A type of partially prefabricated waffle slabs, for use in building wafer foundry (or other structures) and for the purpose of installing equipment for wafer production. Said partially prefabricated waffle slabs comprise primarily: a main body, having a number of primary holes for air circulation or other mechanical needs. Said main body can have pillar (or column) holes or notched corners for the penetration of major pillars (or columns). Said partially prefabricated waffle slabs have the advantage of meeting the requirements of achieving field safety, reasonable cost, rapid production, transportation needs, easy installation, and simple structural joints and at the same time complying with the specifications of Fab.
PARTIALLY PREFABRICATED WAFFLE SLAB
FIELD OF THE INVENTION
[0001] This presented invention relates to partially prefabricated waffle slabs especially for the purpose of installing equipment which produces wafers in a wafer foundry. (Said invention is also suitable for structures of other purposes). Said partially prefabricated waffle slabs will meet requirements in achieving field safety, reasonable cost, rapid production, transportation needs, easy installation, and simple structural joints.

PROBLEM THE PRESENT INVENTION AIMS TO SOLVE
[0002] As the semi-conductor market changes rapidly, construction of a wafer foundry ("Fab") must be very efficient, so that construction and performance testing can be completed which allows production to commence within set schedule to ensure profit.

[0003] As required by these delicate equipment, the Fab floors must be able to withstand microvibrations. The slabs are the so-called waffle slabs. Waffle slabs, which are supported by main pillars, can be used in Fabs and other structures where resistance of microvibrations or wide spans is required.

[0004] In the conventional Fab waffle slab construction, the construction platform must be set up first, then placing the pre-assembled wooden molds on the construction platform. After the wooden molds are secured in place the reinforced steel bars are arranged, finally topped with concrete to obtain a waffle slab. Waffle production equipment can be installed after the installations of rigidly shaped elevated floors. The multiple holes of the waffle slabs are designed to provide air circulation and other mechanical needs (the functions of such waffle slab holes are of learned technology, the description of which is therefore not briefed further.)

[0005] Since conventional waffle slabs are assembled at the construction site, conditions like the weather, the elevated construction platform and the mass number of construction platforms will affect the construction transportation that will cause delay in construction and undermine business opportunity.

[0006] In order to reduce the impact of weather and the massive number of workers at the construction site and to improve quality, prefabrication emerges as the preferred choice. But feasibility of such prefabrication will depend on whether requirements for structural safety and acceptable cost during the stages of production, transportation, installation and assembly can be satisfied. In the past, the prefabrication of waffle slabs, because of the complexity in joining waffle slabs in both the transverse and longitudinal directions, coupled by the slab's heavy weight, the cost for production, transportation and installation would increase significantly. Therefore, prefabrication of waffle slabs was not feasible in the past, and the problems of long construction period and unpredictable quality associated with the construction of Fab have persisted.

SOLUTION OFFERED BY THE PRESENT INVENTION
[0007] The primary objective is to provide a type of partially prefabricated waffle slabs. The slabs are partially prefabricated with a bottom plank first, then shipped to the construction site for the next phrase of construction. Such partially prefabrication can reduce the weight of the waffle slabs to allow easier facilitation of production, transportation, and installation. Since the concrete topping is poured on site (second phase of construction), adjacent slabs can easily be jointed. The bottom planks of partially prefabricated slabs are built strong enough to support the weight of concrete and construction dead loads, so the construction platforms, which can affect the construction transportation, are no longer required.

[0008] Said objective is achieved by a type of partially prefabricated waffle slab that comprises a main body which consists of a number of holes for air circulation and other mechanical needs.

[0009] Said main body can also extend forward horizontally to form a bearing plate.

[0010] Said bearing plate has a number of secondary holes for air circulation and other mechanical needs.

[0011] Said main body is preferably in rectangular shape for easier assembly.

[0012] The primary holes of said main bodies are preferably in rectangular or circular shape for easier facilitation in construction.

[0013] The secondary holes of said bearing plate are preferably in circular or rectangular shape for easier facilitation in construction.

[0014] Four Corners of either the main body or the bearing plate are notched, for continual of columns.

[0015] The said main body can also be prefabricated with holes for pillars (or columns) to pass through.

BRIEF DESCRIPTION OF THE DRAWINGS
[0016] FIG. 1 An isometric view of the main body of the first embodiment.

[0017] FIG. 2. An isometric view of the partially prefabricated waffle slabs placed over four pillars (or columns), and shows several partially prefabricated waffle slabs jointed together to form a larger waffle slab area ready for second phase of construction.

[0018] FIG. 3 A reflected isometric view of FIG. 2.

[0019] FIG. 4 A top view of FIG. 2.

[0020] FIG. 5 Front view of FIG. 4.

[0021] FIG. 6 Section A-A of FIG. 4.

[0022] FIG. 7 Section B-B of FIG. 4, which shows the waffle slab at the finish of the second phase construction.

[0023] FIG. 8 Section of FIG. 7 at completion.

[0024] FIG. 9 Section C-C of FIG. 4, which shows the partially prefabricated waffle slab with reinforced steel bar cage installed.

[0025] FIG. 10 Section of FIG. 6, which shows the H-shaped steel replacing reinforced bars in FIG. 9.

[0026] FIG. 11 Section of FIG. 10, which shows the waffle slab at the finish of the second phase construction.
FIG. 12A waffle slabs in a second embodiment of the invention.

FIG. 13. A waffle slabs in a third embodiment of the invention.

FIG. 14. A waffle slabs in a fourth embodiment of the invention.

FIG. 15. Section D-D of FIG. 14.

FIG. 16. Jointing of several prefabricated waffle slabs of FIG. 14.

FIG. 17. A waffle slabs in a fifth embodiment of the invention.

FIG. 18. A waffle slabs in a sixth embodiment of the invention.

FIG. 19. A waffle slabs in a seventh embodiment of the invention.

Numbering Scheme of Elements

1, 2 waffle slabs
10, 20 main body
11, 21 primary holes
12, 22 disk-shape plates
13, 23 secondary holes
14 notches
15 reinforced web
18 multi-cylindrical post connectors
19 cylindrical pillars
24 secondary holes

DETAILED DESCRIPTION OF THE INVENTION

As shown in FIGS. 1 & 6, the partially prefabricated waffle slab 1 comprises a main body 10 and disk-shaped plate 12. Said main body 10 is a rectangular structure and having a plurality of primary holes 11. Said primary holes 11 are rectangular in shape in this instance of embodiment. The primary holes 11 form reinforced webs 15 transversely and longitudinally so main body 10 is structurally safe. Said disk-shaped plate 12 is formed by the extension of main body 10 and is thinner than main body 10. The disk-shaped plate is made with number of secondary holes 13, which are in cylindrical shape. The corners of the disk-shaped plate 12 are also notched. In FIG. 7, a multi-cylindrical post connector 18 made of material like FRP is placed inside each of the primary holes 11 of the main body 10; cylindrical pillars 19 made of such material as FPR are also placed inside each of secondary holes 13 of the disk-shaped plate 12. The multi-cylindrical post connectors 18 and cylindrical pillars 19 are embedded before prefabrication process begins. The reinforced steel bar cage 94 is then laid in the transverse and longitudinal directions over the main body 19 (see FIG. 9). Then second phase of construction continues with pouring concrete. (For easier understanding, the reinforced steel bar cage 94, multi-cylindrical post connectors 18 and cylindrical pillars 19 are not drawn in FIGS. 1 through 5).

The waffle slab 1 of a Fab and prefabricated pillars (or columns) 9 will be described with illustration FIGS. 1 through 5.

As shown in FIGS. 2 through 5, several prefabricated pillars (or columns) 9 are placed at appropriate positions in accordance with the structural needs. Each pillar 9 has a capital 91, which forms a supporting area 92 that has larger area than a capital 91. The notches of corners 14 of said waffle slab 1 are placed on the four pillars 9 at the corresponding position. A larger area of waffle slab floor is achieved by jointing several said waffle slabs 1. The purpose of said notches 14 is for the reinforced bars 90 to pass through for the continual jointing of pillar 9 (or columns). (For easier understanding, FIGS. 2-5 show only reinforced bars 90 of one main pillar (or columns)).

Please refer to FIGS. 2-5 and FIG. 7 for the following discussion of the second phase construction of the waffle slabs 1.

While said waffle slab 1 have been placed to form a larger area of waffle slab floor, the steel bars are installed at the junctures of adjacent slabs. The second phase of construction is to pour concrete 95 as the topping. (FIG. 7 shows the structural view of each waffle slab 1 after the second phase of construction). In FIG. 8, the surfaces of each multi-cylindrical post connectors 18 and cylindrical pillars 19 are removed to form thorough passage for air circulation and other mechanical needs.

FIG. 10 shows the example of using H-shaped steel 96 to substitute said reinforced steel bar cage 94 shown in FIG. 9. In FIG. 11, after concrete 95 is poured, the top surface 97 of the H-shaped steel 96 remains exposed. By virtue of its rigidity, the top surface 97 can serve as support of the machines required for the installation of said rigid shaped elevated floors. This will prevent concrete on the surface 97 from cracking.

FIG. 12 is the second embodiment of the waffle slab. Said partially prefabricated waffle slab 1A is different from the partially prefabricated waffle slab 1 of first embodiment in that the partially prefabricated waffle slab 1A does not have the disk-shape plate and that there are holes 11' surrounding the rectangular primary holes 11.

FIG. 13 shows the third embodiment of the waffle slab, where the partially prefabricated waffle slabs 1B are more similar to the partially prefabricated waffle slabs 1A of FIG. 12. The difference is that the primary holes 11' of partially prefabricated waffle slabs 1B are all in circular shape.

FIG. 14 shows the fourth embodiment of the waffle slab. The differences between the first embodiment and the fourth embodiment are that the primary holes 21 and the secondary holes 23 are in circular shape, and the four corners of the fourth embodiment are not notched. In the fourth embodiment, said waffle slabs are made with rectangular holes 24 in the main body 20 for the continual jointing of major pillars (or columns); there are four major pillars (or columns) in this embodiment. FIG. 15 shows the section D-D in FIG. 14. FIG. 16 shows a larger waffle slab floor area composed of several partially prefabricated waffle slabs 2 of FIG. 14. For constructing the same area, the span between the main pillars (or columns) in the fourth embodiment shown in FIG. 14 is smaller than the span between
pillars (or columns) in the first through third embodiment, but this offers another option for the clients when building a Fab.

[0055] FIG. 17 shows the fifth embodiment. The partially prefabricated waffle slabs 2A are similar to the partially prefabricated waffle slabs 2 in FIG. 14. The difference of the two is that the partially prefabricated waffle slabs 2 in this embodiment do not have the disk-shaped plate 12 or 22.

[0056] FIG. 18 shows the sixth embodiment. The partially prefabricated waffle slabs 2B are similar to the partially prefabricated waffle slabs 2 in FIG. 14. The difference of the two is that the partially prefabricated waffle slabs 2B have only one rectangular hole 24 for major pillar (or column) to pass through in the center of main body 20. Since there is only one rectangular hole 24 for one major pillar (or column) to support, this embodiment allows greater span between pillars (or columns) and the best visual penetrations when constructing the same quantity of floors.

[0057] FIG. 19 shows the seventh embodiment. The partially prefabricated waffle slabs 2C are similar to the partially prefabricated waffle slabs 2B in FIG. 18. The difference is that the partially prefabricated waffle slabs 2C do not have the disk-shaped plate 12 or 22.

[0058] Effectiveness of the Invention

[0059] The partially prefabricated waffle slabs of the present invention have the advantage of meeting the requirements in achieving field safety, reasonable cost, rapid production, transportation needs, easy installation, and simple structural joints and at the same time complying with the specifications of the Fab. A number of partially prefabricated waffle slabs can be jointed to form the waffle slab floor large enough for the Fab. However, the present invention does not place limitations on the shape of the primary or secondary holes the presence or absence of the disk-shaped plate the penetration of major pillars (or columns) the notched corners type of reinforcing method used the span between the pillars (or columns). The scope of claims herein should cover all feasible technology for partially prefabricated waffle slabs.

What is claimed is:
1. A partially prefabricated waffle slabs, comprising at least a main body having a plurality of primary holes.
2. A partially prefabricated waffle slab as recited in claim 1, wherein the main body having disk-shaped plates extended outward horizontally as needed.
3. A partially prefabricated waffle slab as recited in claim 1, wherein the disk-shaped plates have a plurality of holes.
4. A partially prefabricated waffle slab as recited in claim 1, wherein the main body is in rectangular shape.
5. A partially prefabricated waffle slab as recited in claim 1, wherein the holes of main body are in rectangular or circular or other appropriate shape.
6. A partially prefabricated waffle slab as recited in claim 2, wherein the disk-shaped plate is thinner than the main body.
7. A partially prefabricated waffle slabs as recited in claim 3, wherein the holes of the disk-shaped plate are in rectangular or circular or other appropriate shapes.
8. A partially prefabricated waffle slabs as recited in claim 2, wherein the four corners of the disk-shaped plate are notched.
9. A partially prefabricated waffle slabs as recited by claim 1, wherein the four corners of main body are notched.
10. A partially prefabricated waffle slabs as recited by claim 1, wherein the main body having at least one pillar (or column) hole.

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