

**An identity card having a magnetic track covered by color
and a method for producing it**

The present invention relates to a method for producing an identity card having at least one opaque card layer and at least one magnetic track applied to one side of the card with a carrier band and covered by one or more layers, and a printed pattern applied to the card surface, and to an identity card produced by this method.

Identity cards (referred to as "ID cards" in the following) are widely used today as identity cards, check cards or customer cards. For automatic processing these cards are provided with magnetic stripes on which personal, card-related and/or possibly other information is recorded, which may be updated constantly. The magnetic track is provided for instance by so-called laminating band or transfer band techniques, the laminating band technique involving the magnetic track being prefabricated on a carrier band in the shape of stripes and this band being embedded in a subsequent step in the card cover film together with the magnetic coating. In the transfer method the materials and series of layers are selected in such a way that the carrier band can be removed from the card cover layer after the magnetic layer has been transferred thereto.

The magnetic track itself is generally brown or black, which drastically restricts the possibilities for designing the printed pattern on the card. There have therefore been many attempts to integrate the magnetic track better into the card design by taking additional measures.

To solve this problem EP-A 0 071 850 proposes integrating a magnetic track into the card design by means of its shape. It proposes for example providing the magnetic track in the form of an "insular" but longish stripe. Although the magnetic track, which is preferably covered by a non-magnetic metal layer and/or a layer of color, can still be recognized as a magnetic track this "insular" stripe no longer divides the printed pattern of the card so strictly into two completely separate zones. The card design encloses the area of the magnetic track in this case, so that it is less disturbed by the track. This specially cut magnetic track stripe is applied to the card together with one or more layers of color by known transfer band techniques. In one embodiment this known transfer band carrier bears a layer of color and a magnetic layer thereabove. The magnetic track is given the desired appearance in this method by punching the transfer layers on the carrier band using appropriately formed tools. The layer material surrounding the stripe is then removed and the cut-out series of layers applied with the aid of the carrier band to the layer forming a transparent cover film of the card. After the carrier band has been removed the "insular" magnetic track overprinted with color is pressed into the film. The magnetic stripe provided in this way thus also adds its color to a printed pattern applied to a deeper core layer of the card. So that the magnetic track covered by color can be optimally adapted to the particular design desired, both the shape of the magnetic stripe and the color provided thereabove must be selected accordingly for each series of cards; i.e. a matching transfer band must be produced for each series of cards.

Furthermore, each change in the series of cards during card production requires the transfer band to be replaced

and the sheet run-on synchronized with the transport devices for feeding the transfer band, in order for the specially designed layers already punched on the transfer band carrier to be applied to the cards or sheets in the correct positions, i.e. in exact register.

Since separate transfer bands must be prepared for each series of cards in the method disclosed in EP-A 0 071 850, the adjustment of the transfer bands is additionally complicated by the phase relation to be maintained between the band and the card in each case, and this adjustment must be performed anew before the production of each card series, small-lot production is much more expensive by the known method and mass production is difficult due to the amount of effort involved.

The same applies to the method described in US-A 4,132,350 for producing a magnetic card bearing a color print in the area of the magnetic stripe. In this case a carrier substrate is provided in a first method step with a transparent cover layer, a printed pattern, an uninterrupted layer of color and a magnetic layer in fixed order. In a second method step this carrier band is placed on the cover layer of the card such that the magnetic layer comes to lie on the inside, in direct contact with the cover layer of the card. After subsequent lamination the carrier band is removed while the other layers adhere to the cover layer of the card.

In this method separate transfer bands must be prepared for each series of cards. Furthermore the known method does not permit the cover layer of the card to be printed uniformly beyond the area provided with magnetic material since

the print and the magnetic layer are transferred with the same transfer band.

The invention is therefore based on the problem of rationalizing the method for producing an ID card having a magnetic track covered by color so as to allow for inexpensive production of both small and large lots while making use of conventional production processes if possible.

This problem is solved according to claim 1.

The inventive solution makes it possible to detach laminating band or transfer band production from card production even when producing cards having colored magnetic tracks, and also to produce a completely user-neutral semi-finished product by applying the magnetic track masked in white directly to a white colored card layer or to a transparent layer to be underlaid with a white colored layer. The present invention thus permits production of white ID cards both sides of which are completely neutral.

This uniformly designed semifinished product can then be provided on one or both sides with the particular printed pattern desired as one chooses, the design being selected without any separate consideration of the magnetic stripe area.

Furthermore the uniform white design of the semifinished product involves the advantage that even if thin printed layers or light, possibly transparent, inks are used for the printed pattern they are not falsified by the neutral background in the magnetic track area. The colors for the printed pattern on the back can thus be selected without any problem from standard color charts in accordance with

the desired coloring. There are no special restrictions of the colors. Since the colors of the printed pattern are influenced by the white masking layer and the white card layer in the same way the card is no longer divided into several zones by coloring in the magnetic stripe area that deviates from its surroundings.

A further particularly advantageous consequence of the inventive solution is that the same type of laminating band or transfer band can be used for all card series. Thus the band can be produced and purchased in large numbers and thus inexpensively. At the same time this drastically reduces the number of types of laminating bands or transfer bands to be kept available.

During the production process itself a change in the card design requires neither that the laminating or transfer bands be replaced nor any other manual intervention in the band means. The rejects usually produced with every card series due to such replacement and intermediate adjustment are not produced, which makes particularly small-lot production more economical.

The white masking layer in the magnetic track area can also be exploited in designing the printed pattern. In one advantageous embodiment the printed pattern is applied by negative screen process printing, the left-out or free areas being shaped as letters for example and representing any desired information. These areas are preferably covered by transparent lacquer in positive printing in order to protect the preferably very thin white masking layer from abrasion. The negative screen process printing may optionally be performed with several colors, preferably leaving a small unprinted gap between all color zones, at least in the area of

the magnetic track. These gaps avoid the formation of "steps," which arise when printed layers overlap and may disturb the magnetic recording. Furthermore the white edges between the color zones due to these gaps provide further possibilities for varying the design of the printed pattern. The thickness of this layer of color or transparent lacquer is approximately constant in the entire magnetic stripe area. When the magnetic information is being scanned the magnetic head is thus always the same distance away from the magnetic layer all along the track and always provides signals of the same quality all along the track.

Further advantages and advantageous developments are the object of the subclaims and the description with reference to the figures, in which

Fig. 1 shows a laminating band with a magnetic track masked by color,

Fig. 2 shows a cross-sectional view of the card cover layer with a magnetic track embedded therein,

Fig. 3 shows this card cover layer from the top,

Fig. 4 shows the card cover layer after the printing process,

Fig. 5 shows an inventively produced ID card,

Figs, 6 and 7 show possible embodiments of ID cards,

Fig. 8 shows a transfer band with a magnetic track masked by color,

Fig. 9 shows an ID card having a magnetic track applied by the transfer method,

Figs. 10 to 14 show further embodiments of inventive ID cards.

Fig. 1 shows a laminating band for transferring a magnetic track to the card. Transfer techniques using carrier bands have generally proved to be particularly economical for various reasons since the magnetic track can be produced independently of the card on separate specialized production equipment. This ensures constant layer quality to a high degree. In particular, larger surfaces can be coated, such as a wide carrier band which can then be cut into bands of any desired width, as is customary in the production of magnetic tapes for audio and video technology.

As can be seen in Fig. 1, a laminating band 10 is produced for example by applying a series of layers consisting of a magnetic layer 4 and a masking layer 3 successively and in superposition to a carrier band 1 made of synthetic material such as polyester. Magnetic layer 4 is applied to the carrier band in the known manner, and a white layer of color serving as a masking layer preferably applied to the dried magnetic layer by intaglio printing. This makes it possible to achieve layer thicknesses of less than 10 μm in good printing quality. For this masking layer white inks are selected which have high covering power even with a layer thickness of only a few μm , so that the dark color of magnetic layer 4 is completely masked by white layer of color 3 and the distance between the magnetic head and the magnetic track is as small as possible. Thus the magnetic track is writable and readable to a sufficient degree even in the case of high recording density. If suitable colors are not

very resistant to abrasion due to their high proportion of pigment and a resulting low proportion of medium, they may be protected from abrasion by the color or transparent lacquer printed on the masking layer during card production.

Laminating band 10 is then rolled hot onto card cover layer 6 during ID card production (Fig. 2), carrier band 1 being bonded to the card cover layer. The carrier band thus remains under the magnetic track, which is masked by white for the observer, on card cover layer 6. In order to permit a good adhesive effect between carrier band 1 and card cover layer 6 the carrier band may be provided with an additional adhesive layer 5 (melt adhesive). Card cover layer 6 itself may be colored white or be transparent, whereby in the latter case the transparent layer is applied at a later time to a further card layer which is colored white and may be provided first with a printed pattern. Card cover layer 6 is made for example of a thermoplastic synthetic layer of PVC in which the white masked magnetic layer can be embedded under the action of heat and pressure in such a way that the white masking layer and card cover layer 6 form a smooth surface.

The cards are usually produced in a sheet with a plurality of individual copies, this card cover layer 6 existing either as a sheet or as an endless roll out of which the multi-copy sheets are then cut.

Fig. 3 shows the semifinished product made by the inventive method, comprising unprinted card cover layer 6 (already in the form of the later ID card for the sake of clarity) with magnetic track 4 masked by white. The position of masking layer 3 is indicated by the two broken lines.

Both the laminating band provided with white masking layer 3 and sheets 6 provided with magnetic stripes are completely neutral so that the semifinished product shown in Figs. 2 and 3 can be used for a great variety of ID cards and a great variety of users.

An advantage of the invention is thus that in the transfer process one and the same transfer band and one and the same sheet material can be used for many different ID card series. Since no readjustment of the transfer band feed is necessary when the card design changes, the usual rejects are no longer produced.

This user-neutral semifinished product can then be provided in the next step with printed layer 7 (Figs. 4 and 5). This is preferably done in precisely the same way as the magnetic track is transferred to the endless sheet or individual sheets. Due to the neutral background, printed layer 7 can extend across the entire surface of the card independently of the magnetic track.

Figs. 4 and 5 show possible embodiments for the printed pattern with areas of color 8 and 11 and transparent lacquer covering 9. Since white masking layer 3 is only printed together with card cover layer 6 after being applied thereto, the printed pattern can be applied without any consideration of the exact ultimate position of the magnetic band. If positioning errors are made when the laminating band is applied they do not lead to any disturbing displacements in the printed pattern. The printed pattern is thus always executed precisely.

After the printing process sheet 6 is laminated with any sheets forming the other card layers, and the cards punched out.

Fig. 5 shows the finished card comprising printed card cover layer 6 and a further card layer 15. The printed pattern can extend over the entire card area and is not limited to the area of the magnetic track or the other card areas. The printed pattern may be applied by various printing techniques, for example screen process printing. It has a transparent lacquer covering 9 at least in the area of the magnetic track on the areas not covered by areas of color 8 and 11.

Fig. 6 shows the cross section VI-VI of the card shown in Fig. 5 with card layers 6 and 15. On card cover layer 6 there is the series of layers comprising adhesive layer 5, carrier band 1, magnetic layer 4 and masking layer 3 as well as printed layer 7, applied by means of the laminating band of Fig. 1.

Printed layer 7 comprises area of color 8, transparent lacquer covering 9 and area of color 11. The quality of the magnetic signal scanning is improved by printing the transparent lacquer and the ink, or various inks, in the same thickness and not on top of each other in the area of the magnetic layer. This makes it possible for the scanning head always to be the same distance away from the magnetic track when reading and writing on it, and for the magnetic signals to be damped by a constant factor all along the magnetic track. As shown in Fig. 6 the various areas of color 8, 11 may be designed so as to have a small gap 12 therebetween. These gaps are so narrow that they do not impair the run of the magnetic head during scanning and the white masking

layer need not be protected by a transparent lacquer covering here either. Furthermore this gap 12 causes area of color 11 to be surrounded by a fine white edge, resulting in further design effects.

Fig. 7 shows cross-sectional view VII-VII of the card shown in Fig. 5. Prior to the printing process the layers applied here with a laminating band (adhesive layer 5, carrier layer 1, magnetic layer 4 and masking layer 3) were pressed into the card cover layer so that there is a smooth surface for the printing process. Printed layer 7 can then be readily applied both to the white masking layer and to parts of the rest of the card cover layer surface.

Card layer 6 may directly be the white colored card layer, for example, or else be a transparent cover layer underlaid with a white synthetic layer.

If the magnetic track is first applied to a transparent synthetic film which is then transferred to a white background surface, this white background surface can be first provided with an additional printed pattern.

Another preferred technique for transferring magnetic tracks is the so-called transfer method. One uses transfer bands provided with a magnetic layer which form an intermediate carrier for the magnetic track. Fig. 8 shows such an inventively used transfer band.

Unlike the laminating band, the transfer band bears the layers to be applied in the reverse order on the carrier band. A separation layer 2, white masking layer 3, magnetic layer 4 and an adhesive layer 5 are applied on top of one other, successively and in the abovementioned order to car-

rier band 14 (made of polyester for example). Since the magnetic layer is applied to the masking layer in a liquid form attention must be paid when selecting the magnetic ink and the masking layer or the thickness that the dark magnetic ink not penetrate into the pores of the masking layer and thus impair the covering effect. This transfer band is rolled hot onto the card cover layer and the carrier band removed so that only the white masking layer and the magnetic layer with the adhesive layer remain on the card layer. Since the transfer band carrier is removed it is recommendable to provide a thin separation layer (consisting for example of paraffin wax) between the transfer band carrier and the white masking layer.

Adhesive layer 5 may optionally be dispensed with if synthetic materials with high affinity, which bond together sufficiently well solely by the action of heat and pressure, are used for the card cover layer and the base material of the magnetic layer.

With this method as well one obtains a user-neutral semifinished product which is only provided with the user-related printed pattern during the final card production.

Fig. 9 shows an ID card produced by this method. As in the above examples, printed pattern 7 may have different areas of color 8 and 11 possibly separated by narrow gaps 12. Here, too, larger film areas in the magnetic track area are preferably covered by a transparent lacquer layer 9.

As already stated above, one must make sure that the distance between the magnetic head and the magnetic track is as small as possible, i.e. that the number or thickness of the masking layers for the magnetic track is kept to a min-

imum. In the above examples excellent writing and reading safety is given at a writing density of 75 bpi (this writing density corresponds to the writing density for track 2 according to ISO Standard 7811/2), and writability and readability are sufficient even at an extremely high writing density of 210 bpi (ISO Standard 7811/2 for tracks 1 and 3).

However writing and reading safety for the areas of the magnetic track to be written on with such high bit densities according to the standard can also be considerably improved by simple measures to be explained in the following.

For example the design print, i.e. the printed layer above the masking layer, may be interrupted in the areas in question. Fig. 10 shows such an embodiment. For the sake of clarity the reading and writing tracks in magnetic layer 4 (according to ISO Standard 7811/2 there are three tracks, page 1, page 2, page 3) are shown separated from each other optically. Magnetic layer 4 is masked by masking layer 3 to which colored printed layer 7 corresponding to the card design is then applied. In area 16, corresponding here to ISO track 3, this design print is interrupted. This visible interruption must of course be taken into account during development of the card design but has a much less disturbing effect due to its smaller area than an interruption in the design print extending over the entire magnetic track area.

Fig. 11 shows the cross-sectional view of such a card after lamination during which the card acquires its smooth surface and the printed layers, magnetic layers, etc., are pressed into the adjacent card layers. In area 16 left free of the design print magnetic layer 4 is separated from the card surface only by masking layer 3 and optionally also a thin layer 19 of transparent lacquer so that during the

magnetic recording/scanning the distance between the magnetic head and the magnetic layer is accordingly reduced. Even small reductions of distance may contribute considerably to further improving writing and reading safety due to the specific magnetic field shape with known magnetic heads.

Printed layer 7 of the design print may, as shown in Fig. 12, cover the entire card surface and only leave out corresponding writing and reading tracks 17 which are actually used in the subsequent card application. The example shown here involves two tracks extending over the entire card length. But the print may also cover only part of the card surface and/or consist of writing, a pattern or the like due to corresponding further free spaces 18 (Fig. 13).

In extreme cases masking layer 3 may also be dispensed with in magnetic layer areas 16 of high writing density (see Fig. 14). However the magnetic layer then appears here with its own black or brown color, thereby restricting the possibilities of design for the card.

The zones free from the design print ensure in any case that no, or no excessive, lacquer layer thicknesses which might lead to impermissible signal dampening are applied to the coding tracks with high writing density. Furthermore there are no jumps in thickness due to imprecise register or lacquer layer interruptions due to design contours which could cause signal distortion. A further advantage results from the possibility of applying a very thin protective layer of transparent lacquer over the entire magnetic track width. Transparent lacquer can be applied much more thinly than colored lacquer. By reducing the solids in the transparent lacquer one obtains a reduction of the wet application thickness and improved absorption properties.



Claims

1. A method for producing an identity card having at least one opaque card layer (6, 15) and at least one magnetic track (4) applied to one side of the card with a carrier band (1) and covered by one or more layers, and a printed pattern applied to the card surface, comprising the steps of:

applying to the carrier band (1) a white masking layer (3) with high covering power and a magnetic layer (4);

transferring the magnetic layer (4) and the masking layer (3) with the aid of said carrier band (1) to a white colored or transparent card cover layer (6) in such a way that the magnetic layer (4) comes to lie between the masking layer (3) and the card cover layer (6);

printing the card cover layer (6) on the first side provided with the magnetic layer in the area of the white masked magnetic layer (4) and optionally also in the other areas;

joining the printed card cover layer (6) on its second side with at least one further card layer (15) in sheet form, this further card layer (15) being transparent if the card cover layer (6) is colored white, or colored white if the card cover layer (6) is transparent;

laminating the joined layers with the other layer or layers;

punching the individual cards out of the layer structure.



2. The method of claim 1, characterized in that the magnetic layer (4) is applied to the carrier band (1) and the white masking layer (3) to the magnetic layer (4), the carrier band is then applied to the card cover layer (6) so as to come to lie between the magnetic layer (4) and the card cover layer (6), and the carrier band (1) is firmly connected to the card cover layer (6).

3. The method of claim 2, characterized in that the carrier band is additionally given an adhesive layer (5) so that a sufficient adhesive effect is obtained between the carrier band (1) and the card cover layer (6).

4. The method of claim 1, characterized in that the white masking layer (3) is applied to the carrier band (1) and the magnetic layer (4) to the white masking layer (3), the carrier band (1) is applied to the card cover layer (6), the magnetic layer (4) facing the card cover layer (6) and the magnetic layer (4) and the white masking layer (3) being fixed to the card cover layer (6) and the carrier band (1) removed from the white masking layer (3).

5. The method of claim 4, characterized in that before the white masking layer (3) is applied a separation layer (2) is applied to the carrier band (1) in order to ensure subsequent detachment of the carrier band (1) from the white masking layer (3).

6. The method of any of claims 1 to 5. characterized in that during printing of the card cover layer (6) provided with the magnetic layer (4) and masking layer (3) the printed pattern (7) bridges the transitional area between the magnetic track (4) and its surroundings (6) ridgelessly and continuously.



7. The method of any of claims 1 to 6, characterized in that the white masking layer (3) is printed with ink and/or transparent lacquer largely all over the surface of the magnetic track area (4).

8. The method of claim 7, characterized in that the inks and/or transparent lacquer are printed in a constant thickness and without overlap at least in the magnetic track area (4).

9. The method of claim 8, characterized in that the inks are applied in such a way as to leave a narrow unprinted gap between various areas of color.

10. The method of at least one of claims 1 to 9, characterized in that some areas of the magnetic layer are left free from print.

11. An identity card produced by the method of claim 10, characterized in that these areas left free from the printed pattern (7) correspond to the track or tracks of the magnetic layer (4) in which data recording is to be performed with a bit density higher than in the other areas.