Claims

1. An automatic and accurate adjustment device for a prefabricated beam body formwork, with a geometric center of a bottom surface of the prefabricated beam body formwork as an origin O, a length direction of the prefabricated beam body formwork as an X-axis, a width direction of the prefabricated beam body formwork as a Y-axis, and a height direction of the prefabricated beam body formwork as a Z-axis, establishing a three-dimensional rectangular coordinate system, comprising:

a calibration assembly, which comprises a plurality of calibration units, the plurality of the calibration units are arranged at a symmetrical interval along the X-axis on a plurality of inspection sections on an outer mold side of the prefabricated beam body formwork, and each of the calibration units is provided with a calibration point;

an adjustment assembly, which comprises a plurality of adjustment units in one-to-one correspondence with the calibration units, and each of the adjustment units is fixedly connected with the outer mold of the prefabricated beam body formwork;

a measurement assembly, which is configured to measure and obtain actual three-dimensional coordinates of each of the calibration points; and

a calculation control assembly, which is configured to calculate differences between the actual three-dimensional coordinates of each of the calibration points and preset theoretical three-dimensional coordinates thereof, and automatically control the adjustment assembly to adjust the actual three-dimensional coordinates of the corresponding calibration point when the differences exceed a preset range, such that the differences corresponding to each of the calibration points fall within the preset range;

wherein each of the calibration units comprise a calibration prism, and a center of the calibration prism is the calibration point;

the measurement assembly comprises a station pier, the station pier is provided with an automatic measuring total station and a station point, and the automatic measuring total station is configured to measure a distance, a horizontal angle and a vertical angle between the station point and any one of the calibration points.

2. The automatic and accurate adjustment device for the prefabricated beam body formwork according to claim 1, wherein each of the adjustment units comprises:

a first jack, which is arranged under the outer mold side of the prefabricated beam body

formwork, and a piston end of the first jack is provided with a first telescopic rod;

a second jack, which is arranged under the outer mold side of the prefabricated beam body formwork, and the piston end of the second jack is provided with a second telescopic rod;

a third jack, which is arranged under the outer mold side of the prefabricated beam body formwork, and the piston end of the third jack is provided with a third telescopic rod; and

a receiving piece, which is respectively connected with the first telescopic rod, the second telescopic rod and the third telescopic rod, and the receiving piece is fixed with the outer mold of the prefabricated beam body formwork.

3. The automatic and accurate adjustment device for the prefabricated beam body formwork according to claim 2, wherein

the adjustment assembly further comprises a hydraulic power unit, which is configured to receive an instruction from a control center to drive the pistons of the first jack, the second jack and the third jack to telescopically move, so as to adjust the actual three-dimensional coordinates of the calibration points.

4. A method for adjusting the automatic and accurate adjustment device for the prefabricated beam body formwork according to claim 1, comprising the following steps:

arranging the plurality of calibration units of the calibration assembly at a symmetrical interval along the X-axis direction on the plurality of inspection sections on the outer mold of the prefabricated beam body formwork, and providing the calibration point on each of the calibration units;

fixedly connecting the plurality of adjustment units of the adjustment assembly with the outer mold of the prefabricated beam body formwork, with the adjustment units in one-to-one correspondence with the calibration units;

adopting the measuring device to automatically measure and obtain actual three-dimensional coordinates of all of the calibration points; and

calculating differences between the actual three-dimensional coordinates of each of the calibration points and preset theoretical three-dimensional coordinates thereof by the calculation control assembly, and automatically controlling the adjustment assembly to adjust the actual three-dimensional coordinates of the corresponding calibration point when the differences exceed a preset range, such that the differences corresponding to each of the calibration points fall within the preset range;

wherein each of the calibration units is provided with a calibration prism, and a center of the calibration prism is taken as the calibration point; and

the measurement assembly is provided with a station pier, the station pier is provided with an automatic measuring total station and a station point, and the automatic measuring total station is adopted to measure a distance, a horizontal angle and a vertical angle between the station point and any one of the calibration points.

5. The method according to claim 4, wherein the method further comprises the following steps:

arranging a first jack of each of the adjustment units under the outer mold of the prefabricated beam body formwork, and providing a piston end of the first jack with a first telescopic rod;

arranging a second jack of each of the adjustment units under the outer mold of the prefabricated beam body formwork, and providing the piston end of the second jack with a second telescopic rod;

arranging a third jack of each of the adjustment units under the outer mold of the prefabricated beam body formwork, and providing the piston end of the third jack with a third telescopic rod; and

respectively connecting two ends of a receiving piece of each of the adjustment units with the first telescopic rod, the second telescopic rod and the third telescopic rod, and fixing the receiving piece with the outer mold of the prefabricated beam body formwork.

6. The method according to claim 5, wherein the method further comprises the following step:

a hydraulic power unit of the adjustment assembly receives an instruction from a control center to drive the pistons of the first jack, the second jack and/or the third jack to telescopically move, so as to adjust the actual three-dimensional coordinates of the calibration points.

7. An automatic and accurate adjustment system for a prefabricated beam body formwork, comprising at least two automatic and accurate adjustment devices for the prefabricated beam body formwork according to claim 1, wherein the adjustment system further comprises:

a control management device, which is configured to preset theoretical three-dimensional coordinates of a calibration point of each of the adjustment devices and send the theoretical three-dimensional coordinates to the corresponding calculation control assembly;

a data management device, which is configured to collect and store measurement data and calculation data of each of the adjustment devices; and

a video monitoring device, which comprises a plurality of video monitoring assemblies in one-to-one correspondence with each of the adjustment devices, each of the video monitoring assemblies comprises a camera and a display, and the camera is configured to obtain a real-time image of the corresponding adjustment device and display the real-time image through the corresponding display.