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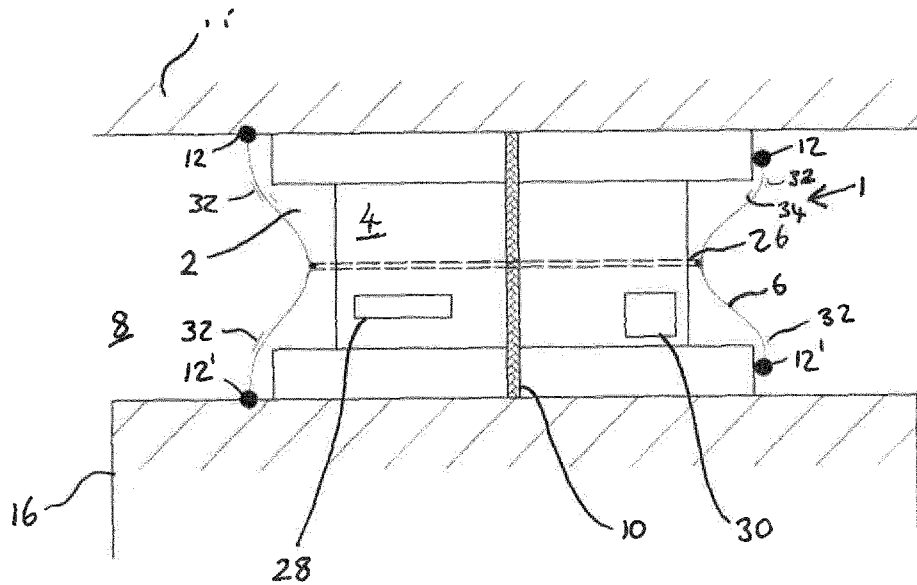


Fig. 1

(57) Abstract: A cover for a structural component, such as a bridge bearing, and a method for protecting and/or monitoring the structural component using the cover are provided. The cover may be a protective cover that comprises a membrane for forming an internal environment around the structural component. The membrane may comprise a material that allows flow of moisture vapour from the internal environment to an external environment through the material. The material may also prevent water ingress into the internal environment from the external environment through the material. The method for protecting a structural component may comprise providing the protective cover. The cover may have an associated temperature and/or humidity sensor for monitoring the environment of the structural component. The method of monitoring may comprise using the cover with the associated sensor. Thus, the cover may have added controls and/or measuring devices to create an intelligent cover.



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PROTECTIVE COVER

The invention relates to a protective cover for a structural component and a method of protecting a structural component using a protective cover.

5 Bridge bearings and other structural components are often subjected to conditions that can result in degradation of the component such that repair or replacement is required during its lifetime. For example, in the case of structural product with moving parts, issues may include contamination of sliding surfaces by dust, salt, salt spray or exposure to wind and humidity which may result in high
10 repair costs or need for premature product replacement. It is often the case that weather conditions cause failure of bearing services via corrosion.

 Previously known techniques to protect such structural components include barriers such as surface treatments or coatings such as paint or resin or cover devices such a flexible skirt.

15 CN 104099861 discloses a bag-type protective device for a bridge support. The protective device includes a capsule body which surrounds the bridge support and in which a filler material may be provided. This is used to isolate the bridge support from the exterior environment so as to extend the life of the bridge support.

 CN 107119555 discloses a reinforced concrete waterproof structure for steel
20 bridge bearings. The structure comprises a skirt and drainage pipe that can be used to protect the bridge bearing in the case of failure of a seal of the waterproof structure.

 There is a desire however for alternative and/or improved protective devices for structural components.

25 In the broadest aspect the present invention provides a cover (e.g. protective and/or intelligent cover) for a structural component and/or a method of protecting and/or monitoring a structural component using a cover.

 The present invention may provide an assembly that comprises the cover and the structural component.

30 The cover, assembly, and/or method may have one, or more, or all of the following features.

 The protective cover may be used for maintenance and/or monitoring of a structural component, such as a bridge bearing.

 The protective cover may protect the structural component from the
35 environment. The protective cover may provide a barrier around the structural

component and may for example seal around the structural component. The protective cover may for example protect the structural component from dust, wind, salt, moisture, weather conditions and/or paint degradation.

5 The protective cover may be used to control the environment around the structural component. For example, by keeping rain, wind, salt and/or dust etc away from the structural component may allow the environment that the structural component is subjected to be controlled and/or improved compared to if the structural component was not protected by the cover.

10 The cover may reduce and/or prevent consequences of the outside environment on the product. The cover may form a protected internal environment around the structural component.

15 When the cover is located around the structural component it may define an internal (e.g. closed) environment within the cover in which the structural component is located and an external environment outside of the cover from which the structural component is protected.

20 The cover and/or membrane may have a first surface and an opposing second surface. In use, i.e. when the cover/membrane is located around a structural component such as a bridge bearing, the first surface may face the structural component and/or internal environment and/or the second surface may face away from the structural component and/or towards the external environment.

The first and second surfaces may be bounded at its edges by first and second sides and first and second ends. The first and second sides may be perpendicular or substantially perpendicular to the first and second ends. The sides and ends define the edges of the cover.

25 The cover may be a panel (i.e. piece) that can be fixed around a structural component. The panel may be a flexible, substantially planar, piece that may be fixed around the structural component so as to completely encase it.

30 When installed around a structural component the first and second sides may form upper and lower edges of the cover. When installed, the first and second ends may be joined to or near each other so as to form an envelope around the structural component.

It has been found that known protective covers trap humidity around the product resulting in inner condensation and increased rate of corrosion. This can result in degradation of the structural component.

It has been realised that by having a protective cover that comprises a breathable material may help improve the condition in which the structural component is located.

5 In an aspect the present invention may provide a protective cover for a structural component, wherein the protective cover comprises a breathable material.

The material may have a breathability (MVPI%), based on BS7209:1990 Appendix B, of at least 10%, or at least 25% or about 50%.

10 The material may for example be a fabric with a water vapour transmission rate value of at least 1000 g/m²/day, at least 5000 g/m²/day or about 10000 g/m²/day.

The material may be water resistant, water-repellent and/or waterproof. The material may have had a durable water repellent treatment.

15 The waterproofness (Hydrostatic Head) of the material, based on BS3424-26: Method 29A, may be at least 100 cm, at least 500 cm, or about 1000 cm.

The cover may comprise a breathable and waterproof material, thus the cover itself may be breathable and waterproof.

20 The breathable and waterproof material may be a material that allows flow of moisture vapour through the material whilst preventing water (i.e. liquid water) passing through the material (e.g. under normal expected operating conditions).

Thus the cover may allow transport of water vapour but not of liquid water through the cover. This may allow outward flow of moisture from the internal environment away from the structural component whilst preventing water ingress towards the structural component into the internal environment.

25 In a first aspect the present invention provides a protective cover for a structural component, the protective cover comprising a membrane for forming an internal environment around the structural component, wherein the membrane comprises a material that allows flow of moisture vapour from the internal environment to an external environment through the material. Additionally, the material of the membrane may prevent (or restrict, in the case of condensation)
30 liquid water being in the internal environment.

This for example may be achieved if the material of the membrane prevents (e.g. net) liquid water ingress into the internal environment from the external environment through the material.

5 The material may move liquid from the internal environment to the external environment through the material. For example, the material may move moisture from one face to the other by means of capillary depression. Thus, whilst the material may not prevent water ingress through the material from the external environment it may prevent water being in the internal environment because water is transported out of the internal environment through the material faster than it ingresses. Thus, such a material may be regarded as waterproof as it prevents a net flow of liquid into the internal environment. Such a material may for example be Nikwax Analogy™.

10 The material may allow flow of moisture vapour from the internal environment to an external environment through pores in the material. The pores may be sized to permit flow of moisture vapour. Additionally the pores may be sized to prevent and/or restrict flow of liquid therethrough.

The material may be porous and air-permeable.

15 The material may be a textile and/or fabric.

The material may be a fire retardant material such as a fire retardant fabric.

The present invention may also provide a method of protecting a structural component using the protective cover.

20 In a second aspect the present invention may provide a method of protecting a structural component, the method comprising providing a protective cover for forming an internal environment around the structural component, wherein the protective cover comprises a material that allows flow of moisture vapour through the material, and forming an internal environment around the structural component with the protective cover.

25 The material may be the above described material. For example, the material may prevent water transport (i.e. liquid water transport) through the material.

The cover may seal to and/or around the structural component.

The cover may form a closed environment around the structural component.

30 Thus the internal environment may be a closed environment.

35 By closed environment it may be meant that the cover is sealed around the component such that the primary flow of fluid (e.g. the majority and/or all of the fluid flow) into or out of the environment is through the cover, e.g. the membrane of the cover, itself. The cover may be used to form an envelope around the structural component.

The cover may be used to improve the environment around the structural component. This may over time prevent, cease and/or reduce degradation of the structural component.

5 The fact that the cover allows transport of moisture/water vapour there through may allow the humidity inside the cover around the structural component to be reduced compared to the external environment. The cover may also reduce condensation inside the cover near the structural component compared to a structure covered with a non-breathable cover.

10 The cover may be used to prevent or minimise inner humidity and/or humidity rate increases and/or may keep a dry atmosphere around the structural component. This may reduce corrosion of the structural component and/or inner condensation compared to covers that are not breathable. The atmosphere around the structural component inside the cover may be drier than compared to a structural component enclosed by a non-breathable cover and/or no cover at all. In
15 the case that the cover fully encloses the structural component, the structural component inside the cover may be drier than compared to a cover which does not fully enclose the structural product.

Particularly when the cover is waterproof, the cover may prevent liquid water, such as rain, coming into contact with the structural component.

20 Although the cover may allow transport of moisture/water vapour there through this may not be free flowing such that the humidity inside the cover may not be equal to the humidity outside the cover, at least for part of the time. This means that if there are spikes in humidity, such as during and after rain, that subsides fairly quickly, the maximum humidity inside the cover may be less than the maximum
25 external humidity reached during the spike in external humidity. Thus the cover may reduce peaks in humidity in the environment around the structural component. The cover may be used to reduce the impact of changing humidity on a structural component enveloped by the cover.

30 The cover may have one or more desiccant attachment device(s) on the internal surface of the cover, e.g. on the internal surface of the membrane. The desiccant attachment device(s) may for example be a desiccant pocket.

These pockets may be for, e.g. sized and/or shaped for, receiving a desiccant, i.e. a moisture absorbing material, such as silica gel which may for example be in a sachet. The desiccant may be provided as a moisture absorbing

bag. The desiccant attachment device(s), e.g. pocket(s), may be stretchable and/or elasticated so as to hold the desiccant in place inside the cover.

The desiccant attachment device(s), e.g. pocket(s), may allow free flow of air between the desiccant and the internal environment. For example, in the case
5 of a pocket, the pocket may be made of a material that allows free flow of air inside and the outside of the pocket. This may for example be a porous material, such as a mesh. This material may be used to form the surface of the pocket between the internal environment of the cover and the internal volume of the pocket. This
10 material may mean that the action of the desiccant is not impeded by the material of the pocket.

By providing a location for a desiccant on an internal surface of the cover, it may be possible to use the cover to change the humidity level around the structural component.

The method may comprise providing a desiccant, such as a moisture
15 absorbing bag, in the internal environment of the cover. This may be attached to the internal surface of the cover using the desiccant attachment device described above.

Thus the present invention may provide a protective cover for protecting a structural component wherein the cover has a desiccant holding device, e.g. a
20 pocket, on an internal surface that is for holding a desiccant.

The present invention may provide a protective system for a structural component, comprising a protective cover and a desiccant, such as silica gel.

The present invention may provide a method of protecting a structural component, the method comprising creating an internal (e.g. closed) environment
25 around the structural component and putting a desiccant within the internal environment. Putting the desiccant in the internal environment may comprise putting the desiccant in a pocket of a cover that creates the internal environment around the structural component. The desiccant may be attached to the cover, e.g.
30 put in the pocket, before or after the cover is provided around the structural component to form the internal environment. The desiccant may be replaced as needed, e.g. once the desiccant is saturated such that it no longer has any substantial effect on the internal humidity of the cover.

Such a method and/or protective cover may be useful in improving the condition of the structural component prior to an operation such as remedial work.
35 For example, if a structural component, such as a bearing, is going to be treated,

such as coated, the protective cover with a desiccant may be placed around the structural component for a period of time, such as a few days or weeks before the remedial work is carried out. This may reduce the humidity of the environment that the structural component is subjected to. This may reduce liquid and moisture on
5 and/or in the structural component such as in corrosion pockets prior to the remedial work being carried out.

The cover may act as an insulator. Thus, the temperature inside the cover may be different to the temperature outside the cover, at least for a period of time, such as a few hours, after the external temperature has changed.

10 The material, e.g. membrane of the cover, may be flexible. Thus the protective cover may be flexible. This may make the cover easier to install and/or it easier to inspect the structural component without having to remove the cover entirely.

The cover may comprise multiple material layers. For example, the cover
15 may comprise two or more sheets. These may be separate sheets, e.g. with an air/fluid layer in between the sheets and/or part of a multi-layer material.

Thus, the material may be or comprise a multi-layer material, for example a multilayer fabric such as a laminated fabric.

The material may be or comprise a twin membrane.

20 Thus, in another aspect, the present invention may provide a protective cover for a structural component, the protective cover comprising a membrane for forming an internal environment around the structural component, wherein the membrane comprises multiple layers.

The material may be, or comprise any material which is breathable and
25 offers water resistance, water repellent and/or waterproof features.

The material may be or comprise polytetrafluorethylene (PTFE) such as stretched PTFE. The material may be or comprise Gore-Tex™.

The material may be or comprise Nikwax Analogy™.

30 The cover may have one or more sensor fixation device for attaching one or more sensors to the cover. For example, the cover may have one or more pockets that may be for, e.g. sized and/or shaped for, receiving one or more sensors. Such a sensor fixation device, e.g. pocket, may be on an internal and/or external surface of the cover. Thus the cover may allow monitoring of the internal and/or external environment.

It may be desirable to monitor both the internal and external environment to compare, report and/or to demonstrate performance of the cover.

In the case that the condition, e.g. humidity and/or temperature, are monitored inside the internal environment and near the internal environment (but
5 outside the internal environment), the internal and external data may be compared and reported and/or used to make assessments/determinations.

The temperature and humidity data may be used to assess whether the environment (internal and/or external) is above or below the dew point.

The sensor fixation device(s), e.g. pocket(s), may be stretchable and/or
10 elasticated so as to hold the sensor in place inside or outside the cover.

The sensor may be any measuring, control and/or reporting device.

The one or more sensors may be used to record ambient condition data, such as humidity and/or temperature data, of the structural component.

The sensor(s) may be used to verify that the cover is protecting the
15 structural component as required to increase its service life.

The sensor may be a device which detects or measures a physical property and records, indicates, and/or otherwise responds to it. The sensor may for example be a data logger, such as a 4G data logger. The sensor, e.g. data logger, may be used to remotely monitor the environment in or around the cover.

Thus the present invention may provide a protective cover for protecting a
20 structural component wherein the cover has a sensor fixation device that is for holding a sensor. The cover may thus be considered to be an intelligent cover.

The cover may additionally comprise a desiccant holding device for holding
25 humidity controlling bags. This may make the cover intelligent. The desiccant holding device may be the same part as the sensor fixation device.

The method may comprise providing a cover with a sensor fixation device. The method may comprise fixing a sensor relative to the cover. This is so that the internal environment and/or the environment around the cover may be monitored. Thus the method may comprise monitoring the environment, e.g. temperature
30 and/or humidity, inside the cover or immediately outside the cover.

In a third aspect the present invention may provide a cover for a structural component, the cover being for forming an internal environment around the structural component, wherein the cover comprises a sensor fixation device for a sensor for monitoring conditions near the structural component. The sensor may
35 be for monitoring conditions within the internal environment.

In particular, the present invention may provide a cover for a structural component, the cover being for forming an internal environment around the structural component, wherein the cover comprises a sensor fixation device for a sensor for monitoring temperature and/or humidity within the internal environment.

5 The cover may be the above described protective cover.

The present invention may provide a monitoring and/or protective system for a structural component, comprising a cover and a sensor. The cover may be a cover for forming an internal environment around the structural component and the sensor may be for monitoring a condition, such as temperature and/or humidity,
10 inside or near the internal environment.

The present invention may provide a method of monitoring a structural component, the method comprising providing a cover for forming an internal environment around a structural component and providing one or more sensors for monitoring, e.g. temperature and/or humidity, inside and/or outside the internal
15 environment.

The method may comprise attaching the sensor to the cover on the internal or external surface.

The sensor may be a temperature and/or humidity sensor.

The sensor may be used to determine the condition that the structural
20 component is subjected to. For example, the sensor may provide data regarding the condition that the structural component is subjected to. Thus the sensor may allow determinations to be made about when the structural component will need repairing and/or replacing.

The sensor data may be used to qualify improved environment. This may
25 lead to an improved life of the structural component and/or be used to compare internal and external conditions during operation and/or hand over period.

A cover, e.g. the protective cover, together with a sensor may be referred to as an intelligent cover.

The system may comprise a sensor on both the internal and external
30 surface of the cover. This may allow data about the environment inside and in close proximity to the outside of the cover to be compared. This may allow an assessment to be made about the effectiveness of the cover, i.e. the function of the cover may be verified using sensors.

The monitoring using sensors may be continuous, e.g. for the majority or
35 whole life of the cover, or it may be temporary and/or periodic. For example, data

regarding the conditions may only be taken during inspections. This may be to verify that the cover is having the desired effect rather than continuous monitoring that may be used to determine when the structural component needs to be repaired and/or replaced.

5 The present invention may provide a method of monitoring a structural component. The method comprising providing a cover for forming an internal environment around the structural component, and a sensor for monitoring a condition, e.g. temperature and/or humidity, inside or near the internal environment. The method may comprise forming the internal environment around the structural
10 component, placing one or more sensors internal or external of the internal environment and obtaining data using the one or more sensors. The method may comprise attaching the sensor to the cover on the internal and/or external surface of the cover. The method may comprise receiving the data and making a
15 determination based on the data. The determination may for example be when to repair and/or replace the structural component based on the data and/or whether the cover is having the desired effect and/or whether the attachment of the cover needs adjusting.

 The protective cover may comprise one or more attachment mechanisms that allow the cover to be attached relative to the structural component, e.g. to
20 and/or around the structural component.

 The attachment mechanism(s) may be used to form an internal, e.g. closed, environment around the structural component to be protected by the cover.

 The protective cover may be attached to the structural component itself and/or to one or more structures to which the structural component is attached.

25 For example, in the case of a bridge bearing, the protective cover may be attached to part of the bridge bearing itself, such as an upper and/or lower part of the bearing. Additionally or alternatively the protective cover may be fixed to the upper and lower structure of the bridge above and below the bearing.

 The cover may have first and second (e.g. upper and lower) attachment
30 mechanisms. The attachment mechanism(s) may be located at or near first and second sides (i.e. edges) of the cover.

 The cover may be arranged so that it can be attached to and/or around the structural component without having to modify and/or affect the component to which it is attached.

One, each or all of the attachment mechanism(s) may be or comprise a friction grip attachment mechanism.

The present invention may provide a protective cover for a structural component, the protective cover being for forming an internal environment around the structural component, wherein the cover is arranged to be attached relative to
5 the structural component by a friction grip attachment mechanism.

The present invention may provide a method of protecting a structural component, the method comprising: providing a protective cover for forming an internal environment around the structural component, and attaching the protective cover relative to the structural component using friction. This may be attaching it by
10 friction alone. This may be achieved by attaching the protective cover to the structural component using one or more friction grip attachment mechanisms.

The attachment mechanism may be referred to as a tool free attachment in the case that it can be used to affix the cover to the structural component without
15 any tools. The friction grip attachment mechanism/tool free attachment may mean that attachment of the cover relative to the structural component is achieved without any damage to the structural component, such as to painted surfaces, or any other alteration of the structural component (such as drilling of holes). This is because the attachment mechanism may work without any deformation, such as drilling or gluing
20 etc., of the structure to which it is attached.

The friction grip attachment mechanism may comprise a belt and a tensioner.

The method of attaching the cover relative to the structural component may comprise tightening a belt around the structural component to hold it relative to the
25 structural component by friction.

The tool free attachment mechanisms (e.g. an external strap with a tensioner and internal friction strip) may allow the cover to be easily installed and replaced without tools. This may be particularly convenient in locations where
30 access to the structural component is difficult, e.g. in the case that it is via rope access.

For example, the attachment mechanism may comprise a belt/strap that is tightened around the structural component. The strap may be made of a strong material, such as a webbing material, that may at least in part be elasticated. The tightening of the strap around the structural component may cause a friction

engagement between the cover and the part to which it is connected, e.g. structural component, that holds it in place.

One or more or each attachment mechanism may comprise a tensioner and/or lock such as a puller, ratchet buckle, ratcheting buckle, cam buckle, 5 ski/snowboard ratchet buckle, double locking D ring etc. The tensioner may be used to tighten/pull the strap around the structural component and/or lock the strap in a tightened position around the structural component so as to hold it in place. The strap and tensioner of the attachment mechanism may be provided on the outer surface of the cover. This may allow easy, convenient and/or quick attachment of 10 the cover to the structural component.

The assembly may comprise one or more spacers. In use the spacer may be located between the cover and the part to which it is attached.

The spacer(s) may facilitate attachment of the cover relative to the structural component. The one or more spacers may provide a fixation surface to which the 15 cover may be attached. The spacer may be fixed relative to the structural component and the cover may be attached to the spacer and/or the spacer may be fixed relative to the structural component by action of the cover.

For example, in the case of a structural component that has an outer perimeter with a polygonal shape (e.g. straight edges), one or more spacers such 20 as wedges (e.g. bulged or convex wedges) may be inserted between the edges of the structural component and the attachment mechanism (e.g. belt) to provide a fully convex and curved profile for the attachment mechanism. This may for example in the case of an attachment mechanism with a belt allow a well distributed plastering pressure on the tightened belt circumference. This may for example 25 prevent the belt gaping on a straight (or slightly concave) edge.

The spacer may be fixed directly to the structural component, or to a part adjacent to the structural component. The spacer may be fixed relative to the structural component e.g. by any means such as bolts, screws, welding, gluing etc.

The attachment mechanism may comprise a friction strip on the inside 30 surface of the cover. The attachment mechanism may be arranged so that the friction strip is pressed into engagement with the part to which the cover is to be attached, e.g. the structural component, so as to hold the cover in place relative to the structural component. The attachment mechanism may additionally or alternatively create a protected, e.g. sealed, environment inside the cover.

For example in the case that the attachment mechanism comprises a strap, the friction strip may be provided on the inside surface of the cover underneath where the strap is provided on the outside surface. In this case as the strap is tightened around the component to which the cover is to be attached, the friction strip is forced into engagement with the component.

The friction strip for example may comprise a plastic strip such as a strip made of polyurethane (PU) and/or polyvinyl chloride (PVC). The friction strip may have a relatively high coefficient of friction (e.g. higher coefficient of friction than the material of the cover) such that it can be used to grip the component when it is forced into contact with it.

The friction strip, may seal the cover to the component to which is being fixed. This may thus form a seal that bounds the internal, e.g. closed, environment within the cover, around the structural component. Thus the friction strip may have the dual function of holding the cover in place and sealing the cover to the structural component.

Thus the attachment mechanism/friction strip may be used to protect the structural component from the external environment and from conditions such as dust.

The cover may additionally or alternatively be attached by means of some other attachment device such as Velcro, poppers, bolts, rivets, clamp, welding, screws (including drive screws), glue, clamped rail system, jubilee clip, magnetic assembly etc. or any other known and suitable attachment device. For example, the top and/or bottom sides of the cover may be mechanically fixed, such as by bolts, clamps, screws, poppers, and/or welding etc. to the structure or adjacent the structure so as to form an internal environment around the structural component to be protected. The attachment between the cover and the structure to which the cover is joined may or may not be airtight. In any event, it may be sufficient to substantially prevent the ingress of dust, water, wind, rain etc. into the internal environment within the cover.

For example, the hook or eyes of Velcro may be fixed, such as glued to the component to which the cover is to be fixed and the other to the cover. Thus the cover may be attached relative to the structural component using Velcro.

A rail system may be provided on the part to which the cover is to be attached, e.g. the structural component to be protected or an adjacent component, into which the cover may be fixed such as clamped. In this case the cover may be

slid through the rail system around the structural component rather than being directly wrapped around the structural component so as to form the internal environment around the structural component. The rail may for example be an aluminium H profile. The rail may be attached, such as screwed, to or near the structural component, such as to a concrete plinth. The cover may have a rail attachment portion that may be slid inside the rail to attach the cover thereto.

The cover may be wrapped around the structural component and fixed thereto or an adjacent structure using one or more attachment mechanisms.

The cover may comprise an attachment mechanism at the first side of the membrane and an attachment mechanism at the second opposite side of the membrane.

For example, in the case that the structural component is a bridge bearing, the cover may be attached directly to the bearing itself or some other component such as bearing grout, taper plate or sub plates.

The cover may surround the structural component. The cover may form an annular cover around the structural component. The annular cover that encircles the structural component may be formed by connecting the ends of one or more cover pieces.

Thus the present invention may provide a protective cover for a structural component, wherein the cover is a panel (single or multi-piece panel/piece) that is arranged to be located around the structural component and secured to itself to form the internal environment.

The panel may be a substantially flat/planar, strip of flexible material (e.g. fabric) that is affixed to itself to form a sleeve (i.e. annular cover) around the structural component.

The present invention may provide a method of protecting a structural component, the method comprising, providing a cover in the form of a panel, surrounding the structural component with the cover and securing the cover to itself to form an internal environment around the structural component.

For example, the cover may be a single piece, i.e. panel, which is wrapped around the component, and connected to itself to form a cover that surrounds/encircles the structural component. The cover may be connected to itself at its ends. For example, the cover may comprise a connector such as zip that can be used to fasten the ends together to hold the cover around the structural

component and/or at least in part form the internal, e.g. closed, environment around the structural environment.

By having a cover that is designed to be wrapped around and connected to itself to surround the structural component, installation and removal may be made
5 easier and/or quicker.

The cover and/or zip may be arranged so that when the cover is around the structural component the zip is undone from the bottom upwards. This may facilitate the cover remaining attached at the top during an inspection.

The zip may comprise zip ends to prevent the ends coming out.

10 The zip may start and/or end underneath the attachment mechanism. When the attachment mechanism comprises a strap the zip may be designed to start and/or end above or below the strap to avoid interfering with the strap. Alternatively the cover maybe designed so that the ends of the zip are underneath the strap so as to be hidden and/or protected by the strap of the attachment mechanisms.

15 The cover may additionally or alternatively comprise one or more horizontal openings, e.g. zips. These may be used to facilitate inspection of the structural component around which the cover is mounted.

The cover may comprise a plurality of sections such as two, or more that can be joined together, such as at their ends, to form a panel that can be used to
20 encircles the structural component. Thus each piece may comprise a connector at each end, such as half a zip that can be used to connect the piece to at least one other piece to form the panel that can be located around a structural component to form the cover.

25 The cover may be a single piece that is connected to itself to enclose the structural component.

The cover may be a modular cover made up of a plurality of pieces that are connected together. Thus, there may be a plurality of pieces, such as two or more from which the cover may be formed by connecting together one or more of the pieces. The plurality of pieces may be provided in a plurality of shapes and/or
30 sizes. This arrangement may provide flexibility with regard to the size and/or shape of the cover. For example, this may mean that the cover can be made appropriate for the structural component by forming it from one or more standard sized pieces to form the correct sized cover for the structural component to be protected.

35 Alternatively the cover may be custom made according to the dimensions of the structural component.

The method may comprise providing a panel for forming the cover by connecting together a plurality of pieces.

5 The method may comprise obtaining the dimensions of the structural component to be made and obtaining one or more cover pieces that can be joined together to form a cover around the structural component. The one or more cover pieces may be selected from pre-made pieces in one or more standard sizes and/or made to custom fit the structural component.

10 The cover may be designed and/or shaped to reduce the amount of fabric at the edges and/or corners of the structural component. Thus, the cover may not be a rectangular piece of material but instead may have a tailored shape that has less fabric at certain points of the cover. For example, the cover may have tailored corners that reduces excess material at the corners. This may prevent trapping of the cover when located around a moving part and/or flapping of excess material in the wind.

15 The panel of the cover may not be a flat piece of material but may be 3-D with a shape that facilitates the cover fitting around the structural component.

20 The shape and/or the size of the cover may be able to accommodate serviceability limit state (SLS) movements of the structural component. The cover may be shaped and or sized such that if the structural component, e.g. bridge bearing, moves more than its SLS the cover will visually indicate that this has occurred. For example the cover may break, move and/or detach if the structural component has moved beyond SLS design values.

25 The connector at the ends of cover that is used to connect one or more pieces to form a cover that encircles the structural component may be a waterproof connector such a waterproof zip.

The advantage of connecting the cover around the structural component using a zip is that installation, removal and/or inspection may be performed relatively quickly. For example, the cover may be undone relatively easily to allow relatively quick inspections of the underlying structural component.

30 The method of installation may comprise providing a cover for forming an internal environment around a structural component, attaching the cover at a first side, e.g. a top side, to or adjacent the structural component using a first attachment mechanism, connecting the ends of the cover (e.g. the ends of one piece or the ends of a plurality of cover pieces) to form an envelope around the
35 structural component using a connector (e.g. a waterproof zip), attaching the cover

at a second side, e.g. a bottom side, to or adjacent the structural component using a second attachment mechanism. The steps of the method may be performed in this order or in any order.

5 The cover may comprise one or more markers that are for aiding installation of the cover on the structural component. For example, the marker(s) may facilitate orientation of the cover on the structural component. The marker(s) may be visual marker(s). The markers may for example be provided to correspond to corners of the structural component (if present). The marker(s) may thus be referred to as corner marker(s).

10 The markings may be sewn, marked or attached onto the outer surface of the cover. The markings may be permanent. The markers may be formed from high visibility material that is sewn onto the outer surface of the cover/membrane.

The cover may be arranged so that the connector, e.g. zip, can be undone, at least in part, whilst at least one attachment mechanism is operable to attach the cover relative to the component. This may allow the cover to be undone to allow inspection of the underlying structural component without having to entirely remove the cover.

15 The cover may have one or more fastening devices, such as a poppers, ties or clips etc., that when the connector is at least partly undone, allows part of the cover to be temporarily fixed away from the opening. This may be so that the loose parts of the cover do not impede an inspection and/or work carried out on the structural component.

20 For example, the cover may be unattached from the component at the bottom side whilst still being attached at the upper side, the ends of the cover disconnected, e.g. unzipped, at least in part and then the free parts of the cover rolled and/or folded up and fixed out of the way using the one or more fastening devices. This may prevent flapping of the cover during an inspection.

The cover may be designed to allow easy installation and/or replacement. This may reduce handling time on site at the structural component.

30 The cover may comprise one or more gathers. These may be parts that are for pulling the cover around the structural component such that it may be held towards the structural component.

The present invention may comprise providing a cover for a structural component, the cover comprising a membrane for forming an internal environment around the structural component, wherein the cover comprises one or more gathers

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that are for pulling the cover around the structural component such that the cover is held towards the structural component. This may prevent flapping of excess material in wind whilst the cover is in use.

5 One or more or each gather may comprise an elasticated belt, such as a bungee, that results in the cover being held towards the structural component. One or more or each elasticated belt may have a connector for connecting one end to the other end of the elasticated belt or another piece of elasticated belt. The connector may comprise one or more hooks and/or loops. The connector may be a releasable connector such that the elasticated belt can be connected and
10 disconnected. When the cover is wrapped around the structural component the ends of the gather may be connected so that the gather pulls the cover around the structural component. Thus the gather(s) may allow the cover to fit more closely around the outside of the structural component.

The gather(s) may extend and/or act in a vertical, horizontal and/or any
15 direction. The desirable direction for the gather may depend on the geometry of the cover and/or the structural component to be covered.

For example there may be one or more gathers that extends between first and second ends and/or one or more gathers that extends between first and second sides of the cover. The gather(s) may act to pull the first and second ends
20 and/or the first and second sides towards each other. This may effectively pull the membrane of the cover towards the structural component. This may minimise movement of the cover once it is installed around the structural component. This may minimise fatigue of the material of the cover due to effects such as the wind that may otherwise result in flapping of the cover.

25 In the case that the cover comprises an upper and lower attachment means at the first and second sides of the cover, a gather may extend longitudinally between the upper and lower attachment means in a direction from the first end to towards the second end of the cover. Such a gather may be used to pull the cover towards the structural component around a horizontal line around the structural
30 component, i.e. form a waist in the cover around the structural component.

The cover may comprise an inner pocket (that may be additional to the desiccant pocket(s) and/or sensor pocket(s), if present) that is for a waterproof inspection record sheet containing inspection details such as installation date, next
inspection date, inspector record, date and/or signature etc.

35 The cover may have an internal and/or external ID label.

The cover may comprise a membrane. The membrane may comprise and/or be formed of a breathable and/or waterproof material.

The cover may be referred to as a jacket, curtain, sleeve, oversleeve, gaiter, and/or skirt.

5 The structural component may be a steel structural component.

The structural component may be a structural component of a bridge and/or a building, in particular moving structural parts. The structural component may be a bearing and/or a seismic device. The structural component may be a structural component with moving parts. For example, the structural component may be a
10 bridge bearing, a joint, an expansion joint, a shock absorber, a tuned mass damper, and/or a shock transmission unit (STU) etc.

The structural component may be a bridge bearing of a pedestrian footbridge, a road bridge, a pipe bridge, industrial bridge, etc.

15 The structural component may be a seismic device such as a shock transmission unit or a seismic bearing.

The protective cover may be used to reduce the rate of degradation of the structural component within the protective cover and/or to monitor conditions to which the structural component is subjected. This may be so informed decisions can be made regarding when to repair and/or replace structural components and/or
20 to know whether the cover is having the desired effect on the environment to which the structural component is subjected.

The cover may be used to increase the lifespan of a protective product. For example, the cover may be used to maximise the product service life of a structural component. The cover may be used with a structural component, e.g. bridge
25 bearing, that has already started to degrade and/or is in a poor condition, and be used to protect the structural component to increase the length of time until the component needs to be repaired or replaced and/or used to monitor the environment in which the structural component is located so as to allow estimations to be made when repair or replacement is required.

30 The cover may have a service life of at least five years. Thus, the cover may be replaced after the cover has been used for its service life. The cover may have a service life that is approximately equal to the time between scheduled inspections. In this case, the cover may be replaced by a new cover at each inspection, if required.

The cover may fully enclose the structural component when the ends of the cover are connected to each other and the attachment mechanisms are attached relative to the structure.

5 The cover may prevent ingress of dust, water and humidity and reduce wind effects on the structural component, e.g. bridge bearing.

A number of the features listed above may be provided in a cover without one or more of the other described features. However, it should also be appreciated that a cover may be provided with a plurality or all of the above described features.

10 A preferred embodiment of the cover may be a cover for a bridge bearing comprising one, or more, or all of a flexible waterproof and breathable membrane for forming an internal environment around the structural component, a sensor for monitoring humidity and/or temperature within the internal environment, a plurality of attachment mechanisms for attaching the cover relative to the bridge bearing by
15 friction, a gather to pull the membrane around the bridge bearing and a waterproof zip for connecting the membrane to itself to form the internal environment.

Certain preferred embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:

20 Figure 1 is a schematic illustration of a protective cover around a structural component;

Figures 2, 3 and 4 show a protective cover around a model of a structural component; and

Figure 5 shows some of the internal parts of a protective cover.

25 Shown schematically in figure 1 is a protective cover 1 that forms a protective internal environment 2 around a structural component 4. In this case the structural component 4 is a bridge bearing, however, the cover 1 of the present invention may be used with many different structural components, such as, but not limited to, a joint, an expansion joint, a shock absorber, a tuned mass damper,
30 and/or a shock transmission unit (STU) etc. Thus the structural component may be any structural component of a building or bridge for example.

The cover 1 comprises a flexible membrane/fabric 6 that is wrapped around the bridge bearing 4. The membrane has an inner surface that faces the internal environment 2 and the bridge bearing 4 and an outer surface that faces an external
35 environment 8 and faces away from the bridge bearing 4. The membrane 6 is

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bounded by upper and lower sides (i.e. edges) that extend around the bearing 4 at upper and lower locations and first and second ends that are connected together via connector 10 so as to form a cover 1 that envelops the bearing 4 by forming a broadly annular cover 1 therearound.

5 The connector 10 is shown in the figures as being a zip, however, this connector 10 may be any known connector such as Velcro, poppers etc.

 The cover 1 is attached relative to the bearing 4 by attachment devices 12, 12'. The attachment devices 12, 12' may attach the cover directly to the bearing 4 as shown on the right-hand side of figure 1 or to upper and lower structures 14, 16 adjacent the bearing 4 as shown on the left-hand side of figure 1. Thus figure 1
10 shows two alternative attachment arrangements on the two sides of the figure.

 The cover comprises upper and lower attachment devices 12, 12' so that the cover is attached relative to the bearing 4 at both an upper and lower location. The attachment devices 12, 12' extend around the outside of the perimeter of the
15 bearing 4 so as to attach the cover 1 along its upper and lower sides to the structure 4.

 The attachment devices 12, 12' may be tool free attachment devices, i.e. attachment devices that can be operated and attached relative to the structural component 4 without tools and/or without requiring any alteration or defacing of the
20 part to which the cover 1 is attached.

 For example, as shown in the cover illustrated in figures 2 to 5, each attachment device 12, 12' may comprise a belt 18 that extends along the length of the side of the cover 1. When the cover 1 is wrapped around the structural component 4, the belt extends around the outer perimeter of the structural
25 component 4. To attach the cover 1 to the structural component 4, the belt 18 may be pulled tight around the part to which it is to be attached. The belt 18 may be pulled tight using a tensioner 20 and locked using locking device 22. In the cover 1 shown in figures 2, 3 and 4 the tensioner 20 is a D-ring that is sewn onto the belt 18 and the locking device 22 is a ratchet buckle.

30 The pulling of the belt 18 tight around the structural component 4 pulls part of the cover 1 into tight engagement to the structural component 4 such that it is attached thereto by friction. This friction grip may be increased by the cover 1 having a friction strip 24 as shown in figure 5. The friction strip 24 may for example be made of polyurethane and/or polyvinyl chloride or any other material that has a
35 coefficient of friction that is higher than the internal surface of the cover.

Additionally or alternatively the attachment devices 12, 12' may comprise Velcro, poppers, screws, bolts, clips, welding, clamped rail system, etc. The appropriate attachment devices 12, 12' for the cover will depend on factors such as the type, size and geometry of the structural component 4 and the forces expected to be experienced by the cover 1 during use.

The attachment devices 12, 12' may also seal the cover 1 to or around the structural component 4 so as to, together with the connector 10, close the internal environment 2. The seal may or may not be an airtight seal.

The connector 10, e.g. waterproof zip, may be arranged so that it can be opened from the bottom first towards the top of the cover 1. For example, in the case of a zip it may be possible to unzip it from the bottom of the cover 1 towards the top. Additionally or alternatively, the connector 10, e.g. waterproof zip, may be arranged so that it can be opened from the top first towards the bottom of the cover 1. For example, it may be possible to unzip from the top of the cover 1 towards the bottom. This is to facilitate being able to open the cover 1 to allow inspection of the internal structural component 4 whilst leaving at least the upper attachment device 12 connected to the structural component 4. Thus the cover 1 may not need to be entirely removed from the structural component 4 during an inspection. This may allow inspections to be carried out easily and/or quickly.

The membrane/fabric 6 may be formed of a breathable material. The membrane/fabric may be formed of water-resistant, water-repellent and/or waterproof material(s). The material(s) may be formed as a single or multiple layers. The material allows air flow between the internal and external environments 2, 8 of the cover. The membrane/fabric 6 may be waterproof. Thus, the cover 1 may allow moisture to flow from the internal environment 2 to the external environment 8 as water vapour whilst preventing liquid water transporting through the membrane 6 from the external environment 8 to the internal environment 2. This may mean that the cover 1 is able to protect the structural component 4 from the outside environment without resulting in the trapping of moisture inside the cover 1.

The cover may comprise one or more gathers 26. The gather 26 may be an elasticated belt as shown most clearly in Figure 5. The gather 26 may extend horizontally around the middle of the cover 1 as shown in figure 1 for example. The gather 26 may act to pull in the cover 1 so that it fits more closely around the structural component 4. This may reduce movement of the cover 1 due to external

factors such as wind that could result in material fatigue over the life time of the cover 1 when the cover 1 is mounted on the structural component 4. Additionally or alternatively, the gather 26 may reduce risk of trapping of the cover 1 in between movable parts of the structural component 4.

5 The gather 26 may be connected at each end by a connector such as a hook and loop arrangement so that it fully encircles the structural component 4. Although the gather 26 in this cover 1 is shown as extending around the structural component horizontally, there may alternatively or additionally be gathers that extend vertically in a direction from one attachment device 12, to the other
10 attachment device 12' or in any other direction.

 The cover 1 may comprise one or more sensor attachment devices such as a pocket 28. The sensor attachment device may be located on the inside and/or outside of the cover 1 so that the internal environment 2 and/or the external environment 8 in close proximity to the cover 1 may be monitored. The pocket 28
15 may hold one or more sensors. The sensors may be for monitoring conditions such as humidity and/or temperature.

 The data from these sensors may be used to estimate and/or determine when repair or replacement of the structural component 4 inside the cover 1 is required. Data from these sensors may additionally or alternatively track
20 performance of the cover and/or report actual results of the environment.

 The cover 1 may additionally or alternatively comprise an attachment device 30 for a desiccant, such as a moisture absorbing bag. The attachment device may be a mesh pocket 30 on the internal surface of the membrane 6 of the cover 1. The desiccant may be used to reduce the humidity of the internal environment 2 of the
25 cover 1. This may for example be useful prior to remedial operations on the structural component 4 when it may be important that the structural component 4 is dry. Thus a desiccant may be put in pocket 30 some time, such as a few days or weeks, before remedial work, such as painting, is carried out on the structural component 4.

30 The cover 1 may comprise permanent visible markers 32 on the outside of the membrane 6. These may be present at the parts of the cover 1 over corners of the structural component 4 and thus may be referred to as corner markers 32. Such markers 32 may be used to help orientate the cover 1 relative to the structural component 4 during installation. This may allow installation of the cover 1 to be
35 easier and/or quicker.

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The cover 1 may comprise one or more fastening devices 34. These may for example be poppers, ties or Velcro etc. During an inspection when the cover 1 is opened by undoing the connector 10, the bottom attachment device 12' may be undone and the loose parts of the cover may be folded or rolled up out of the way and secured using the fastening devices 34. This may mean that the cover 1 can remain attached to the structural component 4 at least in part during an inspection. This may make an inspection easier and/or quicker.

The method of installing the cover 1 may comprise one or more of the following steps:

- 10 attaching at least one attachment device 12, 12' (such as the upper attachment device 12) to fix the cover 1 relative to the structural component 4;
- connecting the gather 26 to itself to pull the cover 1 in around the structural component;
- checking the visible markers 32 are in the correct location to obtain confirmation that the cover 1 is in the correct location and origination on the structural component 4;
- placing one or more sensors into pocket(s) 28;
- placing a desiccant into pocket 30;
- connecting the ends of the membrane 6 using connector 10 to create an envelope around the structural component 4; and/or
- attaching the other attachment device 12' (if not attached already) to the structural component so as to form an internal (e.g. closed) environment 2 around the structural component.

The uninstallation/removal of the cover may be achieved by performing these steps in reverse. For example, uninstallation may comprise one or more of the following steps:

- 25 disconnecting the one or more attachment devices 12, 12';
- undoing the connector 10;
- disconnecting the gather 26;
- 30 disconnecting any attachment devices 12, 12' that are still connected relative to the structural component 4; and
- removing the cover 1 from the structural component 4.

Inspecting the structural component 4 may comprise one or more of the following steps:

- 35 disconnecting the bottom attachment device 12';

- 25 -

undoing the connector 10 from the bottom upwards;
undoing the gather 26 (if present); and
folding/rolling up the loose flaps of membrane 6 and securing them using
securing devices 34 to allow inspection of the structural component 4.

5 After inspecting the structural component 4 the method may comprise
releasing the flaps of the membrane 6 from the securing devices 34, redoing up the
gather 26; redoing up the connector 10 and reattaching the bottom attachment
device 12'.

10 Whilst the steps of each of the installation, uninstallation and/or inspection
may be performed specifically in the order as listed above, these steps may be
performed in any order and steps may be performed concurrently if appropriate.

The cover 1 may be designed to make installation, removal and/or
inspection relative quick and easy procedures.

CLAIMS:

1. A protective cover for a structural component, the protective cover comprising:
5 a membrane for forming an internal environment around the structural component,
 wherein the membrane comprises a material that allows flow of moisture vapour from the internal environment to an external environment through the material.
10
2. A protective cover according to claim 1, wherein the material prevents water ingress into the internal environment from the external environment through the material.
- 15 3. A protective cover according to claim 1 or 2, wherein the cover has a sensor fixation device for holding a humidity and/or temperature sensor.
4. A protective cover according to claim 1,2 or 3, wherein the cover comprises an attachment mechanism for attaching the cover relative to the structural
20 component by a friction grip.
5. A protective cover according to claim 4, wherein the attachment mechanism comprises a belt and a tensioner and/or lock.
- 25 6. A protective cover according to claim 4 or 5, wherein the attachment mechanism comprises a friction strip on the inside surface of the cover.
7. A protective cover according to any preceding claim, wherein the cover is a panel that is arranged to be located around the structural component and
30 secured to itself using a connector to form the internal environment.
8. A protective cover according to claim 7, wherein the connector is a waterproof zip.

9. A protective cover according to claim 8, wherein cover is a modular cover made up of a plurality of pieces connected together.
- 5 10. A protective cover according to any preceding claim, wherein the cover comprises one or more gathers for pulling the cover around the structural component such that it is held towards the structural component when the cover is located around a structural component.
- 10 11. A protective cover according to any preceding claim, wherein the cover comprises a desiccant attachment device on the internal surface of the cover.
12. A method of protecting a structural component, the method comprising:
providing a protective cover for forming an internal environment
15 around the structural component, wherein the protective cover comprises a material that allows flow of moisture vapour through the material, and forming an internal environment around the structural component with the protective cover.
- 20 13. A method according to claim 12, wherein the material prevents water transport through the material.
14. A method according to claim 12 or 13, wherein the method comprises connecting a sensor to the protective cover.
- 25 15. A method according to claim 12, 13 or 14, wherein the method comprises attaching the protective cover relative to the structural component using friction.
- 30 16. A method according to any of claims 12 to 15, wherein the method comprises tightening a belt around the structural component to hold the cover relative to the structural component.

17. A method according to any of claims 12 to 16, wherein the method comprises surrounding the structural component with the cover and securing the cover to itself.
- 5 18. A method according to claim 17, wherein the cover is secured to itself using a waterproof zip.
19. A method according to any of the claims 12 to 18, wherein the cover is a modular cover and the method comprises connecting together a plurality of
10 pieces to form the cover.
20. A method according to any of the claims 12 to 19, wherein the method comprises providing a desiccant in the internal environment of the cover.
- 15 21. A system for monitoring a structural component, comprising a cover for forming an internal environment around the structural component and a sensor attached to the cover for monitoring temperature and/or humidity inside the internal environment.
- 20 22. A system according to claim 21, wherein the sensor is a temperature and/or humidity sensor.
23. A system according to claim 21 or 22, wherein the cover is the protective cover of any of claim 1 to 11.
- 25 24. A cover for a structural component;
wherein the cover is for forming an internal environment around the structural component; and
wherein the cover comprises a sensor fixation device for a humidity
30 and/or temperature sensor for monitoring conditions near the structural component.
25. A method of monitoring a structural component, the method comprising providing a cover for forming an internal environment around a structural

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component and providing a sensor for monitoring humidity and/or temperature inside the internal environment.

5 26. A method according to claim 25, wherein the method comprises attaching the sensor to the cover.

27. A method according to claim 25 or 26, wherein the method comprises the method of any of claims 12 to 20.

10

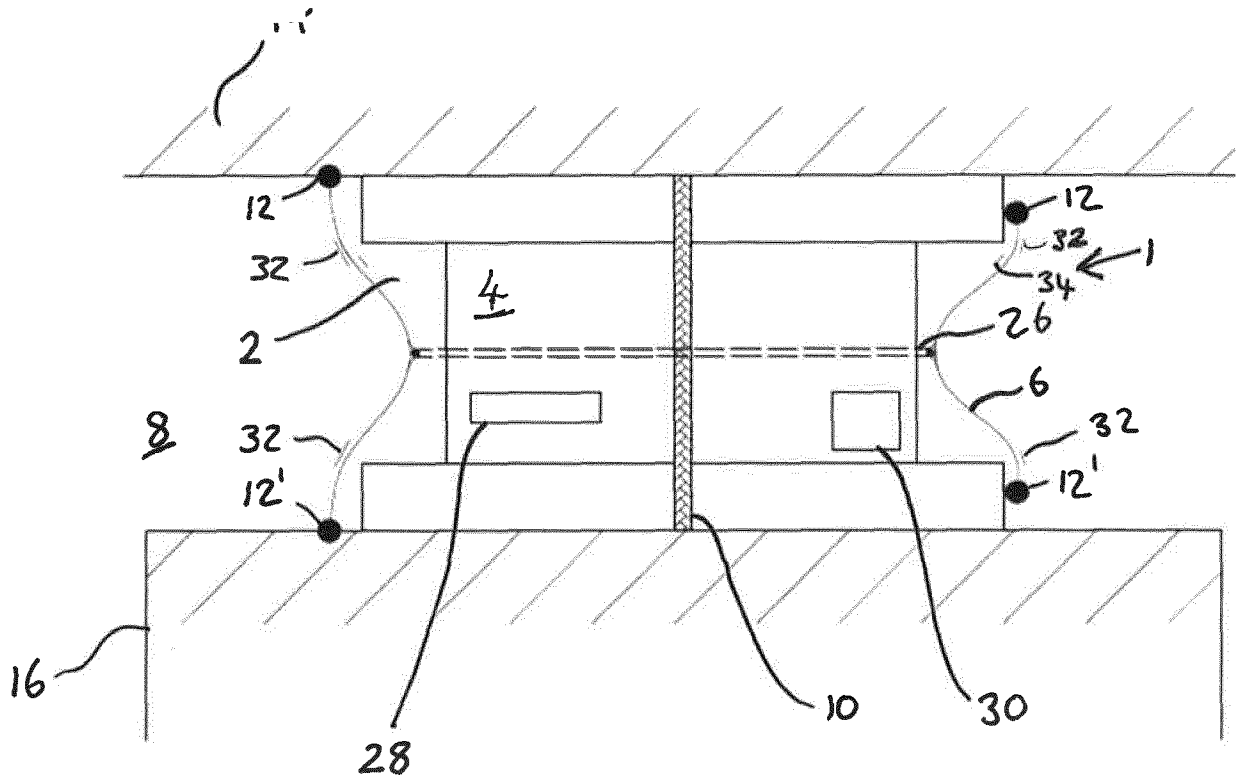


Fig. 1

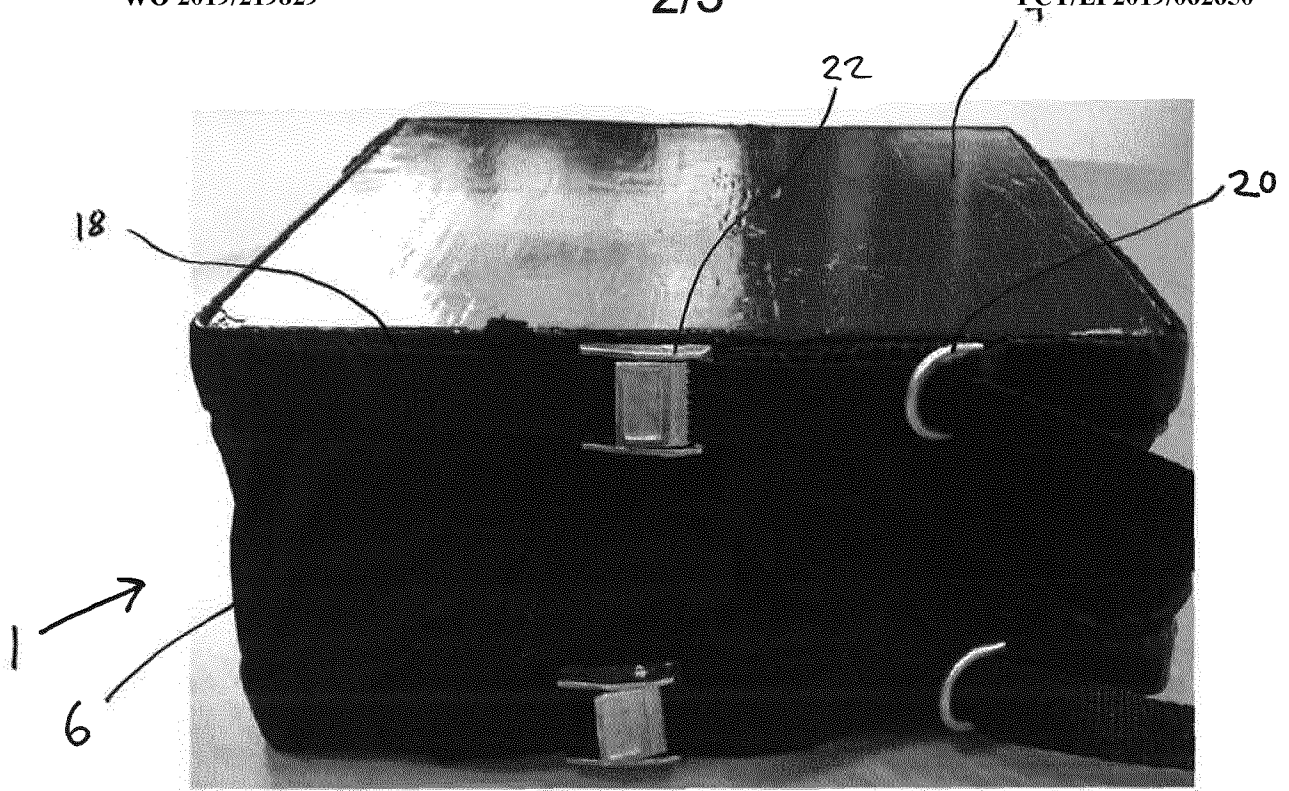


Fig. 2

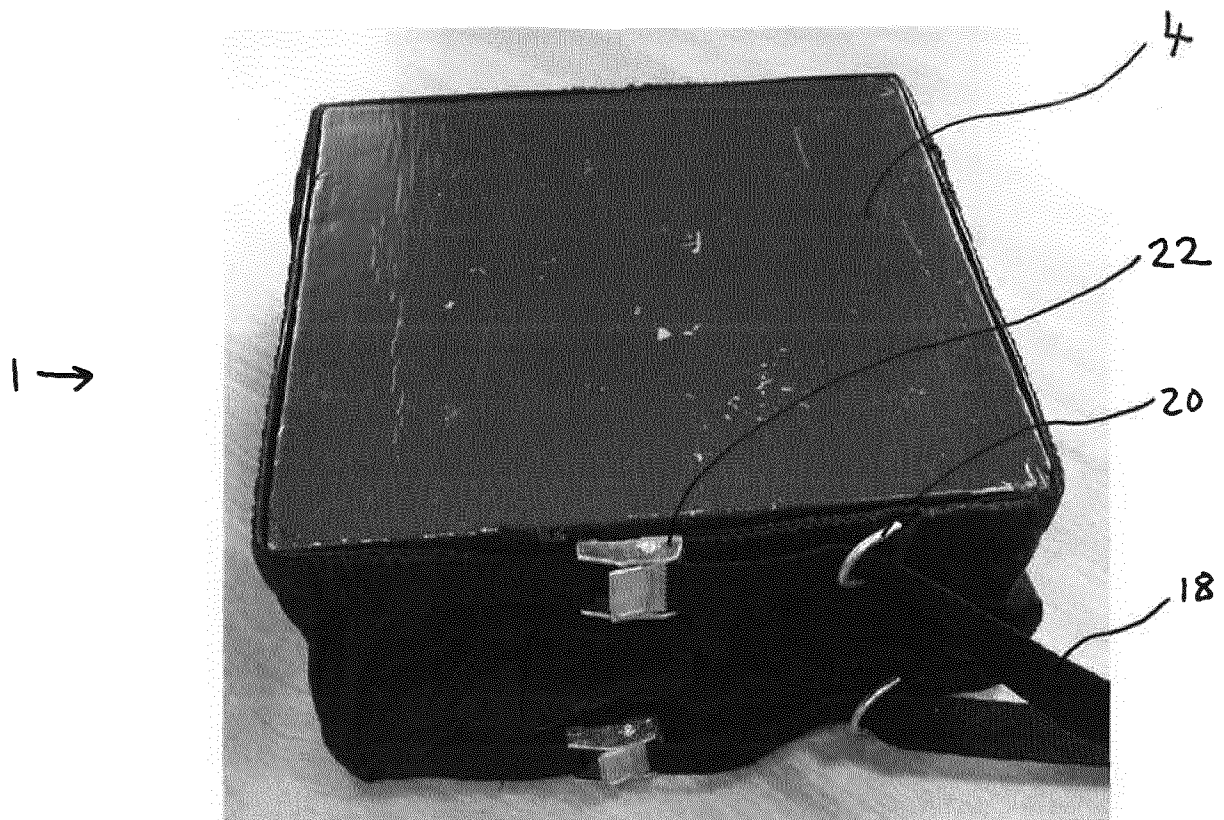


Fig. 3

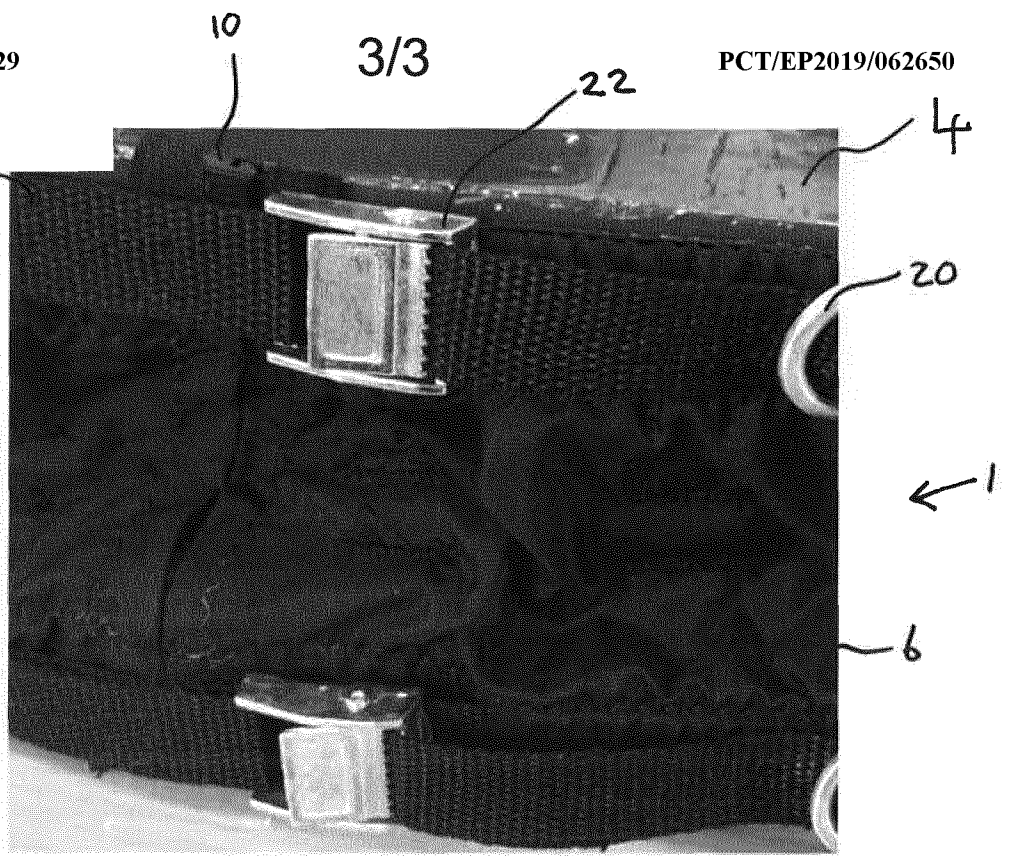


Fig. 4



Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/062650

A. CLASSIFICATION OF SUBJECT MATTER
INV. E01D19/04 E04B1/36
ADD.
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)
E01D E04B

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 and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2000 314444 A (BRIDGESTONE CORP) 14 November 2000 (2000-11-14)	1-4,6,7, 9-13,15, 19,24
Y	paragraphs [0004] - [0029]; figures	5,8,14, 17,18, 20,23,27
X	US 2009/120557 A1 (SERRA JERRY M [US] ET AL) 14 May 2009 (2009-05-14)	16,21, 22,25,26
Y	paragraphs [0026] - [0039]; figures	14,23,27
Y	JP 2017 198239 A (YOKOHAMA RUBBER CO LTD) 2 November 2017 (2017-11-02)	5,8,17, 18
Y	paragraphs [0013] - [0035]; figures	20
Y	CN 107 386 097 A (SHEN LIDAN) 24 November 2017 (2017-11-24)	
	claims 1,3; figures	
	----- -/--	

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search 25 July 2019	Date of mailing of the international search report 02/08/2019
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Movadat, Robin
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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/062650

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 398 998 A (FRANK BURNETT) 27 August 1968 (1968-08-27) claim 1; figures -----	1,12,21, 24,25

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2019/062650

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-27

Protective cover and method for protecting a structural component.

1.1. claims: 21-23, 25-27

Cover with sensor and method of monitoring a structural component

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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