



Application and Research on the Installation Method of Bay Window in Prefabricated House

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Abstract. Residential engineering bay window conventional design, bay window for cast-in-place bay window, bay window between masonry structure, for the disadvantages of the structure in construction, this paper puts forward the prefabricated residential bay window installation method, namely the bay window between masonry structure deepening for cast-in-place structure, the bay window top cast-in-place prefabricated, through cast-in-place structure at the top of the enterprise, after cast-in-place bay window structure template removed, through the reserved enterprises of prefabricated concrete plate of the bay window top, surface construction of fine stone concrete, sealing leveling the gap between the prefabricated slab.

Keywords: prefabricated residential bay window board; split prefabrication; stubble assembly

1 Introduction

Construction engineering residential project, bay window structure is often indispensable, but in the process of residential engineering construction, the structure of bay window is often difficult to construction, conventional bay window end between masonry structure bay window structure, not only in the cast-in-place structure bay window construction complex support mold concrete forming quality is poor, and for outer frame demolition early, basket construction masonry safety hazard, and masonry construction wall plastering easy to cause the phenomenon such as cracking, after considering the late user may this kind of bay window modification, difficult to cast-in-place bay window demolition at the same time, and easy to cause damage to the building structure. As shown in Fig. 1.

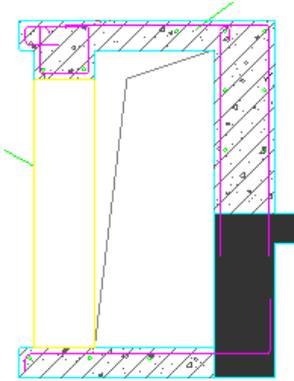


Fig. 1. Design and structure of conventional bay window board

2 Overview

In recent years, with the rise of prefabricated housing structure technology, new ideas in the process of structural prefabrication, Shen Junhua, Geng Shuai, Song Hao and others, respectively, the standardization, assembly and industrialization of housing industry [1-4]; Shen Junhua, Xu Zhonghao and other authors concrete prefabricated housing construction advantages, as well as the technical points in the construction, in order to strengthen the control of the safety and quality of this type of building construction put forward detailed ideas [5-12]. As for the prefabricated structure, the root is the new idea explored after the construction of the cast-in-place structure can not meet the requirements of the current construction industry. This paper is the exploration and research of the prefabricated residential bay window in this idea.

3 Application Overview

This paper refers to the application of prefabricated components, according to the actual application engineering 8 residential building bay window deepening processing, put forward the residential bay window prefabricated and reserve the construction method of assembly, the method not only avoid the external wall masonry process, avoid the hanging basket construction masonry safety hidden trouble, at the same time, the housing users to bay window modification can also guarantee the safety of the structure, with fast, economic and effect is obvious. The thesis of this paper is that after consulting a lot of literature, according to the solid theory and practical project operation experience, the construction operation points of residential bay window plate prefabrication and reserved enterprise stubble assembly, which is hereby summarized for reference in similar projects.

4 Construction Process Flow

4.1 Implementation of the Workflow

Floating outside the window surrounding masonry structure deepening for cast-in-place structure, the bay window top cast-in-place slab separate slice precast, through cast-in-place structure leave good at the top of the enterprise mouth, for cast-in-place bay window structure template demolition, through the reserved enterprise mouth of precast concrete slab on bay window top stubble cover, surface construction of fine stone concrete, the gap between the precast slab for blocking leveling.

4.2 Operation Preparation

Before the project starts, organize the technical personnel to deepen the design drawings, deepen the masonry structure between the end of the bay window into cast-in-place structure, in which the vertical and bottom of the bay window are cast-in-place structure, and the cast-in-place plate on the top of the bay window is prefabricated.

The deepening drawings, concrete construction plan, reinforcement construction plan, template project construction plan shall be submitted to the supervision unit and the construction unit for examination and approval and signed after the completion of the disclosure, management personnel, team leaders, workers of all levels shall be completed according to the requirements. As shown in Fig. 2.

On the working surface, the water and power has been connected to the working surface, the floor control line has been placed and checked; the reinforcement binding has been completed and passed the concealed acceptance. At the same time, the concrete pouring sequence is formulated, and the concrete of the bay window structure is poured together with the wall column of the same layer. The design drawing and the BIM model are shown in Fig. 3.

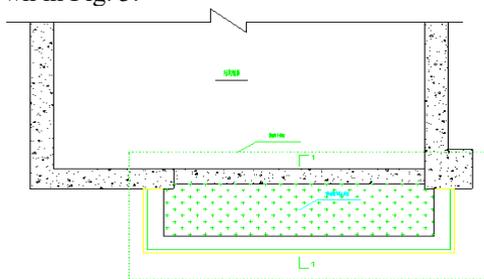


Fig. 2. Front plan of bay window panel optimization

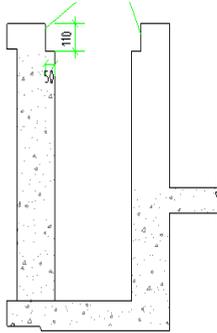


Fig. 3. Profile

4.3 Preparation and Installation of Cavity Formwork

According to the requirements of the deepening design drawings and construction scheme, the cavity template in the middle of the deepening bay window is made. The cavity template is shaped like a cuboid, but the upper cover must be removed to facilitate the reinforcement of the screw;

The bottom surface of the cavity template is connected to the side template through the pin, and the upper and lower spacing of the screw holes on the side is 300mm.

Before the cavity template is placed in the release position, the template should be coated with the release agent. The release agent should be water-based release agent, and the release agent should be coated evenly.

4.4 Installation of Bay Window Template

After the cavity template is installed and placed, and the surrounding template outside the floating window is configured and installed. Before the installation of the peripheral template, the water-based mold release agent shall be uniformly coated;

The formwork reinforcement screw should be made of three-stage water stop screw to ensure that there is no water seepage in the external wall. The reinforcement must be in place to avoid the phenomenon that the cavity template cannot be removed caused by the rising rise.

The concrete of the bay window and the upper wall column are poured at the same time. The bottom of the bay window must be cut in place, the top should be covered, and the exhaust hole shall be retained. The pore diameter is 20mm, and the vertical and horizontal spacing of the exhaust hole is 600mm.

When the installation of the formwork outside the window, attention should be paid to the opening of the bay window roof, the width of the enterprise is 50mm, the height is the same as the thickness of the structural plate, if the process is required, the outer window should be left to ensure the normal development of each process.

4.5 Making of Bay Window Roof Template

According to the requirements of the construction schedule, select the prefabricated site of the bay window roof, which can be prefabricated on the working surface, or the prefabricated site can be arranged for centralized prefabrication.

Floating window precast formwork can be wood formwork, or aluminum alloy formwork, because there is a fine stone concrete covering process, can be made by wood mold, convenient and fast. As shown in Fig. 4.

The width of the prefabricated roof is 10mm smaller than the empty size in the stubble mouth, and both sides are 5mm smaller to ensure that the stubble can be loaded once and the position can be adjusted.

According to the size of the bay window design in the drawing, divide the bay window plate, each plate is 500~800mm; ensure that the workers can work once.

The thickness of bay window is 80mm, with the design requirements. As shown in Fig. 5.

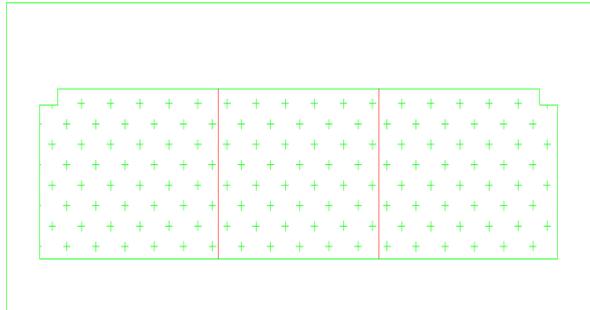


Fig. 4. Slice the prefabricated picture



Fig. 5. The prefabrication site

4.6 Preparation and Installation of Prefabricated Roof Plate

After the completion of roof formwork and steel bar binding, it should be reported to the supervision for acceptance, after the acceptance of concrete pouring, concrete pouring, after the initial condensation, the surface must be scratched;

After the completion of pouring, the precast slab shall be cured before the initial setting, the curing time shall not be less than 7 days, and the concrete can be installed after the strength reaches 100%;

During the installation, 3 people are an installation team, 2 people are responsible for transporting the prefabricated roof to the stubble, and 1 person adjusts and re-views. As shown in Fig. 6.

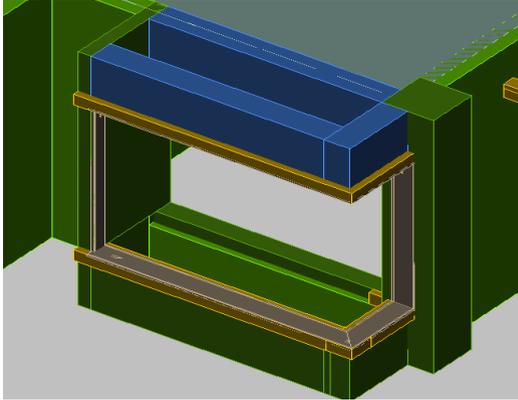


Fig. 6. Forming effect diagram

4.7 Blocking and Leveling

After the installation of the prefabricated roof, the roof shall be wet, and then the polyurethane sealing paste shall be used to block the joints of each enterprise.

C30 fine stone concrete is used for leveling, and usually, wood plaster is used for spreading the roof fine stone concrete to ensure that the flatness, thickness, elevation and slope all meet the design requirements. As shown in Fig. 7.

In the process of spreading, the gap between the prefabricated roof and the stubble, the junction between the prefabricated roof and other parts are placed in place to avoid the occurrence of empty drum phenomenon.

After the fine stone concrete reaches the initial setting, the surface of the fine stone concrete is collected. As shown in Fig. 8.



Fig. 7. Stubble assembly and assembly diagram



Fig. 8. Fine stone concrete surface

4.8 Maintenance and Inspection

After the concrete pouring, watering and curing within 12h (after the final setting) to keep the concrete in a wet state, and the concrete curing time shall not be less than 7d.

Do a good job of enclosure work, prevent the window, railings and other units to the construction of finished products.

After the maintenance is completed, a special person must knock the fine stone concrete plate to ensure that there is no empty drum cracking phenomenon.

5 Engineering Practice Benefits

5.1 Analysis of Construction Economic Benefits

According to the engineering practice of this paper, the specific project quantities include: 8 bay Windows for each floor and 8 buildings are constructed in this paper, including 291 floors, 2328 bay windows, each floor occupies 14.56 m², and the total building area is 4236.96 m²; the specific inspection is shown in the following table 1:

Table 1. Comparison and Analysis Table of economic benefits

Scheme selection	area of structure		Scheme comparison to increase the amount of engineering	Contract unit price			economic benefits
	Monolayer area of (m ²)	gross area (m ²)		Total package income unit price	Unit price of labor expenditure	Unit price of material expenditure	
Masonry masonry between cast-in-place bay windows	fourteen point five six	four thousand two hundred and thirty six point nine six	Concrete quantity	/	/	/	/
			The amount of steel	/	/	/	/
			The volume of masonry	6285.6 (m ³)	six hundred and forty-four point five yuan /m ³	two hundred and seventy-five yuan /m ³	three hundred and twenty-five point five

							yuan /m ³	sixty-six point four yuan
The peripheral cast-in-place bay window panels are partially prefabricated	fourteen point five six	four thousand two hundred and thirty six point nine six	Concrete quantity	6285.6 (m ²)	four hundred and seventy-nine point four eight yuan /m ³	twenty-three yuan /m ²	three hundred and ninety-five point eight eight yuan /m ³	four hundred and twenty-eight thousand and twenty-six point zero eight yuan
			The amount of steel	41.38 Tons	7,994.89 yuan / ton	forty-one yuan /m ²	3,712.56 yuan / ton	three thousand, four hundred and eighty-seven point four six yuan
			The volume of masonry	/	/	/	/	/
Total economic benefits			one hundred and fifty-four thousand, nine hundred and forty-seven point one seven yuan					

It can be seen from the analysis table that the precast scheme of peripheral cast-in-place bay window board is adopted. Compared with the traditional cast-in-place bay window slab, the benefit is 154,947.17 yuan, with good economic benefits.

5.2 Analysis of the Construction Cycle of the Bay Window Prefabricated Plate

In order to compare the construction period of peripheral cast-in-place bay window in the proposed scheme, the peripheral cast-in-place bay window is compared with the construction period and planned period in this scheme, and the following table 2 is made:

Table 2. Comparison of the construction period of bay window prefabricated board

Plan period	Main structure time	Secondary structure time	Mash time	Elevation completion time	Total construction period
Planned construction period	180.00	120.00	90.00	50.00	440.00
Use this scheme for construction duration	195.00	105.00	75.00	35.00	410.00
This scheme is not used	180.00	135.00	105.00	60.00	480.00

The planned construction period is 440 days, and the construction period without prefabricated bay window board is 480 days, while the construction scheme of prefabricated bay window board is only 410 days. Therefore, it can be seen that the construction period of prefabricated bay window board is short, to avoid the delay of construction cycle.

6 Conclusion

In view of the construction experience of bay window prefabrication proposed in this paper, which does not create economic benefits, and has good results in construction quality and progress, this method is now refined and summarized for reference by similar engineers and technicians.

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