

EUROSILO INTELLIGENT DEVICE MOUNTING APPARATUS AND METHOD

TECHNICAL FIELD

The invention relates to the technical field of Eurosilo device mounting construction, and in particular to a Eurosilo intelligent device mounting apparatus and method.

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BACKGROUND

Eurosilo is a new type of silo introduced from the Netherlands for storing and handling bulk materials. It has the advantages of small footprint, large storage capacity, fully enclosed, no dust, anti-spontaneous combustion, and equipped with an intelligent management system, so there is a nation-wide potential for promotion. In a Eurosilo system, the Eurosilo device serves as a key component of the entire system and is responsible for both the storage of bulk materials and the processing of bulk materials. A Eurosilo device is mainly composed of a central rotating piece, a winching system, a spiral frame side rotating trestle, an A-shaped frame side rotating trestle, a spiral frame, an A-shaped frame, a telescopic blanking pipe, etc., with a total weight of 220t. The entire Eurosilo device is suspended on a steel structure conveying trestle mounted on a roof of the Eurosilo, with the characteristics of large volume and weight, and high installation accuracy requirements. Therefore, the safety, stability and high-precision control of the entire Eurosilo device mounting process becomes particularly important. Examples of successful applications in foreign countries all used large-scale hoisting devices to conduct lifting and installation from outside to inside of the Eurosilo and conducted connections at high elevation.

However, the examples of successful applications in foreign countries were mostly constructed in newly built factories or provided with a relatively large construction site. At present, most of the domestic projects involve the reconstruction or renovation of existing factory areas where relatively small construction sites are provided, so that the method of using large-scale hoisting devices which are popular abroad cannot be directly used. Moreover, the method of using large-scale hoisting devices for high-elevation hoisting also has problems such as greater safety risks and larger space occupation.

The information disclosed in the Background is merely intended to enhance an understanding of the general background of the invention and should not be construed as an admission or in any way implying that the information is prior art to a person of ordinary skill in the art.

SUMMARY

The main objective of the present invention is to provide a Eurosilo intelligent device mounting apparatus and method to solve the problem of how to achieve high-precision installation of a large Eurosilo device in a small construction site by using hydraulic overall synchronous lifting technology to synchronously lift part of the Eurosilo device and the steel trestle of the Eurosilo roof in place, and install the remaining devices in sequence using a hoisting device.

In order to achieve the above objective, the technical solution of the present invention is:

A Eurosilo intelligent device mounting apparatus, including:

a Eurosilo device, lifting members, steel trestle pre-assembled sections, a steel trestle, a tire frame, a device moving platform and guide rail, a central rotating piece, a winching system, a hoisting device, a spiral frame, a telescopic blanking pipe, an A-shaped frame, an A-shaped frame side rotating trestle, and a spiral frame side rotating trestle, wherein the steel trestle is assembled inside a Eurosilo structure; the central rotating piece, the winching system, the hoisting device, the spiral frame, the telescopic blanking pipe, the A-shaped frame, the A-shaped frame side rotating trestle and the spiral frame side rotating trestle are assembled at a site outside the Eurosilo structure.

The present invention also provides a Eurosilo intelligent device mounting method, utilizing the aforementioned Eurosilo intelligent device mounting apparatus, the method including the following steps:

step S1: designing the lifting members according to a total weight of the steel trestle, the central rotating piece and the winching system; mounting the lifting members and the steel trestle pre-assembled sections on a ring beam at a top of the Eurosilo structure; installing, inside the Eurosilo structure, the tire frame and the device moving platform and guide rail; assembling the steel trestle on the tire frame after the tire frame has been installed; at the same time, assembling section by section, main components of the Eurosilo device outside the Eurosilo structure;

step S2: using the hoisting device to lift and move the central rotating piece and the winching system along a wall of the Eurosilo device onto the device moving platform and guide rail for assembly, installation and leveling;

step S3: using the lifting members to lift the assembled steel trestle to a specified height;

step S4: moving the central rotating piece and the winching system along a side of the Eurosilo structure to a location below the steel trestle by using the device moving platform and guide rail; aligning a center of the hoisting device with a center of the steel trestle; lowering the steel trestle to a design height to engage and connect with the central rotating piece and the winching system;

step S5: using the lifting members to lift the central rotating piece, the winching system and the steel trestle together to a designated elevation at the top of the Eurosilo structure, and connecting the steel trestle with the steel trestle pre-assembled sections;

step S6: dismounting the lifting members after the steel trestle has been connected with the steel trestle pre-assembled sections; then using the hoisting device to lift and move the spiral frame to the inside of the Eurosilo structure in three sections for installation; and using the hoisting device to sequentially lift and install the telescopic blanking pipe, the A-shaped frame, the A-shaped frame side rotating trestle and the spiral frame side rotating trestle, until the Eurosilo structure is completely installed.

Moreover, step S1 further includes using the hoisting device to lift and move the central rotating piece and the winching system along the wall of the Eurosilo device onto the device moving platform and guide rail and assembling the central rotating piece and the winching system.

Moreover, the specified height in step S3 is 12.0m.

Moreover, the design height in step S4 is 9.018m.

Moreover, the designated elevation in step S5 is 55.40m.

Moreover, step S6 includes:

step 1: removing the tire frame, and then dividing the spiral frame into three sections and using the hoisting device to lift and move the three sections along the wall of the Eurosilo device onto the device moving platform and guide rail; using the hoisting device to lift and move the telescopic blanking pipe into the Eurosilo structure and assembling it with the spiral frame; moving the spiral frame and the telescopic blanking pipe to another side of the Eurosilo structure by using the device moving platform and guide rail; removing the lifting members after they are dismounted; using the hoisting device to lift and move the A-shaped frame to the inside of the Eurosilo structure and connecting it with the spiral frame; and lifting and moving the A-shaped frame side rotating trestle to the inside of the Eurosilo structure above the A-shaped frame and connecting it with the winching system;

step 2: finally, using the hoisting device to lift and move the spiral frame side rotating trestle to the inside of the Eurosilo structure above the spiral frame and connecting it with the winching system;

step 3: after the Eurosilo device is completely installed, using a steel wire of the Eurosilo device to conduct lifting and rotating and entering a debugging stage.

Compared with the prior art, the beneficial technical effects of the present invention lie in:

The present invention uses lifting members to synchronously lift the central rotating piece, the winching system and the steel trestle in place as a whole, and the other devices are sequentially hoisted in place. This Eurosilo device mounting method not only reduces the safety risks of high-elevation operations, but also meets the requirements for high installation accuracy. At the same time, it effectively reduces the occupied area of construction site and greatly saves the construction time and cost. It has well realized the precise installation of Eurosilo device in a small construction site, and provides new reference for subsequent similar device installation and construction, especially renovation projects in existing factories.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an installation plan view of the Eurosilo intelligent device mounting apparatus according to an embodiment of the present invention.

Fig. 2 to Fig. 7 are installation flow charts of steps S1 to S6 of the Eurosilo intelligent device mounting method according to an embodiment of the present invention.

Fig. 8 to Fig. 10 are installation flow charts of step S6 of the Eurosilo intelligent device mounting method according to an embodiment of the present invention.

In the drawings:

Eurosilo device-1, lifting member-2, steel trestle pre-assembled section-3, steel trestle-4, tire frame-5, device moving platform and guide rail-6, central rotating piece-7, winching system-8, hoisting device-9, spiral frame-10, telescopic blanking pipe-11, A-shaped frame-12, A-shaped frame side rotating trestle-13, spiral frame side rotating trestle-14.

DETAILED DESCRIPTION

The Eurosilo intelligent device mounting apparatus and method proposed by the present invention will be further described in detail below with reference to the accompanying drawings and specific embodiments. The advantages and features of the present invention will become clearer from the following description. It should be noted that the drawings are in a very simplified form and use imprecise proportions, and are only used to conveniently and clearly assist in explaining the embodiments of the present invention. For the convenience of description, the terms "upper" and "lower" mentioned below are consistent with the upward and downward directions in the drawings, but this cannot be a limitation of the technical solution of the present invention.

Embodiment 1

The Eurosilo intelligent device mounting method of the present invention will be described in detail below with reference to Figs. 1 to 10.

As shown in Fig. 1, the assembly site is divided into an outside and an inside of the Eurosilo structure 1. The steel trestle 4 is assembled inside the Eurosilo structure 1. The central rotating piece 7, the winching system 8, the hoisting device 9, the spiral frame 10, the telescopic blanking pipe 11, the A-type frame 12, the A-type frame side rotating trestle 13, and the spiral frame side rotating trestle 14 are assembled in a site outside the Eurosilo structure 1.

As shown in Fig. 2, firstly, the lifting members 2 are designed according to a total weight of the steel trestle 4, the central rotating piece 7 and the winching system 8. The lifting members 2 and the steel trestle pre-assembled sections 3 are mounted on the ring beam at a top of the Eurosilo structure 1. Then, a tire frame 5 and a device moving platform and guide rail 6 are installed in the Eurosilo structure 1. Afterward, the central rotating piece 7 and the winching system 8 are assembled outside the Eurosilo structure 1 and the steel trestle 4 is assembled on the tire frame 5.

As shown in Fig. 3, the hoisting device 9 is used to lift and move the central rotating piece 7 and the winching system 8 along the wall of the Eurosilo structure 1 onto the device moving platform and the guide rail 6, and assemble the central rotating piece 7 with the winching system 8.

As shown in Fig. 4, the assembled steel trestle 4 is lifted to a height of 12.0m using the lifting members 2, and the central rotating piece 7 and the winching system 8 are ready for movement.

As shown in Fig. 5, move the central rotating piece 7 and the winching system 8 along a side of the Eurosilo structure 1 to just below the steel trestle 4 using the device moving platform and guide rail 6, leveling with the central rotating piece 7 and the winching system 8, and at the same time aligning with a center of the steel trestle 4. The steel trestle 4 is lowered to a height of 9.018m, and is engaged and connected with the central rotating piece 7 and the winching system 8.

As shown in Fig. 6, the steel trestle 4, together with the central rotating piece 7 and the winching system 8, are synchronously lifted to a height of 55.40m using the lifting members 2, and the steel trestle 4 is connected to the steel trestle pre-assembled sections 3.

As shown in Fig. 7, remove the tire frame 5, and then divide the spiral frame 10 into three sections. Use the hoisting device 9 to lift the three sections along the wall of the Eurosilo structure 1 onto the device moving platform and guide rail 6, and then hoist the telescopic blanking pipe 11 into the Eurosilo structure 1 using the hoisting device 9 and assemble it with the spiral frame 10. Next, move the spiral frame 10 and the telescopic blanking pipe 11 to the other side of the Eurosilo structure 1 using the device moving platform and guide rail 6.

As shown in Fig. 8, after the lifting members 2 are dismantled, the lifting members 2 are removed. Use the hoisting device 9 to first lift the A-shaped frame 12 to the inside of the Eurosilo structure 1 and connect it with the spiral frame 10, and then lift the A-shaped frame side rotating trestle 13 to the inside of the Eurosilo structure 1 above the A-shaped frame 12 and connect it to the winching system 8.

As shown in Fig. 9, the spiral frame side rotating trestle 14 is hoisted above the spiral frame 10 in the Eurosilo structure 1 using the hoisting device 9, and connect it with the winching system 8.

As shown in Fig. 10, the entire Eurosilo device 1 is installed. The device is lifted and rotated using its own steel wire, and enters the debugging stage.

The above description is only a description of the preferred embodiment of the present invention and does not limit the scope of the present invention in any way. Any changes or modifications made by those skilled in the art based on the above disclosure shall fall within the protection scope of the claims.

CLAIMS

1. A Eurosilo intelligent device mounting apparatus, comprising:

5 a Eurosilo device, lifting members, steel trestle pre-assembled sections, a steel trestle, a tire frame, a device moving platform and guide rail, a central rotating piece, a winching system, a hoisting device, a spiral frame, a telescopic blanking pipe, an A-shaped frame, an A-shaped frame side rotating trestle, and a spiral frame side rotating trestle, wherein the steel trestle is assembled inside a Eurosilo structure; the central rotating piece, the winching system, the hoisting device, the spiral frame, the telescopic blanking pipe, the A-shaped frame, the A-shaped frame side rotating trestle and the spiral frame side rotating trestle are assembled at a
10 site outside the Eurosilo structure.

2. A Eurosilo intelligent device mounting method, utilizing the Eurosilo intelligent device mounting apparatus according to claim 1, the method comprising the following steps:

15 step S1: designing the lifting members according to a total weight of the steel trestle, the central rotating piece and the winching system; mounting the lifting members and the steel trestle pre-assembled sections on a ring beam at a top of the Eurosilo structure; installing, inside the Eurosilo structure, the tire frame and the device moving platform and guide rail; assembling the steel trestle on the tire frame after the tire frame has been installed; at the same time, assembling section by section, main components of the Eurosilo device outside the Eurosilo structure;

20 step S2: using the hoisting device to lift and move the central rotating piece and the winching system along a wall of the Eurosilo device onto the device moving platform and guide rail for assembly, installation and leveling;

step S3: using the lifting members to lift the assembled steel trestle to a specified height;

25 step S4: moving the central rotating piece and the winching system along a side of the Eurosilo structure to a location below the steel trestle by using the device moving platform and guide rail; aligning a center of the hoisting device with a center of the steel trestle; lowering the steel trestle to a design height to engage and connect with the central rotating piece and the winching system;

30 step S5: using the lifting members to lift the central rotating piece, the winching system and the steel trestle together to a designated elevation at the top of the Eurosilo structure, and connecting the steel trestle with the steel trestle pre-assembled sections;

step S6: dismantling the lifting members after the steel trestle has been connected with the steel trestle pre-assembled sections; then using the hoisting device to lift and move the spiral frame to the inside of the Eurosilo structure in three sections for installation; and using the hoisting device to sequentially lift and install the telescopic blanking pipe, the A-shaped frame, the A-shaped frame side rotating trestle and the spiral frame side rotating trestle, until the Eurosilo structure is completed.

3. The mounting method according to claim 2, wherein step S1 further comprises using the hoisting device to lift and move the central rotating piece and the winching system along the wall of the Eurosilo device onto the device moving platform and guide rail and assembling the central rotating piece and the winching system.

4. The mounting method according to claim 2, wherein the specified height in step S3 is 12.0m.

5. The mounting method according to claim 2, wherein the design height in step S4 is 9.018m.

6. The mounting method according to claim 2, wherein the designated elevation in step S5 is 55.40m.

7. The mounting method according to claim 2, wherein step S6 comprises:

step 1: removing the tire frame, and then dividing the spiral frame into three sections and using the hoisting device to lift and move the three sections along the wall of the Eurosilo device onto the device moving platform and guide rail; using the hoisting device to lift and move the telescopic blanking pipe into the Eurosilo structure and assembling the telescopic blanking pipe with the spiral frame; moving the spiral frame and the telescopic blanking pipe to another side of the Eurosilo structure by using the device moving platform and guide rail; removing the lifting members after the lifting members are dismantled; using the hoisting device to lift and move the A-shaped frame to the inside of the Eurosilo structure and connecting the A-shaped frame with the spiral frame; and lifting and moving the A-shaped frame side rotating trestle to the inside of the Eurosilo structure above the A-shaped frame and connecting the A-shaped frame side rotating trestle with the winching system;

step 2: finally, using the hoisting device to lift and move the spiral frame side rotating trestle to the inside of the Eurosilo structure above the spiral frame and connecting the spiral frame side rotating trestle with the winching system;

step 3: after the Eurosilo device is completely installed, using a steel wire of the Eurosilo device to conduct lifting and rotating and entering a debugging stage.