

Description

This specification describes a modular, hollow floor panel which when laid over a structural sub-floor, allows reticulation of electrical and communications cabling, without significantly increasing the height of the finished floor level.

It has a major application in automated office buildings, where the extensive use of computing and communications equipment has created a need to locate cabling throughout open office areas, and it is an alternative to the raised "access flooring" used in computer areas which has a depth of several hundred millimetres.

In current building practice the problem of within-the-floor cable access to points on an open-plan floor is solved by one of three methods:

1. in-floor ducted grids, which are typically cast into the floor slab, and consist of one-channel, two-channel or three-channel duct grids linked by cross-over boxes, and which have outlets provided at regular intervals. Australian Patent No. 521,913 is an example of such a system. The ducts must be relatively widely spaced, and so the floor has limited cable-carrying capacity;
2. cellular floors, which utilise hollow cells built into the floor slab. The cells are fitted with outlet boxes at regular intervals and cables are fed along the cells (or "raceways") from a "header trench" which sits flush with the floor and is typically located along a wall or a corridor. Examples are Australian Patent No. 410,965 and US Patent No. 2,445,197.

These systems have a greater flexibility in the location of outlets, but cable access between two adjacent points along the floor is only possible by routing the cable up one cell, along the header trench, and down the adjacent cell. Recent developments have included the system described in Australian specifications 48,697/85 and 32,227/85. (Specification 48,697/85 describes a header-trench module and specification 32,227/85 describes a cellular raceway module). This is a low-height floor laid onto the structural slab, but is generically a cellular floor of the type described above, and suffers from the same disadvantages; and

3. raised access floors, which conventionally consist of 600mm x 600mm deck panels supported at each corner on adjustable-height pedestals. An example is Australian Patent 462,745. Such floors provide optimum accessibility and cable capacity, but are expensive, and create difficulties because of their height. They also require some form of cable guides to maintain order to segregate power, telephone and data services.

"Australian patent specification 39,227/85 dis-

closes a module for use in supporting a floor load above a base. Each module comprises a formation which is adapted to be supported on the base and defines a first set of upwardly closed parallel cable ducts segregated from each other. Each of the ducts has a plurality of spaced apart hollow upstanding projections which support a floor sheet. These modules are laid side by side and end to end. Cables running through the ducts may be passed upwardly through the hollow upstanding projections and exit into the floor. This arrangement however does not allow for cables that are in the ducts to change their direction other than turning upwardly to exit through the floor sheet. The present inventor has perceived the need for a floor made up of modules wherein cables can change direction within the module to allow for more flexible cabling of buildings in which such floors are laid".

The purpose of this invention is to provide a low-height access floor which will allow both lateral and longitudinal cable access to any point on the floor, and which has integral ducting which will provide continuous structural support to the deck, and a means of segregating services, and a means for creating orderly cable layouts.

According to a first aspect of the present invention, there is provided a modular panel which in use is laid in an extended array over a supporting sub-surface to form a hollow floor, wall or ceiling suitable for reticulating electrical, optic fibre, hydraulic or other conduit, and which comprise an upper load bearing deck which overlies structural support elements which form an interstitial duct zone between the deck and a supporting sub-surface, the elements define a lower duct zone which is partitioned by lateral ribs to form a set of lateral ducts running from one side of the panel to the other, and an upper duct zone which is partitioned by longitudinal ribs to form a set of longitudinal ducts running from one end of the panel to the other, characterised in that said panel comprises a set of vertical ducts which open onto the lower lateral ducts and into the upper longitudinal ducts, and in that each of the lateral, longitudinal and vertical duct sets is composed of two or more sub-sets of ducts and only corresponding ones of each sub-set of the lateral, longitudinal and vertical ducts are in communication, each of the lower lateral ducts being in communication with an upper longitudinal duct of a corresponding sub-set through a vertical duct of that corresponding sub-set.

According to a second aspect of the present invention, there is provided a floor comprising an extended array of modular panels in side-by-side and end to end abutment, in which each panel comprises an upper load bearing deck, bearing

onto a plurality of structural support elements which form an interstitial duct zone between the deck and a supporting sub-surface, the structural support elements defining an upper set of ducts extending laterally from one side of the panel to the other and so located within the panel as to align with corresponding duct sets in abutting panels, and a lower set of ducts extending longitudinally from one end of the panel to the other end and so located within the panel as to align with corresponding duct sets in abutting panels, characterised in that the upper and lower sets of ducts are separated by wall means which is formed with holes or knock-out panels allowing communication between the upper sets of ducts and the lower sets of ducts.

Whereas the primary application of the invention is to floors in buildings (and the descriptions herein assume this), it should be understood that there are some situations where the system can be used on walls or ceilings (for example in sound studios) and so the invention is not limited to floor applications.

The invention is now described with reference to the drawings, in which:

FIGURE 1 shows an isometric view of a panel with two sets of ducts, each perpendicular, and located one above the other;

FIGURE 2 shows a plan-view of the construction shown in Figure 1; and

FIGURE 3 shows an isometric view of a panel base which has a series of upper ducts with continuous troughs, which interconnect with ducts on the underside of the panel base via vertical ducts located on each side of the upper ducts.

A critical need of various licencing authorities is that the various trunk cable networks within the floor-space are physically separated from each other. When the networks run only in one direction (for instance perpendicular to the walls) and are thus parallel to each other, separation can be achieved by physical spacing of the panels, or by providing solid barriers between vaults or groups of vaults, so that in effect the channels run in only one direction.

One means of allowing different cable networks to cross each other without passing through the same space is to provide a "tunnel vault" panel with a second set of channels above the tunnel vaults, but at right-hand angles to them. Figures 1 (isometric projection) and 2 (plan view) show such a construction, which has lower channels (40) and perpendicular upper channels (41), which are connected by holes or knock-out panels (42). The holes or panels can be arranged so that each upper channel or group of channels can be uniquely linked to one or a group of lower channels.

In these illustrations there are shown two upper channels or ducts for every lower channel or duct. This arrangement has the advantage that the spans of the overlying deck are reduced, and it can be made thinner. A 2:1 ratio is not essential, however; a 1:1 or a 1:2 ratio may be equally satisfactory from the point of view of cable distribution.

This panel form can be constructed in a number of ways, for example by attaching two extrusions at right-angles, with permanent or removable connections. The panel shown in Figures 2 would be of injection-moulded construction, with a separate deck (43). This deck may be loose-laid or permanently attached or removably attached, and it may be attached over its full area or at the centre or for example along one edge. It may also incorporate the floor finish. In the case of a partially attached deck it may be provided with weakening grooves (44) over the supports or at right-angles to them, which would enable it to flex upwards to provide access to the upper channels. The deck may also be fabricated with the upper channels (41) formed as vaults on its underside, so as to form two half-panels joined at the mid-line. This may allow the panels to be fabricated entirely from extruded sections.

The panel shown in Figure 1 may be permanently or removably attached to the sub-floor. It is advantageous to glue it to the sub-floor around the centre of the panel, and in this case grooves (44), (45) may be provided through the walls of the lower vaults, to allow the panel to be curled upwards so as to allow access to the lower vaults from above.

Removable areas (46) may be provided in the walls of the channels in non-structural areas to permit the passage of cables from one channel to the adjacent channel, to improve flexibility and to permit larger radii of curvature from the upper channels to the lower channels.

In the case of a panel comprising a rigid deck and an injection-moulded base, it will be too rigid to adapt to undulations in the sub-floor. Small irregularities may be taken up by bedding the lower ribs in high-build adhesive (46), but in the case of a very uneven sub-floor it may be advantageous to seat the panels in levelling trays.

In all of the arrangements described in this document, the cabling may be introduced into the sub-flooring system in either of two ways - the cable may be laid along its intended route, in which case the cable route must be exposed by lifting the deck or lifting the panel itself so that the cable can be laid, or alternatively the cable may be fed along its intended route, in which case the panel can remain undisturbed. The first method allows greater flexibility and the use of smaller and shallower cable channels, but the second method will

minimise disruption to the room and the floor, and will allow the use of broadloom carpet rather than removable tiles.

The panel shown in Figure 1 is fairly simple in construction, but it is difficult to feed wires along the upper channels, because of the natural tendency of the wire to fall through the connecting hole into the lower channel.

An improvement on this basic principle is shown in Figure 3, which shows a moulded panel base to be used in conjunction with a removable deck, and perhaps with a levelling tray.

In this arrangement, sets of ducts are provided along three axes at right-angles to each other. A lateral duct set 51, 52, 53 lies along the underside of the panel base, a longitudinal duct set 61, 62, 63 lies along the upper side of the panel base at right angles to the lower ducts, and the vertical duct set 71, 72, 73 extends from the lower duct set, on each side of the upper horizontal ducts.

Each duct set is made up of a number of sub-sets; preferably three in number, to carry power, telephone and data services respectively.

Where a vertical duct abuts an upper horizontal duct of the same sub-set, an opening occurs between the two ducts (which may take the form of a knock-out panel); but where a vertical duct abuts an upper horizontal duct of a different sub-set, no opening occurs.

Thus each lower duct sub-set is connected to the corresponding upper duct sub-set via a vertical duct, and by such selective interconnections a series of physically separate duct networks are created.

In the example of Figure 3 the upper duct (51) is dedicated to power cabling, and inter-connects with lower ducts of the same sub-set (61) via vertical ducts (71) to create a power conduit grid. Similarly, duct sub-sets 52, 62, 72 form a telephone conduit grid, and duct sub-sets 53, 63, 73 form a data conduit grid.

It will be seen that in addition to the major advantage of this arrangement that cables can be fed along the upper ducts with less risk of deflecting into the lower ducts, a number of further advantages accrue. Firstly, the arrangement provides regular access to each lower duct to enable control of cable feeding without the need to lift all or part of the panel. Secondly, the arrangement allows greater turning radii, of the order required for coaxial cables and optical fibre. Thirdly, the vertical ducts provide superior access to services outlets on the deck above the panel.

Although Figure 3 shows three sets of ducts (for power, telephone and data), this number may of course be varied. In addition, there may be several levels of horizontal ducts. Advantages can be gained by providing four layers of horizontal

ducts, with the upper two layers having narrow and closely spaced ducts to reduce distances between possible services outlet points, and with the lower two layers having wide ducts to maximise cable carrying capacity and bending radii.

By utilising the sides of the panel base shown in Figure 3, extending clips may be formed to attach the floor decking to the panel. These clips can be disengaged from the decking panel to allow its temporary removal, and if they are asymmetrical on each side (e.g. of different heights or in different relative locations) the decking will be unable to be mis-oriented when it is replaced. This will allow the decking to have pre-formed outlets, or to be marked with the locations of the services ducts in the panel underneath, so that services can be accessed through drilled holes without the need to remove the panel.

Claims

1. A modular panel which in use is laid in an extended array over a supporting sub-surface to form a hollow floor, wall or ceiling suitable for reticulating electrical, optic fibre, hydraulic or other conduit, and which comprises an upper load bearing deck which overlies structural support elements which form an interstitial duct zone between the deck and a supporting sub-surface, the elements define a lower duct zone which is partitioned by lateral ribs to form a set of lateral ducts (61, 62, 63) running from one side of the panel to the other, and an upper duct zone which is partitioned by longitudinal ribs to form a set of longitudinal ducts (51, 52, 53) running from one end of the panel to the other, characterised in that said panel comprises a set of vertical ducts (71, 72, 73) which open onto the lower lateral ducts and into the upper longitudinal ducts, and in that each of the lateral, longitudinal and vertical duct sets is composed of two or more sub-sets of ducts and only corresponding ones of each sub-set of the lateral, longitudinal and vertical ducts are in communication, each of the lower lateral ducts being in communication with an upper longitudinal duct of a corresponding sub-set through a vertical duct of that corresponding sub-set.
2. A modular panel as claimed in claim 1, characterised in that each vertical duct communicates with the corresponding upper longitudinal duct through a laterally opening knock-out panel (42).
3. A modular panel as claimed in either claim 1 or claim 2, characterised in that the deck is



minimise disruption to the room and the floor, and will allow the use of broadloom carpet rather than removable tiles.

The panel shown in Figure 1 is fairly simple in construction, but it is difficult to feed wires along the upper channels, because of the natural tendency of the wire to fall through the connecting hole into the lower channel.

An improvement on this basic principle is shown in Figure 3, which shows a moulded panel base to be used in conjunction with a removable deck, and perhaps with a levelling tray.

In this arrangement, sets of ducts are provided along three axes at right-angles to each other. A lateral duct set 51, 52, 53 lies along the underside of the panel base, a longitudinal duct set 61, 62, 63 lies along the upper side of the panel base at right angles to the lower ducts, and the vertical duct set 71, 72, 73 extends from the lower duct set, on each side of the upper horizontal ducts.

Each duct set is made up of a number of sub-sets; preferably three in number, to carry power, telephone and data services respectively.

Where a vertical duct abuts an upper horizontal duct of the same sub-set, an opening occurs between the two ducts (which may take the form of a knock-out panel); but where a vertical duct abuts an upper horizontal duct of a different sub-set, no opening occurs.

Thus each lower duct sub-set is connected to the corresponding upper duct sub-set via a vertical duct, and by such selective interconnections a series of physically separate duct networks are created.

In the example of Figure 3 the upper duct (51) is dedicated to power cabling, and inter-connects with lower ducts of the same sub-set (61) via vertical ducts (71) to create a power conduit grid. Similarly, duct sub-sets 52, 62, 72 form a telephone conduit grid, and duct sub-sets 53, 63, 73 form a data conduit grid.

It will be seen that in addition to the major advantage of this arrangement that cables can be fed along the upper ducts with less risk of deflecting into the lower ducts, a number of further advantages accrue. Firstly, the arrangement provides regular access to each lower duct to enable control of cable feeding without the need to lift all or part of the panel. Secondly, the arrangement allows greater turning radii, of the order required for coaxial cables and optical fibre. Thirdly, the vertical ducts provide superior access to services outlets on the deck above the panel.

Although Figure 3 shows three sets of ducts (for power, telephone and data), this number may of course be varied. In addition, there may be several levels of horizontal ducts. Advantages can be gained by providing four layers of horizontal

ducts, with the upper two layers having narrow and closely spaced ducts to reduce distances between possible services outlet points, and with the lower two layers having wide ducts to maximise cable carrying capacity and bending radii.

By utilising the sides of the panel base shown in Figure 3, extending clips may be formed to attach the floor decking to the panel. These clips can be disengaged from the decking panel to allow its temporary removal, and if they are asymmetrical on each side (e.g. of different heights or in different relative locations) the decking will be unable to be mis-oriented when it is replaced. This will allow the decking to have pre-formed outlets, or to be marked with the locations of the services ducts in the panel underneath, so that services can be accessed through drilled holes without the need to remove the panel.

Claims

1. A modular panel which in use is laid in an extended array over a supporting sub-surface to form a hollow floor, wall or ceiling suitable for reticulating electrical, optic fibre, hydraulic or other conduit, and which comprises an upper load bearing deck which overlies structural support elements which form an interstitial duct zone between the deck and a supporting sub-surface, the elements define a lower duct zone which is partitioned by lateral ribs to form a set of lateral ducts (61, 62, 63) running from one side of the panel to the other, and an upper duct zone which is partitioned by longitudinal ribs to form a set of longitudinal ducts (51, 52, 53) running from one end of the panel to the other, characterised in that said panel comprises a set of vertical ducts (71, 72, 73) which open onto the lower lateral ducts and into the upper longitudinal ducts, and in that each of the lateral, longitudinal and vertical duct sets is composed of two or more sub-sets of ducts and only corresponding ones of each sub-set of the lateral, longitudinal and vertical ducts are in communication, each of the lower lateral ducts being in communication with an upper longitudinal duct of a corresponding sub-set through a vertical duct of that corresponding sub-set.
2. A modular panel as claimed in claim 1, characterised in that each vertical duct communicates with the corresponding upper longitudinal duct through a laterally opening knock-out panel (42).
3. A modular panel as claimed in either claim 1 or claim 2, characterised in that the deck is



removably attached to structural support elements by wedging devices formed integrally with the structural support elements.

4. A modular panel as claimed in any one of claims 1 to 3, characterised in that a plurality of thickened ribs are formed between the ducts, forming structural pillars which in use transfer load from the deck to the supporting sub-surface.

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5. A modular panel as claimed in any one of claims 1 to 3, characterised in that a plurality of twin-rib constructions are formed between the ducts, forming structural pillars which in use transfer load from the deck to the supporting sub-surface.

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6. A modular panel as claimed in any one of the preceding claims, characterised in that a tray is provided between the structural support elements and the sub-surface, the tray having vertical ribs which engage with the lower, lateral ribs of the structural support elements, and which in use accomodate undulations in the supporting sub-surface.

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7. A modular panel as claimed in any one of the preceding claims, characterised in that interlocking keys are provided in the sides and ends of the modular panel so that in use incorrect orientation of abutting panels is prevented and vertical mis-alignment is reduced.

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8. A floor comprising an extended array of modular panels in side-by-side and end-to-end abutment, in which each panel comprises an upper load bearing deck (43), bearing onto a plurality of structural support elements which form an interstitial duct zone between the deck and a supporting sub-surface, the structural support elements defining an upper set of ducts (41) extending laterally from one side of the panel to the other and so located within the panel as to align with corresponding duct sets in abutting panels, and a lower set of ducts (40) extending longitudinally from one end of the panel to the other end and so located within the panel as to align with corresponding duct sets in abutting panels, characterised in that the upper and lower sets of ducts are separated by wall means which is formed with holes or knock-out panels (42) allowing communication between the upper sets of ducts and the lower sets of ducts.

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9. A floor as claimed in claim 8, characterised in that the structural support elements include

lateral ribs segregating the ducts of the upper set of ducts from one another and longitudinal ribs segregating the ducts of the lower set of ducts from one another, each upper and lower set of ducts being composed of one or more sub-sets of ducts, the holes or knock-out panels being so provided that each upper duct can communicate with each lower duct of the corresponding sub-set but with no other lower ducts.

Patentansprüche

1. Modulare Platte, welche im Gebrauch in einem ausgedehnten Feld über eine tragende Unterflache gelegt ist, um einen hohlen Boden, Wand oder Decke zu bilden, die zur Netzbildung von elektrischen, faseroptischen, hydraulischen oder anderen Leitungen geeignet sind, und welche eine obere lasttragende Deckseite aufweist, die strukturelle Tragelemente, welche eine dazwischenliegende Leitungskanalzone zwischen der Deckseite und einer tragenden Unterflache bilden, überdeckt, wobei die Elemente eine untere Leitungskanalzone, welche durch seitwärts verlaufende Rippen unterteilt ist, um eine Gruppe seitwärts verlaufender Leitungskanäle (61, 62, 63) zu bilden, die von einer Seite der Platte zur anderen verlaufen, und eine obere Leitungskanalzone definieren, die durch längsverlaufende Rippen unterteilt ist, um eine Gruppe längsverlaufender Leitungskanäle (51, 52, 53) zu bilden, die von einem Ende der Platte zum anderen verlaufen, dadurch gekennzeichnet, daß die Platte eine Gruppe vertikal verlaufender Leitungskanäle (71, 72, 73) aufweist, die sich zu den unteren seitwärts verlaufenden Leitungskanälen und in die oberen längsverlaufenden Leitungskanäle öffnen, und daß die seitwärts, längs und vertikal verlaufenden Leitungskanäle sich jeweils aus zwei oder mehr Untergruppen von Leitungskanälen zusammensetzen und nur einander entsprechende aus jeder Untergruppe der seitwärts, längs und vertikal verlaufender Leitungskanäle miteinander in Verbindung stehen, wobei jeder der unteren seitwärts verlaufenden Leitungskanäle mit einem oberen längsverlaufenden Leitungskanal einer entsprechenden Untergruppe durch einen vertikal verlaufenden Leitungskanal dieser Untergruppe in Verbindung steht.
2. Modulare Platte nach Anspruch 1, dadurch gekennzeichnet, daß jeder vertikal verlaufende Leitungskanal durch eine sich seitlich öffnende herausdrückbare Platte (42) mit dem entsprechenden oberen längsverlaufenden Leitungska-



nal in Verbindung steht.

3. Modulare Platte nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß die Deckseite an den strukturellen Tragelementen durch Keileinrichtungen abnehmbar befestigt ist. 5
4. Modulare Platte nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß zwischen den Leitungskanälen eine Mehrzahl verstärkter Rippen gebildet ist, die strukturelle Pfeiler bilden, die im Gebrauch Belastungen von der Deckseite auf die tragende Unterfläche übertragen. 10
5. Modulare Platte nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß zwischen den Leitungskanälen eine Mehrzahl Zwillingsrippenkonstruktionen gebildet ist, die strukturelle Pfeiler bilden, die im Gebrauch Belastungen von der Deckseite auf die tragende Unterfläche übertragen. 15
6. Modulare Platte nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß zwischen den strukturellen Tragelementen und der tragenden Unterfläche eine Unterlegplatte vorgesehen ist, wobei die Unterlegplatte vertikale Rippen aufweist, die in die unteren seitwärts verlaufenden Rippen der strukturellen Tragelemente eingreifen, und die im Gebrauch Welligkeiten in der tragenden Unterfläche ausgleicht. 20
7. Modulare Platte nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß Verschlussriegel an den Seiten und Enden der Platte vorgesehen sind, so daß im Gebrauch eine fehlerhafte Orientierung aneinanderliegender Platten verhindert und eine vertikale Fehlausrichtung vermindert wird. 25
8. Boden, welcher ein ausgedehntes Feld modularer Platten aufweist, die Seite-an-Seite und Ende-an-Ende aneinanderliegen, bei welchem Boden jede Platte eine obere lasttragende Deckseite (43) aufweist, die auf einer Mehrzahl von strukturellen Tragelementen gelagert ist, welche eine dazwischenliegende Leitungskanalzone zwischen der Deckseite und einer tragenden Unterfläche bilden, wobei die strukturellen Tragelemente eine obere Gruppe von Leitungskanälen (41), welche seitwärts von der einen Seite der Platte zu der anderen verlaufen und so innerhalb der Platte angeordnet sind, daß sie mit entsprechenden Leitungskanalgruppen in anliegenden Platten ausgerichtet sind, 30

und eine untere Gruppe von Leitungskanälen (40) definieren, die längs von dem einen Ende der Platte zum anderen Ende verlaufen und so innerhalb der Platte angeordnet sind, daß sie mit entsprechenden Leitungskanalgruppen in anliegenden Platten ausgerichtet sind, dadurch gekennzeichnet, daß die oberen und unteren Gruppen von Leitungskanälen durch Wandmittel abgetrennt sind, die mit Öffnungen oder herausdrückbaren Platten (42), welche die Verbindung zwischen den oberen Gruppen von Leitungskanälen und den unteren Gruppen von Leitungskanälen ermöglichen, ausgebildet sind.

9. Boden nach Anspruch 8, dadurch gekennzeichnet, daß die strukturellen Tragelemente seitwärts verlaufende Rippen, die die Leitungskanäle der oberen Gruppe von Leitungskanälen voneinander trennen, und längsverlaufende Rippen aufweisen, die die Leitungskanäle der unteren Gruppe von Leitungskanälen voneinander trennen, wobei jede der oberen und unteren Gruppe von Leitungskanälen aus zwei oder mehr Untergruppen von Leitungskanälen zusammengesetzt ist, wobei die Öffnungen oder herausdrückbaren Platten so vorgesehen sind, daß jeder obere Leitungskanal mit jedem unteren Leitungskanal der entsprechenden Untergruppe aber mit keinem anderen oberen Leitungskanal in Verbindung stehen kann. 35

Revendications

1. Panneau modulaire qui, lors de son utilisation, est déposé suivant une rangée étendue sur une sous-surface de support pour former un plancher, mur ou plafond creux approprié pour la réticulation d'un conduit électrique, de fibre optique, hydraulique ou autre, et qui comprend un plancher supérieur de support de charge qui est posé sur des éléments de support structurels qui forment une zone de conduite interstitielle entre le plancher et une sous-surface de support, les éléments définissent une zone de conduite inférieure qui est cloisonnée par des nervures latérales pour former un ensemble de conduites latérales (61, 62, 63) passant d'un côté du panneau à l'autre, et une zone de conduite supérieure qui est cloisonnée par des nervures longitudinales pour former un ensemble de conduites longitudinales (51, 52, 53) passant d'une extrémité du panneau à l'autre, caractérisé en ce que ledit panneau comprend un ensemble de conduites verticales (71, 72, 73) qui s'ouvrent sur les conduites latérales inférieures et dans les conduites longitudinales supérieures, et en ce que chacun 40



- des ensembles de conduites latérales, longitudinales et verticales est composé de deux ou de plusieurs sous-ensembles de conduites et seulement celles correspondantes de chaque sous-ensemble des conduites latérales, longitudinales et verticales sont en communication, chacune des conduites latérales inférieures étant en communication avec un conduit longitudinal supérieur d'un sous-ensemble correspondant à travers une conduite verticale de ce sous-ensemble correspondant.
2. Panneau modulaire selon la revendication 1, caractérisé en ce que chaque conduite verticale communique avec la conduite longitudinale supérieure correspondante à travers un panneau pouvant être chassé (42) réalisant une ouverture latérale. 15
 3. Panneau modulaire selon l'une des revendications 1 ou 2, caractérisé en ce que le plancher est attaché de façon amovible aux éléments de support structurels par des dispositifs de calage réalisés intégralement avec les éléments de support structurels. 20
 4. Panneau modulaire selon l'une des revendications 1 à 3, caractérisé en ce qu'une pluralité de nervures épaisses sont réalisées entre les conduites, formant des piliers de structure qui, lors de l'utilisation, transfèrent la charge du plancher à la sous-surface de support. 25
 5. Panneau modulaire selon l'une des revendications 1 à 3, caractérisé en ce qu'une pluralité de constructions de nervures doubles sont réalisées entre les conduites, formant des piliers de structure qui, lors de l'utilisation, transfèrent la charge du plancher sur la sous-surface de support. 30
 6. Panneau modulaire selon l'une des revendications précédentes, caractérisé en ce qu'un plateau est prévu entre les éléments de support structurels et la sous-surface, le plateau possédant des nervures verticales qui viennent en prise avec les nervures latérales inférieures des éléments de support structurels et qui, en cours d'utilisation, s'adaptent au mouvement ondulatoire dans la sous-surface de support. 35
 7. Panneau modulaire selon l'une des revendications précédentes, caractérisé en ce que des clavettes inter-verrouillant sont réalisées dans les côtés et extrémités du panneau modulaire de façon à empêcher, en cours d'utilisation, une orientation incorrecte des panneaux d'about et à réduire un mauvais alignement 40

vertical.

8. Un plancher comprenant une rangée étendue de panneaux modulaires posé à plat-joint et bout-à-bout, dans lequel chaque panneau comprend un plancher supérieur de support de charge (43), supporté par une pluralité d'éléments de support structurels qui forment une zone de conduite interstitielle entre le plancher et la sous-surface de support, les éléments de support structurels définissant un ensemble supérieur de conduites (41) s'étendant latéralement d'un côté du panneau à l'autre et localisé ainsi à l'intérieur du panneau de façon à s'aligner avec les ensembles de conduites correspondantes dans des panneaux d'about, et un ensemble inférieur de conduites (40) s'étendant longitudinalement d'une extrémité du panneau à l'autre extrémité et localisé ainsi à l'intérieur du panneau de façon à s'aligner avec les ensembles de conduites correspondantes dans les panneaux d'about, caractérisé en ce que les ensembles supérieurs et inférieurs des conduites sont séparés par des moyens formant paroi qui présentent des trous ou des panneaux pouvant être chassés (42) permettant la communication entre les ensembles supérieurs de conduites et les ensembles inférieurs de conduites. 45
9. Plancher tel que revendiqué dans la revendication 8, caractérisé en ce que les éléments de support structurels comprennent des nervures latérales séparant les conduites de l'ensemble supérieur de conduites les unes des autres et des nervures longitudinales séparant les conduites de l'ensemble inférieur des conduites les unes des autres, chaque ensemble supérieur et inférieur de conduites étant composé d'un ou de plusieurs sous-ensembles de conduites, les trous ou panneaux pouvant être chassés étant réalisés de façon que chaque conduite supérieure puisse communiquer avec chaque conduite inférieure du sous-ensemble correspondant mais avec aucune autre conduite inférieure. 50