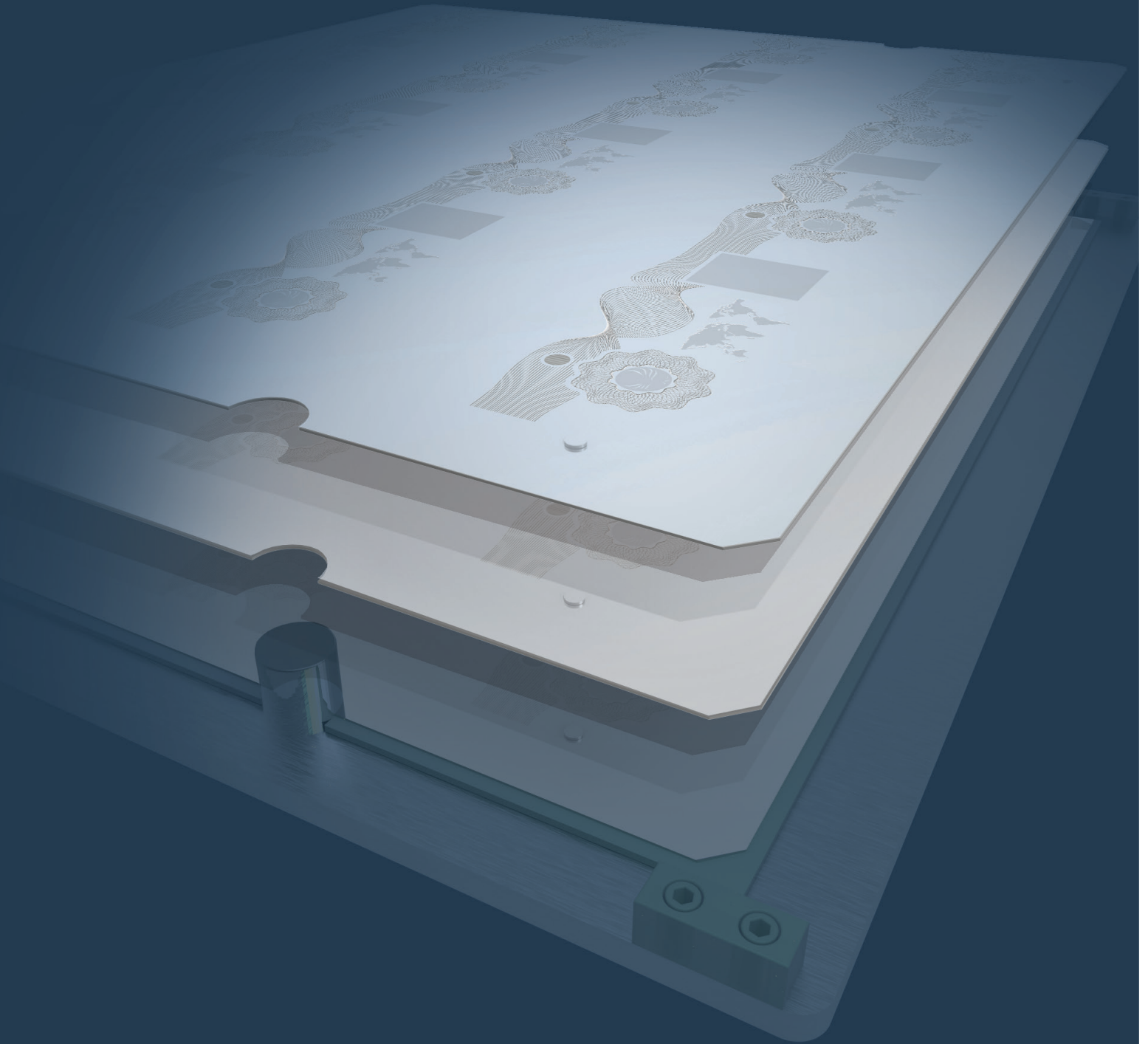




# HIGH TECH LAMINATION PLATES WITH EMBEDDED SECURITY



# Welcome to VTT

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Given name  
Yarrall  
Date of birth  
1974-04-20  
Sex  
M  
Nationality  
U  
Date of expiry  
2017-11-12

IDD - - ZAMBUKAH - YARRALL - - - - -



REPUBLIC OF UTOPIA  
ID CARD

4001272  
Surname  
Zambukah  
Given names  
Yarrall  
Date of birth  
1974-04-20  
Sex  
M  
Nationality  
U  
Date of expiry  
2017-11-12



IDD - - ZAMBUKAH - YARRALL - - - - -  
4001272U - - - - - 65758484 - - - 5502119 - - -

REPUBLIC OF UTOPIA  
ID CARD  
4001272

**VTT's lamination plates are used to produce security features on document surfaces that are easy to identify but can't be copied.**

Ongoing research and development, experienced experts and first-class manufacturing technology pay dividends. We're delighted that VTT's uncompromising demands on quality and service worldwide have gained it a good reputation with manufacturers of passports, ID cards, government documents and driving licences.

In terms of engineering, we go that extra mile. But it also goes without saying that we deal with our customers, suppliers, and employees fairly and in a way that engenders trust. As a producer, development and service partner, we value long-term collaborations based on trust. Which is why you can count on VTT to provide first-class products, support on all technical issues and manufacture efficiently.

Let's join forces to make the world a little more secure.

Marshall Haldane



Marshall Haldane  
CEO Cardel Group

■ ■ MORE ABOUT THE CARDEL GROUP

VTT is a member of the international Cardel Group and a forgery-proofing expert. The Cardel Group is a leading manufacturer of specialist products used to make bank cards, ID cards, PCBs, fuel cells and lots of other products that require sophisticated lamination technology.

We have several manufacturing sites and a network of sales partners worldwide. Our customers include private companies and governmental organisations issuing cards and documents, as well as a number of manufacturers from the electronics, automotive, aerospace, and general lamination technology sectors.



# Security features

Manufacturing ID cards and passports is very demanding because they need to be efficient to produce, forgery proof and the security features easy to validate. A high degree of in-house manufacturing means that we can guarantee maximum security from the get-go and supply products in consistently outstanding quality.

VTT lamination plates with security features offer:

- > Exceptional protection from forgery
- > A wide range of design options
- > Visual and haptic enhancement
- > Efficient production

VTT develops solutions for almost any specifications:

- > With customised lens patterns
- > By cleverly combining various security features with and without underprinting



**MLI** (Multiple Laser Image)  
**CLI** (Changeable Laser Image)

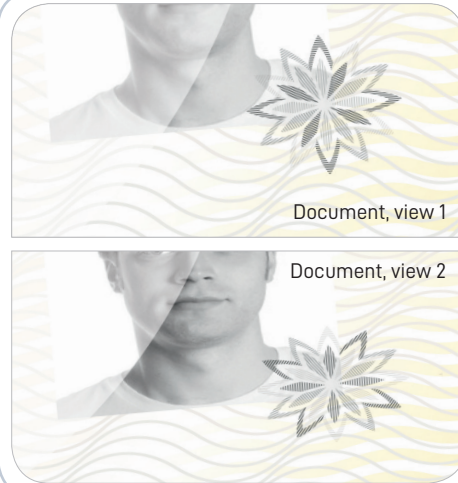


Tilting the document reveals two or more views of personalised features (text or picture as a black- and white image).

In the case of MLIs and CLIs, closely spaced parallel lenticular lenses are created on the surface of the card (raised or recessed), each of which are only a few micrometres wide. The smallest radius possible is 30 µm. Personalised features are added through the lenses by laser at several different angles. A visual feature is created in each direction.

- > Easy-to-verify variable data.
- > High level of security due to the lens's fine structure and subsequent personalisation options. Raised lenses mean extra security.
- > Because lasers can personalise items, variables such as a secondary image can be applied.

**MDI**  
(Multi Directional Image)



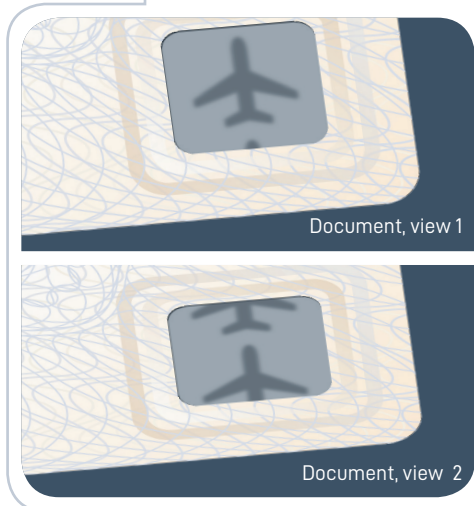
Tilting the document in different directions or waving it around will reveal different effects and types of motion.

To achieve this feature, diverse shapes of lens fields can be created to suit preferences that have different angles.

Several visual features can be revealed for each field. With appropriately matched underprinting, highly complex impressions can be generated.

- > Easy-to-verify tilt effects.
- > High level of security due to the lens's fine structure and superior complexity.
- > Vast scope of design options and security (variable outer contours, combined with laser personalisation and/or OVI (Optical Variable Ink).

## TWIN LENSE



Tilting the document in any direction causes a multi-dimensional movement of a translucent image in a transparent window.

The visual feature is generated by the interaction of lenticular lenses on the front of the card and the very fine structures on the rear. Printing on other layers of the card is not required to achieve this effect.

- > Easy-to-verify movement of visual feature.
- > Exceptional protection from forgery due to superior precision throughout.
- > Can be used on all card materials.
- > Can be combined with MLI personalisation options.

## move ID

**CMI** (Converse moving Image)

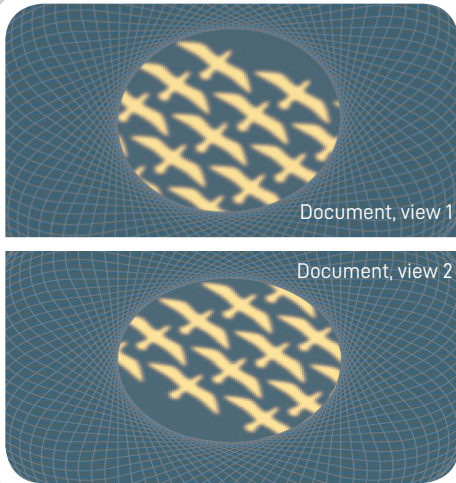


Depending on the angle you view it from, the visual feature changes with a tilt effect (move ID). A single visual feature can also be used that moves in multiple directions (CMI).

Just like MLIs or CLIs, a range of lenticular lenses are applied to the card. The lenses focus line by line on the underlying layer printing. This has been prepared and creates different views from different angles.

- > Easy-to-verify personalised feature motion and tilt effect.
- > Superior security due to precisely defined interaction of the lens, print and structure of the card. Raised lenses mean extra security.
- > Personalised sections create even greater security.

## FlyEye

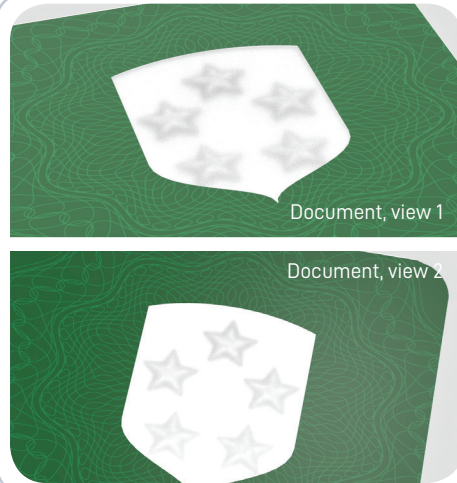


Tilting and waving the documents about shows a cropped visual feature that looks as if it's floating and has impressive three-dimensional depth.

The effect is produced by a lens field on the body of the card that's filled with single hexagonal lenses. Each of them is just a few  $\mu\text{m}$  in size. Each of the lenses focus on a special, high-resolution print on the layer underneath.

- > The visual feature has an easy-to-verify 3D and floating look.
- > Exceptional security level due to the fine structure and high complexity.
- > A wide range of design options. The depth and movement of the image can be adjusted exactly.

## Double FlyEye

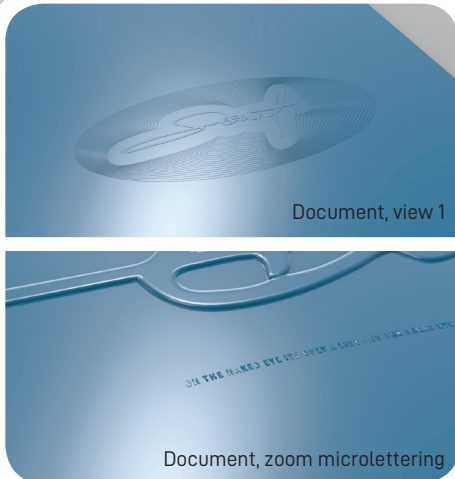


Tilting and waving the document about shows a translucent, floating visual feature with impressive three-dimensional depth in a transparent window on the document.

The visual feature is generated by the interaction of FlyEye lenses on the front of the card and the very fine structures on the rear. Printing on other layers of the card is not required to achieve this effect.

- > The visual feature has an easy-to-verify 3D and floating look.
- > Exceptionally forgery proof due to superior precision throughout.
- > A wide range of design options. The depth and movement of the image can be adjusted exactly.

## Structures



Depending on the type and size, some details with fine haptics and high resolution are only visible under magnification in plan view.

The visual feature is created by light and shade over raised or recessed structures on the card surface. Depending on the required appearance and function, the structures can have different degrees of fineness. Relatively coarse, raised structures are also used as tactile elements (e.g. for Braille lettering).

- > Haptically/visually verifiable (depending on fineness).
- > The finer the structure, the greater the security level. An extreme case: microlettering with font sizes of just a few  $\mu\text{m}$ . The lettering is only perceived as a line.
- > Very flexible to use for graphics.

## Latent Images 1/2/3-fold

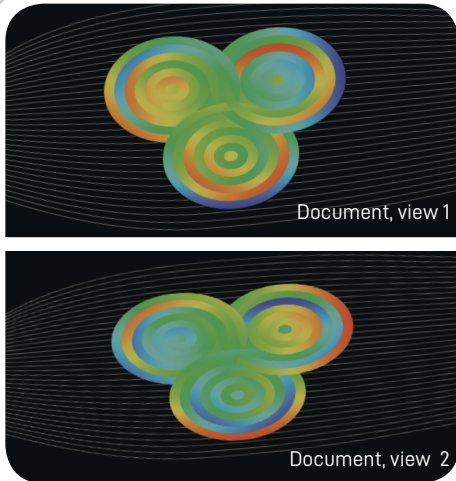


When looked at directly, latent images are almost invisible. Tilting the document in different directions or waving it around will reveal up to three monochrome visual features alternately.

The image views are generated by the special layout and overlay of very fine, parallel line grids and special shapes directly on the card's surface. It's only when the light hits it at an angle that these generate glossy and shadowy areas that produce the image.

- > Verifiable via magnification if necessary.
- > Exceptional security level due to the fine structure and high complexity of image integration.
- > Perfect for textures and graphics, easy and practical integration into the card design.

## Holographic

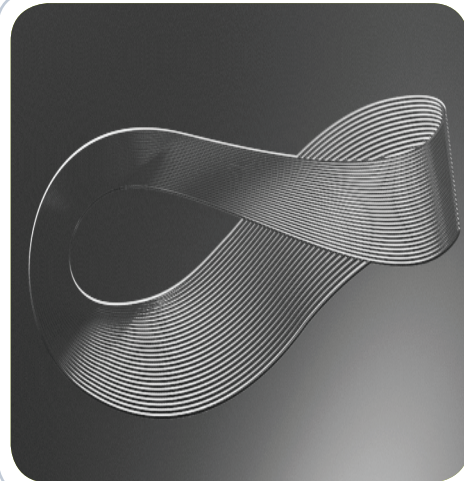


When the card's viewed from different angles, different colour iridescent areas appear on the surface of the card, which interact to show the visual feature in its entirety

Modifying the card surface with nanotechnology produces hologram-like reflections with no extra substrates or steps required.

- > Easily verifiable with the right lighting.
- > High level of security due to the nano structure.
- > It's advisable to embed raised structures to increase the life of the card.
- > Perfect for textures and graphics.
- > A dark, monochrome background is advantageous.

## ODI (Optical Depth Illusion)

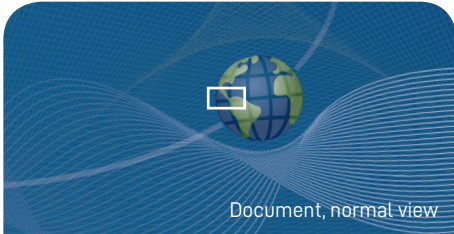


When you view the card from any angle, a three-dimensional image with visible depth consisting of high-gloss surfaces appears.

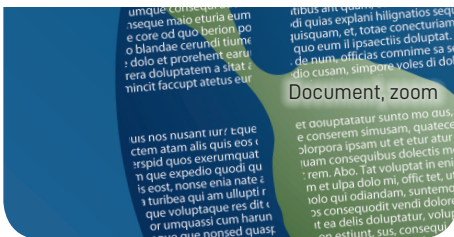
The image view is created in a similar way to latent images. In contrast to the LI, the lines aren't parallel. Like contour lines on a map, they follow the geometry of the body depicted at variable distances. Glossy and shady sections create the optical illusion of depth.

- > Easily verifiable.
- > High level of security.
- > Ideal for showing spatial objects.

## Nano Code



Document, normal view



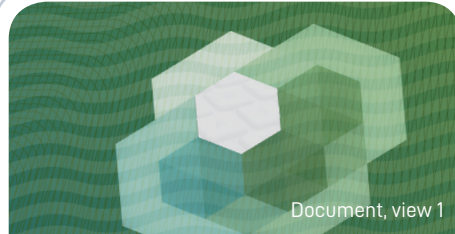
Document, zoom

The naked eye perceives Nano Code as a matt surface. Only when magnified do users realise that the surface consists of narrowly spaced, extremely tiny micro text that can be down to  $50\mu$  in size.

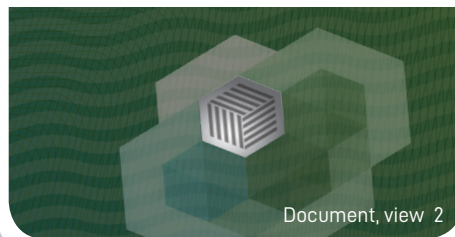
The text can be continuous or repeat itself. Long texts or combinations of numbers with occasional intentional errors usually make identifying forged documents child's play.

- > Simple to verify by magnifying a limited area using a template.
- > Exceptionally secure due to high-resolution structures and the option to intentionally hide errors deep in the design.
- > Requires a translucent area on the card/in the document.
- > Easy and practical to integrate into the card design thanks to customised contouring.

## Iconiq



Document, view 1



Document, view 2

VTT Iconiq is a characteristic, which the naked eye can't see, that is transmitted by light on a surface that looks matt. It takes an extra light source, for instance a smartphone's LED, to identify the characteristic.

A glance through the characteristic to the light source reveals a luminous visual feature. A laser pointer can also project the visual feature.

- > Easy to verify by shining an LED onto it.
- > Requires a translucent area on the card/in the document.
- > Iconiq's sophisticated, high-resolution structure guarantees superior security.
- > Easy and practical integration into the card design through customised contouring of the matt surface and the characteristic on it.



Various security features on lamination plates.

# Lamination plates

To produce payment and ID cards efficiently, VTT supplies top-quality lamination plates for all applications. No defects, stains, scratches, dents, pinholes, dust, dirt inclusions, oil, or additives.

Surfaces in varying degrees of hardness, as well as diverse degrees of glossiness and thickness are available to suit the application. Customised designs in nickel and austenitic steels can also be supplied but aren't shown here.

**AA**★  
VTT DOUBLE A  
QUALITY



## VTT X40-S

High quality stainless steel with our VTT Double A surface and top of the industry quality. VTT X40-S offers an ideal combination of quality, versatility and cost-efficiency. Integrating secure elements is possible.

- > Highly cost efficient stainless steel in a thickness of 0,8mm.
- > Tailored to your individual demand and needs in terms of their size, shape, surface or texture to perfectly match your application.
- > Optimum flexibility to incorporate a variety of secure elements makes VTT X40-S an ideal choice for governmental projects.

Material: Ferritic stainless steel,  
VTT Double A surface quality

Hardness: HV 140

Parallelism: within 0.015 mm/plate

Flatness:  $\leq 3.00$  mm/m

Thickness: Plate 0.8 mm  $\pm 0.05$  mm

Surface: Matte, Silk or Glossy finish

## VTT Duro 500

The flexibility to incorporate secure elements makes VTT Duro 500 an ideal choice for governmental documents. Our VTT Double A surface and a high resistance to scratches and indentions make VTT Duro 500 the superb choice for sophisticated applications.

- > Offers a significant increase of lifetime compared to conventional hardend plates with a thickness of 0,8 mm.
- > High resistance to indetions, extending the lifetime of the plate over conventional steel grades.
- > Can be manufactured with all security elements.
- > Replacing mild steel lamination plates according to AISI 430 specifications.
- > Available with glossy and matt finishes.
- > No change of lamination parameters.
- > Cost-efficient purchase.
- > Reduced card scrap saves significant extra costs.

Material: Through hardened stainless steel,  
VTT Double A surface quality

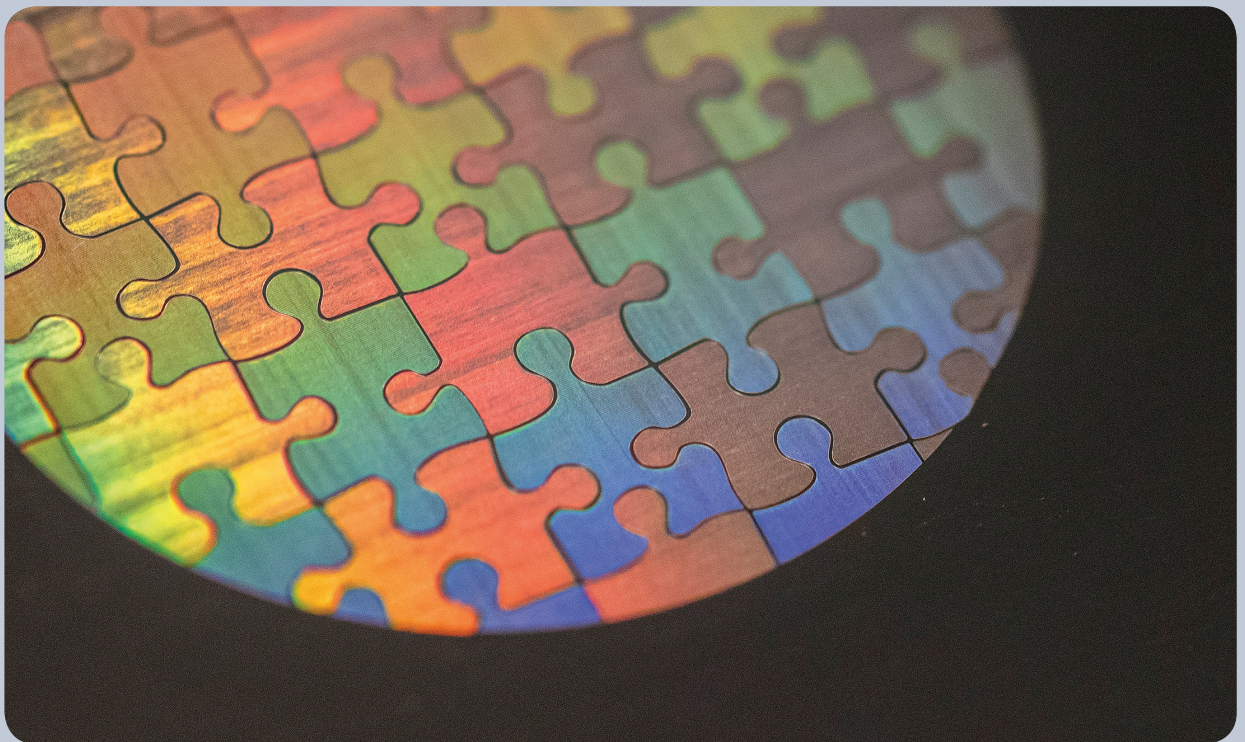
Hardness: HV 500  $\pm 8\%$

Parallelism: within 0.015 mm/plate

Flatness:  $\leq 3.00$  mm/m

Thickness: Plate 0.8 mm  $\pm 0.05$  mm

Surface: Matte or Glossy finish



Various security features on lamination plates.

## VTT Duro 900+

An extraordinary resistance to scratches and indentions makes VTT Duro900plus the optimum choice for sophisticated applications such as e.g. the production of contactless antennas and integrated modules.

- > Scratch-resistant VTT- Duro 900plus core hardness HV 500 with VTT-DIAplus technology with surface hardness HV 900 (Hardness in Vickers) stainless steel.
- > Offers a significant increase of lifetime compared to conventional materials such as nickel- and chromium-plated lamination plates made out of brass and mild stainless steel.
- > Highest durability in the market with a lifetime that is up to 15 times longer than conventional lamination plates.
- > Cost-efficient production with a consistent quality.

Material: Hardened stainless steel,  
VTT Double A surface Quality  
coated with VTT DIAplus anti scratch

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Core Hardness: HV 500 ± 8%

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Surface Hardness: ≥ HV 900

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Parallelism: within 0.015 mm/plate

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Flatness: ≤ 3.00 mm/m

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Thickness: Plate 0.8 mm + DIAPlus 25 µm  
per side ±0.05 mm

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Surface finish: Glossy

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## Customised materials

When it comes to customers' requirements, we're very flexible.

Alongside the standard materials outlined, we can offer a large selection of other stainless steel and metal types.

In these cases, you can still rely on consistently top quality and the material and application matching perfectly.

## Coating eX28

Our VTT Release eX28 coating is a permanently applied surface treatment that increases the chemical resistance of the lamination plates while reducing the adhesion of materials on the plate surface.

- > Increased durability and chemical resistance.
- > Optional reworking.

## Coating eX30/30+

VTT Release eX30 is a contour reproducing and infiltration stable thin layer applied in a plasma polymerisation process with increased anti-adhesive characteristics and an improved corrosion resistance.

- > Creates a non-stick effect to the lamination plates while not impacting other surface properties such as gloss level, surface textures etc.
- > As permanent thin plasma polymerisation process based layer. It infiltrates the surface and minimizes surface adhesion of plastic materials on lamination plate surfaces.
- > Prolonged lifetime of lamination plates with higher production efficiency as less material remainders are sticking to lamination plate surface.
- > Suitable for all card materials.

## Vautrol

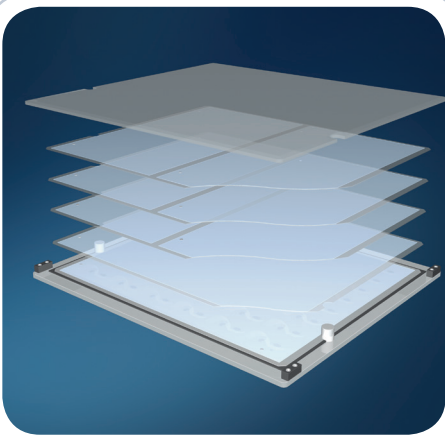
VTT Vautrol is a non-stick coating whose ease of application makes it a very versatile option. Customers can easily apply Vautrol as a spray on site. It's also ideal for preventing the sheets sticking to the lamination plate.

- > Vautrol is just sprayed onto the plate surface and heat fixed.
- > The resulting film is only a few nanometres thick and reproduces all contours accurately.
- > Vautrol drastically cuts surface energy, leading to sheets sticking to the lamination plates much less frequently.
- > Suitable for all card materials.

## Raised dams

One of the key issues of producing a plastic datapage for passports is the solution for the hinge so the sewing area of that datapage: flexible, but durable with no additional process.

- > VTT Lamination plates with raised dams form a thin and flat hinge area to allow easy lamination of plastic sheets with hinges made of fabric, polyurethane or others.
- > Anti adhesive coatings allow a flexible selection of materials for the hinge.
- > Top protection from forgery is provided cost efficiently by using VTT lamination plates with extra security features such as MLI/CLI lenses, micro lettering, latent images, braille, matt and glossy finishes.



## VTT Cassette System

The cassette system is optimized for the respective lamination press type. High-precision register pins in the bottom cassette plate and semi-circular notches in the lamination plates create perfect registration between the lamination plates. As a result, plates patterned on both sides can be used.

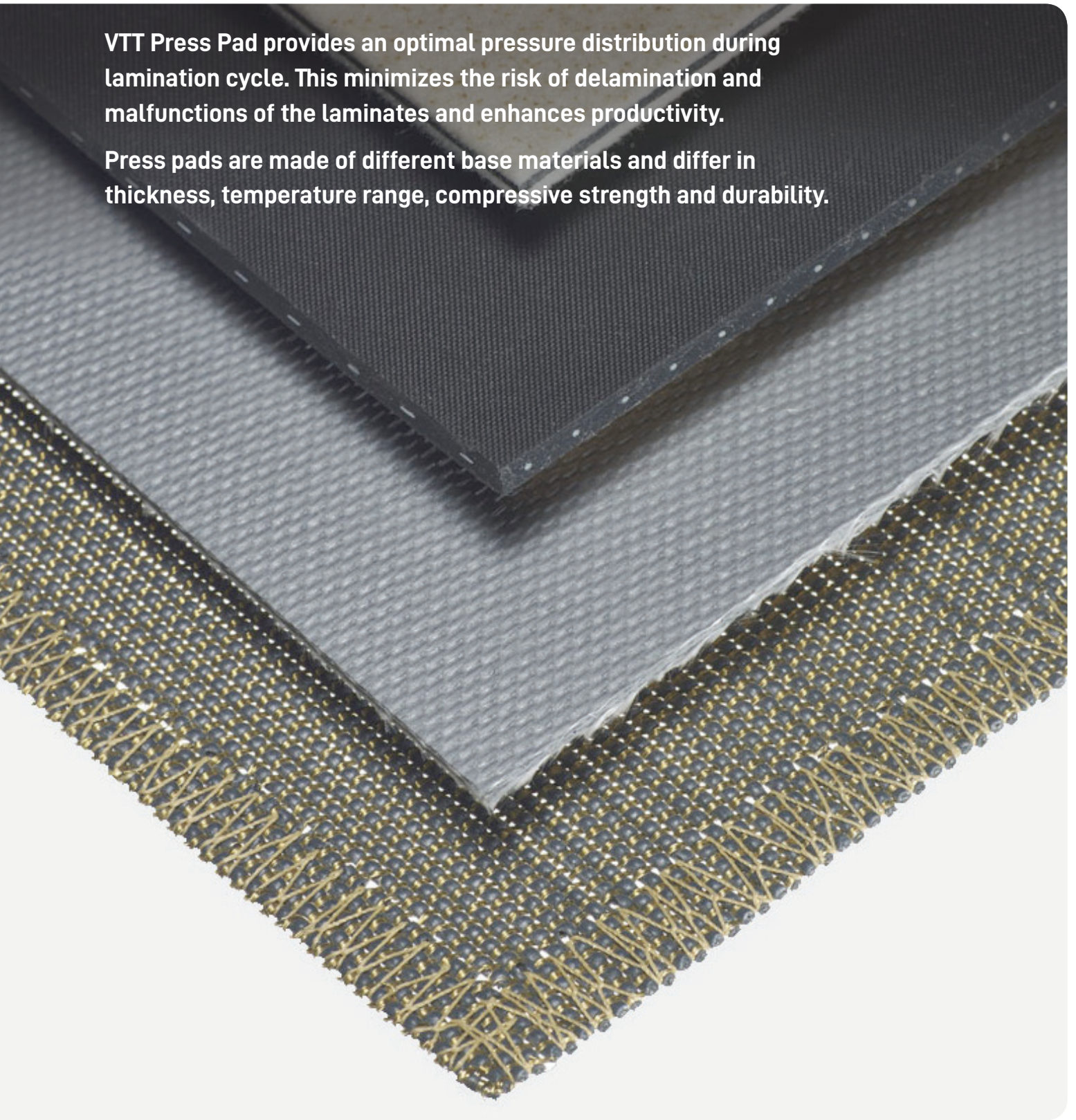
Even small-sized pre-lams can be placed next to each other in the press on a large size lamination plate.

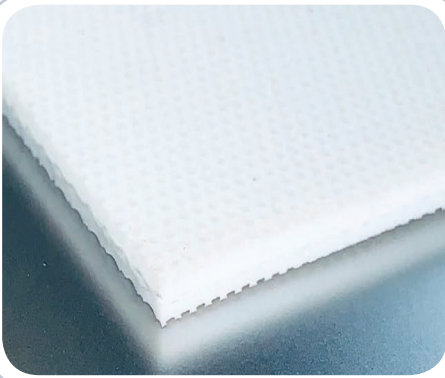
- > Low weight for easy handling.
- > Smooth ceramic surface offers higher scratch resistance compared to ceramic-free surfaces.
- > Excellent heat transfer shortens the dwell time in press.
- > More efficient production and excellent card quality thanks to lower cycle times.

# Lamination Heatpads

VTT Press Pad provides an optimal pressure distribution during lamination cycle. This minimizes the risk of delamination and malfunctions of the laminates and enhances productivity.

Press pads are made of different base materials and differ in thickness, temperature range, compressive strength and durability.

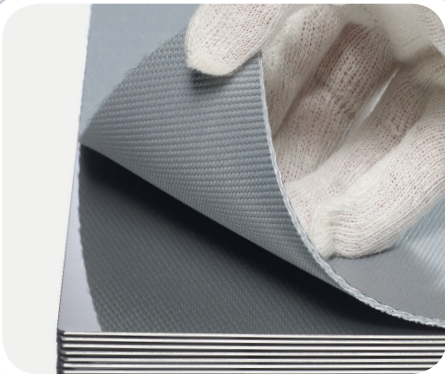




**Cardlam™ 220+WS**

**Cardel Cardlam™ 220+WS lamination pads offer increased productivity and quality in all types of plastic card lamination including Smartcards:**

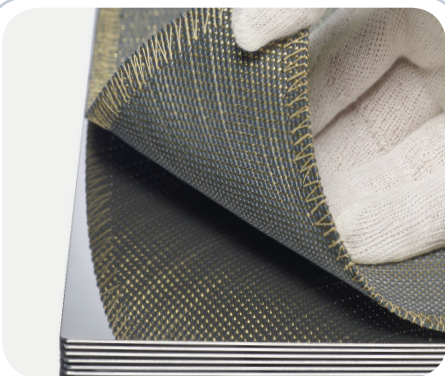
- > Up to 5% to 20% increase in lamination output.
- > Thermally "dynamic pad" - ability to adjust conductivity during cycle stages for optimum cycle time
- > Rapid and even heat distribution. / Excellent compressive qualities.
- > Clean pad – no fibre contamination.
- > High durability – typically 4000 – 6000 operations.
- > Compatible with all types of Single and Twin Stack laminators.
- > Easy handling – suitable for tilt table systems.
- > Enables reduced lamination cycle time in multiple daylight high volume laminators due to thermal efficiency.



**Cardlam™ 220/220+**

**Cardlam™ 220 lamination pads have been developed for specific use in high performance lamination of Credit and Smart cards achieving:**

- > Up to 20% increase in lamination output.
- > Thermally "dynamic pad" – ability to adjust conductivity during cycle stages for optimum cycle time.
- > Rapid and even heat distribution.
- > Excellent compressive qualities.
- > Clean pad – no fibre contamination.
- > High durability – typically 4000 – 6000 operations.
- > Compatible with all types of Single and Twin Stack laminators.
- > Easy handling – suitable for tilt table systems.
- > Enables reduced lamination cycle time in multiple daylight high volume laminators due to thermal efficiency.



**Cardlam™ 230**

**Cardlam™ 230 lamination pads have been developed for specific use in high temperature lamination of Identity and Smart cards achieving:**

- > Used globally in the manufacture of polycarbonate Identity cards, banking cards and RFID pre-lams.
- > Up to 30% increase in lamination output.
- > Assist in the elimination of laking and frosting.
- > Rapid and even heat distribution.
- > Excellent compressive qualities and reduces static for improved handling.
- > Clean pad – no fibre contamination.
- > High durability – typically 8 – 10,000 operations.
- Compatible with all types of laminators.
- > Easy handling – suitable for tilt table systems.

VTT GmbH  
Am Pferdemarkt 16  
D-30853 Langenhagen  
Germany  
☎ +49 (0)511 51 93 50-0  
📠 +49 (0)511 51 93 50-20  
[www.vtt.de](http://www.vtt.de)



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