

Improvement of a process of manufacturing smart cards and the cards thus obtained.

The said invention concerns an improvement of a process of manufacturing smart cards; it comprises a card body and an electronic module, and the cards obtained through the implementation of the process.

Among the existing processes, we know of one process that consists of providing a card body made up of a cavity, an electronic module comprising mainly contact points and a semiconducting chip containing an integrated circuit, and of fixing the electronic module in the aforementioned cavity by means of glue such as a cyanocrylate glue. In general, the gluing operation includes a prior operation of applying the glue, an operation of inserting the module in the cavity and an operation of pressing it for a predetermined time.

However, the practical implementation of such a process, generally called inserting, on an automatic industrial scale requiring distinct paced operations carried out at different work stations as well as transfers of cards from one station to the other at a high speed in the order of a few thousand cards per hour, is source of various problems that have an effect on the quality of the final product.

In particular, the inventor has noticed that the cards obtained through gluing by following the operations described above often revealed major defects.

Among these defects, we find the main defect is in centring the module in the cavity. Indeed, in spite of the module being correctly centred in the cavity, the inventor has noticed that the modules became decentred at the end of the gluing stage, that is to say, they had shifted in relation to the initial inserting position. The typical shifting noticed results either in a slight rotation, a translation, or both simultaneously within the cavity, or even in extreme cases, in coming out of the cavity by overlapping one side of the contact points on the surface of the card body.

The inventor has found that the shifting away from the centre is the result of forces generated on the card during its movement from one station to the next, in particular the sudden forces of acceleration and deceleration respectively generated by the departure from the insertion station and the stopping at the pressing station.

The shifting from the centre can also be the result of residual pressure present in the module that tends to give it a slight curvature. In that case, the module might come out of the cavity on each acceleration or deceleration above.

We also find defects relating to poor adhesion of the module on the card body. In such situations, the card cannot fulfil certain criteria of mechanical resistance under bending / twisting or pulling out as imposed by the norms in force (ISO, AFNOR).

It is therefore necessary to solve these problems without reducing the production rate.

The purpose of the present invention is to propose a process for gluing the electronic module in the card body that can be compatible with an automatic and rhythmic industrial production at a very high speed, without resulting in centring or gluing defects.

To this effect, the purpose of the present invention is to create a process for manufacturing cards with an electronic module, of the type consisting of providing a card body with a cavity, an electronic module with dimensions similar to the cavity, a cyanocrylate glue, and comprised of stages according to which we drop the first type of glue in the aforementioned cavity, we insert the aforementioned module in a roughly centred position and we press the aforementioned glue between the card and the module.

The process is characterized by the fact that it includes in addition one stage that consists of providing a second adhesive substance that we also deposit in the cavity; the aforementioned adhesive substance has sticky qualities sufficient to maintain the module in its centred position in the cavity until the first adhesive substance has been pressed.

Thanks to this second adhesive substance with sticky qualities (adhesion and strong viscosity), the cards can be subjected to acceleration and deceleration during their manufacturing without their centred position being affected.

In addition, it is possible to significantly lessen the time used for inserting the module and as a result, we are able to increase the production rhythm.

The invention enables us to maximize the selection of the first glue and to use it under maximum conditions so as to better resist the forces that tend to pull, bend or twist the module.

In order to ensure a profitable usage of the process, we select the second glue among substances capable after treatment of resisting the pulling, bending or twisting forces, and we use the aforementioned substance in such a way that it can produce the effect of resisting such forces.

Thus, the second adhesive substance, when properly treated, has the extra function of contributing, together with the first glue, resistance to the pulling, bending and twisting forces imposed by the norms in force that are mentioned above.

According to a favourite implementation, we use a photo-activable epoxyed resin. This resin can be subjected to an ultra-violet radiation before the insertion of the module if we want it to perform the function of mechanical resistance so that it contributes to the mechanical resistance of the whole set comprising the card body and the module.

Thanks to this implementation, we can facilitate the activation of the second gluing point efficiently and independently from the operation circumstances. Besides this, we can easily act on the kinetics of the polymerization reaction followed by the resin by acting on its intensity and its time of exposure to the ultra-violet radiation.

According to another characteristic giving a good result in maintaining the module, the resin has a viscosity of 50 000 m.P/second.

According to another characteristic which produces good results and for the sake of convenience in implementing the process, we deposit one drop of 0.003 gram in the centre of the cavity, and we expose the resin to the radiation in such a way that its opening time is equal to about 60 seconds.

In compliance with the second way of implementing the process, we use a gel of cyanocrylate glue under appropriate conditions of temperature and hygrometry before inserting the module.

The use of that gel is favourable because it can be cost saving.

According to another characteristic in using the gel for good results in maintaining the module, we deposit one drop in the centre of the cavity, the conditions of temperature and hygrometry ensuring an opening time of a minimum of 60 seconds.

In compliance with another characteristic of the process, according to the first or second implementation, the process can consist of using cyanocrylate-type glue as a first means of adhesion.

That glue has the advantage of being convenient and cost saving in its usage.

This first glue can be deposited in sufficient quantity to cover a gluing area of between 50 and 100% of the surface of the aforementioned cavity, after pressing, and in the form of a minimum of four lateral points in the contact areas, at a temperature between 18 and 24 °C and a hygrometric rate between 60 and 75%.

Such operation conditions enable us to carry out industrial production at high speed resulting in few defects, with the glue being a cyanocrylate glue.

According to another favourite characteristic of the process, we deposit the cyanocrylate glue before the insertion stage.

In this way, we obtain better results in the way the cyanocrylate glue adheres to the module.

According to another characteristic of the process, we choose preferably a relatively pure cyanocrylate glue, the opening time of the cyanocrylate glue being equal to about 60 seconds under the operation conditions stated above.

Thus, this glue enables us to ensure a better adhesion since it is relatively slow to polymerize.

The purpose of the present invention is also to create a smart card with an electronic module in compliance with the above stated process.

Other characteristics and advantages of the invention will appear more clearly while reading the following description concerning the two main modes of implementation given solely as examples. It must be read in reference to the diagrams in the appendix in which:

- Diagram 1 represents a card body to be used in the invention process;
- Diagram 2 represents in section view an electronic module to be used in the invention process;
- Diagram 3 represents, as seen from above, a support film for the electronic module;
- Diagram 4 represents a schematic view showing the layout of the module in relation to the card;
- Diagram 5 represents the drawing of a cavity, as seen from above, with the marks for the gluing points;
- Diagram 6 represents the adhesion areas of the gluing substance after pressing;
- Diagram 7 to 12 represent the various steps of the process, or different operation stations of the set up;
- Diagram 13 represents the means of pressing;
- Diagram 14 represents a view from above of an example of setup for the implementation of the process at high speed;
- Diagram 15 represents the means of wetting with alcohol.

We are now going to describe the invention process in compliance with a first mode of implementation with reference to diagrams 5 to 12.

The invention process requires that we provide a card body with a cavity and an electronic module with dimensions corresponding to the aforementioned cavity.

Diagram 1 represents an example of a card body to be used for the process. It includes a cavity 2 that can be obtained by moulding together with the card body or by machining.

The card bodies of this type are standardized to ISO or AFNOR norms, and therefore have predetermined dimensions.

The cavity must be able to receive the module. It can therefore have variable forms in accordance with the module chosen. In this example, it is made up of two hollows, the first one (3) generally with a rectangular shape appearing at the front surface of the card, and the second hollow (4) with generally a circular shape and deeper than the first one, placed at the centre of the rectangle and appearing at the bottom of the first one. The second hollow has a diameter d of 8.2 mm and a height h of 0.6 mm (diagram 4).

The material used, generally plastic, depends on the applications. For example, telephone smart cards are made of ABS (acrylonitrile butadiene styrene), they can also be made of

PVC (polyvinyl chloride), or in layers with polycarbonate (PC), for example, in PC/ABS, or in PC/PVC.

In this example, we have used a cavity in compliance with ISO standards, and ABS for the material of the card body.

The electronic module (5) (diagram 2 and 3) generally includes a support film (6a) in insulating synthetic material, contact areas (7) in conductive material, a silicium chip (8) containing an integrated circuit, wires (9) connecting the chip to the contact areas and a coating resin (10) covering the chip and the connecting wires.

The coating, generally in thermo hardening epoxy resin forms a boss that can have irregular dimensions particularly in thickness. In the best of cases, that boss can be erased through milling according to more precise curve so as to facilitate the operation of gluing the module in the card body. It is preferable that the invention uses the boss directly without milling.

The module (diagram 2 and 3) can be of several types, for example, of the type called "LFCC" (Lead Frame Against Glue) with a support film in polyimide, or of the type comprising a support film in epoxy.

In the example, the module is of the LFCC type and shows therefore an inner surface in polyimide. It is provided from a continuous film (diagram 3) and presented on a coil.

The cavity of the card is meant to receive the module as shown in diagram 4. For this, the hollow (4) corresponds to the boss (10), while the hollow (3) corresponds to the contact areas (5) with a necessary play (j) for assembling. This play is such that a simple rotation of the module on the level of the card or a simple translation on this same level is noticeable to the naked eye and represents therefore a centring defect.

The process consists also of providing at least one first adhesive substance capable of adhering to the card body and to the module. The adhesion takes place generally after activation or treatment. In the cases of electronic modules, the adhesive substances ensure the function of resistance to the pulling, bending and twisting forces in accordance with the norms above.

The first adhesive substance can be of various natures. It can, for example, be based on liquid cyanocrylate glue in the form of dots or string. It can also be a heat-adhesive or a thermoplastic substance that is applied as a film. It can be added to the card body or be part of it as for example in the patent FR 2 579 799. It can be applied to the body or to the module.

In the examples described, we used a cyanocrylate glue that we deposited in the cavity in compliance with a favourite design as described above and illustrated in diagram 5.

In compliance with the process, there are several stages according to which we deposit the first adhesive substance in the cavity or on the module, preferably in the cavity; we insert the aforementioned module in the cavity in a roughly centred position and we press the first adhesive substance between the card and the module. Such stages will be described in details in an example of implementation illustrated in diagrams 7 to 12,

The invention process is characterized by the fact that it comprises an additional step consisting of providing and depositing in the cavity a second adhesive substance capable of maintaining the module in its centred position in the cavity (against the forces that tend to shift it from its centred position) at least until the first adhesive substance has been pressed.

According to the invention, the second usable adhesive substance includes material capable of displaying sticking properties. By sticking properties we mean, not only that the substance should be adhesive particularly to plastic material used for the card bodies, but also that it should display a high viscosity as explained further. The adhesion must be such that the module does not slip out under the forces it is exposed to before the pressing station. As an example of such a material, we can mention a mono-component epoxy resin, a gel of cyanocrylate glue, a heat hardening epoxy resin, etc. In addition, these materials must be very viscous as compared to a cyanocrylate glue commonly used with a viscosity of about 190 mP/s. We consider that the substance is very viscous in comparison to the cyanocrylate glue above when the viscosity of the substance is 10 times higher than the viscosity of the cyanocrylate glue stated above. It is preferable to use a viscosity higher by a factor of 100.

In the example, we used a photo-activable mono-component epoxy resin (even though it is not activated in this example) that is convenient due to its presentation in mono-component and that adheres well to ABS and to the polyimide film of the module. In the example, this resin is deposited in the cavity in compliance with a stage illustrated in diagram 7.

A viscosity of this resin equal to 50 000 P/second gave excellent results in holding the module in its centred position when it was subjected to accelerations similar to those of an industrial plant at the high speed intended by the invention and with an example below.

The total volume of the sticky substance depends particularly on the place where it is deposited (available volume in the cavity), its adhesive properties, its viscosity and the forces it must resist.

It can have a total volume corresponding to a quantity between 0.002 and 0.004 grams when it is deposited in one point only. This volume can, however, be divided up in several points, for example, four points of 0.001 in the case where the resin would be deposited laterally in the first hollow.

In the example, the resin that gave an excellent performance in maintaining the module with a viscosity of 50 000 mP/s was deposited in the form of one drop corresponding to 0.003 gram in the center of the cavity. These values are compatible with a manufacturing plant using a setup as described below, in which the cards are transferred from one station to the other by means of fingers that strike them at the level of a back edge, which results in high accelerations.

We conclude that under gentler manufacturing conditions, that is to say, with lower forces exerted during the transfer of the card, it is possible to reduce the quantity and/or viscosity of the resin.

The cyanocrylate glue used in the examples as a first adhesive substance is deposited by means of a dropping device in the location of the contact areas in the form of four lateral gluing points of 0.001 gram each and following a design as described below.

Various means to deposit the drop of cyanocrylate glue in a precise quantity and at a precise moment known to the professional can be used. The same applies to the dropping devices for the resin. The resin used is preferably of the mono-component and tixotropic type so as to enable the distribution to be compatible with industrial production at high speed.

The choice of a very viscous substance for an industrial production that requires a very fast distribution goes against the accepted belief according to which a substance must not be too viscous and adhesive for easy and fast distribution. But thanks to the tixotropic nature of the resin in spite of its viscosity and strong adhesion, we have succeeded in distributing it easily and fast, contrary to preconceived ideas. Such an epoxy resin is supplied by the company "Delo" under reference 4597.

Concerning the surrounding conditions when using the cyanocrylate glue, we have noticed that too low a temperature and hygrometry resulted in too slow a polymerization of the glue and consequently lead to risks for the module to come off and to shift from its centred position (with risks of pollution on the surface due to polymerization of the glue: "blooming"). Conversely, we noticed that too high a temperature and hygrometry resulted in too fast a polymerization of the glue, which lead, on one hand, to the risk of the module coming off, and, on the other hand, has the disadvantage of dirtying and clogging the needle used to drop the glue. Besides this, we also noticed that too low a hygrometry resulted in risks of static electricity. The static electricity has the disadvantage of strongly attracting drops of cyanocrylate glue that might then collect at random and generate defects.

We obtained good results in terms of mechanical resistance to the forces of bending/twisting, when the cyanocrylate glue was treated or used at a temperature between 18 and 24 °C and a hygrometric rate of between 60 and 75%.

To our advantage and thanks to the function of immediately holding the module by means of the second adhesive substance in compliance with the invention, we can choose

a relatively pure cyanocrylate glue that produces effects within a relatively long time, for example, a time lapse of 60 seconds so as to maximize the quality of the adhesion.

In this example, the glue has an opening time equal to about 60 seconds under the surrounding circumstances stated above. The opening time is the time during which it is still possible to have an object to adhere to the glue. The longer the time, the better the polymerization. This polymerization can end, if need be, after the pressing operation.

In the example of implementing the process, we use a favourite layout as shown in diagram 5 that shows the cavity with the points (11a to 15a). It comprises one central point (11a) where the chip is lodged (3), and four other lateral points (12a to 15a) situated in the location of the contact areas (4) and in the angles of the rectangle representing the cavity.

The four lateral points enable us to cover, after pressing, a gluing area of between 50 and 100% of the surface of the aforementioned cavity (diagram 6). The pressing was carried out in such a way as to obtain a thickness of a cyanocrylate glue joint of about 0.02 mm. The print left by the spreading at each lateral gluing point covers a semi-circular area (12c to 15c) with a generally "U" shape that spreads roughly radial-wise from near the second hollow (4) to the border of the boundary of the rectangle formed by the first hollow, with the base of the U directed at the angle. We thus obtain sufficient adhesion for the module to resist the forces imposed by the norms mentioned earlier.

In compliance with a favourite mode of operation, we deposit the cyanocrylate glue right before the pressing stage, in any case, after depositing the second adhesive substance. We understand that in this way, the glue keeps its maximum potential for polymerization and thus its grip to the module when the latter is inserted and pressed against it.

In the example of implementation, the diagram 7 to 12 can represent stages of the process or successive operation stations in a plant as described below.

At a first station (diagram 7) and according to a first step a), we first deposit a drop of glue (11b) at the centre of the cavity by means of a dropping device (16), then we transfer the card to the next station (diagram 8).

At this station and according to a second step b), we drop four drops of cyanocrylate glue (12b) to (14b) in the four lateral angles of the hollow by means of other dropping devices (17) and (18), and the card is transferred to an insertion station (diagram 10).

At the insertion station, according to another step of the process (d), we insert an electronic module (5), by means of an insertion device (19); the insertion period is equal to 300 ms but it could be reduced even more. The card is transferred to the pressing station (diagram 1a) or (according to a favourite alternative: diagram 12).

At the pressing station (diagram 11), according to another step of the process (2), we press the gluing devices by applying a force equal to 34 daN for a duration of 22 seconds by means of pressing devices acting all over the surface of the module.

According to a favourite alternative and according to a step (f), we press only on the periphery of the contact areas by means of pressing devices (20b), which has the advantage of pressing the glue properly without introducing mechanical constraints that might damage the semiconducting chip or the connection wires.

As already explained earlier, the coating boss can have slightly variable thicknesses. But in extreme cases, the boss can come up against the bottom of the cavity and thus create a central point of the module slightly higher than the contact areas that are almost level with the surface of the card body. Such configurations that happen frequently in industrial production prevent us from applying the pressure necessary for a good quality adhesion.

An example of pressing device (20b) is described below in diagram 13.

In the example, a force of only 34 daN was spread solely on the peripheral zone of the contact points that lean on the first hollow.

At the next stage (not shown), the card is evacuated or is subjected to prior treatment, which ends the inserting operation.

In compliance with profitable characteristic of the process, we use the second adhesive substance in such a way that it produces effects of resistance to the pulling, bending and twisting forces.

Even though the resin perfectly fulfils its function of holding the module without need for ultraviolet radiation, it is preferable to harden it, if only in order to avoid harmful micro leaks situated under the contact areas between the prints or adhesion areas (12c to 15c) (diagram 6). After hardening, certain viscous substances such as the resin stated above or a gel of cyanocrylate glue give us the benefit of properties of mechanical resistance against pulling and/or bending and twisting forces.

In the case where we use the epoxy resin, the process according to the first mode of implementation includes an extra stage during which we activate the polymerization by subjecting the aforementioned epoxy resin to an ultra violet radiation, this stage taking place prior to the insertion of the module.

In the example, this stage is carried out in diagram 9, preferably right after depositing the drop of resin as described here above.

The intensity and the duration of the exposure are set here in such a way that the opening time of the resin is above 60 seconds, this time corresponding to the opening time of the cyanocrylate glue used. For an industrial production at a rhythm mentioned above, the duration of exposure varies from 0.5 to 1 second. The intensity can be adjusted in terms

of the power of the bulb used as well as in term of the distance between the bulb and the resin.

In turn, the insolation of the resin can take place, at the latest, the same time as the depositing of the drops of cyanocrylate glue.

We thus understand that the time between the activation of the first and second adhesive substance and the pressing stage is reduced to the minimum with one step only to the pressing stage; this enables us to obtain a better quality of adhesion since the pressing time is the maximum compared to the opening time of each adhesive substance.

We are now going to describe the different stages of the invention process in compliance with a second way of implementing it.

We use, in this second way of implementation, a gel of cyanocrylate glue instead of epoxy resin.

This gel also has the property of enabling the module to maintain its position when subjected to forces that tend to make it shift from its centred position during the manufacturing process.

This gel is used in identical volume and according to depositing stages similar to when we use epoxy resin, except that in this case there is no extra stage for the activation of the adhesive substances. Indeed, the activation of the gel takes place as with the cyanocrylate glue, in particular, in terms of the operation conditions at similar temperature and hygrometric rate.

We understand that the activation of this second substance is easier to carry out and more economical. Indeed, there is no usage of ultra violet radiation that is particularly costly.

Other treatments known by the professionals can also be used. We can, for example, treat the film by wetting it with alcohol in order to activate the polymerization of the gel of cyanocrylate glue when coming in contact with the module.

The insertion and pressing stations are identical to those described for the resin.

We are now going to describe an example of setup for industrial production at high speed according to the invention with reference to diagram 14.

The setup includes equipment (21) to feed a multiplicity of cards bodies, devices to feed a multiplicity of modules (22a), (22b), a station (23) to distribute drops of glue equipped with a distribution device (23b), one station of insolation with ultra violet radiation (24b), a station (25) to distribute drops of cyanocrylate glue equipped with distribution devices (25b) comprising two needles (16) and (17), a station (26) for inserting the module, equipped with inserting devices (26b), pressing stations (27) equipped with pressing devices (27a) positioned on the periphery of a carousel (28) where the cards can stay for

the pressing period, devices to cut (29) and to transfer the modules to the insertion station, devices for wetting with alcohol (30) if necessary, then evacuation devices (31). The setup also includes an enclosure to control the temperature and the hygrometry of the atmosphere.

The equipment to feed the modules is made up of two reels, a first reel (22a) loaded with a film (6a) carrying the modules and a second reel (22b) carrying a film empty of modules, one unwinding while the other is being wound. The film passes successively through the devices for wetting with alcohol (30) described above and through the devices to cut the modules (29).

The devices (23) for the distribution of resin include one hollow needle (16) vertically mobile.

The insolation station is connected to an equipment generating ultra violet radiation (UV) of a known type by elongated optic means (32) (diagram 9) capable of carrying the radiation (UV) near the resin so as to expose only the cavity to the radiation, certain prints of the card being sensitive to ultra violet radiation.

The devices to distribute the cyanocrylate glue include two hollow needles (17), (18) (diagram 8) that can move vertically and crosswise.

The modules are removed from the film (6a) by means of cutting devices and lead through transfer equipment (29) towards the insertion station where they are inserted in a centred manner in the cavity of each card. It is particularly at the film cutting station that residual constraints are released which are responsible for the bending of the module as explained above.

Each pressing station (27) is equipped with pressing devices (27a) comprising one vertically mobile end (20a) (diagram 12) that comes into contact with the module. In order to carry out the pressing in compliance with the process, that end is equipped with a blanket (20b) with a hole in the center to enable it to exert pressure solely on the periphery of the module. The blanket is made of a material capable of distributing the pressure without damaging the contact areas, for example an elastomer, and has a rectangular shape corresponding to the form of the module. The diameter of the central hole corresponds roughly to the diameter of the first hollow.

The device (30) (diagram 15) to wet with alcohol the bottom surface of the module is made in this example of a sponge (32) plunged in a vat filled with 95° ethyl alcohol (33). The sponge is maintained permanently in contact with the film feeding the modules. This method enables us to activate the cyanocrylate glue or the gel so as to create an immediate grip to the module and/or restore grip differences of the glue or gel in relation to the module and the card.

The equipment for the movement of cards from one station to the next is mechanized so as to ensure a rhythm of minimum 2000 cards per hour.

Running

When a card arrives in position at the gluing station (23), the distributing needle (16) comes into position above the central point (11a) corresponding to the layout provided for (diagram 5), come down near the surface of the cavity and a control system (not shown) controls the distribution of 0.003 gram of resin to be deposited in the cavity; then the needles go up in such a way as to break the residual thread of glue that tends to hang on the needle, and they return to a waiting position for the next card. They are adjusted in a way so as to ensure a movement down, dripping and movement up in 1.5 seconds. Afterwards, the cards are transferred to the insulation station (24).

At this station, the resin is exposed to ultra violet radiation (UV) for a period of 0.5 to 1 seconds so as to ensure an opening time of 60 seconds for the resin, and the cards are transferred to the next station for distribution of cyanocrylate drops (25).

At this glue distribution station, two needles (17) and (18) come in position at points (12a) to (15a) corresponding to the layout; they come down, distribute four drops of 0.001 gram that are deposited on the cavity, then they go up and wait for the next cards. The cards are transferred to the inserting station (26b).

At this station, the cards receive a module; the insertion period lasts 300 ms and the cards are transferred to the pressing station (27).

At that post, each module is pressed against the card body; the force applied is 34 daN. They stay 22 seconds in the carousel; then they are ejected to the next station.

At the exit of the carousel, the cards are generally tested and evacuated towards the evacuation equipment (31).

CLAIMS

1. Process of manufacturing cards with an electronic device of a type consisting of supplying a card body (1) with a cavity (2), an electronic module (5) with dimensions corresponding to the aforementioned cavity, at least one first adhesive substance (12c to 15c) capable of adhering to the card body and the module, and comprising several stages according to which we deposit at least the first adhesive substance in the aforementioned cavity, we insert the aforementioned module in the cavity in a roughly centred position and we press the aforementioned glue between the card and the module characterized by the fact that it includes in addition one stage consisting of:
 - Providing a second adhesive substance (11b) that we also deposit in the cavity (2), the aforementioned second adhesive substance being capable of showing sticking



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properties sufficient to maintain the module in its centred position (5) in the cavity until the first adhesive substance has been pressed.

2. Process according to claim 1, characterized by the fact that we select a second adhesive substance among the substance that can, after being treated, resist pulling, and/or bending/twisting forces, and we use the aforementioned substance in such a way that it produces it can resist such forces.
3. Process according to claim 1 or 2, characterized by the fact that we use a mono-component photo-activable epoxy resin.
4. Process according to claim 1 or 2, characterized in the fact that we use a gel of cyanocrylate glue.
5. Process according to claim 3, characterized by the fact that the glue has a viscosity of 50P/second.
6. Process according to claim 3, characterized by the fact that we deposit one drop of 0.003 gram at the centre of the cavity, and we expose the resin to radiation in such a way that its opening time is above or equal to 60 seconds.
7. Process according to claim 4, characterized by the fact that we deposit one drop of gel at the centre of the cavity, the temperature and the hygrometry conditions being between 18 to 24 °C and 60 to 75% respectively.
8. Process according to any of the previous claims, characterized by the fact that we use a cyanocrylate glue as a first adhesive substance.
9. Process according to claim 8, characterized by the fact that we deposit a quantity capable of covering, after pressing, a gluing area of between 50 and 100% of the surface of the aforementioned cavity; the glue is deposited in the form of a minimum of four lateral gluing points (12c to 15c) in the contact areas and under a temperature between 18 and 24 °C and a hygrometric rate between 60 and 75%.
10. Process according to claim 8, characterized by the fact that we deposit the cyanocrylate glue right before the inserting station.
11. Process according to claim 9, characterized by the fact that we choose a relatively pure cyanocrylate glue, the opening time of the cyanocrylate glue being above or equal to about 60 seconds.
12. Card with an electronic module obtained by implementing the process according to any of the claims 1 to 11.