

A COVER STRUCTURE FOR ELECTRICAL EQUIPMENT AND A WALL PANEL OF THE COVER STRUCTURE

Cross Reference to Related Applications

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The present disclosure claims the benefit of United Kingdom Patent Application 2312505.7 filed on 16 August 2023, which is incorporated in its entirety by reference herein.

10 Technical Field

The present disclosure generally relates to a cover structure for electrical equipment and a wall panel of the cover structure. More specifically, the present disclosure describes various embodiments of a cover structure for at least partially covering
15 electrical equipment, as well as a wall panel of the cover structure.

Background

For reasons such as safety and system protection, various electrical equipment are covered or enclosed partially or entirely. For example, a fuel cell system contains a
20 fuel cell stack, which is made from an assembly of a series of plurality of individual cells stacked up and assembled usually as a singular stack. The fuel cell is an electrical power generating device. This electrochemical device consumes hydrogen as fuel and reacts with oxygen to produce electricity. The fuel cell system, especially
25 the fuel cell stack, is enclosed to minimise exposure to external environment and personnel. The stack and system casings are to provide protection and electrical isolation to all unintended ingress.

To operate the fuel cell system, it requires control over a few key functions, namely
30 fuel management for the anode action, oxidant management for cathode reaction, and thermal management for maintaining the fuel cell at its optimal temperature. These functions and other balance of plant (BOP) components comprise electrical devices to support the operation, and are constantly electronically controlled by an electronic

controller with a microcontroller. Those BOP components and the electronic controller are connected by wires and cables connections.

In some cases, by system designs preferences, the electronic controller could be in/on the fuel cell casing/housing or distally apart, and the multiple BOP components would connect over, from across parts of the stack or casing. In some cases, certain BOP components are proximally near the fuel cell stack. In some cases, it could be better for certain components to be on the stacks and housings themselves. Examples of BOP components include fans, blowers, solenoid valves, pressure transducers, temperature transducers, gas detectors, flow controllers, pumps, compressors, communication protocol devices, etc.

FIG. 1A to FIG. 1D show an existing cover 100, a partial enclosure, for a fuel cell system with assembled BOP components 110 such as fans. The electrical connections 140 and wires 120 are all exposed and distributed over the cover 100 and components. This poses a challenge to wiring and cabling routings, raising assembly and material costs.

Therefore, in order to address or alleviate at least one of the aforementioned problems and/or disadvantages, there is a need to provide an improved cover for electrical equipment.

Summary

According to a first aspect of the present disclosure, there is a wall panel of a cover structure for at least partially covering electrical equipment, the wall panel comprising:

- a PCB integrated with the wall panel, such that the PCB and the wall panel share a first surface and a second surface opposite the first surface;
- a set of electrical points disposed on the first surface and/or the second surface, the electrical points configured for receiving electrical connections from externally of the PCB and/or internally from the PCB; and
- the PCB further comprising electrical conduits embedded therein for internally connecting to the electrical points on the PCB,

wherein the wall panel is configured to provide structural support for the cover structure without additional support structures at the first surface or the second surface, such that the first surface and the second surface are substantially exposed for receiving electrical connections from externally of the PCB; and

5 wherein the wall panel is coupleable to one or more other wall panels to form the cover structure.

According to a second aspect of the present disclosure, there is cover structure for at least partially covering electrical equipment, the cover structure comprising one or
10 more wall panels coupled together, each wall panel comprising:

 a PCB integrated with the wall panel, such that the PCB and the wall panel share a first surface and a second surface opposite the first surface;

 a set of electrical points disposed on the first surface and/or the second surface, the electrical points configured for receiving electrical connections from
15 externally of the PCB and/or internally from the PCB; and

 the PCB further comprising electrical conduits embedded therein for internally connecting to the electrical points on the PCB,

 wherein the wall panel is configured to provide structural support for the cover structure without additional support structures at the first surface or the second
20 surface, such that the first surface and the second surface are substantially exposed for receiving electrical connections from externally of the PCB.

A cover structure for at least partially covering electrical equipment and a wall panel of the cover structure according to the present disclosure are thus disclosed herein.

25 Various features, aspects, and advantages of the present disclosure will become more apparent from the following detailed description of the embodiments of the present disclosure, by way of non-limiting examples only, along with the accompanying drawings.

30 **Brief Description of the Drawings**

FIG. 1A to FIG. 1D are illustrations of an existing cover for a fuel cell system.

FIG. 2A and FIG. 2B are illustrations of a wall panel of a cover structure for electrical equipment, according to embodiments of the present disclosure.

FIG. 3A to FIG. 3C are illustrations of the wall panel comprising electrical connectors on the surfaces, such as pin connectors to join two wall panels.

FIG. 4A and FIG. 4B are illustrations of the wall panel comprising ventilation openings and with ventilation devices.

FIG. 5A and FIG. 5B are illustrations of the cover structure comprising the wall panel and a frame.

FIG. 6A to FIG. 6C are further illustrations of the cover structure.

FIG. 7A and FIG. 7B are illustrations of the cover structure covering a fuel cell stack.

Detailed Description

For purposes of brevity and clarity, descriptions of embodiments of the present disclosure are directed to a cover structure for at least partially covering electrical equipment and a wall panel of the cover structure, in accordance with the drawings. While aspects of the present disclosure will be described in conjunction with the embodiments provided herein, it will be understood that they are not intended to limit the present disclosure to these embodiments. On the contrary, the present disclosure is intended to cover alternatives, modifications and equivalents to the embodiments described herein, which are included within the scope of the present disclosure as defined by the appended claims. Furthermore, in the following detailed description, specific details are set forth in order to provide a thorough understanding of the present disclosure. However, it will be recognized by an individual having ordinary skill in the art, i.e. a skilled person, that the present disclosure may be practiced without specific details, and/or with multiple details arising from combinations of aspects of particular embodiments. In a number of instances, well-known systems, methods, procedures,

and components have not been described in detail so as to not unnecessarily obscure aspects of the embodiments of the present disclosure.

5 In embodiments of the present disclosure, depiction of a given element or consideration or use of a particular element number in a particular figure or a reference thereto in corresponding descriptive material can encompass the same, an equivalent, or an analogous element or element number identified in another figure or descriptive material associated therewith.

10 References to “an embodiment / example”, “another embodiment / example”, “some embodiments / examples”, “some other embodiments / examples”, and so on, indicate that the embodiment(s) / example(s) so described may include a particular feature, structure, characteristic, property, element, or limitation, but that not every embodiment / example necessarily includes that particular feature, structure,
15 characteristic, property, element or limitation. Furthermore, repeated use of the phrase “in an embodiment / example” or “in another embodiment / example” does not necessarily refer to the same embodiment / example.

The terms “comprising”, “including”, “having”, and the like do not exclude the presence
20 of other features / elements / steps than those listed in an embodiment. Recitation of certain features / elements / steps in mutually different embodiments does not indicate that a combination of these features / elements / steps cannot be used in an embodiment.

25 As used herein, the terms “a” and “an” are defined as one or more than one. The use of “/” in a figure or associated text is understood to mean “and/or” unless otherwise indicated. The term “set” is defined as a non-empty finite organisation of elements that mathematically exhibits a cardinality of at least one (e.g. a set as defined herein can correspond to a unit, singlet, or single-element set, or a multiple-element set), in
30 accordance with known mathematical definitions.

Representative or exemplary embodiments of the present disclosure describe a wall panel 200 of a cover structure for at least partially covering electrical equipment. The

electrical equipment may be an electrical power generating device such as a fuel cell stack or system. As shown in FIG. 2A and FIG. 2B, the wall panel 200 includes a printed circuit board (PCB) 210 integrated with the wall panel 200, such that the PCB 210 and the wall panel 200 share a first surface 220 and a second surface 230
5 opposite the first surface 220. The first surface 220 and second surface 230 are thus the exterior sides of the wall panel 200. For example, one of the first surface 220 or second surface 230 directly faces the external environment of the cover structure, and the other of the first surface 220 or second surface 230 directly faces the electrical equipment. The wall panel 200 forms a physical barrier to the external environment,
10 and shields the electrical equipment, such as fuel cell systems, from the external environment. Preferably, the PCB 210 occupies at least half of the wall panel 200, or more preferably at least 80% of the wall panel 200.

The PCB 210 includes electrical conduits (e.g. wirings) embedded therein. The PCB
15 210, also referred to as a printed wiring board or PWB, can be defined as a medium used to connect electronic components to one another in a controlled manner. The PCB 210 takes the form of a laminated sandwich structure of one or more conductive and insulating layers. Each of the conductive layers is designed with an artwork pattern of traces, planes, and other features (similar to wires on a flat surface) etched from
20 one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. The non-conductive substrate may be made of an epoxy material, such as glass-reinforced epoxy laminate material (e.g. FR-4). The non-conductive substrate may also be made of a ceramic material, and one or both of the first surface 220 and second surface 230 can be printed with copper traces.

25 Further as shown in FIG. 3A and FIG. 3B, the wall panel 200 includes a set of electrical points 240 disposed on the first surface 220 and/or the second surface 230. The electrical points 240 are configured for receiving electrical connections from externally of the PCB 210 and/or internally from the PCB 210. The PCB 210 includes the
30 embedded electrical conduits for internally connecting to the electrical points 240. The electrical points 240 on the surface(s) 220,230 of the PCB 210 provide a means for receiving external electrical connections. For example, the first surface 220 and/or the second surface 230 includes electrical soldering points for soldering external electrical

- connectors. For example, the electrical points 240 allow electrical connections between a power source, an electronics controller unit, and the BOP components of the fuel stack system, wherein the components are electrically connected, e.g. soldered, onto the first surface 220 and/or the second surface 230. For example, the
- 5 PCB 210 may include electrical measurement probing points configured for electrically connecting to the PCB 210. For example, the electrical points 240 may include electrical measurement probing points to sense selected electrical conduits of the PCB 210. For example, the probing points can be used for troubleshooting via the PCB 210.
- 10 In some embodiments, the PCB 210 can be multi-layered, where it makes possible multiple layers of isolated wiring on the same footprint, hence significantly minimizing or removing the clutter of wires. The use of PCB 210 also allows for easier implementation of splitting/joining of electrical connections to/from different points. Suitable materials may be selected for the PCB 210 to provide appropriate structural
- 15 strength for the wall panel 200 as well as for thermal dissipation when the PCB 210 is in use. The fabrication and material costs of the wall panel 200 integrated with the PCB 210 and its necessary electrical routing would be lower than conventional manufacturing, such as moulding or casting, of an ordinary wall panel of the same size but with external wirings instead of a PCB.
- 20 The wall panel 200 is coupleable to one or more other wall panels 200 to form the cover structure. Further, the wall panel 200 is configured to provide structural support for the cover structure without additional support structures at the first surface 220 or the second surface 230, such that the first surface 220 and the second surface 230
- 25 are substantially exposed for receiving electrical connections from externally of the PCB 210. For example, in forming the cover structure, it is not necessary for any wall panel 200 to be layered on another supporting substrate, such as an epoxy or resin substrate, to support the PCB 210. The absence of additional support structures exposes the first surface 220 and the second surface 230 and allows them to directly
- 30 face the external environment or the electrical equipment covered by the cover structure. Electrical components can be more easily connected to the PCB 210 via the electrical points 240 on the exposed first surface 220 and/or second surface 230.

As mentioned above, the wall panel 200 is coupleable to other wall panels 200 to form a cover structure 300. For example, the wall panel 200 has panel mounting holes for installation with other wall panels 200 to form the cover structure 300. Each wall panel
5 200 may optionally be removable from the cover structure 300. For example, fasteners are used to removably couple the wall panels 200. As illustrated in FIG. 3C, the structural connection or joining between the wall panels 200 can additionally or alternatively be achieved by use of standard pin connectors 270 soldered 290 at soldering points 280 on a first PCB 210A to an adjacent second PCB 210B. This
10 connection method may also serve as means of electrical continuity between the PCBs 210.

In some embodiments as shown in FIG. 4A, the wall panel 200 includes a set of openings 250 through the first surface 220 and second surface 230 for providing
15 ventilation for the electrical equipment. In some embodiments as shown in FIG. 4B, the wall panel 200 includes a set of clearance holes or mounting elements 252 (e.g. mounting holes) on the first surface 220 and/or the second surface 230 for mounting a set of ventilation devices 260, such as fan units or other airflow inducing devices, to the openings 250. For example, the ventilation devices 260 provide air ventilation to
20 cool the electrical equipment covered by the cover structure. The openings 250 and mounting elements 252 are configured to represent the appropriate inlet and outlet dimensions of the ventilation devices 260.

The cover structure 300 is thus constructed from one or more wall panels 200 coupled
25 together. In some embodiments as shown in FIG. 5A and FIG. 5B, the cover structure 300 includes a frame 310 and a wall panel 200 may be coupled to the frame 310. The frame 310 may facilitate coupling of the wall panel 200 to other wall panels 200 and thereby construct the cover structure 300. For example, the cover structures 300 as shown in FIG. 5B and FIG. 6A to FIG. 6C are 5-sided cover structures 300 that mostly
30 covers one side of the electrical equipment and partially covers other four sides, thus at least partially enclosing the electrical equipment.

The cover structure 300 is thus configured to at least partially cover or enclose electrical equipment such as power generating devices or fuel cell systems. For example, the cover structure 300 covers only one side, a plurality of sides, or all sides of the electrical equipment. For example, the cover structure 300 covers multiple sides
5 of the electrical equipment, such as four sides while leaving the top exposed. For example, the cover structure 300 is a full enclosure that covers all sides of the electrical equipment, such that the electrical equipment is housed within the cover structure 300 and substantially isolated from the external environment. Covering the electrical equipment helps to isolate the electrical equipment from the external environment
10 advantageously protects the electrical equipment from water and/or dust ingress and improves human safety. For example, the cover structure 300 prevents users from accidentally touching the electrical equipment when in use.

FIG. 7A and FIG. 7B show an example of the cover structure 300 for covering a fuel
15 cell stack 400. The cover structure 300 has one wall panel 200 that comprises the PCB 210 covering one side of the fuel cell stack 400. Electrical points 240 of the wall panels 200 provide a means to connect to BOP components of the fuel cell stack 400 and for other electrical connectivity via the PCB 210. The electrical points 240 may include probing points configured for electrically connecting to the PCB 210.

20 The cover structure 300 described herein is constructed from one or more wall panels 200, wherein at least one of the wall panels 200 is integrated with a PCB 210. The wall panel 200 thus provides structural stability to the cover structure 300 and electrical connectivity via the integrated PCB 210. The wall panel 200 and its PCB 210 provides
25 embedded electrical wiring for various electrical components, ~~which otherwise would be unsightly wires on the exterior.~~ The wall panel 200 enables electrical components to be more easily installed or soldered onto the wall panel 200 and connected to the integrated PCB 210. This would achieve the simplification of integrating electrical components with the cover structure 300 formed by one or more such wall panels 200.
30 The wall panels 200 also act as physical barriers to shields the electrical equipment from the external environment.

The wall panel 200 or parts thereof, as well as the cover structure 300 or parts thereof such as the frame 310, may be manufactured using an additive manufacturing process. A common example of additive manufacturing is three-dimensional (3D) printing; however, other methods of additive manufacturing are available. Rapid prototyping or
5 rapid manufacturing are also terms which may be used to describe additive manufacturing processes.

As used herein, "additive manufacturing" refers generally to manufacturing processes wherein successive layers of material(s) are provided on each other to "build-up" layer-
10 by-layer or "additively fabricate", a 3D component. This is compared to some subtractive manufacturing methods (such as cutting, milling, or drilling), wherein material is successively removed to fabricate the part. The successive layers generally fuse together to form a monolithic component which may have a variety of integral sub-components. In particular, the manufacturing process may allow an example of
15 the disclosure to be integrally formed and include a variety of features not possible when using prior manufacturing methods.

Additive manufacturing methods described herein enable manufacture to any suitable size and shape with various features which may not have been possible using prior
20 manufacturing methods. Additive manufacturing can create complex geometries without the use of any sort of tools, moulds, or fixtures, and with little or no waste material. Instead of machining components from solid billets of plastic or metal, much of which is cut away and discarded, the only material used in additive manufacturing is what is required to shape the part.

25 Suitable additive manufacturing techniques in accordance with the present disclosure include, for example, Fused Deposition Modelling (FDM), Selective Laser Sintering (SLS), 3D printing such as by inkjets and laserjets, Stereolithography (SLA), Direct Selective Laser Sintering (DSLS), Electron Beam Sintering (EBS), Electron Beam
30 Melting (EBM), Laser Engineered Net Shaping (LENS), Electron Beam Additive Manufacturing (EBAM), Laser Net Shape Manufacturing (LNSM), Direct Metal Deposition (DMD), Digital Light Processing (DLP), Continuous Digital Light Processing (CDLP), Direct Selective Laser Melting (DSLM), Selective Laser Melting (SLM), Direct

Metal Laser Melting (DMLM), Direct Metal Laser Sintering (DMLS), Material Jetting (MJ), NanoParticle Jetting (NPJ), Drop On Demand (DOD), Binder Jetting (BJ), Multi Jet Fusion (MJF), Laminated Object Manufacturing (LOM), and other known processes.

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The additive manufacturing processes described herein may be used for forming components using any suitable material. For example, the material may be metal, plastic, polymer, composite, or any other suitable material that may be in solid, liquid, powder, sheet material, wire, or any other suitable form or combinations thereof. More specifically, according to exemplary embodiments of the present disclosure, the additively manufactured components described herein may be formed in part, in whole, or in some combination of materials suitable for use in additive manufacturing processes and which may be suitable for the fabrication of examples described herein.

As noted above, the additive manufacturing process disclosed herein allows a single component to be formed from multiple materials. Thus, the examples described herein may be formed from any suitable mixtures of the above materials. For example, a component may include multiple layers, segments, or parts that are formed using different materials, processes, and/or on different additive manufacturing machines. In this manner, components may be constructed which have different materials and material properties for meeting the demands of any particular application. In addition, although the components described herein are constructed entirely by additive manufacturing processes, it should be appreciated that in alternate embodiments, all or a portion of these components may be formed via casting, machining, and/or any other suitable manufacturing process. Indeed, any suitable combination of materials and manufacturing methods may be used to form these components.

Additive manufacturing processes typically fabricate components based on 3D information, for example a 3D computer model (or design file), of the component. Accordingly, examples described herein not only include products or components as described herein, but also methods of manufacturing such products or components via additive manufacturing and computer software, firmware or hardware for controlling the manufacture of such products via additive manufacturing.

The structure of the product may be represented digitally in the form of a design file. A design file, or computer aided design (CAD) file, is a configuration file that encodes one or more of the surface or volumetric configuration of the shape of the product.
5 That is, a design file represents the geometrical arrangement or shape of the product.

Design files can take any now known or later developed file format. For example, design files may be in the Stereolithography or "Standard Tessellation Language" (.stl) format which was created for Stereolithography CAD programs of 3D Systems, or the
10 Additive Manufacturing File (.amf) format, which is an American Society of Mechanical Engineers (ASME) standard that is an extensible markup-language (XML) based format designed to allow any CAD software to describe the shape and composition of any 3D object to be fabricated on any additive manufacturing printer. Further examples of design file formats include AutoCAD (.dwg) files, Blender (.blend) files, Parasolid
15 (.x_t) files, 3D Manufacturing Format (.3mf) files, Autodesk (3ds) files, Collada (.dae) files and Wavefront (.obj) files, although many other file formats exist.

Design files can be produced using modelling (e.g. CAD modelling) software and/or through scanning the surface of a product to measure the surface configuration of the
20 product. Once obtained, a design file may be converted into a set of computer executable instructions that, once executed by a processor, cause the processor to control an additive manufacturing apparatus to produce a product according to the geometrical arrangement specified in the design file. The conversion may convert the design file into slices or layers that are to be formed sequentially by the additive
25 manufacturing apparatus. The instructions (otherwise known as geometric code or "G-code") may be calibrated to the specific additive manufacturing apparatus and may specify the precise location and amount of material that is to be formed at each stage in the manufacturing process. As discussed above, the formation may be through deposition, through sintering, or through any other form of additive manufacturing
30 method.

The code or instructions may be translated between different formats, converted into a set of data signals and transmitted, received as a set of data signals and converted

to code, stored, etc., as necessary. The instructions may be an input to the additive manufacturing system and may come from a part designer, an intellectual property (IP) provider, a design company, the operator or owner of the additive manufacturing system, or from other sources. An additive manufacturing system may execute the
5 instructions to fabricate the product using any of the technologies or methods disclosed herein.

Design files or computer executable instructions may be stored in a (transitory or non-transitory) computer readable storage medium (e.g., memory, storage system, etc.)
10 storing code, or computer readable instructions, representative of the product to be produced. As noted, the code or computer readable instructions defining the product that can be used to physically generate the object, upon execution of the code or instructions by an additive manufacturing system. For example, the instructions may include a precisely defined 3D model of the product and can be generated from any
15 of a large variety of well-known CAD software systems such as AutoCAD®, TurboCAD®, DesignCAD 3D Max, etc. Alternatively, a model or prototype of the product may be scanned to determine the 3D information of the product. Accordingly, by controlling an additive manufacturing apparatus according to the computer executable instructions, the additive manufacturing apparatus can be instructed to
20 print out the product.

In light of the above, embodiments include methods of manufacture via additive manufacturing. This includes the steps of obtaining a design file representing the product and instructing an additive manufacturing apparatus to manufacture the
25 product according to the design file. The additive manufacturing apparatus may include a processor that is configured to automatically convert the design file into computer executable instructions for controlling the manufacture of the product. In these embodiments, the design file itself can automatically cause the production of the product once input into the additive manufacturing apparatus. Accordingly, in this
30 embodiment, the design file itself may be considered computer executable instructions that cause the additive manufacturing apparatus to manufacture the product. Alternatively, the design file may be converted into instructions by an external

computing system, with the resulting computer executable instructions being provided to the additive manufacturing apparatus.

- Given the above, the design and manufacture of implementations of the subject matter
- 5 and the operations described in this specification can be realized using digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this specification and their structural equivalents, or in combinations of one or more of them. For instance, hardware may include processors, microprocessors, electronic circuitry, electronic components, integrated circuits, etc.
- 10 Implementations of the subject matter described in this specification can be realized using one or more computer programs, i.e., one or more modules of computer program instructions, encoded on computer storage medium for execution by, or to control the operation of, data processing apparatus. Alternatively or in addition, the program instructions can be encoded on an artificially generated propagated signal, e.g., a
- 15 machine-generated electrical, optical, or electromagnetic signal that is generated to encode information for transmission to suitable receiver apparatus for execution by a data processing apparatus. A computer storage medium can be, or be included in, a computer-readable storage device, a computer-readable storage substrate, a random or serial access memory array or device, or a combination of one or more of them.
- 20 Moreover, while a computer storage medium is not a propagated signal, a computer storage medium can be a source or destination of computer program instructions encoded in an artificially generated propagated signal. The computer storage medium can also be, or be included in, one or more separate physical components or media (e.g., multiple CDs, disks, or other storage devices).
- 25
- Although additive manufacturing technology is described herein as enabling fabrication of complex objects by building objects point-by-point, layer-by-layer, typically in a vertical direction, other methods of fabrication are possible and within the scope of the present subject matter. For example, although the discussion herein
- 30 refers to the addition of material to form successive layers, one skilled in the art will appreciate that the methods and structures disclosed herein may be practiced with any additive manufacturing technique or other manufacturing technology.

In the foregoing detailed description, embodiments of the present disclosure in relation to a cover structure for at least partially covering electrical equipment and a wall panel of the cover structure are described with reference to the provided figures. The description of the various embodiments herein is not intended to call out or be limited
5 only to specific or particular representations of the present disclosure, but merely to illustrate non-limiting examples of the present disclosure. The present disclosure serves to address at least one of the mentioned problems and issues associated with the prior art. Although only some embodiments of the present disclosure are disclosed herein, it will be apparent to a person having ordinary skill in the art in view of this
10 disclosure that a variety of changes and/or modifications can be made to the disclosed embodiments without departing from the scope of the present disclosure. Therefore, the scope of the disclosure as well as the scope of the following claims is not limited to embodiments described herein.

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Claims

1. A wall panel of a cover structure for at least partially covering electrical equipment, the wall panel comprising:
 - 5 a printed circuit board (PCB) integrated with the wall panel, such that the PCB and the wall panel share a first surface and a second surface opposite the first surface;
a set of electrical points disposed on the first surface and/or the second surface, the electrical points configured for receiving electrical connections from
10 externally of the PCB and/or internally from the PCB; and
the PCB further comprising electrical conduits embedded therein for internally connecting to the electrical points on the PCB,
wherein the wall panel is configured to provide structural support for the cover structure without additional support structures at the first surface or the
15 second surface, such that the first surface and the second surface are substantially exposed for receiving electrical connections from externally of the PCB; and
wherein the wall panel is coupleable to one or more other wall panels to form the cover structure.
- 20 2. The wall panel according to claim 1, wherein the electrical equipment comprises an electrical power generating device, the electrical power generating device comprising a fuel cell stack or system.
- 25 3. The wall panel according to claim 1 or 2, further comprising a set of openings through the first surface and the second surface, the openings configured for providing ventilation for the electrical equipment.
4. The wall panel according to claim 3, further comprising a set of mounting
30 elements on the first surface and/or the second surface, the mounting elements configured for mounting a set of air-flow inducing devices to the openings.

5. The wall panel according to any one of claims 1 to 4, wherein the PCB occupies at least half of the wall panel.
6. The wall panel according to any one of claims 1 to 5, wherein the PCB occupies at least 80% of the wall panel.
7. The wall panel according to any one of claims 1 to 5, wherein the electrical points comprise electrical measurement probing points configured for electrically connecting to the PCB.
8. A computer program comprising computer executable instructions that, when executed by a processor, cause the processor to control an additive manufacturing apparatus to manufacture a product comprising the wall panel according to any one of claims 1 to 7.
9. A method of manufacturing a product via additive manufacturing, the method comprising:
- obtaining an electronic file representing a geometry of the product wherein the product comprises the wall panel according to any one of claims 1 to 7; and
 - controlling an additive manufacturing apparatus to manufacture, over one or more additive manufacturing steps, the product according to the geometry specified in the electronic file.
10. A cover structure for at least partially covering electrical equipment, the cover structure comprising one or more wall panels coupled together, each wall panel comprising:
- a printed circuit board (PCB) integrated with the wall panel, such that the PCB and the wall panel share a first surface and a second surface opposite the first surface;
 - a set of electrical points disposed on the first surface and/or the second surface, the electrical points configured for receiving electrical connections from externally of the PCB and/or internally from the PCB; and

the PCB further comprising electrical conduits embedded therein for internally connecting to the electrical points on the PCB,

5 wherein the wall panel is configured to provide structural support for the cover structure without additional support structures at the first surface or the second surface, such that the first surface and the second surface are substantially exposed for receiving electrical connections from externally of the PCB.

10 11. The cover structure according to claim 10, wherein each wall panel is removable from the cover structure.

12. The cover structure according to claim 10 or 11, wherein the wall panel comprises a set of openings through the first surface and the second surface, the openings configured for providing ventilation for the electrical equipment.

15 13. The cover structure according to claim 12, wherein the wall panel comprises a set of mounting elements on the first surface and/or the second surface, the mounting elements configured for mounting a set of air-flow inducing devices to the openings.

20 14. The cover structure according to any one of claims 10 to 13, wherein the PCB occupies at least half of the wall panel.

15 15. The cover structure according to any one of claims 10 to 14, wherein the PCB occupies at least 80% of the wall panel.

25 16. The cover structure according to any one of claims 10 to 15, wherein the electrical equipment comprises an electrical power generating device, the electrical power generating device comprising a fuel cell stack or system.

30 17. The cover structure according to claim 16, wherein electrical connectors of the fuel cell stack or system are soldered to the electrical points of the wall panels.

18. The cover structure according to any one of claims 10 to 17, wherein the wall panels are coupled by soldering with pin connectors.
19. The cover structure according to any one of claims 10 to 18, wherein the
5 electrical points comprise electrical measurement probing points configured for electrically connecting to the PCB.
20. A computer program comprising computer executable instructions that, when executed by a processor, cause the processor to control an additive manufacturing
10 apparatus to manufacture a product comprising the cover structure according to any one of claims 10 to 19.
21. A method of manufacturing a product via additive manufacturing, the method comprising:
- 15 obtaining an electronic file representing a geometry of the product wherein the product comprises the cover structure according to any one of claims 10 to 19; and
- controlling an additive manufacturing apparatus to manufacture, over one or more additive manufacturing steps, the product according to the
20 geometry specified in the electronic file.