

**Method for manufacturing a prelam for an electronic document,
method for manufacturing the electronic document, prelam thus obtained,
and electronic document comprising such prelam**

5 Field of the invention

The invention relates to a method for manufacturing a prelam for an electronic document, the electronic document being for example a card, for example such as a bankcard, or credit card, and more particularly a prelam comprising a hidden magnetic strip (generally referred to as "magstripe"). The
10 invention also relates to a method for manufacturing an electronic document, for example a card, for example such as a bankcard, comprising such a prelam.

The invention also relates to the prelam thus obtained and to the electronic document comprising such prelam, the electronic document being for example a card, for example such as a bankcard.

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Technical background

An electronic document, such as an electronic card, and more particularly a credit card, often comprises a front face with a variety information, for example a name of a holder of the electronic document, and a back face that
20 can include a magnetic strip.

For aesthetic reasons for example, it is desired to have the magnetic strip hidden.

A magnetic strip usually looks like a stripe, which is often of a dark color, but which can change color after treatment.

25 To have it hidden, according to one example embodiment, the magnetic strip covers only a part of the card surface.

As the initial surface of the card is usually white, whereas the magnetic strip is usually dark, for example black, several layers are applied over the entire surface of the card in order to hide the magnetic strip in a satisfactory manner

30 Thus, it is rather difficult to hide the magnetic strip in a satisfactory manner while keeping magnetic output properties that are compliant with card specification or standards.

According to another example embodiment of a card comprising a hidden magnetic strip, the card comprises a magnetic layer that covers the entirety of one surface of the card. To make a magnetic strip that is functional, only a strip of the magnetic layer is functionalized. Nevertheless, concealing
5 layers are applied over the whole magnetic layer.

As the concealing layers are applied over a solid unicolor substrate (i.e. the magnetic layer which is usually uniform), it is rather easy to hide the magnetic strip (which is the functional part), while a good magnetic functionality of the strip can be maintained.

10 However, covering the entire surface of the card with a magnetic layer is not compliant with several personalization technologies, in particular, with laser marking, which becomes very difficult, or even impossible to use.

Besides, both the aforementioned embodiments lead to very specific card structures that can be incompatible with a desired structure of some cards,
15 in particular to personalize a card as desired.

Various embodiments of hidden magnetic strips are described in the following documents for example.

Document WO2021/123625 describes embodiments of a method for manufacturing an electronic document, and an electronic document thus
20 obtained, in which an apparent surface of the card, which includes a magnetic strip, has a contrast ΔE equal to or less than 15, and a decoration layer covering the surface over the magnetic strip has a thickness equal to or less than 10 μm and an opacity ratio of at least 70%.

Document US9805224B2 discloses a magnetic structure including a
25 substrate, a magnetic ink layer, an opaque layer and a protective coating. The magnetic ink layer covers the substrate. The opaque layer covers the magnetic ink layer in order to visually hide characters, bar code, and other patterns.

Document US6186398B1 discloses a magnetic card, wherein a magnetic layer is concealed. The magnetic card comprises a substrate layer, a
30 magnetic layer provided on the substrate, a thin film layer made from a metal or metallic compound having a property of concealing the underlying layer, a print layer provided on the surface of the thin film layer, a transparent first protective

layer, wherein the magnetic layer is embedded between the substrate and the thin film layer, and a second transparent protective layer on the surface of the print layer. The substrate layer is made-up of vinyl chloride resins. The print layer is formed by silkscreen printing. The protective layers are made-up of transparent
5 resin such as vinyl chloride resin.

Document US9519851B2 discloses a transaction card comprising a magnetic strip of any width, length, shape.

Document US10311350B2 discloses a transaction card which includes a magnetic strip inside the card frame between a card inlay and a card
10 housing.

Document US10395153B2 discloses a card comprising a core subassembly, a hard coat subassembly attached to top and/or bottom sides of the core subassembly to protect the core subassembly. The core layer is made
15 of white PVC.

Summary of the invention

It is therefore an object of the invention to provide a method for manufacturing a prelam for an electronic document and a prelam thus obtained that allows both personalization options and a hidden magnetic strip.

20 To this end, the invention provides a method for manufacturing a prelam for an electronic document, the method comprising steps of:

- ~ Providing a substrate having a top edge and a bottom edge, and a surface extending from the top edge to the bottom edge;
- ~ Providing an overlay comprising a magnetic strip;
- 25 ~ Applying the overlay to the surface of the substrate;
- ~ Laminating the substrate with the overlay;
- ~ Applying at least one concealing layer over the entire magnetic strip to hide the magnetic strip, a border of the at least one concealing layer forming an intermediate edge, the intermediate
30 edge being situated between the magnetic strip and the bottom edge of the substrate, thus forming the prelam comprising two areas on one face, a top area of the two areas having the at least

one concealing layer and the magnetic strip under the at least one concealing layer, and a bottom area of the two areas without the at least one concealing layer.

According to such an example embodiment, the surface of the substrate comprises two opposite edges, referred to as top edge and bottom edge.

Here, a height of the surface is defined as the distance between the top edge and the bottom edge.

For example, in an embodiment in which the surface of the substrate is rectangular, the top edge is parallel to the bottom edge.

The prelam thus obtained comprises two areas, the top area and the bottom area, which are easily visible.

For example, the at least one concealing layer covers at maximum part of the substrate, so that the bottom area of the substrate is free of the at least one concealing layer.

In other words, a part of the substrate surface which is free of the at least one concealing layer forms the bottom part.

The top area and the bottom area define one edge between them, said intermediate edge.

For example, in an embodiment in which the surface of the substrate is rectangular, the intermediate edge between the top area and the bottom area is parallel to both the top edge and the bottom edge.

According to one example embodiment, the method comprises a step of forming a colored zone on a part of the surface of the substrate, the magnetic strip being then entirely positioned on the colored zone, and the colored zone being then entirely covered by the at least one concealing layer.

According to one example embodiment, the colored zone has a height bigger than a height of the magnetic strip; each of these heights being a dimension taken along the height of the surface.

According to one example embodiment, the colored zone extends from the top edge of the substrate.

The colored zone thus forms a top zone of the surface of the substrate, and the surface of the substrate then comprises a bottom zone extending from the top zone to the bottom edge of the substrate.

The top zone and the bottom zone thus define a demarcation line
5 between them.

In other words, the at least one concealing layer is applied covering at least the colored zone of the substrate.

For example, the colored zone comprises a color chosen such that a contrast DeltaE between said color and a color of the magnetic strip is equal to
10 or less than 20, for example equal to or less than 15, or for example equal to or less than 10.

The contrast DeltaE is advantageously here the measure of color deviation defined by the International Commission on Illumination (CIE - Comité international de l'éclairage). A method is for example described in the CIE
15 standard of 1976: ISO 11664. Thus, for example, DeltaE, dE or else ΔE , is defined as a Euclidean distance measurement between two colors considered in a color space. The formula established at 1976 by CIE is for example:

$$\Delta E^* = \sqrt{(L_2^* - L_1^*)^2 + (a_2^* - a_1^*)^2 + (b_2^* - b_1^*)^2}$$

Where:

20 - L_1^* , a_1^* and b_1^* are the coordinates in the CIE color space L a b of the first color to be considered, and
- L_2^* , a_2^* and b_2^* those of the second.

However, other formulas are used to calculate the DeltaE (CIE 1976, CIE 1994, CIE 2000, CMC).

25 The wavelengths of the visible domain here denote wavelengths between about 380 nm and 780 nm.

For example, for black color and a traditional black magnetic strip, DeltaE is nearly equal to 1.

According to an example embodiment, the substrate is made of PVC
30 (polyvinyl chloride), PET (polyethylene terephthalate), foil, or other material.

According to one example embodiment, the overlay is made of PVC (polyvinyl chloride).

According to one example embodiment, the overlay is applied over the entire surface of the substrate so that it covers the whole surface of the substrate. Thus, the overlay has same dimensions as the surface of the substrate onto which it is applied.

5 For example, the magnetic strip is a boosted magnetic strip.

According to one example embodiment, the step of laminating the substrate with the overlay is performed at low temperature, for example at a temperature comprised between 90 °C and 120 °C.

Low temperature lamination makes it possible to limit, or even avoid,
10 material deformation (for example shrinkage, warping, etc.) that would make the prelam thus obtained hard to process during following steps.

For example, the at least one concealing layer comprises at least one silkscreen layer.

For example, the at least one silkscreen layer comprises an ink, for
15 example silver or white, applied by silkscreen.

For example, the ink is a solvent based ink.

A silkscreen layer comprising a solvent based ink is thinner than a silkscreen layer comprising another ink type such as UV ink or hydro UV ink.

This allows attenuation of the magnetic strip output to be minimized.

20 According to one example embodiment, the at least one silkscreen layer comprises a silver silkscreen layer.

According to one example embodiment, the at least one silkscreen layer comprises a white silkscreen layer.

25 According to one example embodiment, the at least one concealing layer comprises at least one offset layer.

For example, the offset layer extends over an edge of the at least one silkscreen layer.

Thus, according to one example embodiment, the step of applying at least one concealing layer to hide the magnetic strip comprises a step of applying
30 the at least one silkscreen layer over the magnetic strip.

According to one example embodiment, the step of applying the at least one silkscreen layer over the magnetic strip comprises a step of applying a white silkscreen layer.

According to one example embodiment, the step of applying the at
5 least one silkscreen layer over the magnetic strip comprises a step of applying a silver silkscreen layer.

According to one example embodiment, the white silkscreen layer is applied, for example overprinted, on the silver silkscreen layer.

According to one example embodiment, the step of applying at least
10 one concealing layer to hide the magnetic strip comprises a step of applying the at least one offset layer over the magnetic strip, and eventually over the at least one silkscreen layer, for example over at least the white silkscreen layer.

According to one example embodiment, the step of applying at least one concealing layer comprises a step of applying the at least one concealing
15 layer from the top edge of the substrate.

Thus, for example, the top area can extend from the top edge.

For example, when the at least one concealing layer comprises at least two layers, at least an outermost layer of the at least two layers can extend from the top edge of the substrate.

20 In the above-mentioned example, the outermost layer is the offset layer.

Any layer under the outermost layer of the at least two layers can extend over at least the magnetic strip, but does not need to extend from the top edge.

25 However, each layer of the at least one concealing layer can extend from the top edge in order to provide better thickness homogeneity.

For example, the step of applying the at least one offset layer comprises printing the offset layer.

According to one example embodiment, the method comprises a step
30 of applying a varnish layer over at least the top area of the prelam.

For example, the varnish layer is transparent.

For example, the varnish layer forms an outermost surface layer of the prelam, and so later of the document comprising such a prelam.

For example, the varnish layer extends from the top edge of the substrate.

5 For example, the varnish layer extends over the intermediate edge between the top area and the bottom area of the prelam.

According to one example embodiment, the varnish layer covers at maximum part of the bottom area, so that at least a part of the bottom area is free of at least the varnish layer.

10 This leads to a little thickness difference between a top area and a bottom area of the prelam, but then the bottom area of the substrate is free of any overprinted layers (not taking the overlay into account).

The concealing layers (including all silkscreen layers (silver or white for example) and offset layer) and the varnish layer are chosen to be as thin as possible in order to impact as little as possible the magnetic strip output.

15 For example, the total layer thickness (including overlay with magnetic strip, concealing layers, offset layer and varnish layer) is less than or equal to 30 μm , for example comprised between 5 μm and 30 μm , in particular between 5 μm and 25 μm .

20 Applying varnish over the top area only permits the overlay to be kept free of any additional layer in the bottom area of the prelam.

This improves almost all personalization technologies process:

- Embossing: this reduces the risk of cracks;
- Thermal printing, Drop on demand and Durable graphic: the surface properties of the varnish compared to PVC makes the application much more complicated and reduces the technology durability;

The case is similar for hologram and signature panel hot stamping. A varnish surface makes the application much more complicated.

However, according to another example embodiment, the varnish layer is printed on the entire surface of the substrate (i.e. covers both the bottom area and top area of the prelam).

At least one advantage of this option is that the thickness difference between the top area and the bottom area of the prelam is reduced.

Thanks to the invention according to any one of the above-mentioned features, the bottom area provides an area with a common structure and possibly
5 no overprinted layers before personalization (except optionally varnish), and/or a pattern can be offset printed on the substrate before the overlay (with the magnetic strip) is laminated. This bottom area is therefore compliant with most personalization features.

In addition, although the magnetic strip is hidden, the invention also
10 clearly highlights, through the design of the document, the magnetic strip localization. Therefore, this helps a user of the document including the prelam to intuitively know where the magnetic strip is located and to correctly position the document when needed, for example for swiping a corresponding card.

According to one example embodiment, the method comprises a step
15 of making a pattern on at least the bottom area of the prelam.

For example, the step of making a pattern on at least the bottom area of the prelam comprises a step of offset printing.

Such a step can be performed before the substrate is laminated with the overlay comprising the magnetic strip for example, so that the pattern is
20 directly made on the substrate, for example on the bottom zone of the substrate.

Such a method therefore enables a prelam to be provided, and then an electronic document, in which a back face is clearly separated into two areas, one of the two areas comprising the hidden magnetic strip, while the other can be personalized according to any of most of the personalization processes.

25 Further, to manufacture an electronic document comprising the prelam as described above, the prelam can be assembled with other constitutive layers of the electronic document to manufacture, named here functional substrate.

Such a step of assembling can comprise a lamination step for example, for example hot lamination.

30 Thus, a method for manufacturing an electronic document comprising a prelam as described above comprises, for example, a step of assembling the

prelam and at least one functional substrate, and for example a step of laminating the prelam and the functional substrate together.

For example, the step of laminating the prelam and the functional substrate together is carried out at a temperature greater than 120 °C, for example
5 comprised between 120 °C and 140 °C.

According to one example embodiment, such a lamination step uses lamination plates with no relief on their surface.

This helps providing a flat back face of the electronic document.

For example, the prelam is manufactured further to at least some steps
10 of a method for manufacturing a prelam as described above.

For example, such an electronic document is a card, for example a bankcard.

The inventor feared that the thickness difference between the top area and the bottom area of the prelam could present a risk when laminating the
15 prelam with a functional substrate because of flashes and/or visibility of the intersection gap between the top area and the bottom area of the prelam, but first trials have shown that it is not the case.

The functional substrate comprises, for example, polycarbonate layers, and/or layers comprising electronic components.

20 According to one example embodiment, the method for manufacturing an electronic document comprises a step of punching the electronic document, for example to mark data.

According to one example embodiment, the method for manufacturing an electronic document comprises a step of finalizing the electronic document.

25 For example, the step of finalizing the electronic document comprises a step of adding a hologram and/or a signature panel, and/or hot stamping.

For example, the step of finalizing the electronic document comprises a step of milling a cavity in at least a part of the functional substrate and/or a step of embedding a chip in the cavity.

30 For example, the step of finalizing the electronic document comprises a step of personalization of the chip, for example a first step of configuring software in the chip.

According to one example embodiment, the method for manufacturing an electronic document comprises a step of personalizing the electronic document.

For example, the step of personalizing the electronic document
5 comprises one of drop on demand, thermal printing, embossing personalization and/or durable graphic, or one or more other features, or any combination thereof.

According to another aspect, the invention also provides a prelam comprising a face, named back face, wherein the back face comprises two areas, a top area of the two areas that comprises a first pattern, and a bottom area of
10 the two areas that comprises a second pattern, the second pattern being different from the first pattern, and the prelam comprising a magnetic strip hidden in the top area.

The invention is therefore meant for documents, in particular cards, such as bank cards, that are clearly split in two areas on their back face.

15 The top area is dedicated to hiding the magnetic strip, for example with at least one concealing layer.

The bottom area is an area free of concealing layer, compliant with most types of personalization features.

Furthermore, the pattern of the top area is usually quite different from
20 the pattern of the bottom area.

This helps the user of the future electronic document to intuitively know where the magnetic strip is located and to position the electronic document correctly when needed.

For example, the back face comprises two opposite edges, referred to
25 as top edge and bottom edge.

As above, a height of the back face is defined between the top edge and the bottom edge.

For example, in an embodiment in which the back face is rectangular, the top edge is parallel to the bottom edge.

30 For example, the top area extends from the top edge of the prelam.

For example, the top area extends over less than 60 %, preferably less than one-half, of the height of the back face, toward the bottom edge.

For example, the bottom area extends from the top area to the bottom edge.

The top area and the bottom area then define one intermediate edge between them.

5 For example, in an embodiment in which the back face is rectangular, the intermediate edge between the top area and the bottom area is parallel to both the top edge and the bottom edge.

For example, the prelam comprises a substrate having a surface comprising two zones, a bottom zone of the two zones, and a top zone of the two
10 zones.

The top zone and the bottom zone define a demarcation line between them.

For example, the substrate of the prelam comprises the second pattern.

15 For example, the top zone of the substrate comprises a colored zone, for example of a dark or black color, which can be different from a color of the bottom zone.

According to one example embodiment, the colored zone has a height greater than a height of the magnetic strip; each of these heights being a
20 dimension taken along the height of the surface.

According to one example embodiment, the colored zone extends from the top edge of the substrate.

For example, the colored zone comprises a color chosen such that a contrast DeltaE between said color and a color of the magnetic strip is equal to
25 or less than 20, for example equal to or less than 15, or for example equal to or less than 10.

The contrast DeltaE is advantageously here the measure of color deviation defined by the CIE. A method is for example described in the CIE standard of 1976: ISO 11664. Thus, for example, DeltaE, dE or else ΔE , is
30 defined as a Euclidean distance measurement between two colors considered in a color space. The formula established in 1976 by CIE is for example:

$$\Delta E^* = \sqrt{(L_2^* - L_1^*)^2 + (a_2^* - a_1^*)^2 + (b_2^* - b_1^*)^2}$$

Where:

- L_1^* , a_1^* and b_1^* are the coordinates in the CIE color space L a b of the first color to be considered, and

- L_2^* , a_2^* and b_2^* those of the second.

- 5 However, other formulas are used to calculate the DeltaE (CIE 1976, CIE 1994, CIE 2000, CMC).

The wavelengths of the visible domain here denote wavelengths between about 380 nm and 780 nm.

- For example, for black color and a traditional black magnetic strip,
10 DeltaE is nearly equal to 1.

According to an example embodiment, the substrate is made of PVC (polyvinyl chloride), PET (polyethylene terephthalate), foil, or others.

For example, the magnetic strip is positioned to the top zone of the substrate, and for example on the colored zone.

- 15 For example, the magnetic strip is a boosted magnetic strip.

For example, the prelam comprises an overlay which comprises the magnetic strip.

For example, the overlay is made of PVC (polyvinyl chloride).

For example, the overlay covers the entire surface of the substrate.

- 20 For example, the prelam comprises at least one concealing layer to hide the magnetic strip.

For example, the magnetic strip is comprised between the substrate and the at least one concealing layer.

- For example, the at least one concealing layer extends from the top
25 edge of the prelam.

For example, the at least one concealing layer comprises at least one silkscreen layer.

For example, the at least one silkscreen layer comprises a silver silkscreen layer.

- 30 For example, the at least one silkscreen layer comprises a white silkscreen layer.

The silver silkscreen layer is for example between the overlay and the white silkscreen layer, if these layers are present.

For example, the at least one concealing layer comprises at least one offset layer.

5 For example, the at least one silkscreen layer is comprised between the overlay and the at least one offset layer.

For example, the at least one concealing layer covers at least the top zone of the substrate, over the magnetic strip, for example at least the colored zone.

10 For example, the at least one concealing layer extends over the demarcation line between the top zone and the bottom zone of the substrate.

For example, the at least one concealing layer covers at maximum part of the bottom zone, so that the bottom zone is mainly free of the at least one concealing layer.

15 For example, the offset layer covers at least the top zone of the substrate.

For example, when the at least one concealing layer comprises at least two layers, at least an outermost layer of the at least two layers can extend from the top edge of the substrate.

20 In the above-mentioned example, the outermost layer is the offset layer.

For example, the outermost layer of the at least two layers of the at least one concealing layer extends from the top edge of the substrate.

25 For example, the offset layer extends from the top edge of the substrate.

Any layer under the outermost layer of the at least two layers can extend over at least the magnetic strip, but does not need to extend from the top edge.

30 However, each layer of the at least one concealing layer can extend from the top edge in order to provide better thickness homogeneity.

For example, the offset layer extends over the demarcation line between the top zone and the bottom zone of the substrate, and for example over an edge of the at least one silkscreen layer.

For example, the offset layer comprises the first pattern of the top area
5 of the prelam.

For example, the prelam comprises a varnish layer.

For example, the varnish layer covers at least the top area of the prelam.

For example, the varnish layer forms an outermost surface layer of the
10 prelam, and so later of the electronic document. For example, it forms at least part of the back face of the electronic document.

For example, the varnish layer is a transparent layer.

For example, the varnish layer extends from the top edge of the substrate.

For example, the varnish layer extends over the intermediate edge
15 between the top area and the bottom area of the prelam.

According to one example embodiment, the varnish layer covers at maximum part of the bottom area, so that at least a part of the bottom area is free of at least the varnish layer.

This leads to a small thickness difference between the top area and
20 the bottom area of the prelam, but then the bottom area is totally free of any overprinted layers (without taking the overlay into account).

The concealing layers (including all silkscreen layers (silver and/or white for example) and offset layer) and the varnish layer are chosen to be as
25 thin as possible in order to impact as little as possible the magnetic strip output.

For example, the total layer thickness (including overlay with magnetic strip, concealing layers, offset layer and varnish layer) is less than or equal to 30 μm , for example comprised between 5 μm and 30 μm , in particular between 5 μm and 25 μm .

Applying varnish over the top area only permits the overlay to be kept
30 free of any additional layer in the bottom area of the prelam.

According to another example embodiment, the varnish layer covers the entire surface of the substrate (i.e. covers both the bottom area and top area of the prelam).

5 The invention also provides an electronic document comprising a prelam as described above.

According to one example embodiment, the electronic document comprises other constitutive layers under the substrate of the prelam, said other constitutive layers being here named as functional substrate.

10 The functional substrate comprises, for example, polycarbonate layers, and/or layers comprising electronic components, and/or PVC or PET layers for example.

For example, a functional substrate of PVC or PET layers leads to manufacture a card, like a bankcard.

15 Although there can be a difference of thickness between a top part of the document comprising the top area of the prelam, and the bottom part of the document comprising the bottom area of the prelam, such thickness is so small that it cannot be felt by a user's finger.

20 Surprisingly, the final electronic document possesses good visual quality. The difference of structure between the top part and the bottom part is not visually detectable either.

Thanks to these features, the bottom area of this prelam remains compatible with most of the traditional printing options used so far (there is no constraint about hiding the magnetic strip in this area) and compatible with traditional personalization technologies (embossing, laserisation, etc).

25

Brief description of the drawings

Other particularities and advantages of the invention will also emerge from the following description, in reference to the accompanying drawings, given by way of non-limiting examples, and which are not drawn to scale, in which:

- 30
- Figure 1 shows a blank substrate;
 - Figure 2 shows the substrate of Figure 1 comprising two zones, the top zone being darkened;

- Figure 3 shows the substrate of Figure 2 in which the bottom zone has been decorated with a pattern;
- Figure 4 illustrates steps of manufacturing a prelam according to one example embodiment of the invention;
- 5 - Figure 5 shows a top view of the document obtained further to the embodiment of Figure 4;
- Figure 6 is a highly simplified cross sectional diagram of the document of Figure 5;
- Figure 7 is a highly simplified cross sectional diagram of another
10 example embodiment of a document according to the invention; and
- Figure 8 illustrates a process flow of a method for manufacturing an electronic document according to an example embodiment of the invention.

Description of the invention

15 Figures 1 to 5 illustrate method steps in order to manufacture a prelam
20 for forming an electronic document 30 according to one example embodiment of the invention. Those steps are also illustrated in Figure 8.

In the illustrated drawings, the electronic document to be manufactured is a card, like for example a bankcard, like a credit card.

20 To form the prelam 20, Figure 1 illustrates a step of providing a substrate 10, which is initially blank here.

For example, such a blank substrate 10 is made for example of PVC (polyvinyl chloride), PET (polyethylene terephthalate), foil, or others.

25 The substrate often is initially white, and/or it can be tinted, at least on surface 13.

As the electronic document is to be of a card type, the substrate 10 here as a rectangular shape.

At this stage, the substrate can be part of a larger foil in which substrates, or even a prelam thus obtained, are cut at a later stage.

30 For example, all steps corresponding to Figures 1 to 5 can be performed for a 48-cards plastic plate/foil.

Here, the substrate 10 comprises a top edge 11, and a bottom edge 12, which is opposite and parallel to the top edge 11.

The substrate also comprises the surface 13 which extends from the top edge to the bottom edge.

5 As illustrated in Figure 2, according to one option, the surface 13 is shared in two zone 14, 15: a top zone 14 and a bottom zone 15.

The two zones 14, 15 define between them a demarcation line 16, so that the demarcation line 16 is parallel to both the top edge 11 and the bottom edge 12.

10 Figure 2 also illustrates a step of coloring, for example here darkening, the top zone 14, in order to favor a better invisibility of the magnetic strip.

It permits to reduce a color gap (contrast ΔE) between the magnetic strip (which is usually black and the substrate color below (which is often naturally white, or of light color) and facilitate concealing of the magnetic strip during following steps.

For example, the top zone can be painted in dark grey or even in black, and printed by offset technology.

Such coloring helps hiding a magnetic strip which is positioned at a later stage of the process.

20 Then, Figure 3 illustrates an optional step of decorating the bottom zone 15, here with a pattern, referred to as second pattern.

In Figure 3, the second pattern comprises wavelets, but of course it can comprise any pattern, like for example a logo, or even data, and/or with a colored printed image/pattern.

25 For example, patterns are applied by offset technology.

However, such a step of decorating the bottom zone 15 can take place at a later stage and/or the bottom zone 15 can remain blank.

Figure 4 then illustrates a step of forming the prelam 20 according to one embodiment of the invention, also represented in Figure 8.

30 As diagrammatically illustrated in Figure 4, the step of forming the prelam 20 comprises:

- A step of providing the substrate 10, which here has the surface 13 comprising two zones, the bottom zone 15 and the top zone 14;
- A step of providing an overlay 21 comprising a magnetic strip 22;
- A step E21 of applying the overlay 21 over the substrate 10, the magnetic strip 22 being positioned on the top zone 14.

According to a specific embodiment, the step of forming the prelam 20 comprises a step E22 of laminating the substrate 10 with the overlay 21.

For example, the step E22 of laminating is performed at low temperature, for example at a temperature comprised between 90 °C and 120 °C, in order to limit material deformation (shrinkage, warping, etc.) that would make the prelam hard to process during further manufacturing steps.

Then, the step of forming the prelam 20 comprises a step E3 of applying at least one concealing layer to conceal the magnetic layer.

For example, the step E3 of applying at least one concealing layer comprises:

- A step E31 of applying a first silkscreen layer 23 as a concealing layer to hide the magnetic strip, which is for example a silver layer; and
- A step E32 of applying a second silkscreen layer 24 as a concealing layer to hide the magnetic strip, which is for example a white layer.

However, said second silkscreen layer 24 is optional and can be omitted depending on a desired application.

Here, the first silkscreen layer 23 is applied on the overlay 21 over at least the top zone 14 and covering at least the magnetic strip 22, and, the case being, the second silkscreen layer 24 is applied on at least the first silkscreen layer 23.

For example, silver and/or white ink of the silkscreen layers 23, 24 are applied by silkscreen to hide the magnetic strip.

Then, the step E3 of applying at least one concealing layer comprises a step of applying a colored ink to obtain a dedicated image on the top area of the document, over the magnetic strip. Such forms an offset layer 25.

In the illustrated embodiment, the step E3 of applying at least one concealing layer therefore comprises a step E33 of printing the offset layer 25.

The offset layer 25 covers at least the top zone 14, and in particular here it covers at least the silkscreen layers, here the white silkscreen layer 24.

In the illustrated embodiment, the step of forming the prelam 20 also comprises a step E331, E332 of applying a varnish layer 26.

5 The varnish layer 26 covers at least the top zone 14 and more specifically at least the offset layer 25.

The varnish layer 26 is here transparent.

In addition, the varnish layer 26 here forms an outermost surface layer of the prelam 20, and is configured to form an outermost surface layer of the
10 document.

According to one aspect of the invention, each layer is applied on the previous layer to cover the previous layer, and preferably go over an edge of the previous layer.

In other words, each layer covers at least a part of the surface 13 of
15 the substrate 10.

Here, each layer extends on a part of the surface 13, in particular starting from the top edge 11 of the substrate, and extending a little further than a under layer, toward the bottom edge 12.

For example, the varnish layer 26 goes over the demarcation line 16
20 between the top zone 14 and the bottom zone 15, or even over an edge 27 of the offset layer 25, which forms an intermediate edge 27 between a top area 28 and a bottom area 29 of the prelam.

Such a stack of layers 23, 24, 25, 26 leads to a little thickness difference between the top area 28 and the bottom area 29 of the prelam
25 (represented Figure 5), but then the bottom area 29 is free of any overprinted layers (except the overlay).

For example, a minimal dimension from the top edge 11 to the intermediate edge 27 of the top area is a bottom limit of the magnetic strip, with an additional 0.1 mm, and a maximal dimension can be defined in order to not
30 overlap personalization region, for example 19 mm for a card like a standard bankcard, the dimensions of which usually are 86 mm x 54 mm x 0.76 mm (width, height, thickness).

For example, lengths of the various layers are as follows:

- First (silver) silkscreen layer 23: same length as top zone 14 from top edge 11, plus [0.1;1] mm;
- Second (white) silkscreen layer 24: same length as first (silver) silkscreen layer 23 from top edge 11, plus [0.1;1] mm;
- Offset layer 25: same length as second (white) silkscreen layer 24 from top edge 11, plus [0.1;1] mm;
- Varnish layer 26: same length as offset layer 25 from top edge 11, plus [0.5;2] mm;

However, the varnish layer can be applied over the entire surface of the substrate, as illustrated in Figure 7 described below.

This enables slightly reducing a thickness difference between the top area 28 and the bottom area 29 of the prelam 20.

Figure 5 illustrate the prelam 20 thus obtained.

The prelam therefore comprises a back face, which is here the illustrated face.

The back face comprises two opposite edges, referred to as top edge and bottom edge, which correspond to top edge 11 and bottom edge 12 of the substrate.

As above, a height of the back face is defined between the top edge and the bottom edge.

As the back face is rectangular, the top edge is parallel to the bottom edge.

The back face here comprises two areas: the top area 28, and the bottom area 29.

The top area 28 and the bottom area 29 then define one intermediate edge 27 between them, and as the back face is rectangular, the intermediate edge 27 between the top area and the bottom area is parallel to both the top edge and the bottom edge.

Besides, the top area 28 here comprises a first pattern, which is here the pattern of the offset layer 25, and the bottom area 29 comprises a second pattern (here the pattern of the bottom zone 15 of the substrate).

Here, the second pattern is therefore different from the first pattern.

The prelam thus shows a back face that is clearly split in two areas 28, 29.

The top area 28 is dedicated to hide the magnetic strip 22, whereas
5 the bottom area 29 is an area free of any concealing layer, compliant with most types of personalization features.

Furthermore, the pattern of the top area being quite different from the pattern of the bottom area helps the user to intuitively know where the magnetic strip is located and to position an electronic document comprising the prelam
10 correctly when needed.

Figure 6 diagrammatically shows a cross section of an electronic document 30 comprising a functional substrate 31 and the prelam 20 as described above, according to line A-A of Figure 5. Such an electronic document is for example a card.

15 This Figure 6 shows the stack of layers of the prelam 20 comprising, successively, the substrate 10, the overlay 21 comprising the magnetic strip 22 disposed over the top zone 14 of the substrate, the first (silver) silkscreen layer 23, the second (white) silkscreen layer 24, the offset layer 25, and the varnish layer 26.

20 It also shows that each layer extends over an edge of the previous layer, while the varnish layer covers the top area 28, so that the bottom area 29 is free of any concealing layer, and even of the varnish layer.

Figure 7 shows another embodiment, which only differs from the embodiment of Figure 6 in that the varnish layer 26 is applied over the entire
25 surface of the substrate.

This can reduce the thickness difference, and also protect the second pattern of the bottom area.

In any case, the electronic document can further comprise a cavity, formed in the functional substrate, in which a module with a chip is inserted,
30 and/or electronic components which can be embedded in the functional substrate.

Figure 8 diagrammatically shows an example embodiment of a method for manufacturing an electronic document 30 comprising a prelam 20 as described above.

In the illustrated example, the method comprises a step E1
5 representing pre-requirements for providing the substrate 10 and the overlay 21.

The step E1 here comprises a step E11 of offset printing the surface 13 for forming top zone 14 and bottom zone 15 of the substrate.

In parallel, the step E1 comprises here a step of applying the magnetic strip in the overlay.

10 Then, the method can comprise a step E2 comprising the step E21 of applying the overlay 21 over the substrate 10, the magnetic strip 22 being positioned on the top zone 14.

According to the illustrated embodiment, the step E2 further comprises the step E22 of laminating the substrate 10 with the overlay 21, at low
15 temperature.

For example, the step E22 of laminating is performed at low temperature, for example at a temperature comprised between 90 °C and 120 °C, in order to limit material deformation (shrinkage, warping, etc.) that would make the prelam hard to process during further manufacturing steps.

20 Then, the method comprises the step E3 of applying at least one concealing layer to conceal the magnetic layer.

Here, the step E3 of applying at least one concealing layer comprises:

- step E31 of applying a first silkscreen layer 23 as a concealing layer to hide the magnetic strip, which is for example a silver layer;
- 25 – step E32 of applying a second silkscreen layer 24 as a concealing layer to hide the magnetic strip, which is for example a white layer; and
- step E33 of printing the offset layer 25.

There is so provided a prelam 20 which shows two areas on one face: top area 28 formed by the at least one concealing layer, and in particular here
30 the offset layer 25, and bottom area 29 which is free of concealing layer.

In the illustrated embodiment, the method also comprises the steps E331, E332 of applying a varnish layer 26, either to part (for example at least top area) or to the entire of the surface of the prelam.

The method further comprises step E4 of forming the document 30.

5 The step E4 comprises for example a step E41 of assembling the prelam 20 with the functional substrate 31 (for example a layer of antenna, a front face of the electronic document, etc), and then a step E42 of laminating the prelam 20 and the functional substrate 31, which is for example a hot lamination step, for example at a temperature greater than 120°C, for example comprised
10 between 120°C and 140°C.

For example, such a lamination step uses lamination plates with no relief on their surface. This helps providing a flat back face of the electronic document.

 According to the illustrated example embodiment, the method also
15 comprises a step E43 of punching the electronic document, for example to mark data.

The method also comprises here a step E5 of finalizing the electronic document 30.

 For example, the step E5 of finalizing the electronic document 30
20 comprises a step E51 of adding an hologram and/or a signature panel, and/or hot stamping.

 For example, the step E5 of finalizing the electronic document 30 comprises a step E52 of milling a cavity in at least a part of the functional substrate and/or of embedding a chip in the cavity.

25 For example, the step E5 of finalizing the electronic document 30 comprises a step E53 of personalization of the chip, for example a first step of configuring a software in the chip.

 According to the illustrated example embodiment, the method further comprises a step E6 of personalizing the electronic document 30.

30 For example, the step E6 of personalizing the electronic document comprises a step E61 of drop on demand, thermal printing, embossing personalization and/or durable graphic, or other, or any combination thereof.

What is claimed is:

- 5 1. A method for manufacturing a prelam for an electronic document, the method comprising steps of:
- ~ Providing a substrate having a top edge and a bottom edge, and a surface extending from the top edge to the bottom edge;
 - ~ Providing an overlay comprising a magnetic strip;
 - 10 ~ Applying the overlay to the surface of the substrate;
 - ~ Laminating the substrate with the overlay;
 - ~ Applying at least one concealing layer over the entire magnetic strip to hide the magnetic strip, a border of the at least one concealing layer forming an intermediate edge, the intermediate edge being situated between the magnetic strip and the bottom edge of the substrate, thus forming the prelam comprising two areas on one face, a top area of the two areas having the at least one concealing layer and the magnetic strip under the at least one concealing layer, and a bottom area of the two areas without the at least one concealing layer.
- 15 2. The method according to claim 1, wherein it comprises a step of forming a colored zone on a part of the surface of the substrate, the magnetic strip being then entirely positioned on the colored zone, and the colored zone being then entirely covered by the at least one concealing layer.
- 20 3. The method according to anyone of claims 1 or 2, wherein the overlay is applied over the entire surface of the substrate so that it covers the whole surface of the substrate.
- 25 4. The method according to anyone of claims 1 to 3, wherein the step of laminating the substrate with the overlay is performed at a temperature comprised between 90°C and 120°C.
- 30

5. The method according to anyone of claims 1 to 4, wherein the step of applying at least one concealing layer comprises a step of applying the at least one concealing layer from the top edge of the substrate.
6. The method according to anyone of claims 1 to 5, wherein the step of applying at least one concealing layer to hide the magnetic strip comprises a step of applying at least one silkscreen layer over the magnetic strip.
7. The method according to anyone of claims 1 to 6, wherein the step of applying at least one concealing layer to hide the magnetic strip comprises a step of applying at least one offset layer over the magnetic strip.
8. The method according to claims 6 and 7, wherein the step of applying at least one concealing layer to hide the magnetic strip comprises a step of applying the at least one offset layer over the at least one silkscreen layer.
9. The method according to anyone of claims 1 to 8, wherein the method comprises a step of applying a varnish layer to at least the top area of the prelam, the varnish layer extending from the top edge of the substrate until over the intermediate edge between the top area and the bottom area.
10. A method for manufacturing an electronic document comprising a prelam, the method comprising steps of a method for manufacturing a prelam according to anyone of claims 1 to 9, and a step of assembling the prelam with at least one functional substrate.
11. The method according to claim 10, wherein the step of assembling the prelam with at least one functional substrate comprises a step of laminating the prelam and the functional substrate together which is carried out at a temperature greater than 120°C.
12. A prelam comprising a face, named back face, wherein the back face comprises two areas, a top area of the two areas that comprises a first pattern, and a bottom area of the two areas that comprises a second pattern, the

second pattern being different from the first pattern, and the prelam comprising a magnetic strip hidden in the top area.

13. The prelam according to claim 12, wherein the prelam comprises an overlay which comprises the magnetic strip.

5 14. The prelam according to claim 12 or 13, wherein the prelam comprises a substrate having a surface comprising two zones, a bottom zones of the two zones, and a top zone of the two zones; the top zone of the substrate comprising a colored zone, wherein the magnetic strip is positioned on the colored zone of the substrate, the colored zone comprising a color chosen
10 such that a contrast ΔE between said color and a color of the magnetic strip is equal to or less than 20.

15. The prelam according to anyone of claims 12 to 14, wherein the prelam comprises at least one concealing layer to hide the magnetic strip, the at least one concealing layer comprising at least one offset layer, the offset layer
15 comprising the first pattern of the top area.

16. The prelam according to anyone of claims 12 to 15, wherein the at least one concealing layer comprises at least one silkscreen layer.

17. The prelam according to anyone of claims 12 to 16, wherein the prelam comprises a varnish layer, the varnish layer covering at least the top area of
20 the prelam.

18. The prelam according to anyone of claims 12 to 17, wherein the top area extends from a top edge of the prelam.

19. An electronic document comprising a prelam according to anyone of claims 12 to 17, and a functional substrate under the substrate of the prelam.