Claims

What is claimed is:

1. A construction method for a fully prefabricated multi-story concrete plant, comprising the following steps:

S1, arranging an installation route of a floor plane, wherein the installation route comprises a longitudinal route and a lateral route;

S2, laying track devices on the installation route, and installing a hoisting robot on the track devices, wherein the hoisting robot comprises a self-lifting device, an inner tower body, an outer tower body, a moving device and a hoisting device,

the outer tower body serves as a supporting structure during hoisting of the hoisting robot, the inner tower body serves as a guiding structure and a supporting structure during self-lifting of the hoisting robot, and the inner tower body cooperates with the outer tower body to constitute a self-lifting system of the hoisting robot,

the self-lifting device provided between the inner tower body and the outer tower body comprises a jacking cylinder and a forced cross-beam, wherein the inner tower body is provided with a lower base, the outer tower body is provided with an upper base, the jacking cylinder is connected to the lower base via the forced cross-beam, and the jacking cylinder is connected to the upper base,

the outer tower body is provided with a chassis, the moving device is provided on the chassis, the moving device includes an installation seat, a steering shaft, a motor, a connecting base, a moving wheel and a rail clamp, wherein the installation seat is connected to the chassis, both ends of the steering shaft are respectively rotatably connected to the installation seat and the connecting base; the motor, the moving wheel and the rail clamp are provided on the connecting base, and a driving end of the motor is employed for driving the moving wheel to rotate, and the hoisting device is connected to the outer tower body;

S3, performing hoisting and installation of column and beam prefabricated components required for the plant along the longitudinal route via the hoisting robot on the track devices;

S4, acting on the hoisting robot to disengage the hoisting robot from the track devices on the longitudinal route via a driving end of the self-lifting device at a turn of the installation route, and

after the track devices are turned and mounted to the lateral route, the hoisting robot is connected to the track devices on the lateral route; and the hoisting robot on the track devices performs hoisting and installation of the column and beam prefabricated components required for the plant along the lateral route;

S5, acting on the hoisting robot to disengage the hoisting robot from the track devices on the lateral route via the driving end of the self-lifting device at a turn of the lateral route, and after the track devices are turned and mounted to the longitudinal route, the hoisting robot is connected to the track devices on the longitudinal route, and the hoisting robot on the track devices performs hoisting and installation of the column and beam prefabricated components required for the plant along the longitudinal route; and

S6, lifting the hoisting robot to the floor plane installed via the self-lifting device after installation of the floor plane, and repeating the above-mentioned steps of S1 to S5 until a roof of the multi-story plant is installed.

2. The construction method of claim 1, wherein in S2, the track device comprises a movable steel beam, an embedded part and a track member, the movable steel beam is laid on the floor plane via the embedded part, and the track member is provided on an upper surface of the movable steel beam.

3. The construction method of claim 2, wherein at least two sets of track devices are provided, and each set of the track devices comprises two movable steel beams symmetrically arranged at both sides of the installation route.

4. The construction method of claim 1, wherein in S3, S4 and S5, the specific steps of the hoisting robot moving along the track devices are as follows:

the track devices are divided into a first set of track devices and a second set of track devices, when the column and beam prefabricated components within reach of the hoisting robot at the first set of track devices are already installed, the hoisting robot moves to the second set of track devices, and the hoisting robot is utilized to remove and hoist the first set of track devices and move to the second set of track devices for installation along the installation route; similarly, after the column and beam prefabricated components within reach of the hoisting robot at the second set of track devices are installed, the hoisting robot is utilized to remove and hoist the second set of track

devices and move to the first set of track devices for installation along the installation route, repeating the steps until the hoisting robot moves to a bay at one end of the plant.

5. The construction method of claim 1, wherein in S4 and S5, the specific steps for turning of the hoisting robot at the turn of the installation route are as follows:

a beam seat is provided below the hoisting robot as a support for the lifting, the beam seat is provided on the floor plane, after the moving device is raised to a certain height by the self-lifting device, the track devices below the moving device are disassembled and turned 90 degrees for installation, then a moving direction of the moving device of the hoisting robot is adjusted to follow an installation direction of the track devices below the moving device, the moving device is lowered back to the track devices and moves thereon, and when moving to another turn of the installation routes again, the hoisting robot performs the steps of lifting and lowering again, and the moving direction of the moving device is adjusted to follow the installation direction of the track devices below the moving device.

6. The construction method of claim 1, wherein in S3, S4 and S5, the hoisting of the column and beam prefabricated components includes installing a supporting column, a frame beam and a secondary beam, then a tower crane is arranged to alternately perform hoisting and installation of prefabricated composite floors and wall panels, and pouring of floor concrete; and not to install the secondary beam and the prefabricated composite floors temporarily when the hoisting robot moves to a last bay surrounded by the supporting columns, thereby leaving a lifting passage for the hoisting robot to be self-lifted.

7. The construction method of claim 6, wherein in S6, the specific steps of the hoisting robot being lifted to a next floor plane via the self-lifting device are as follows:

employing the hoisting robot to remove a prior set of the track devices, hoisting the prior set of the track devices to a vicinity of a predetermined installation position of a next floor without obstructing the lifting passage for the hoisting robot to be self-lifted; and

a beam seat is provided below the inner tower body of the hoisting robot as a support for self-lifting, and the self-lifting device of the hoisting robot is utilized to raise the moving device to a position above a predetermined installation position of the track devices, after the track devices are raised to the vicinity of the predetermined installation position and mounted in place, the self-lifting device is employed to perform the lowering of the hoisting robot and the connection

between the self-lifting device and the track devices; and finally the inner tower body of the hoisting robot is retracted, reset and fixed.

8. The construction method of claim 6, wherein prior to step S1, arranging one or more tower cranes at a plane position of the plant structure for the transportation of the column and beam prefabricated components from the ground to each floor in a vertical direction, as well as the installation of the prefabricated composite floors and the wall panels, the tower cranes are arranged for minimizing the horizontal transportation amount from an unloading point of the column and beam prefabricated components to each installation position, and meeting requirements for hoisting the prefabricated composite floor and the wall panels;

alternatively, an automobile crane(s) or a crawler crane(s) is/are utilized to achieve transportation of the column and beam prefabricated components in the vertical direction, as well as the hoisting of the prefabricated composite floors and the wall panels in order to reduce cost.

9. The construction method of claim 1, further comprising S7: the hoisting robot and the track devices are removed via a tower crane or an automobile crane, or via a gin pole.