



Report

The Foundations of a Passport

The Role of a Passport

A passport is defined as an internationally recognised official document, issued by the government of a country to one of its citizens, authorising travel to foreign countries. It authenticates the bearer's identity, citizenship, right to protection while abroad, and right to re-enter his or her native country.

Its fundamental purpose is to convey trust. Trust that the person presenting the document is its rightful holder, that their details are correct and that the passport was officially issued to them by the State that purports to have issued it.

These humble documents enable us to travel anywhere in the world on holiday or for business. They give reassurance to the authorities in our home and destination countries that we are eligible to travel and our identity is genuine. They are used to prove who we are when engaging with enforcement and verification authorities, unassumingly facilitating our leisure, our trade and our freedom

That's why passports have an infinite worth, a value far greater to an individual than its physical cost, and also why they are a frequent target of criminals, counterfeiters and organised crime.

As a direct result of these escalating threats, passports are designed to be the most secure documents they possibly can be. Increasingly complex security features, devices and deterrents are now being used to protect and secure the book, ensuring its integrity and trust, making it not only an incredibly sophisticated document but also one of great value and worth to us all.

The Physical Elements

With an initial global agreement of passport standards in the 1920's, it was decided that the passport would take the form of a 32-page booklet, be valid for 2 years, and be bound in cardboard bearing the name and coat of arms of the country.¹

Today, its guidelines are set by ICAO, the International Civil Aviation Organisation – a specialist Agency of the United Nations. The passport is a far more sophisticated, technically complex and security advanced document now, but its essence remains much the same in terms of format; a booklet, with internal pages and a cover displaying the country's crest.



¹: https://biblio-archiv.unog.ch/Dateien/CouncilMSD/C-641-M-230-1925-VIII_EN.pdf

The Key Components

1. Cover

The cover serves to protect the internal pages of the book and the data it carries from everyday wear and tear. It also declares ownership to a country, proudly carrying the name of the State that issued it and in the case of an ICAO Compliant ePassport, the ICAO 'chip inside' emblem is included too.

2. End papers

The end papers are found at the front and back of the book and are adhered to the cover. They provide added strength to the book cover and provide protection to the chip and antenna of ebooks. They are critical to the security and construction of the book, often carrying additional security features to deter the risk of forgery by dismantling and reassembly.

3. Sovereign statement or Right of Passage request

Often located on the inside front cover of the passport document, the sovereign statement requests that the bearer be given the right of safe passage through a host's country.

4. The bio-data page and observations page

These are the most significant pages of a passport, as the holder's personal information, image and the passport issuance details are all personalised here. This part of the document comes under the highest threat of attack through substitution, alteration and counterfeit. Security features are optimised and also integrated through substrate, print, personalisation and page protection solutions.

5. Visa pages

Also a prime target of potential attack, visa pages are the subsequent double page spreads and often feature cross page designs. The purpose of these pages is for stamps, permits and visas to be applied and evident, detailing the holder's travel permissions and history.

Watermarks are central to their design and page numbers are often shown as both an electrotype and print feature. The watermarks provide proof of authenticity and provide a deterrent for counterfeiting. Tamper evidence is an important consideration for the visa pages as this mitigates the threat of data alteration.

6. Chip

In an ePassport, the electronic chip is typically hidden within the cover or encapsulated in a polycarbonate bio-data page. The chip holds the same personal details as shown on the bio-data page, and then digitally signed, only accessible when using specialist passport reading software.



Bringing it all Together

Design

Passport design sits at the very start of the process and combines beautiful imagery and cultural aesthetics with a highly refined layering of security features. These are specially selected to combat specifically identified threats and ensure the document's trust and integrity. The integration of design elements and security features, from the watermark artwork to invisible UV pattern-work, is deliberately complex so that the passport book remains one step ahead of the counterfeiters.

Paper

At the very foundation of a passport's physical solution is the substrate that the document is produced from – the paper that forms the pages of the booklet, secures it to the cover and frequently contains the personal details of the passport holder. The vitally important tamper evident properties of the sheet must also work in unison with excellent printability and durability characteristics.

Print

The printed elements of the passport can be extensive. The most appropriate printed features and techniques are selected to meet the specific needs of the customer. These can include: lithography, intaglio, iridescent and UV print, latent images, micro text, see-through features, rainbows, guilloches, medallion fine-line workings, duplex and triplex patterns, user-definable screen and colour-changing inks.

Assembly

Book assembly or construction is the next stage of the process and involves the collation and stitching of the pages into a booklet and the secure attachment of the cover. This is achieved in such a way that any interference can be clearly identified.

Personalisation

Personalisation ties the passport book to its true owner, its holder. Adding a unique booklet number, the holder's personal details, and multiple holder images with embedded security features, ensures each individual passport is totally unique to its owner.



Understanding the Threats

A banknote must survive the rigours of circulation, folding, creasing and general handling during its lifecycle. Its primary security threat is that of counterfeit.

The passport, however, has a far more complex array of threats to contend with. Although typically well protected and well looked after, only being used a limited number of times in its multi-year life, the realm of different potential attacks includes counterfeiting, dismantling & reassembly and data alteration.

Whilst we do still see counterfeit passports, alteration of the personal details page or information on a visa page is far more common. Tamper-evidence is therefore absolutely key for passport pages.

Counterfeiting – A counterfeit passport contains non original materials. This can either be in part or in full, deliberately to resemble an original authentic document.

Booklet – Wholly counterfeit passports means every element of the booklet has been reproduced.

Bio-data page – attempts to counterfeit the bio-data page only is one of the common seen forms of attack against the passport booklet.

Visa pages – when seen within wholly counterfeit passports, these are usually mass produced, due to the complexities and expense of producing counterfeit books. The main reason for replacing only a single visa page, is the removal of an adverse travel history such as a refusal of entry stamp.

Forgery – As opposed to counterfeiting, this refers to the alteration of a genuine document. If a passport is to be used by a person who is not the rightful holder, it will need to be altered to suit the new holder.

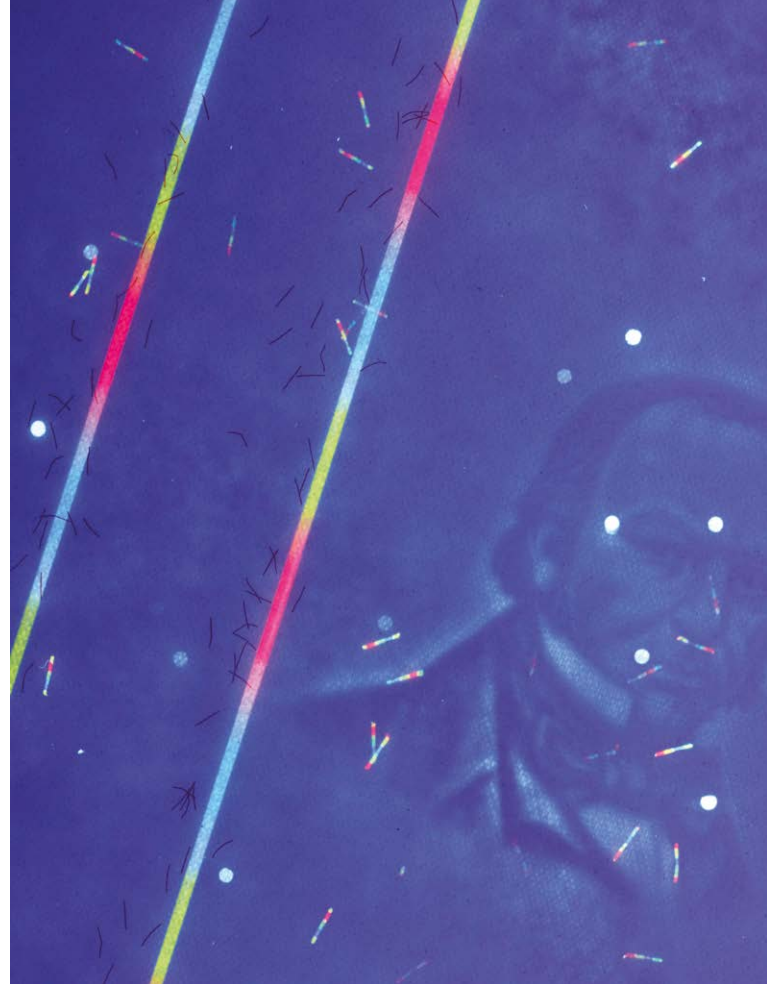
The most common example is the replacement of all or parts of the holders image, but name, date of birth, gender, and expiry date may also need to be altered.

Dismantling & reassembly – This is necessary if pages within the booklet are going to be substituted. A passport can be dismantled by removing the thread that stitches the component pages together. Re-assembly may include retained parts of the original thread or a replacement thread.

End pages can be damaged during the dismantling process and may need to be replaced. The use of complex printing techniques, including intaglio printing make end papers difficult to reproduce.

Page splitting – split pages are used to enable access to personalisation data from behind, hiding any paper damage when the page is re-assembled.

Alternatively, the page could be split in an attempt to retain part of the watermark and then apply this to a counterfeit page giving the impression of a full watermark being present.



Alteration of details – This is where the personalised information in the passport has been somehow removed and wholly or partially replaced by another image or data.

Physical abrasion – removal of personalised details (holder image, name, sex, date of birth, date of expiry, etc) by means of scratching, cutting, lifting with a tacky material, etc.

Chemical abrasion – removal of personalised details (holder image, name, sex, date of birth, date of expiry, etc) by using chemicals to dissolve the ink, toner, etc.

Deliberate damage – The result of an attempt to render the chip unreadable when the bio-data page has been altered or replaced.

Chip replacement – If an ePassport is forged by altering the holder image or other data, the chip, which to date cannot be altered to match, will have to be disabled. In many passports, the chip is located within the cover and can only be accessed by removing the end page.

The insertion of a counterfeit chip is a relatively new trend, that would also require access to the cover by lifting the end page.



Beating the Fraudsters

As already stated, sitting at the very core of a passport's secure solution is the security substrate itself.

The table below shows some specific paper substrate features and the threats they mitigate.

Threat	Feature	Mitigation
Counterfeiting	Cylinder Mould Watermarks	The most widely recognised, easy to validate and virtually impossible to replicate security feature available today.
	Electrotype	The electrotype watermark is extremely difficult to replicate with the most common counterfeiting techniques.
	Security thread	As it is embedded within the substrate it is extremely difficult to replicate. In addition, the thread positions can be staggered to further deter counterfeiting.
	Fibres and other inclusions	Integrated into the furnish of paper, their randomly placed nature means no two pages are the same. The counterfeiter often replicates with print and repeats patterns making this easy to detect.
	Design	A well-designed passport in which the watermark design is suitably integrated into the overall design enhances the security and aesthetics of the passport. This aids inspection and verification.
Dismantling and reassembly	Skylight™	A tamper evident feature that will cause irreparable damage to the end pages if attempts are made to lift them in order to access stitching thread that binds the book together.
Alteration of details	Furnish	A tamper-evident paper structure will make alteration easier to identify, by observing the disturbance of paper fibres in the area of attack.
	Skylight™	A Portals specialist tamper-evident feature that causes, easy to detect, substrate damage when a forger seeks to manipulate the page or attempt to lift / split it to replace or tamper with the data.
	Chemical sensitisation	Chemical sensitisation of the substrate means that coloured dyes will be activated if certain chemicals are used for the removal of printed data.
Deliberate damage / Chip replacement	Skylight™	A tamper evident feature that will cause irreparable damage to the end pages if attempts are made to lift them to access either the chip or stitching thread that binds the book.

Portals' Passport Know-how

Expert security paper maker Portals has extensive experience of the passport market, and is able to deliver a broad range of solutions to meet all your passport paper needs.

Design

The design of a passport is a critical element. Good design is equivalent to adding a powerful additional security feature. Each element of the passport should complement each other and work together in a coherent manner.

The design team at Portals has been designing highly secure, beautifully aesthetic watermarks for many years and has extensive experience of working closely with passport designers. The subjects chosen for the mark must reflect the page design and the page design should not obscure the watermark.

Furnish

Portals use a blend of different fibres in the paper making furnish for passport paper, delivering appropriate durability (for a 10-year passport), excellent tamper evidence and a high clarity watermark.

High clarity watermarks

The cylinder mould watermark is the most effective and widely recognised substrate security feature, as acknowledged by Interpol, border authorities throughout the world and document fraud experts.

Portals has been making high definition, cylinder mould-made and electrotype watermarked papers for the world's leading security printers for over 300 years, working together to produce the highest quality important national documents such as passports, identity papers and high security certificates.

Textmark™

Portals has developed Textmark™ as an innovative new anti-counterfeiting feature that delivers a combinational effect of positive and negative (light and dark) text, numbers and characters within the watermark.

Cornerstone® and Edgestone™

Cornerstone® and Edgestone™ give added robustness and rigidity to the paper substrate to avoid creasing, folding and tearing of pages during the reading process. They are specialist cylinder mould watermarking techniques developed by Portals that reinforce the edges and corners of a page, protecting them from unintentional damage, wear & tear and the threat of counterfeiting.



Skylight™

Another specialist Portals feature, Skylight™ is a complex, unique and tamper proof watermarking feature where small areas of the paper are specially engineered to be lighter and thinner than the surrounding area and background sheet.

Designed to protect against the passport threats of dismantling and reassembly, any attempt to lift or split the paper will cause the page to rupture around the Skylight™ feature making it totally unusable for any further activity.

Integration of threads, fibres and other security components

There are many different elements that can be added to security paper, further enhancing both its aesthetics and also its security. Portals works very closely across the industry and with supply chain partners to offer and integrate an extensive range of security enhancement inclusions including threads, fibres and planchettes. Portals can also supply a wide range of high security stitching threads vital for the protection of the book against dismantling and reassembly.

Chemical sensitisation

Portals can add hidden chemical sensitisation dyes during the paper manufacturing process. These chemical agents are invisible, but then react when they come into contact with a substance used for attempted alteration, leaving a permanent and visible staining to the document.

Conclusion

The passport today is an incredibly sophisticated and highly technical document that holds a huge value for us all. As a result, we must ensure a passport's integrity and always remain one step ahead of the counterfeiters, forgers and criminals.

To do this, it is necessary to really understand the purpose of every element of the book and also the many threats it faces. Only then can the most appropriate solution and layering of security features commence, starting of course, with the very foundation of the passport itself, the paper it is printed on.

For more information on any of the aspects raised and discussed in this paper, please do not hesitate to contact our industry experts at Portals, we would be delighted to help!



About Portals

Portals has two UK sites with a combined capacity of 16,000 tonnes – producing more than 70 million passports, 60 million certificates, 12 billion banknotes and 200 million brand labels each year, for use in more than 100 countries around the world. Every product we produce is bespoke and our breadth of experience and technical capabilities mean our customers have the flexibility to choose a paper solution that complements their security strategy and design requirements.

Portals is proud to be one of the only paper manufacturers in the world with a mill dedicated to producing passport, certificate, voucher and other high-security papers on cylinder mould machines. Based in the beautiful location of Bath, we are proud to say that we are a zero waste to landfill site and hold the PEFC – Chain of Custody accreditation (Programme for the Endorsement of Forest Certification Schemes) supporting sustainable manufacturing.

Our reports

This report is part of Portals' dedication to supporting our partners and driving industry innovation.

Our series of reports share best practice from within the industry and offer the latest advice and insight to help you select and adopt secure papers to meet your requirements.

Contact us

If you would like to discuss any aspect of this report further please contact us at info@portalspaper.com

Alternatively, if you'd like to find out more about Portals please visit us at: portalspaper.com

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