Title: DATA STORAGE MEDIA AS WELL AS A METHOD AND INSTALLATION FOR PACKAGING THEM

Abstract: Method for packaging a number of data storage media (12) roughly in the shape of thin plates, characterised in that it includes the following steps: - each data storage medium (12) is successively brought between two layers (14A, 14B) of a first thermoplastic film (14) which has a sealing temperature T1; - the two layers (14A, 14B) of the first thermoplastic film (14) are successively sealed so as to form individual package for each data storage medium (12); - a batch of data storage media (12) so packed is stacked; and - the said batch of stacked data storage media (12) is packed using the second thermoplastic film (28) with a sealing temperature T2 less than T1.
DATA STORAGE MEDIA AS WELL AS A METHOD AND INSTALLATION FOR PACKAGING THEM

Field of the invention
This invention concerns a method, an installation for packaging a number of data storage media roughly in the shape of thin plates and a batch of data storage media.

This type of packaging is often used for data storage medium in the shape of thin plates such as memory cards, especially phone cards loaded with telephone units. To assure the user that the card has never been used and therefore that it contains the number of units purchased, the card is packed in an individual packet which it must not be possible to close once it has been opened.

Background of the invention
These cards are generally packed in batches of ten, twenty-five, fifty, etc., which therefore means that, in addition to the individual package, group packaging is required for the batch of cards.

This type of packaging method is well known, where two types of packaging, individual and batch, are applied using pre-glued films, using a technology known as "cold sealing". Each individually packed data storage medium is stacked so as to form a batch of a determined number of cards which will be packed together.

However, the production cost of this type of packaging is high, since the films which can be used in these technologies are expensive. Moreover, to prevent the pre-gluing of these films from polymerising before use, making them unfit for use; the films require special storage conditions. In addition, since the sealing is carried out cold, the individual packaging can be closed again manually after opening without this being visible, which leads to a problem of security. Lastly, the dimensions
involved in batch packaging are often much greater than the original dimensions of the packed product. For example, for a card measuring 54×85mm², the packaging of a batch of twenty-five cards measures 100×100mm².

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Summary of the invention

The first objective of this invention is to provide a method which can improve the packaging of data storage media, both individual and batch, whilst reducing the manufacturing costs and improving the security of the packaging.

This objective is reached due to the fact that the method for packaging a number of data storage media includes the following steps:

- each storage medium is successively brought between two layers of a first thermoplastic film which has a sealing temperature T₁;

- the two layers of the first thermoplastic film are successively sealed so as to form an individual package for each storage medium;

- a batch of storage media so packed is stacked; and

- the said batch of stacked storage media is packed using the second thermoplastic film with a sealing temperature T₂ less than T₁.

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Firstly, the heat sealing method prevents packaging which has once been opened from being closed again. Secondly, using a temperature T₂ less than T₁ simplifies the packaging procedure. The second thermoplastic film is in fact sealed without damaging the sealing of the first thermoplastic film, since T₂ is less than T₁. In addition, since the two thermoplastic films have different polymerisation temperatures, they cannot stick to each other during the heating applied to seal the second thermoplastic film.

The said batch is preferably linked in a string to simplify handling.
Preferably, at least one pre-cut is also made in the first polypropylene film between each individual package of a given string of storage media.

A pre-cut of the first polypropylene film is preferably made as soon as the number of individually packed storage media forms the expected string.

The method can be used to pack either a batch of cards, or a string of cards linked together. The stack of a string of storage media consists of a strip of individual packages linked together which are stacked like an accordion. This type of packaging simplifies the group packaging method of the string and also the storage of the string after the said group packaging has been opened. Furthermore, the string packaging is almost the same size as the stack size, since a string of cards measuring 54×85mm², for example, measures only 68×95mm².

Preferably, the first and second thermoplastic films are polyolefins.

Polyolefins are polymers derived from the polymerisation of ethylene. This class of thermoplastics includes high-density polyethylene (hdPE) and the polypropylenes (PP) which are generally used as packaging films.

Preferably, the first and second thermoplastic films are polypropylenes.

The propylene films require no special treatment in the heat sealing technique, which means that the manufacturing costs can be reduced.

Preferably, temperature $T_1$ is approximately 140°C and temperature $T_2$ is approximately 130°C.

Polypropylenes are frequently used in the food industry where sterilisation can be carried out by heating, since they withstand, in the absence of stress, temperatures from 110 to 120°C. These temperatures
can be increased with the degree of cross-linking depending on the chemical bonds formed between polymer chains during polymerisation.

Consequently, to obtain a suitable temperature so that the two films can be successively sealed without damaging the first film, polypropylenes with different degrees of cross-linking must be chosen. In particular, the film used for the individual package in batch or string, respectively for the group packaging, can be MB400, respectively MB666/668, both sold by Mobil, or GND, respectively HND/HNA, both available from Hoechst, whose melting points are 130°C, respectively 140°C.

In addition, the storage medium is generally made from polyvinyl chloride (PVC) or acrylonitrile-butadiene-styrene (ABS), which means that its melting point is greater than the sealing temperatures $T_1$ and $T_2$ applied. During the packaging process, therefore, the storage medium is unlikely to be damaged.

The heat sealing installations known use a single type of film for the individual packaging, which cannot be used for the batch packaging. Batch or string packaging is frequently carried out by wrapping, i.e. with a thermoplastic strip about 1 cm wide, wrapped around the batch and sealed locally with a wrapping machine.

However, the batch can slip outside the strip or the strip may become damaged or tear, especially during storage.

The second objective of this invention is to improve an installation of this type, providing an easy way of manufacturing two types of packaging for a number of data storage media roughly in the shape of thin plates, individual package and batch packaging, less likely to be accidentally opened, which can be used in the above-mentioned process.

This objective is reached due to the fact that the installation includes:

- means to successively bring each storage medium between two layers of a first thermoplastic film;
- means to successively pack each storage medium using the first thermoplastic film with a sealing temperature $T_1$;
- means to pre-cut and cut the first thermoplastic film;
- means to stack a batch of storage media so installed; and
- means to form a group package (38) of the said batch of storage media so stacked using a second thermoplastic film with a sealing temperature $T_2$ less than $T_1$.

The polymerisation temperature $T_2$ of the second thermoplastic film is less than the polymerisation temperature $T_1$ of the first thermoplastic film, which means that the second thermoplastic film can be sealed with no risk of sticking to the first thermoplastic film. In addition, the second thermoplastic film is sealed with no special precautions since it is carried out without damaging the sealing of the first thermoplastic film, since $T_2$ is less than $T_1$.

Preferably, the said first and second thermoplastic films are polyolefins.

The polyolefins have a useful feature: they are opaque when thick and transparent in film. Consequently, as films, they can be used for individual or batch packaging through which the packaged products can be seen.

Preferably, the said means include a device to stack a string of data storage media.

The installation includes a stacking system whereby, when the data storage media are linked in a string, the string can be stacked in accordion fashion.

Preferably, the first and second thermoplastic films are polypropylenes.

In order to obtain different sealing temperatures $T_1$ and $T_2$, two different polypropylene films are chosen. Greater quantities are required of the first packaging film, since it is used to wrap each card individually, so it is best to use a cheap polypropylene. The second polypropylene packaging film, used in lesser quantities, is more expensive.
Preferably, temperature $T_1$ is approximately 140°C and temperature $T_2$ is approximately 130°C.

Since there is a difference of 10°C or more, between the polymerisation temperatures $T_1$ and $T_2$ of the first and second polypropylene films, the two types of packaging can be carried out without damaging the sealing.

In addition, the installation is simplified through the use of films whose temperatures are well above the ambient temperature. No special storage conditions are therefore required to prevent damage to the films.

The third objective of this invention is to propose a batch of data storage media roughly in the shape of thin plates with improved group packaging (38).

This objective is reached due to the fact that it includes an individual package for each data storage medium including a first thermoplastic film with a sealing temperature $T_{1,1}$, that it includes a stack of data storage media, and that the said group packaging includes a second thermoplastic film with a sealing temperature $T_2$ less than $T_1$.

The invention will be clearly understood and its advantages will appear on reading the detailed description below, of a mode of realisation represented as a non-limiting example:

**Brief description of the drawings**

The description refers to the attached drawings, on which:
- figure 1 is a view of a batch of individually packed data storage media linked in a string,
- figure 2 is a view of the data storage media stacked and packed in a string,
- figure 3 is a view of the installation according to the invention,
- figures 4A to 4E and 5A to 5C are perspective views of the various folds and welding operations intended to close the group packaging around the stack of cards,
- figure 6 is a perspective view of the stack packed in batch with the flat welding electrodes.

**Detailed description**

Figure 1 shows a number of data storage media 12 individually packed in a first thermoplastic film 14 so as to form a batch of a determined quantity of data storage media 12. The batch of data storage media 12 is preferably linked in the form of a string 16.

The first thermoplastic film 14 is made from polypropylene, preferably chosen from amongst an MB400 from Mobil or a GND sold by Hoechst, whose melting point is 140°C.

According to a special mode of realisation, the data storage devices are phone cards 12 each having a memory chip 18 so that each phone card 12 can be loaded beforehand with telephone units.

So that it is easier to open the individual packaging, a "pull-tear" 20 can be fitted between the first polypropylene film 14 and the phone card 12. The pull-tear 20 consists of a plastified strip which is simply pulled to tear the packaging.

Each card 12 can be separated from the string 16 by tearing an intermediate welding area 22 formed between each individual packaging. Pre-cuts 24 can be made in each intermediate welding area 22 so that it is easier to separate one individual package of a card 12 from the string 16 and to avoid damaging the packaging.

Figure 2 shows a stack 26 of the string 16 packed in a second thermoplastic film 28. The second thermoplastic film 28 is also made from polypropylene. Preferably, it is chosen from amongst a MB666/668 from Mobil or a HND/HNA sold by Hoechst, whose melting point is 130°C.

So that the group packaging is as near as possible to the cards 12, the stack 26 is made in accordion fashion by folding the intermediate welding areas 22 in half, preferably near the pre-cuts 24.
Figure 3 shows the installation used to make the individual packages in batch or string 16 and the group packages 38. The installations used to produce a package by sealing are known; consequently, the feeding device for the first 14 and second 28 polypropylene films and the cards 12 is not represented.

Each card 12 is inserted either manually or mechanically using clips between two layers 14A and 14B of the first polypropylene film 14 which are kept apart using means which are not shown. The pull-tear 20, not represented, can be inserted between one of the two layers 14A, 14B of the first polypropylene film 14 and the card 12 so that it easier to open the individual packaging.

The layers 14A and 14B are then heat-sealed at a temperature $T_1$ equal to 140°C, corresponding to the melting point of the first polypropylene film 14 using a first sealing station 30, to produce individual package for each card 12. The three welding areas, in fact, include the intermediate welding area 22 and two transverse welding areas 32A and 32B.

If there is no pull-tear, a pre-cut can be made in each of the individual packages, preferably in one of the transverse welding areas 32A of 32B so that it is easier to open the individual package later on.

The sealing station 30 is followed by a perforation/separation station 34 used either to make the pre-cuts 24 in the intermediate area 22 designed to simplify the later separation of a card 12 packed as a string 16, or to completely cut the intermediate area 22 to separate two consecutive cards 12 or possibly two consecutive strings 16, depending on whether single packages are to be produced to form a batch afterwards or whether strings of ten, twenty five, fifty, etc. cards 12 are to be produced.

The string 16 of cards 12 is then stacked in accordion fashion near the pre-cut 24 to form a stack 36 of cards 12 previously packed individually, with a known stacking station 37. To produce the group packaging 38 of the string 16, the stack 36 is fed towards the second
sealing station 40 supplied with the second polypropylene film 28 from a reel 42. As with the individual packaging, a pull-tear 20' (not shown on this figure) can be inserted before closing the second film so that it is easier to open the group packaging 38.

Figures 4A to 4E show the various successive folding and sealing steps required to produce the group packaging 38.

Figure 4E shows that the stack 36 is fed towards the second polypropylene film 28 cut to suitable dimensions according to the number of cards 12 in the stack 36 and kept roughly vertical and against which the pull-tear 20' is applied.

Two flats 28A and 28B are then folded around the stack 36, as shown on figure 4B. A folder, not shown, successively makes a first oblique fold 44A and a second oblique fold 44B on one side 46 of the polypropylene film 28, respectively according to the arrows F₁ and F₂. The flats 28A and 28B are then respectively folded according to the arrows F₃ and F₄ so as to cover the side 48 opposite the side 46 of the stack 36 shown on figure 4C.

Figures 5A to 5C show in detail the three successive steps used to make the longitudinal weld 50 at the same time as the folding of flats 28A and 28B on the side 48. A folding and welding device, partially shown on figure 5A, includes two portions 52 and 54 previously separated slightly in the vertical direction each side of the stack 36. The figure 5B shows that when the portion 52 moves towards the top of the stack 36, it pulls the fold of flat 28B according to the arrow F₄. The portion 54 then drops to fold the flat 28A downwards according to the arrow F₃. When both portions 52 and 54 are opposite each other, as shown on figure 5C, the longitudinal weld 50 can then be made by heating portions 52 and 54.

Temperature T₂ applied on the second polypropylene film 28 is 130°C. The temperature T₂ is less than temperature T₁ of the first polypropylene film 14 so that the closure welds of the individual packages of the stack 36 do not open and so that the first polypropylene film 14 does not stick to the second polypropylene film 28. In addition,
temperatures $T_1$ and $T_2$ are greater than the melting point of the card 12, preferably made from PVC or ABS, thereby reducing the risk of damaging the card 12 during the packaging process.

Figure 5D shows the successive folds of flats 44C and 44D respectively according to the arrows $F_5$ and $F_6$ on the side 48 which has the longitudinal weld 50.

Figure 5E shows the last folds of flats 28A and 28B, successively according to the arrows $F_7$ and $F_8$, respectively according to the arrows $F_{10}$ and $F_8$, so as to cover respectively the side 54 transversally across sides 46 and 48 of the stack 36, and the side 56 opposite the said side 54.

Lastly, the flat welding electrodes 58 and 60 are brought up against the sides 54 and 56 to make the transverse welds 62 and 64 terminating the group packaging 38.

According to the invention, the first and second films 14 and 28 used are made from polypropylene so that they are transparent, allowing the group packaging 38 and the individual package to be seen inside. In particular, concerning the group packaging 38, the number of cards 12 included in the string 16 can be counted. Concerning the individual package, the final purchaser can choose a card 12, according to the decoration for example, from amongst the different strings 16 proposed.
CLAIMS

What is claimed is

1. A method for packaging a number of data storage media (12) roughly in the shape of thin plates, said method comprising:
   - successively bringing each data storage medium (12) between two layers (14A, 14B) of a first thermoplastic film (14) which has a sealing temperature $T_1$;
   - successively sealing the two layers (14A, 14B) of the first thermoplastic film (14) so as to form an individual package for each data storage medium (12);
   - stacking a batch of data storage media (12) so packed and
   - packing the said batch of stacked data storage media (12) using the second thermoplastic film (28) with a sealing temperature $T_2$ less than $T_1$.

2. The method according to claim 1, wherein the said batch is linked in a string (16).

3. The method according to claim 2, characterised in that at least one pre-cut (24) is also made in the first thermoplastic film (14) between each individual package in the same string (16) of data storage media (12).

4. The method according to claim 1, wherein the first (14) and second (28) thermoplastic films are made from polyolefins.

5. The method according to claim 4, wherein the first (14) and second (28) thermoplastic films are made from polypropylenes.

6. The method according to claim 4, wherein temperature $T_1$ is equal to approximately 140°C and temperature $T_2$ is equal to approximately 130°C.
7. The method according to claim 2, wherein a pre-cut of the first thermoplastic film (14) is also made whenever a string (16) of data storage media (12) is packed individually.

8. An installation for packaging data storage media (12) roughly in the shape of thin plates, wherein it includes:
   - means to successively bring each data storage medium (12) between two layers (14A, 14B) of a first thermoplastic film (14);
   - means (30) to successively pack each data storage medium (12) using the first thermoplastic film (14) with a sealing temperature $T_1$;
   - means (34) to pre-cut and cut the first thermoplastic film (14);
   - means (37) to stack a batch of data storage media (12) so installed; and
   - means (40) to form a group package (38) of the said batch of data storage media (12) so stacked using a second thermoplastic film (28) with a sealing temperature $T_2$ less than $T_1$.

9. The installation according to claim 8, wherein the said means (37) include a device to stack a string (16) of data storage media (12).

10. The installation according to claim 8, wherein the said first (14) and the second (28) thermoplastic films are made from polyolefins.

11. The installation according to claim 10, wherein the said first (14) and the second (28) thermoplastic films are made from polypropylenes.

12. The installation according to claim 10, wherein the said temperature $T_1$ is approximately 140°C and the said temperature $T_2$ is approximately 130°C.

13. A batch of data storage media (12) roughly in the shape of thin plates including a group packaging (38), wherein
   - it includes an individual package for each data storage medium (12) including a first thermoplastic film (14) with a sealing temperature $T_1$,
   - in that it includes a stack of data storage media (12), and
- in that the said group packaging (38) includes a second thermoplastic film (28) with a sealing temperature $T_2$ less than $T_1$.

14. The batch according to claim 13, wherein the said data storage media (12) are linked in a string (16) and in that the said stack of the data storage media (12) is built in accordion fashion.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65B9/02 B65D75/42

According to International Patent Classification (IPC) or to both national classification and IPC.

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65B B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched:

Electronic data base consulted during the international search (name of data base unit; where practical, search terms used)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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11 March 2002

Date of mailing of the international search report
25/03/2002

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European Patent Office, P.O. Box 5018 Patentlaan 2 NL-2280 HU Rijswijk
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