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Article

Construction Strategies for Residential High Rise Buildings Decoration during Structure Work

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Abstract: The market's attention to the quality and efficiency of engineering construction is continuously increasing. Quality inspection departments, market departments, and others have begun strict supervision and review of projects, aiming to ensure that they are completed in accordance with the correct ideas and standards. Process interleaving is achieved through design optimization and process optimization, reducing processes and measures, and fully utilizing spatial and process parameters to achieve the goals of shortening time parameters, improving quality, and reducing costs. The design of process interleaving schemes lies in the effective utilization of the plane site and spatial resources on the construction site, maintaining the improvement of utilization efficiency, installing as many construction mechanization equipment as possible, and adopting an automated construction mode to improve not only construction efficiency but also reduce the impact of external temperature, humidity, and climate, thereby achieving better improvement in engineering construction quality.

Keywords: process interleaving; fine decoration

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1. Introduction

The level of fine decoration in high-rise buildings directly affects the subsequent sale and use of the properties. If the fine decoration work of high-rise buildings is unsatisfactory, it may affect the overall impression of high-rise buildings, which is not conducive to their subsequent use. Therefore, it is necessary to implement the fine decoration work of high-rise buildings well. Considering cost and efficiency, the fine decoration of high-rise buildings can adopt the form of interspersed construction of internal and external premises, which saves costs and improves efficiency. Therefore, this paper focuses on the research of interspersed construction and management of high-rise building decoration. Firstly, it analyzes the main breakthrough points and control points of interspersed construction of fine decoration in high-rise buildings [1]. Then, it proposes the main process, construction key points, and management key points of interspersed construction of fine decoration in high-rise buildings.

2. Major Breakthrough Points in the Pre-Interleaved Construction of Fine Decoration for High-Rise Buildings

Firstly, there must be a breakthrough in the construction organization method for high-rise buildings. The previous approach of constructing the main structure first and then the facade and fine decoration cannot be adopted anymore. Fine decoration should follow the main structure from bottom to top, making the overall construction process more comprehensive. The government inspection process also poses difficulties in the pre-interleaved construction of fine decoration for high-rise buildings. The general inspection mode for high-rise buildings is to inspect the entire building after its completion [2]. The disadvantage of this inspection mode is that if any part of the building's design and

quality is unqualified, it will have to be redesigned and rebuilt, which not only wastes a lot of building materials resources but also harms the overall structure of the high-rise building. In addition to the above two main breakthrough points, there is also a breakthrough in the way resources are obtained. It is no longer possible to adopt the mode of reasonable allocation of high-rise building construction materials as in the past. Such a procurement mode not only wastes a lot of manpower and material resources during procurement but also cannot guarantee the consistent quality level of the purchased high-rise building materials. Changing the design and procurement methods to gradually provide resources according to the on-site progress makes the planning stronger and the advantages of centralized procurement more evident [3].

3. Key Control Points for Pre-Interleaved Construction during High-Rise Building Decoration

When carrying out the pre-interleaved construction for the fine decoration of high-rise buildings, there are three main control points.

Firstly, when transitioning from interior decoration to exterior decoration, it is necessary to consider the public areas and ensure proper waterproofing.

Secondly, to ensure the quality of construction, it is imperative to carry out thorough preparations before commencing construction, implement all construction processes and procedures, and ensure that the construction personnel possess the technical proficiency sufficient to meet the construction requirements.

Thirdly, before carrying out exterior decoration, it is necessary to conduct non-wet operations on the entire building and ensure the quality of the entire construction process.

These three control points are extremely important. Although they seem simple, they are complicated with various issues. If these three points cannot be properly implemented, it may lead to unsatisfactory results in the pre-interleaved construction, and even quality problems that require rework, wasting financial and material resources, and affecting the aesthetics of the entire building.

4. Main Process of Pre-Interleaved Construction for Fine Decoration of High-Rise Buildings

4.1. Carry Out High-Rise Building Construction

The pre-interleaved construction for the fine decoration of high-rise buildings allows no room for negligence. Before officially carrying out the pre-construction, it is necessary to first implement the construction work of the high-rise main body, and determine the structural accuracy of the building through the construction of the main body, so as to closely integrate the construction of the internal and external walls of the pre-interleaved construction. For this, aluminum alloy templates can be used to control the accuracy, and wooden structure templates should be avoided as much as possible, as they are prone to affecting the accuracy. Furthermore, it is important to avoid carrying out wet plastering operations, which not only waste materials but also pollute the environment. The most advanced plaster-free new technology should be used, which can greatly assist the subsequent pre-interleaved construction [4].

4.2. Fine Decoration Drawing Design

Drawing design is a crucial aspect of fine decoration, as it determines the specific standards for fine decoration construction and serves as a significant criterion for determining the construction process. In the design drawings, detailed aluminum membrane drawings, decoration drawings, and detailed prefabricated wallboard drawings are required. Among them, the aluminum membrane detailed drawings are the simplest drawings in the entire design drawings, and the detailed work should be completed before the basement of the high-rise building is finished. The decoration drawings are the drawings

for fine decoration, which need to be reviewed and detailed before the completion of the main structure of the building, and efforts should be made to meet the inspection standards of government departments to avoid subsequent rework. The detailed prefabricated wallboard drawings need to be considered from the perspective of the overall integration of the building, and the detailed work should be completed one week before the completion of the basement floor [5].

4.3. Prevention of Floor Grout Leakage

Preventing floor price leakage is an extremely important and meticulous task that requires careful dismantling of aluminum formwork structures, ensuring proper waterproofing between floors, followed by cleaning of the inspected structures. Special garbage bags can be used for this purpose. Ensure sufficient construction space for sealing external wall screw holes and polishing air conditioning panels. Then, measure and mark the repair points for polishing the interior walls of the structure, and take precautions against leakage.

5. Key Points for Construction of Pre-Interleaved Fine Decoration in High-Rise Buildings

One of the key points of water drainage construction is to set up reserved holes on the floor, which allows water to drain out through these holes. Typically, reserved holes are opened at a relatively lower position compared to the slab surface in the upper and lower layers, covered by concrete pouring. After the construction of the entire building's main structure is completed, these holes will be opened. Furthermore, drainage needs to be set up at the balcony location, allowing the hose on the upper floor to be directly connected to the riser on the lower floor.

The water blockage is also a relatively important construction point, which requires blocking the water supply pipe and doors and windows, as these two places are the most prone to leakage problems. Therefore, it is necessary to use hard cement mortar to block the gaps on all four sides of the wall and the gaps between the door and window frames, and then apply waterproof coating. Additionally, pressure maintenance of the water pipe should be properly carried out.

6. Key Points of Pre-Interleaved Management for Fine Decoration of High-Rise Buildings

The implementation of process interleaving aims to enhance the reliability and feasibility of construction management, and to improve the efficiency and quality of various engineering constructions. Improving the management plan and enhancing the rationality of process interleaving are the most fundamental requirements [6]. During the design process of the management plan, clear technical guidance and basis should be provided, whether it is in terms of construction preparation or during the construction process, to ensure good coordination in management work. All potential hazards should be eliminated. The process interleaving plan is as follows: bidding procurement management: complete the bidding work for each subcontractor in advance, and ensure that each unit participates in the early interleaving planning to guarantee the quality of process interleaving. Design prepositioning: prioritize drawings, utilize BIM technology to summarize issues related to civil engineering, water and electricity, heating, decoration, etc. in advance, and eliminate problems in their infancy through early drawing reviews to ensure the integration of four drawings: civil engineering, water and electricity, heating, and decoration. Overall management: unify the thoughts and goals of all participating units, focus on the implementation of process interleaving, and carry out work to reduce costs and increase efficiency. Design optimization: there is no masonry wall on the exterior wall, and the cross-sectional changes of aluminum formwork floor beams, slabs, walls, and columns are not changed. The exterior wall shape remains unchanged on each floor to avoid

structural cavity shapes and U-shaped cavities that may make aluminum formwork difficult to construct. The elevator walls use structural shear walls, and the size of the coupling beams meets the requirements of the elevator professional door opening size. Drawing deepening: the design institute should improve the drawings of architecture, structure, water and electricity, and heating in advance. The elevator manufacturer provides professional drawings for elevators. Based on the drawings of the elevator manufacturer and the design institute, complete the aluminum formwork deepening drawings, climbing frame deepening drawings, precise positioning drawings for water and electricity pipeline layout, precise positioning drawings for fire boxes and strong and weak electricity boxes, deepening drawings for door and window openings and fixing piece positions, deepening and positioning drawings for railings, and floor tile and wall tile layout drawings. Interleaving plan: use professional scheduling software, combine project design and contract conditions, and prepare the overall interleaving plan of the project in advance [7]. Organize acceptance: communicate with the quality supervision station to reach a unified opinion on segmented acceptance, form a supervision disclosure, and create conditions for early interleaving of decoration. The structural wall surface uses plaster-free, and the masonry wall surface uses thin plaster to avoid affecting plaster construction due to physical inspection. Quality improvement: Aluminum formwork + fully cast-in-place exterior walls + composite floor slabs + PC components + ALC interior wall panels + full-process actual measurement, improving the pass rate of actual measurement. Reduction of processes: Fully cast-in-place exterior walls + internal insulation to reduce exterior wall construction processes, enabling early installation of exterior wall putty, paint, drainage pipe installation, doors and windows, railings; structural columns, lintels, door jambs are formed in one piece without secondary casting, the internal corners of the bathroom drop-off are made into R-corners, the drip line is formed in one piece on the aluminum formwork, and structural wall surfaces are free of plastering under reliable quality control. Finished product protection: The protection of decoration finished products mainly aims to prevent water damage to the decorative surface. Water stop and diversion measures must be taken above the interior wall plastering work surface, and water stop measures must be taken for closed setting-out holes, material transfer holes, flues, elevator shafts, pump pipe holes. Diversion measures must be taken for staircases, bathrooms, balconies, and external window glass must be installed before the plastering work layer; reducing wet work processes is the main direction of process optimization. Precise blocks and thin plastering processes are used to reduce some wet work, creating conditions for subsequent construction. After the installation of railings, door and window frames, and glass, protective films must be ensured to be completed. If there is any damage, it must be restored, and the protective film can only be removed after the coating construction is completed. After the civil engineering work surface is handed over to the fine decoration, the corresponding responsibility for finished product protection is handed over together with the work surface [8]. Before installing fine decoration flooring, switch panels, lamps, sanitary ware, cabinets, and bathroom cabinets, the entrance door must be installed, and the fine decoration must adopt closed management for the accepted work surface. The application of process interleaving in construction management is not completely based on construction experience. Experience can be used as a reference, but it cannot be used as a basis for decision-making. According to the requirements of process interleaving, construction management is carried out in strict accordance with current national norms and standards. At the same time, in each work, contradictions and conflicts are reduced to maximize the quality improvement of engineering construction.

6.1. Ensure Effective Management of Construction Personnel

In the process of fine decoration of high-rise buildings, construction personnel need to implement every process of the work well and strictly follow the construction drawings and plans. Therefore, construction personnel need to have a high level of professional

ability and also possess a sufficiently high level of moral quality to complete the work conscientiously. For this reason, when selecting a construction team in the early stage, it is necessary to assess the overall professional level and moral quality of the team. It is determined that construction teams that can enter the construction site need to undergo training before formal construction begins, to help them fully familiarize themselves with the work content, know what they need to do, and receive technical training specific to their work content to help them further solidify their professional basic knowledge. After training, they need to be assessed to ensure that the professional technical level and moral quality of the construction personnel are sufficient to support them in completing the entire construction work and guarantee the quality of construction [9].

6.2. Improved Management System

Considering that problems are inevitable during the construction process, it is necessary to address them promptly and hold relevant personnel accountable. However, there are various loopholes in most of current construction management systems, making it difficult to hold relevant personnel accountable when problems arise. This can, to some extent, lead to a significant reduction in the vigilance of relevant staff during work, potentially fostering a complacent work mentality. To address this, it is necessary to improve the management system to enhance the level of pre-interleaved construction management for high-rise building fine decoration. Improving the management system is not an easy task [10]. It requires continuously identifying problems and finding solutions based on those problems. For newly emerging issues, it is necessary to promptly formulate new institutional regulations, so that in the event of similar problems arising in the future, relevant responsible persons can be directly identified. No one responsible for this matter can escape responsibility, which can, to some extent, reduce the complacent mentality of staff, enabling them to seriously carry out construction work and fully devote their energy to their work, avoiding being held accountable and severely punished for problems arising during construction [11].

7. Conclusion

There are many details that need to be carefully managed in the pre-interleaved construction and management of high-rise buildings' fine decoration. Considering this, in the future high-rise construction process in China, it is necessary to further strengthen the assessment of the professional technical abilities of the construction team, and enhance the inspection efforts of government departments. The happy life of the public requires the protection of every worker. The pre-construction work for high-rise building fine decoration needs to be perfect, and management efforts should also avoid loopholes in the construction process as much as possible. Only in this way can the pre-interleaved work for high-rise building fine decoration be completed with quality and quantity guaranteed, allowing high-rise buildings to be presented to the public in a more beautiful and durable form, providing a more comfortable and high-quality living and working environment for the public.

References

1. Mir M. Ali, Ph.D. (2023). STRATEGIES FOR INTEGRATED DESIGN OF SUSTAINABLE TALL BUILDINGS.
2. Abd. Latif Azmi N.A., 2016, The study of problems faced by property management in managing the high rise condominium in Malaysia, Master thesis, Universiti Teknologi Malaysia, Malaysia.
3. Ali A.S., Kamaruzzarnan S.N., Sulaiman R., Peng Y.C., 2010, Factors affecting housing maintenance cost in Malaysia, Journal of Facilities Management, 8, 285-298.
4. Ahmad B.R., 2003, The effect of faulty design & maintenance works on sustainable housing environment,1st APNHR, Conference on Housing & Sustainable Urban Development, 1st-4th July, Kuala Lumpur, Malaysia, 1-4.
5. Arabian Business. (2021, November 02). 'Azizi Developments': Our quality sets us apart from other developers.

6. Burer, C. (2016). Workmanship In Construction Of Small And Medium Hospitality Enterprises In Nairobi Central Business District (Doctoral dissertation, University of Nairobi).
7. Diesel, T. (2020, June 28). How are Low, Mid, and High Rise Buildings Classified. Diesel Commercial Group. Retrieved November 4, 2021
8. Nima, M. A., Abdul-Kadir, M. R., Jaafar, M. S., and Riadh, G. A. (2002). Constructability concepts in west port highway in Malaysia.
9. Journal of Construction Engineering and Management, 128(4), 384-356. Poh, T., M., (2016). A Study on Quality Management System (QMS) Applied in Construction Project (Doctoral dissertation, UTAR).
10. Sweeney Law, P. S. A. (2019, April 25). The "Good Workmanship" Standard | Fort Lauderdale Construction Law Attorney. Sweeney Law, P.A.
11. Construction projects. International Journal of Civil Engineering and Technology, 8(4), 7. Vulcan, N. (2017, November 21). The Definition of a Good Worker & Workmanship. Work - Chron.Com.