IMPACT CORE FOR INSERTION INSIDE AN OUTER SHELL OF A HELMET

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ABSTRACT

The invention relates to an impact core for insertion inside an outer shell of a helmet. The impact core comprises a shock-proof material and is substantially dome-shaped, having cut outs to increase the flexibility of the impact core. The cut out makes the impact core deformable and as a result the impact core can be adjusted according to different head shapes and sizes. The impact core comprises a substantially star-shaped cut out at a top and a plurality of elongated edge cut outs near an edge of said impact core. Further, each of a plurality of arms of said star-shaped cut out extends downward between two neighboring edge cut outs at the edge.
IMPACT CORE FOR INSERTION INSIDE AN OUTER SHELL OF A HELMET

FIELD OF THE INVENTION

[0001] The invention relates to helmets and, more particularly, to impact cores and safety helmets having an impact core.

BACKGROUND OF THE INVENTION

[0002] Typically, a safety helmet provides a user or a wearer protection from head injury or damage in case of an accident. There is a wide variety of safety helmets available in the market. Various examples of safety helmets may include, but are not limited to, bicycle helmets, motorbike helmets, and racing car helmets.

[0003] Different users may have different head sizes. Generally, a shopkeeper measures the size of the user’s head with the help of a measuring instrument, and accordingly provides a helmet from the variety of helmets present in the shop. The user selects a helmet after taking numerous fitting trials depending on the ease and comfort of its fit.

[0004] However, the disadvantage associated with the abovementioned methods for selecting the best fit safety helmet is that only the size of the head is taken into consideration.

[0005] Because apart from size, different users also have different head shapes, a helmet does not fit perfectly around the head. The user normally chooses a helmet that is comfortable but that does not fit perfectly. In fact, most often a helmet is chosen which is too spacious. This may lead to unnecessary injuries when being involved in an accident.

[0006] In light of the foregoing, there is a need for a comfortable fit safety helmet according to various head sizes and shapes of different users.

OBJECT AND SUMMARY OF THE INVENTION

[0007] It is an object of the invention to provide a helmet and/or an impact core that fits better on different heads as compared to the known helmets and/or impact cores.

[0008] In a first aspect, the invention relates to an impact core for insertion inside an outer shell of a helmet. The impact core comprises a shockproof material. The impact core is substantially dome-shaped and comprises cut outs. The cut outs increases the flexibility of the impact core. The impact core comprises a substantially star-shaped cut out at a top of said impact core and a plurality of elongated edge cut outs near an edge of said impact core. Each of a plurality of arms of said star-shaped cut out extends downward between two neighboring cut outs at the edge, or so called edge cut outs. Further, the flexible impact core can provide for a deformable and an adjustable helmet for different head shapes. The plurality of edge cut outs makes the impact core flexible.

[0009] In an embodiment, the star-shaped cut out is a cross-shaped cut out. For example, the cross may consist of two substantially perpendicularly crossing lines. Alternatively, the cross may for example comprise two lines crossing each other at an angle smaller than about 90 degrees.

[0010] It is noted that the arms of the star-shape may have substantially the same length. However, alternatively the length of the arms may differ from each other.

[0011] In an embodiment, the elongated cut outs near the edge extend from said edge in a substantially upward direction.
core comprises an upper portion and a lower portion. The upper portion is substantially dome-shaped. The dome shape of the upper portion facilitates a base support to the impact core. Further, the lower portion surrounds a lower part of the skull of the user. In a particular embodiment, to provide a proper fit to the impact core when the comfort core is inserted in it, the upper portion of the comfort core is less thick than its lower portion.

It is noted that, in a preferred embodiment, the helmet comprises tree layers, substantially placed one inside the other. The three layered helmet may thus comprise: the outer shell, the substantially dome-shaped impact core substantially placed in said outer shell, and the comfort core arranged at least partly inside said impact core.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 schematically shows a representation of a helmet according to an embodiment of the present invention; and
FIGS. 2a, 2b, 2c, 2d, and 2e depicts a top-view, a side-view, a front-view, a first perspective view, and a second perspective view, respectively, of the embodiment of FIG. 1.

DESCRIPTION OF THE EMBODIMENTS

FIG. 1 schematically shows a representation of an embodiment of a helmet according to an aspect of the invention. The helmet comprises three layers—a comfort core 2, an impact core 3 according to an aspect of the invention, and an outer shell 4. The arrangement of the three layers of the helmet 1 is in a manner such that, the comfort core 2 can be arranged at least partly inside the impact core 3, and the impact core 3, along with the comfort core 2, can be arranged inside the outer shell 4.

It is noted that the helmet may be a so-called safety helmet.

In an embodiment, the comfort core 2 is made of foam or expanded rubber, such as Ethylene vinyl acetate (EVA) rubber. In the embodiment of FIG. 1, the comfort core 2 is substantially a helmet-shaped layer and comprises an upper portion 5 and a lower portion 6. The upper portion 5 is substantially dome-shaped which facilitates a base support to the impact core 3. Thus, the impact core 3 gets the base support from the comfort core 2, and both are closely fit into the outer shell 4 of the helmet 1. Further, the lower portion 6 surrounds a lower part of the skull of a user. In a particular embodiment, the upper portion 5 is less thick than the lower portion 6 to properly accommodate the impact core 3.

Further, the outer shell 4 is preferably made of a shock-proof material. The shock-proof material in the impact core 3 makes the helmet robust and protects the user in case of accidents. In an embodiment, the impact core 3 comprises a number of edge cut outs, or so called bottom cut outs, such as 7, 8, 9, and 10. It should be noted that the cut-outs can not be too wide, since then, the protection of the head will be compromised.

Additionally, each of the edge cut outs 7, 8, 9, and 10 extends from the edge in a substantially upward direction. This is, each edge cut out 7, 8, 9, and 10 starts from an edge of the impact core 3. It may be apparent to any person skilled in the art that the edge may be defined as the circumferential boundary of the surface of the substantially dome-shaped impact core 3. It may be also appreciated by a person skilled in the art that the cut-out edges 7, 8, 9, and 10 provide sufficient space for expansion of the impact core 3 to adjust according to the different head shapes of different users.

FIGS. 2a, 2b, 2c, 2d, and 2e depicts a top-view, a side-view, a front-view, a first perspective view, and a second perspective view, respectively, of the embodiment of FIG. 1.

In this embodiment, four cut outs 11, 12, 13, and 14 are arranged at top of the impact core 3. These cut outs 11, 12, 13, and 14 are slit-shaped and combine together to form a substantially star-shaped cut out at the top of the impact core 3 and can alternatively be referred to as the arms of the star-shaped cut out. Additionally, the impact core 3 comprises numerous other elongated cut outs, i.e., the edge cut outs 7, 8, 9, and 10 near the edge of the impact core 3 (as shown in FIG. 2a). In this embodiment, the arms 11, 12, 13, and 14 of the star-shaped cut out extends vertically downward between two neighboring cut outs from the cut outs 7, 8, 9, and 10 at the edge. It should be noted that these cut out will be collectively referred as 7-14 in the subsequent paragraphs.

It may be apparent to any person skilled in the art that, although the star-shaped cut out is cross-shaped in the shown embodiment, the star-shaped cut out can alternatively have another star shape, and may for instance have three or five arms.

The cut outs 7-14 are of predefined length and width to provide maximum flexibility to the impact core 3. In the example of FIG. 2a, the width of each of the slits 7-14 is about 10 mm. Furthermore, the pre-defined angle of separation between two subsequent cut outs at the edge 7 and 10 is preferably about 90 degrees. However, other angles of separation are possible, such as about 45, 72, 75 or 120 degrees. Typical dimensions of the impact core 3 are shown in FIG. 2a. It is noted that other dimension are possible.

As will be appreciated by the skilled person, the edge cut outs may be evenly distributed around the impact core 3. However, the edge cut outs 7, 8, 9, and 10 may be placed closer to each other at a first part of the impact core than at another part of said impact core. For example, the angle of separation may be smaller at a back side than at a front side of said impact core, or vice versa.

As will be appreciated by the skilled person, the cut-out can be of varying shapes, and the invention is by no means limited to the use of slit-shaped cut outs. It should however be noted that the cut-out can not be too wide, since then, the protection of the head will be compromised.
In an embodiment, the density of the EPP material used for the impact core 3 lays between 20 and 100 kg/m³, and preferably is about 60 kg/m³. These densities showed good results during impact tests.

Alternatively, the impact core may comprise expanded Polyurethane (PU) or another flexible material or another flexible material composition.

The impact core 3 may be made using moulding technique. The moulding technique preferably uses a single mold which considerably reduces the manufacturing time and makes the overall process simple.

Instead of using Ethylene vinyl acetate (EVA) rubber, the comfort core 5 may comprise relative low density EPP or EPS. A typical density for an EVA rubber comfort core could be about 30 kg/m³.

Alternatively, the comfort core 5 could comprise textile, PU, rubber or Neoprene or a combination thereof. With Neoprene for example, several sheets can be sewed together to form the comfort core.

It is emphasized that the present invention can be varied in many ways, of which the alternative embodiments as presented are just a few examples. A person skilled in the art will readily appreciate that various features disclosed in the description may be modified and that various embodiments disclosed and/or claimed may be combined without departing from the scope of the invention. These different embodiments are, hence, non-limiting examples. The scope of the present invention, however, is only limited by the subsequently following claims.

1. An apparatus comprising:
an impact core for insertion inside an outer shell of a helmet, wherein the impact core comprises a shock proof material and is substantially dome-shaped having cut outs to increase the flexibility of the impact core, wherein the impact core comprises a substantially star-shaped cut out at a top of the impact core and a plurality of elongated edge cut outs near an edge of the impact core, and wherein each of a plurality of arms of the star-shaped cut out extends downward between two neighboring edge cut outs.

2. The impact core according to claim 1, wherein the star-shaped cut out is a cross-shaped cut out.

3. The impact core according to claim 1, wherein the elongated cut outs near the edge extend from the edge in a substantially upward direction.

4. The impact core according to claim 1, wherein each of the arms extends from the top of the impact core downwardly towards a respective point located above the edge, and wherein each of the elongated cut outs extends from the edge upwardly towards a respective point located below the top of the impact core.

5. The impact core according to claim 1, wherein each arm extends downwardly to such extent that a lower part of the respective arm is at least partly located between two neighboring elongated edge cut outs.

6. The impact core according to claim 1, wherein the impact core is substantially serpentine-shaped, following a substantially serpentine-shaped path extending in a circumferential direction of the impact core, the path running above upper ends of the elongated edge cut outs and running below lower ends of the arms.

7. The impact core according to claim 1, wherein the impact core comprises expanded polypropylene.
8. The impact core according to claim 1, wherein the impact core comprises expanded polyurethane.

9. The impact core according to claim 1, wherein the impact core is molded.

10. A helmet comprising:
    an impact core for insertion inside an outer shell of the helmet, wherein the impact core comprises a shock proof material and is substantially dome-shaped having cut outs to increase the flexibility of the impact core, wherein the impact core comprises a substantially star-shaped cut out at a top of the impact core and a plurality of elongated edge cut outs near an edge of the impact core, and wherein each of a plurality of arms of the star-shaped cut out extends downward between two neighboring edge cut outs,
    the helmet further comprising an outer shell, the impact core being arranged in the outer shell.

11. The helmet according to claim 10, wherein the outer shell comprises acrylonitrile butadiene styrene (ABS).

12. The helmet according to claim 10, wherein the outer shell has a thickness of between 0.5-3.5 mm, more preferably between 1.8-2.2 mm.

13. The helmet according to claim 10, wherein the helmet further comprises a comfort core comprising a substantially helmet shaped layer arranged at least partly inside the impact core.

14. The helmet according to claim 13, wherein the comfort core comprises EVA rubber.

15. The helmet according to claim 13, wherein the comfort core comprises an upper portion being substantially dome-shaped and a lower portion for surrounding a lower part of the skull of a user.

16. The helmet according to claim 15, wherein the upper portion of the comfort core is less thick than the lower part so as to accommodate the impact core.

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