence of machine handling requires greater banknote durability and issuers are seeking greater longevity from their banknotes in an attempt to save money.

The challenge for paper manufacturers has been to develop products that match the proven benefits of polymer. "Long life" papers were introduced as a stronger alternative to generic forms of rag paper, and protective coatings were added to enhance the lifespan

of banknotes printed on conventional papers. Initial feedback from countries trialing these developments indicate only marginal increases in the performance of the paper banknotes – far short of the performance of polymer notes.

But while durability was a much-discussed issue, it is security that remains the key priority – reflected in the increased emphasis of integrating security features in the substrate with the overall banknote design. This is an area in which polymer again exceeds expectations.

Polymer. Your Questions Answered

Q. What is the effect of heat and cold on polymer notes?

A. Ongoing research and development projects have addressed this issue: the most recent study examining the effect of heat on the dimension of polymer notes and, in particular, the impact of extremes of heat as found on car dashboards.

When exposed on a car dashboard for 6.5 hours at 90°C (194°F), Australian \$5 polymer notes were found to increase only 0.33% in length and to decrease 0.63% in width. Polymer notes were also tested in

temperatures down to 40°C (104°F) with no adverse results. This change of less than 1% in polymer note dimensions correlates with earlier studies which demonstrated similar results after 4 hours of heat exposure at 100°C.

The impact of extremely cold temperatures has also been investigated. Polymer notes were tested in temperatures of minus 40°C and no physical changes were found.

Q. Do polymer and paper banknotes handle differently?

A. The notes do handle a little differently – after all, they are made from different materials. Polymer banknotes are more robust and their non-fibrous properties help them retain a crisp and clean feel throughout their circulation life.

In comparison, paper banknotes are challenged by harsh circulation conditions and appear dirty, weak and limp in handling.

Experience with polymer banknotes shows that the general public and retailers adapt positively to the handling differences, particularly when they have been informed and introduced to the concept of polymer notes in advance of a polymer note issue. As the public learns more about polymer's superior durability and cleanliness, they welcome their introduction.

International events

Conference	Location	Date	Website
2002			
Interpol IPC 2002 10th International Conference on Currency Counterfeiting & 5th International Conference on Fraudulent Documents	Amsterdam, Netherlands	April 8-12	www.ipc2002.com
China Business Summit	Beijing, China	April 18-20	www.weforum.org
IMF (International Monetary Fund) Conference	Washington DC, USA	October 1-3	www.imf.org
Currency Conference	Hawaii, USA	October 6-9	www.currencyconference.com
PISEC (Product Image & Security Exhibition Conference)	Dublin, Ireland	October 28-30	www.pisec-europe.com
Banknote 2003	Washington DC, USA	February 2-5	www.banknote2003.org
IMF (International Monetary Fund) Conference	Dubai, United Arab Emirates	September 23-25	www.dubai2003.org
Pacific Rim Banknote Printers' Conference	Canada	September	–



For more industry news, polymer facts and currency hot topics, look out for the next issue of IPCA Bulletin.

Your questions, comments and feedback are always welcome, including any information on industry events for inclusion in to the International events calendar.

Back issues of IPCA Bulletin can be found on the IPCA website: www.ipca.au.com

Editor Ann Fang
E-mail ann.fang@ipca.au.com

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