

**DOUBLE GIRDER STRUCTURE CONNECTED TO COLUMN AND REINFORCED
WITH STIFFNESS AND ITS CONSTRUCTION METHOD**

TECHNICAL FIELD

[0001] The present disclosure relates to a double girder structure connected to a column and reinforced with stiffness and its construction method, and more particularly, to a double girder structure connected to a column and reinforced with stiffness and its construction method which can prevent buckling of a girder and is also easy to construct by using a double girder.

BACKGROUND

[0002] In general, a PC composite construction method refers to a construction method in which a part or all of major structural members, such as reinforced concrete columns, beams, and slabs, are manufactured in a factory, and assembled and installed on site, and cast-in-place concrete is poured at joints between members and on upper portions of the slabs to integrate the structure.

[0003] This construction method is a composite construction method that combines a factory manufacturing method and a field construction method. The structure is a joint structure manufactured by a wet joint system, and is manufactured in a factory and assembled and constructed on

site. Therefore, the quality of the structure is good and is easily constructed, and the construction may be completed early, so it has the advantage of shortening the construction period and, in particular, has the advantage of reducing the risk of disasters due to less investment in manpower and temporary materials.

[0004] Meanwhile, the steel structure is a structure that assembles steel members using methods such as rivets, bolts, and welding, and has advantages of construction efficiency, being usefully applied to high-rise and large-scale span buildings, and being free in design and internal plane composition and easy to expand or remodel.

[0005] A steel girder connected to a column generates an end moment (bending), and as a result, at an end portion of the steel girder, an upper portion of the steel girder experiences tension and a lower portion of the steel girder experiences compression. The end portion of the steel girder is usually called a negative moment section.

[0006] In order to solve the inefficient design problem of the steel girder, when an absolute value of the negative moment is greater than that of a positive moment, the entire steel girder is designed as a member that may resist the positive moment, while the end portion of the steel girder is reinforced by adding an inverted T-shaped steel to the lower portion.

[0007] In the past, since a single girder was connected to a joint of the column, there was an insufficient aspect of reinforcement for the section where the absolute values of the positive moment and negative moment were large. Therefore, it is necessary to introduce a double girder for a portion where a large moment occurs.

SUMMARY

[0008] The present disclosure provides a double girder structure connected to a column and reinforced with stiffness and its construction method, which can prevent buckling of the girder by connecting a double girder and a bracing part, and makes a connection between the bracing parts and the double girder very easy by the bracing part.

[0009] In one general aspect, a double girder structure connected to a column and reinforced with stiffness includes: a column part; bracing parts that are connected to the column part, connected by a steel bar so that lengths of the bracing parts are adjusted, and provided by a plurality of X-shaped bracings; and a double girder part that includes a first double girder rigidly connected to the column part and set on left and right of the bracing part and a second double girder connected to the first double girder by bolt fastening.

[0010] The bracing part may include: a first bracing part that is directly connected to the column part; and a second

bracing part that is slidably connected to the first bracing part and joined to the first bracing part.

[0011] The first bracing part may include: a plurality of flanges that are connected to be fixed to the column part; a fixed bracing that is connected to be fixed to one side of the plurality of flanges; and a movable bracing that is guided and moves by the plurality of flanges.

[0012] A plurality of connecting steel bars may penetrate through upper, lower, left, and right sides of the fixed bracing, a circular tube may penetrate through a center of the fixed bracing, and the movable bracing may be provided so that the plurality of connecting steel bars and the circular tube move to one side.

[0013] The second bracing part may include: a plurality of flanges; a penetrating bracing that is provided to allow the circular tube and connecting steel bars of the first bracing part to penetrate therethrough; and a reinforcing bracing that is provided to reinforce the plurality of flanges.

[0014] The first bracing part and the second bracing part may be joined by a bolting fastening part after the connecting steel bar of the first bracing part moves by the movable bracing and penetrates through the penetrating bracing.

[0015] The double girder part may include: first double girders set on left and right of the first bracing part and a bottom plate provided between the first double girders;

and second double girders set on left and right of the second bracing part and a bottom plate provided between the second double girders.

[0016] In another general aspect, a construction method of a double girder structure connected to a column and reinforced with stiffness includes: a first construction step of fixedly connecting a first bracing part and a first double girder to one side of a column part; a second construction step of setting a second bracing part on one side of the first bracing part; a third construction step of joining the first bracing part and the second bracing part; a fourth construction step of setting a second double girder on one side of the first double girder; and a fifth construction step of fixing a double girder part by a fastening part.

[0017] In the third construction step, a connecting steel bar and a circular tube of the first bracing part may move by a movable bracing of the first bracing part and penetrate through the penetrating bracing, and then joined by a bolting fastening part.

[0018] The construction method may further include: after the fifth construction step, a sixth construction step of connecting a crossbeam between the second double girder and an adjacent second double girder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] FIG. 1 is a perspective view illustrating a double girder structure connected to a column and reinforced with stiffness according to an embodiment of the present disclosure.

FIG. 2 is a perspective view illustrating a first bracing part according to an embodiment of the present disclosure.

FIG. 3 is a perspective view illustrating a second bracing part according to an embodiment of the present disclosure.

FIG. 4 is a perspective view illustrating a connection and arrangement of the first bracing part and the second bracing part according to an embodiment of the present disclosure.

FIG. 5 is a perspective view illustrating the first bracing part and the second bracing part being joined according to an embodiment of the present disclosure.

FIG. 6 is a perspective view illustrating a first double girder connected to the first bracing part according to an embodiment of the present disclosure.

FIG. 7 is a perspective view illustrating a second double girder connected to the second bracing part according to an embodiment of the present disclosure.

FIG. 8 is a perspective view illustrating a connection

of an abdomen and a lower flange in the process of connecting the first double girder and the second double girder according to an embodiment of the present disclosure.

FIG. 9 is a perspective view illustrating an upper flange being connected during the process of connecting the first double girder and the second double girder according to an embodiment of the present invention.

FIGS. 10 to 13 are diagrams illustrating a construction method of a double girder structure connected to a column and reinforced with stiffness according to an embodiment of the present disclosure.

DETAILED DESCRIPTION OF EMBODIMENTS

[0020] Hereinafter, embodiments of the present disclosure will be described in detail with reference to the accompanying drawings so that they may be easily practiced by those skilled in the art to which the present disclosure pertains. However, the present disclosure may be implemented in various different forms, and is not limited to embodiments described herein. In addition, in the drawings, portions unrelated to the description will be omitted to clearly describe the present disclosure, and similar portions will be denoted by similar reference numerals throughout the specification.

[0021] Throughout the specification, "including" any

component will be understood to imply the inclusion of other components rather than the exclusion of other components unless explicitly described to the contrary.

[0022] Hereinafter, a double girder structure connected to a column and reinforced with stiffness according to an embodiment of the present disclosure will be described in detail with reference to the drawings.

[0023] Referring to FIG. 1, the double girder structure connected to a column and reinforced with stiffness according to an embodiment of the present disclosure includes a column part 100, a double girder 200 with reinforced stiffness connected to the column part 100, and a crossbeam 300. The double girder 200 reinforced with stiffness includes bracing parts 210 and 220 and double girder parts 230 and 240.

[0024] The column part 100 may be provided as hollow or solid, and may be provided as a circular cross-section or a polygonal cross-section.

[0025] The bracing parts 210 and 220 are connected to the column part 100, connected by a steel bar so that lengths of the bracing parts 210 and 220 can be adjusted, and provided by a plurality of X-shaped bracings.

[0026] The bracing parts 210 and 220 include a first bracing part 210 that is directly connected to the column part 100, a second bracing part 220 that is slidably connected to the first bracing part 210 to be joined to the first bracing

part 210. The first bracing part 210 is preferably directly connected to the column part 100 but is reinforced by a first double girder 230.

[0027] Referring to FIG. 2, the first bracing part 210 includes a plurality of flanges 211 that are fixedly connected to the column part 100, a fixed bracing 215 that is fixedly connected to one side of the plurality of flanges 211, and a movable bracing 213 that may be guided and move by the plurality of flanges 211.

[0028] The flange 211 may be preferably formed in an 'L' shape, but it is also possible to form a 'ㄱ' shape, an I shape, an H shape, a steel pipe, etc., to support the girder part 230.

[0029] The flange 211 is preferably formed in four pieces and fixedly connected to the column part 100, and the fixed bracing 215 and the movable bracing 213 are formed in an X shape and may be coupled to the flange 211 at the end portion.

[0030] The fixed bracing 215 is fixedly connected to one side of the plurality of flanges 211, a steel bar penetration hole is provided so that each of the plurality of connecting steel bars 217 may penetrate therethrough, and a circular tube penetration hole may be provided so that a circular tube 219 may penetrate therethrough.

[0031] The plurality of connecting steel bars 217 penetrates through the upper, lower, left, and right sides of the fixed bracing 215, the circular tube 219 penetrates through a

center of the fixed bracing 215, and the movable bracing 213 is provided so that the plurality of connecting steel bars 217 and the circular tube 219 move to one side.

[0032] The movable bracing 213 is guided by an inner side of the plurality of flanges 211 and moves, but is formed so that the plurality of connecting steel bars 217 and the circular tube 219 may be pushed to one side.

[0033] To this end, the other end portion of the plurality of flanges 211 may be provided to contact each wing part 213a of the movable bracing 213, and the circular tube 219 may be inserted or contacted by the protrusion part 213b of the movable bracing 213.

[0034] Referring to FIG. 3, the second bracing part 220 includes a plurality of flanges 221, a penetrating bracing 223 provided with a circular tube penetration hole 222 and a steel pipe penetration hole 228 through which the circular tube 219 and the connecting steel bar 217 of the first bracing part 210 each penetrate therethrough, and reinforcing bracings 225 and 226 provided to reinforce the plurality of flanges 221.

[0035] The plurality of flanges 221 may be provided in a shape and size corresponding to the plurality of flanges 211 of the first bracing part 210, and the penetrating bracing 223 may be provided in a shape and size corresponding to the fixed bracing 215 of the first bracing part 210.

[0036] At least one of the reinforcing bracings 225 and 226 may be provided, and fixed to the plurality of flanges 221.

[0037] Referring to FIGS. 4 and 5, the first bracing part 210 and the second bracing part 220 are set adjacently, and then the connecting steel bar 217 and the circular tube 219 of the first bracing part 210 may move together by the movable bracing 213 to penetrate through the penetrating bracing 223 and then be joined by bolting fastening parts 218a and 218b.

[0038] The double girder parts 230 and 240 are set to the left and right of the bracing parts 210 and 220 and then connected by bolt fastening.

[0039] The double girder parts 230 and 240 may include first double girders 230a and 230b set on the left and right of the first bracing part 210 and a bottom plate 230c provided between the first double girders 230a and 230b, and second double girders 240a and 240b set on the left and right of the second bracing part 220 and a bottom plate 240c provided between the second double girders 240a and 240b.

[0040] The first double girders 230a and 230b and the second double girders 240a and 240b may be provided as a pair of I-beam or H-beam, and may be guided and move by the flanges 211 and 221, respectively.

[0041] Hereinafter, referring to FIGS. 10 to 13, a construction method of a double girder structure connected to a column and reinforced with stiffness according to an

embodiment of the present disclosure includes a first construction step of fixedly connecting the first bracing part 210 and the first double girder 230 to one side of the column part 100, a second construction step of setting the second bracing part 220 to one side of the first bracing part 210, a third construction step of joining the first bracing part 210 and the second bracing part 220, a fourth construction step of setting the double girder parts 230 and 240, and a fifth construction step of fixing the double girder parts 230 and 240 by a fastening part 260.

[0042] In the first construction step, the flange 211 of the first bracing part 210 is fixedly connected to the column part 100 that has been set in advance. The first bracing part 210 is preferably directly connected to the column part 100 but is reinforced by the first double girder 230. Thereafter, in the second construction step, the second bracing part 220 is set adjacent to the first bracing part 210, and then, in the third construction step, the connecting steel bar 217 and circular tube 219 of the first bracing part 210 move together by the movable bracing 213 to penetrate through the penetrating bracing 223, and then the first bracing part 210 and the second bracing part 220 may be joined by the bolting fastening parts 218a and 218b.

[0043] In the fourth construction step, a lower empty space of the first double girders 230, 230a, and 230b provided on

the left and right of the first bracing part 210 may be finished with the bottom plate 230c.

[0044] Providing the second double girders 240, 240a, and 240b on the left and right of the second bracing part 220 corresponds to providing the first double girders 230a and 230b on the left and right of the first bracing part 210, and thus a detailed description thereof will be omitted.

[0045] In the fifth construction step, after setting the first double girder 230 and the second double girder 240 on each of the first bracing part 210 and the second bracing part 220, the first double girder 230 and the second double girder 240 may be connected by fastening parts 250 and 260. Thereafter, after the fifth construction step, a sixth construction step may be provided to connect the crossbeam 300 between the second double girder 240 and the adjacent second double girder 240.

[0046] According to the present disclosure, since the double girder and the bracing part are connected to the column instead of the single girder, the buckling of the girder is prevented, and the connection between the bracing parts and the connection between the double girders are very easy by the bracing part, the construction is easy.

[0047] The above description of the present disclosure is for illustrative purposes, and those skilled in the art to which the present disclosure pertains will understand that it may

be easily modified to other specific forms without changing the technical spirit or essential features of the present disclosure. Therefore, it is to be understood that the example embodiments described above are illustrative rather than being restrictive in all aspects. For example, each component described as a single type may be implemented in a distributed manner, and similarly, components described as distributed may be implemented in a combined form.

[0048] It should be interpreted that the scope of the present disclosure is defined by the following claims rather than the above-mentioned detailed description and all modifications or alterations deduced from the meaning, the scope, and equivalences of the claims are included in the scope of the present disclosure.

WHAT IS CLAIMED IS:

1. A double girder structure which, when assembled, is connected to a column and reinforced with stiffness, comprising:

a column part;

bracing parts that are connected to the column part, connected by a steel bar so that lengths of the bracing parts are adjusted, and provided by a plurality of X-shaped bracings; and

a double girder part that includes a first double girder rigidly connected to the column part and set on left and right of the bracing part and a second double girder connected to the first double girder by bolt fastening;

wherein the bracing part includes:

a first bracing part that is directly connected to the column part; and

a second bracing part that is slidably connected to the first bracing part and joined to the first bracing part; and

wherein the first bracing part includes:

a plurality of flanges that are connected to be fixed to the column part;

a fixed bracing that is connected to be fixed to one side of the plurality of flanges; and

a movable bracing that is guided and moves by the plurality of flanges.

2. The double girder structure of claim 1, wherein a plurality of connecting steel bars penetrate through upper, lower, left, and right sides of the fixed bracing, a circular tube penetrates through a center of the fixed bracing, and the movable bracing is provided so that the plurality of connecting steel bars and the circular tube move to one side.

3. The double girder structure of claim 1, wherein the second bracing part includes:

a plurality of flanges;

a penetrating bracing that is provided to allow the circular tube and connecting steel bars of the first bracing part to penetrate therethrough; and

a reinforcing bracing that is provided to reinforce the plurality of flanges.

4. The double girder structure of claim 3, wherein the first bracing part and the second bracing part are joined by a bolting fastening part after the connecting steel bar of the first bracing part moves by the movable bracing and penetrates through the penetrating bracing.

5. The double girder structure of claim 1, wherein the double girder part includes:

first double girders set on left and right of the first

bracing part and a bottom plate provided between the first double girders; and

second double girders set on left and right of the second bracing part and a bottom plate provided between the second double girders.

6. A construction method of a double girder structure connected to a column and reinforced with stiffness, comprising:

a first construction step of fixedly connecting a first bracing part and a first double girder to one side of a column part;

a second construction step of setting a second bracing part on one side of the first bracing part;

a third construction step of joining the first bracing part and the second bracing part;

a fourth construction step of setting a second double girder on one side of the first double girder; and

a fifth construction step of fixing a double girder part by a fastening part;

wherein, in the third construction step, a connecting steel bar and a circular tube of the first bracing part move by a movable bracing of the first bracing part and penetrate through the penetrating bracing, and are then joined by a bolting fastening part.

7. The construction method of claim 6, further comprising:

after the fifth construction step, a sixth construction step of connecting a crossbeam between the second double girder and an adjacent second double girder.