A swimming pool safety coping element (5, 40) comprising a first portion (110) formed of the group of polyurethane, epoxy, latex, block copolymer, polyethylene foam, polypropylene foam and glass reinforced plastic (GRP); a display layer (121); and a second portion (120), disposed on the first portion (110) and the display layer (121), comprising a Low Surface Energy material. The display layer (121) may include an LED arrangement (202) to improve visibility and safety.
SWIMMING POOL SAFETY COPING ELEMENTS AND DISPLAY

[0001] The present invention relates to coping, in particular coping elements used around the edge of a swimming pool.

[0002] Conventional coping elements installed around the edge of swimming pools are made from materials such as stone, concrete and reconstituted stone. Such coping stones are often formed with a bull nose or rounded exposed edge so that corners are eliminated from their profile in order to minimise the danger associated therewith. However, a hazardous surface is still present when these conventional coping stones are installed. If a user of the swimming pool was to slip or misjudge their entry into the water, they could collide with the coping stone and receive an injury, potentially a serious injury.

[0003] It is an aim of the present invention to provide an alternative coping product having an improved safety characteristic.

[0004] According to a first aspect, the present invention provides a swimming pool safety coping element comprising:

[0005] a first portion comprising one of the group of polyurethane, epoxy, latex, block copolymer, polyethylene foam, polypropylene foam and glass reinforced plastic (GRP);

[0006] a display layer;

[0007] a second portion, disposed on the first portion and the display layer, comprising a Low Surface energy material.

[0008] According to a second aspect, the present invention provides a swimming pool safety coping element comprising:

[0009] a first portion comprising one of the group of polyurethane, epoxy, latex, block copolymer, polyethylene foam, polypropylene foam and glass reinforced plastic (GRP);

[0010] a second portion, disposed on the first portion and the display layer, comprising a Low Surface energy material wherein the second portion comprises a display means.

[0011] By providing a coping element comprising Low surface energy materials, also resilient materials, if a user were to impact the coping element with significant force, some of the energy of the impact would be absorbed by the coping element as the coping element would be able to deform under the impact. Any resulting injury would, consequently, be significantly less than a corresponding impact with a conventional non-resilient coping stone or element made from, for example, concrete. By providing a display means the user can be alerted to information relevant to them, such as depth, safety information or time information. In an embodiment the first portion is arranged to accommodate a portion of the display layer. In an embodiment the first portion is arranged to accommodate a portion of the display layer. By providing an interface between the two resilient materials with a display means an interlocking mechanical bond between the two portions can be achieved. Thus, even materials which are otherwise incompatible for chemical bonding may be used in combination and a coping element having enhanced properties is provided.

[0012] In an embodiment the accommodation of the display may include an interlocking member which may comprise a chamber or recess which may be formed within the second portion or may depend therefrom. Alternatively, or in addition, an interlocking component may comprise a complex, protruding member. By complex we refer to the geometry of the member e.g. having lateral sub-members or describing a convoluted shape such as a spiral or comprising one or more loops.

[0013] In an embodiment the display comprises an LED display board. The display board may be powered by a mains power supply connected to a transformer and the LED display board.

[0014] The second material may be softer than the first material. The first material may comprise a resin and a hardener. The coping element may comprise a cured portion for ease of manufacture. The cured portion may set at around 50°C.

[0015] The second material may comprise a silicone compound and/or ethylene vinyl acetate and/or a block copolymer.

[0016] The second material may comprise luminescent material, capable of visually defining the edge of a swimming pool in low lighting conditions. For example a phosphor such as strontium aluminate and or zinc sulphide may be used.

[0017] In providing a cured portion and method whereby the second portion is initially formed having an interlocking component, the material of the first portion can then be brought into contact with the second portion. The method of manufacture is described in further detail in WO 2009/050426 and the method is incorporated by reference herein. The first material, upon introduction into the mould, is received by the interlocking component so that when the first material goes off and hardens it is permanently secured about or with the interlocking component and the materials become mechanically interlocked. Thus the materials are secured to one another and a unitary coping element is provided, even in circumstances where the first material is chemically incompatible with the second material such that they cannot be chemically bonded to one another.

[0018] The thickness of the second portion in an embodiment is in the range from 5 mm to 15 mm. The thickness provides a region of softer material in the coping element capable of supporting and withstanding shocks without breaking or cracking, as might happen with a brittle or stiffer material. The shocks could be the action or impact of a heavy footfall or someone falling over onto the coping element, or dropping a heavy item onto the coping element. The thickness range is sufficient such that any impact would be absorbed in the material and would not cause damage to the display board or LED display arrangement.

[0019] The Low Surface Energy (LSE) material may be one of the group of a silicone compound, ethylene vinyl acetate and a block copolymer.

[0020] The second portion may comprise a luminescent material for example strontium luminate or zinc sulphide.

[0021] By Low Surface Energy material we mean a material having a surface energy below 25 dynes/cm, preferably below 23 dynes/cm.

[0022] Preferred features of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

[0023] FIG. 1 illustrates a straight coping element;

[0024] FIG. 2 illustrates a corner coping element;

[0025] FIG. 3a illustrates a cross section of a coping element;

[0026] FIG. 3b illustrates a cross section of a coping element according to the invention;

[0027] FIG. 4 illustrates a cross section of a further coping element of the present invention; and

[0028] FIG. 5 illustrates a display board suitable for use in the coping element of the present invention.
FIG. 1 illustrates a straight coping element 5 to be installed along the edge of a swimming pool. The coping element 5 of the present embodiment is depicted as an approximately cuboid slab having dimensions in the region of 230 mm x 610 mm x 75 mm. As illustrated, a front edge 10 of the coping element 5 has a bull nose profile, in other words a convex surface is provided so that a smooth continuous profile extends from an upper surface 20 of the slab to a bottom surface 25 of the slab. This smooth profile is presented towards the swimming pool upon installation of the coping element 5.

The upper surface 20 of the coping element 5 is preferably provided with texture to enhance anti-slip properties of the coping element 5. In this embodiment, the texture is provided by two sets of four substantially parallel grooves 30.

As shown, lateral edges 35 of the coping element 5 stone that are configured to be positioned proximate another coping element are provided with a slight taper so that the coping elements can be placed in direct contact with one another at a lower portion and the resulting gaps between the elements at an upper portion can subsequently be filled and sealed with a sealant material, e.g. a silicone or polyurethane sealant material.

The coping element 40 illustrated in FIG. 2 is configured to join together two orthogonally placed, straight coping elements 5. In other words, it represents a corner coping element. The convex (in plan) edge 45 which is presented towards the swimming pool is provided with a bull nose profile to match that of the straight coping element 5. Furthermore, texture, in this embodiment grooves 50, are provided on an upper surface 55 of the corner coping element 40 to match those of an adjacent straight coping element 5.

The dimensions suggested in this embodiment are appropriate for many configurations of rectangular swimming pools. However, it should be noted that alternatively dimensioned and shaped coping elements may be provided. For example, rather smaller elements may be appropriate around a Jacuzzi, and a kidney shaped pool will require alternatively shaped coping elements having different curvature. Further, the bull nose profile described above may be replaced with a flat edge if, for example, the coping element is to approximate a flag stone.

A cross section of each of the coping elements 5, 40 is illustrated in FIG. 3. The coping element 5 comprises a first portion 110 made from a resilient material, for example a resin compound. In this embodiment, the resin used to form the first portion 110 is polyurethane. Other example resin compounds which may be used are epoxy, latex, block copolymer, polyethylene foam, polypropylene foam and glass reinforced plastic (GRP).

Each of these resin compounds are formed by mixing two products together. The first product, ‘component A’ is the bulk resin e.g. polyurethane. The second product, ‘component B’ is a hardening material, for example aliphatic isocyanate. Upon mixing component A with component B a chemical reaction takes place to form the final material of the first portion 110.

The quantities of component A and component B that are introduced to one another are chosen to ensure that stoichiometry of the resulting mixture is achieved in a known manner.

The second portion 120 is, preferably, made from a softer material than that used for the first portion 110. A silicone compound may be used as such a material has particularly desirable properties in that it is particularly grippy (slip resistant) and soft, both of which are desirable when enhancing the safety aspect of a coping element. Unfortunately, silicone compounds do not lend themselves to being chemically bonded to other materials such as those listed above for the first portion.

In order to secure a silicone based second portion 120 to a first portion 110, the second portion 120 is formed first using an extrusion or injection moulding technique. Interlocking members are formed on or in an inner surface 130 of the second portion 120. In one embodiment, illustrated in FIG. 3, the interlocking members are provided by reservoirs or recesses 125 being formed on the inner surface 130 of second portion 120. Ports 135 are formed in a wall of the, or each, reservoir 125 so that material may pass there into during manufacture. The reservoirs 125 may be formed within the second portion 120, as illustrated in FIG. 3a.

The thickness of portion 120 illustrated as W in FIG. 3a should be of a thickness sufficient to absorb the force and shock of a falling person.

The preformed second portion 120 is located in a mould (not shown) and arranged such that the, or each, port 135 is exposed and is, therefore, able to receive material, and the display means of the LED board 121, that is subsequently introduced into the mould.

An additional amount of material of the second portion 120 is provided to accommodate the display means 121. In testing 2 to 3 mm additional material has been used, i.e. 2 to 3 mm of additional material in the region W. In an embodiment between 1 to 7 mm of additional material is provided.

The embodiment shown in FIG. 3b and in FIG. 4 has thickness W around 7 mm, a range of 5 to 20 mm represents the preferred thickness range. The thickness W is required to provide sufficient shock absorption for objects falling on the coping element not to break the second portion and the display portion apparatus 200.

In an alternative embodiment, illustrated in FIG. 4, the interlocking members are provided by complex, protruding members 140, here T sectioned members, formed on the inner surface 130. During manufacture, material engulfs these members 140 to thereby interlock the first portion 110 to the second portion 120 and display portion 21.

Components A and B are mixed and then poured into the mould as a homogeneous mixture. The homogeneous
mixture is readily received within each reservoir 125 and around LED display board, 121. In this way the remainder of the coping element, namely the first portion 110 is formed. The coping element 5 may then be left to cure at an ambient temperature or the filled mould may be placed into an oven at around 50°C in order to speed up the curing process. This latter part of the method of manufacture is referred to as a two part cold pour system, alternative methods of manufacture include a blown foam rapid injection system, an injection moulded system, an EPDM moulded system, a latex/rubber moulded system and rubber crumb or EPDM with resin binder system.

Example materials for the second portion 120 include the class of Low Surface Energy materials e.g. ethylene vinyl acetate (EVA) or a block copolymer such as Evoprene®. The LED display board can also be envisaged as being pre formed and pre moulded within the second portion 120 and thus prepared and moulded as part of the second portion 120.

In practice, the second portion 120 represents a smaller volume than the first portion 110 in order to achieve a cost effective solution. It may be desirable to provide a second portion 120 having a greater volume with respect to the first portion 110. This serves to further improve the compliance of the coping element. Indeed, the entire coping element 5 can be formed from a homogenous material e.g. a silicone compound.

Swimming pools are typically designed to have aesthetic appeal, the coping elements of the present invention can be enhanced by incorporating decorative objects within the material of the second portion during extrusion prior to curing. Examples of decorative elements include shells, pebbles, coloured beads, preformed shapes made from a plastics material, metal or wood. However these examples are not intended to be restrictive and many suitable materials may be used alone or in combination.

Furthermore, an additional safety feature can be included within the coping elements 5, 40 of the present invention. Materials having luminescent properties can be embedded into the second portion. The luminescent materials may be phosphors such as strontium aluminate or zinc sulphide. The luminescent materials help to define the edge of the swimming pool as the ambient light reduces at the end of the day or during bad weather.

Paving elements can be manufactured having the same constitution as the luminescent coping elements. These paving elements can be laid in a path leading to the swimming pool to assist in defining a path to the pool.

An alternative combination could include the display means fabricated and formed as part of the first portion of the coping element instead of the second portion, or with elements of the display layer forming parts of both the first and second portions, so that a complete display layer and display means is provided when the first and the second portion are arranged in combination and secured or cured together.

In summary, coping elements are provided that are made from a material having a degree of resilience such that when a user of the swimming pool trips and falls or otherwise misplaces their footing upon entry into the pool and comes into contact with the edge of the pool the injury sustained by the user during the impact is significantly less severe than would be the case if conventional coping stones were installed at the edge of the swimming pool and additionally provide an element of signage and communication with the user of the swimming pool.

1. A swimming pool safety coping element, comprising:
   a first portion comprising a material selected from the group consisting of polyurethane, epoxy, latex, block copolymer, polyethylene foam, polypropylene foam and glass reinforced plastic (GRP);
   a display layer; and
   a second portion, disposed on the first portion and the display layer, comprising a Low Surface Energy material.

2. A swimming pool safety coping element, comprising:
   a first portion comprising a material selected from the group consisting of polyurethane, epoxy, latex, block copolymer, polyethylene foam, polypropylene foam and glass reinforced plastic (GRP); and
   a second portion, disposed on the first portion, comprising a Low Surface Energy material and a display.

3. A coping element according to claim 1, wherein the first portion is arranged to accommodate a portion of the display layer.

4. A coping element according to claim 2, wherein the first portion is arranged to accommodate a portion of the display.

5. A coping element according to claim 2, wherein the display comprises an LED display board.

6. A coping element according to claim 1 or 2, wherein the first and second portions comprise resilient material and the material of the second portion is softer than the material of the first portion.

7. A coping element according to claim 1 or 2, wherein the first material comprises a resin and a hardener.

8. A coping element according to claim 1 or 2, comprising a cured portion.

9. A coping element according to claim 8, wherein the cured portion is set at around 50°C.

10. A coping element according to claim 1 or 2, wherein the thickness of the second portion is in the range from 5 mm to 15 mm.

11. A coping element according to claim 1 or 2, the Low Surface Energy material is a material selected from the group consisting of a silicone compound, ethylene vinyl acetate and a block copolymer.

12. A coping element according to claim 1 or 2, wherein the second portion comprises a luminescent material.

13. A coping element according to claim 12, wherein the luminescent material comprises a phosphor.

14. A coping element according to claim 12, wherein the luminescent material is strontium aluminate or zinc sulphide.

15. (canceled)