

Method and arrangement in cardboard creasing

Technical Field of the invention

The present invention relates to a method and an arrangement in
5 cardboard creasing when performing creases on a cardboard web fed from a
large roller, where said web comprise the width of at least two blanks in parallel to
each other. More precisely the invention relates to measures taken in connection
with creasing wear tools that normally cooperate in pairs in creating a certain
crease pattern to lanes of coherent package blanks, made from cardboard.

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Technical background

Cardboard creasing is, as is well known in the art, made for facilitating
folding of a material, which folding is to be performed after having made a pattern
of crease lines thereon. Blanks for packages are sometimes like here prepared
15 from wide webs comprising at least two blanks in parallel to each other. Within
the packaging industry the term "blank" refers to a portion of a packaging material
needed to form one package. A web comprises longitudinal lanes of blanks. The
width of one lane equals the length or the width of one blank. When producing
liquid food products containing for example water, these have to be contained in
20 a more or less liquid proof package. For many years laminates comprising
cardboard and polymer materials has been used for this purpose with an
excellent result. When, however, producing cardboard packages of increased
volumes, for instance such containing 1,5 liters or more, the stress on the
material becomes larger and thus the thickness of the cardboard has to be
25 increased.

As a result of the increased thickness there is a tendency of the cardboard
material, while influenced by positively progressing male and female dies as well
as different types of rollers in the feeding process thereof, which is positively
progressing the cardboard material, to create what is called wild-creases. A wild-
30 crease is an unwanted self-generated crease-like deformation or a defibration of
a cardboard material between two adjacent intentionally made creases and
seems to be the result of a necessary combination of high compression stresses
to create the intentional creases, the mutual distance between the separated

adjacent creases, the depth of each crease and the thickness of the creased material. This gives rise to shear stresses in the pulp layers of the cardboard material, which may cause delamination or defibration thereof, which in turn may produce the wild-creases. The wild-creases occur mainly between two coherent
5 lanes in the modified offset printing process that constitutes the creasing process.

The wild-creases appears as an uncontrolled wrinkling of the cardboard in an area between two from one another independent co-linear male dies and more specifically between two separated crease lines, one on each blank. The crease lines can be realized by a crease-roller system well known to the skilled person
10 and in such case the two separated crease lines are transversal to the tangential direction of any point of a crease plate in it's rotational direction. This is clearly shown in Fig 6 of the attached drawings belonging to this description. It is desired to avoid wild-creases occuring on a package blank in an area where a longitudinal seal is to be made. Such wild-creases might and do in some cases
15 constitute a risk that the package thus produced will show channels in the seal. Channels lead to a loss of product integrity. These phenomena are of course not acceptable neither from a producers point of view nor from the same of a consumer.

20 Background art

In performing a scan regarding the state of the art regarding methods and/or arrangements dealing with the problem thus described, no relevant material was found.

25 Summary of the invention

A main object of the work that has resulted in the present invention has therefore been to provide a method and an arrangement that makes it possible to eliminate any risk of creation of wild creases, when it, due to factors such as required larger structural rigidity is required to make use of a thicker material for
30 producing packages.

According to the invention this and other objects of the invention are achieved by the fact that the cardboard blank web (7) in a limited area of such an interruption is intentionally and positively elevated and supported from the side of

a female crease die (in Z-direction = ZD) to a level coinciding with or above an outermost surface of the female crease die. Hereby the tensile stress of the material is released and no delamination or defibration will occur spontaneously.

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Brief description of the drawings

In the following the invention will be described in more detail, having reference to a preferred embodiment thereof shown in the attached drawings, in which:

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Fig 1 shows an isometric view of two pairs of male creasing plates to be comprised in and as such fixed to a roller in a creasing station of a packaging machine,

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Fig 2 shows an isometric view of two pairs of female creasing plates aimed at cooperating with the plates shown in fig 1,

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Fig 3 shows an enlarged view of a part of the above initially mentioned female plates,

Fig 4 shows a situation before the creation of a crease between two elements of a male and a female crease die respectively, before making use of the teachings of the invention,

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Fig 5 shows a view similar to fig 4 but in which the teachings of the invention is implemented, and

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Fig 6 shows, partially as an enlargement, a situation according to prior teachings, where unintentional wild-creases have emerged between two lanes of creased blanks.

Detailed description of a preferred embodiment

The technology representative to the present invention relates to a case where it is aimed to create unfolded package blanks from a large roller containing a preferably preprinted, cardboard web material of a width equaling at least the
5 width of two package blanks.

Fig 1 thus shows two pairs of male creasing plates 1, each of which are aimed for a prefabricated, i.e. printed, blank (not shown). It may here in parenthesis be mentioned that the creasing plates 1, each having the shape of a semi cylindrical shell, are to be rigidly mounted by for instance bolts to a roller
10 (not shown) for a long but anyway nevertheless limited life as a wear-plate. These wear-plates are designed to be used for a certain amount of repetitions and are thereafter recycled. It should for clarification purposes be mentioned that wear plates by no means are necessary. The creasing pattern may also be formed directly on the rollers. The creasing plates shown here are of a shape giving rise
15 to four package blanks per revolution and lane. The number of lanes in a setup is limited by the width of the cardboard roller used. The setup here shown thus gives rise to eight blanks per revolution. Between the plates in a specific region where creases transversal to a machine direction (to be defined later) the male crease plate shows countersunk portions 5A aimed to co-operate with cantilevers
20 5B to be defined below, to avoid interference when male and female dies meet and counteract.

According to Fig 2 there is shown a set of female creasing plates 2, correspondingly and invertedly set up as compared to the male plates 2 shown earlier, to interact therewith in the formation of intentional creases.
25 Each of the creasing plates 1 and 2 are provided with a number of holes 3 and cavities 4, where the holes 3 are provided to constitute means for correctly aligning the plates 1 or 2 to it's respective roller and the cavities 4 are provided to constitute countersunk cavities for the fitting of bolts for obtaining a secure fixation of the plates 1 or 2 to it's respective roller (not shown).

30 Fig 3 shows a detailed partial view from Fig 2 of the main issue of the invention, namely a so-called cantilever 5B, here bolted to the female creasing plate 2. The cantilever 5B has the shape of a large I standing in the peripheral direction of the plate 2 and enclose a borderline between two female plates 2 to a

part. The surface of said cantilever facing outwards in it's mounted condition comprise a number of elevated portions 6, the purpose of each is to elevate or lift the cardboard 7 an amount of on or around 5 mm from it's free state along the outermost surface of the female crease plate in the volume between the creasing plates 1 and 2, to counteract the tensile stress in the cardboard material in the vicinity of the ends of each of the male crease protrusions, while pressing permanent creases in counteraction with the crease recesses of the female crease plate 2. By outermost surface of the female crease die is meant the predominating surface of the female crease die above the dies. By doing so the occurrence of wild creases in the vicinity of this area are eliminated or at least diminished. It should be noted that the elevated portions 6 also might be produced in one piece with the roller, which in some way comprise the female crease pattern.

To provide a better understanding of how this is achieved, Fig 4 and 5 are produced. According thereto a blank of a cardboard material 7 is shown interlaced between an approximately 0,5 mm wide conventionalized male die 8 and a likewise conventionalized female die 9 having a width of around 2mm. A coordinate symbol is shown bearing a sign ZD for Z-direction, i.e. a direction normal to and directed from the female crease die roller "upwards" and MD for Machine-Direction, i.e. the direction in which the cardboard 7 is transported. Thus it is shown that the respective dies here are transversal to said transport direction. If here the male die 8 suddenly ends, which is the case where the aim is to create a sealing area along which later to provide a longitudinal seal, the cardboard material 7 experiences a sudden loss of counter support and will as a consequence thereof suddenly tend to spontaneously create "wild-creases" 10, as previously explained. This is more clearly shown in Fig 6 even as an enlargement at 11 along the length 12, where the neighborhood between two blanks lack an intentionally made male crease. Here, however, the material has by itself during the creasing operation developed a wild-crease 10. By the insertion of the cantilever 5B, as is illustrated in fig 5, and thereby achieving a positive elevation of the material approximately 5mm above the outer envelope surface of the female die 9 in the specific area where the male die 8 ends, no more such wild-creases will spontaneously occur.

CLAIMS

1. Method in a cardboard creasing machine operation to perform creases on a cardboard web (7), said web having a width of at least two lanes of blanks in parallel to each other and in at least one zone per pair of lanes comprise an area where intentional creases on both said lanes are made in an adjacent area transversally to a feeding direction of the machine and these creases are interrupted avoiding them to meet to provide an uncreased portion at each lane of blanks, which portion is adapted to form one part of a longitudinal overlap seal,
c h a r a c t e r i z e d in that the cardboard blank web (7) in a limited area of such an interruption is intentionally and positively elevated and supported from the side of a female crease die (in Z-direction = ZD) to a level coinciding with or above an outermost surface of the female crease die.
2. Method according to claim 1, c h a r a c t e r i z e d in that the elevated area is elevated on or around 5 mm above said outermost surface of the female crease die.
3. Method according to claim 1 or 2, c h a r a c t e r i z e d in that the creasing dies each are provided with exchangeable male and female wear plates (1, 2) on which a creasing pattern to be transferred is arranged.
4. Method according to claim 3, c h a r a c t e r i z e d in that said lift and support action is provided by inserting a cantilever (5A) in a countersink (5B) to be made in an area of a female crease die lacking a therewith cooperating male creasing die.
5. Method according to anyone of the preceding claims, characterized in that said creasing die patterns are formed on rollers or on curved plates arranged on rollers.

- 5 6. Arrangement in a cardboard creasing machine comprising a system of at least two rollers, the envelope surfaces of at least two of which define a pattern of creasing dies, male and female (8, 9), to co-operate in creating similar crease patterns (13) on each and every blank of a cardboard web (7) of coherent such blanks, positively run through the creasing machine, in which pattern (13) exist uncreased areas where male creasing dies show intentional interruption areas adapted to form a portion of an overlap seal, c h a r a c t e r i z e d in that the areas where the male dies (8) show interruptions, especially those that run transversally to the running direction (MD) of the machine, the corresponding areas of each female 10 dies are provided with a cantilever arrangement (5B), providing a support to the cardboard web (7) on a level coinciding or above an outermost surface of the female crease die roller, whereby the cardboard web (7) is elevated to a level on which wild creases are avoided.
- 15 7. Arrangement according to claim 6, c h a r a c t e r i z e d in that the cantilever arrangement (5B) is located in a countersink (not shown) on the female crease die roller.
- 20 8. Arrangement according to claim 6 or 7, c h a r a c t e r i z e d in that the cantilevers (5B) comprise a locally from said outermost surface increased height of on or around 5 mm.
- 25 9. Arrangement according to claim 8, c h a r a c t e r i z e d in that corresponding areas on the male crease roller has a countersink (5A) corresponding to said locally increased height of the female roller.
- 30 10. Arrangement according to anyone of claims 6 to 9, c h a r a c t e r i z e d in that the cantilevers (5B) are arranged in a central position exactly in line with each interrupted such male crease protrusion of the male creasing roller.