Analysis of Construction Technical Points of Mass Concrete Structure in Architectural Engineering

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Abstract: In the actual construction project, a series of problems, especially the quality of housing construction, are becoming more and more obvious, and have been widely concerned by everyone. Its structural form has also changed. Nowadays, the scale of construction projects is large, and the application of mass concrete construction technology in projects is increasing. In order to ensure the quality of building engineering, it is necessary to improve the construction technology of mass concrete. Therefore, in order to ensure the quality of construction projects, it is necessary to strengthen the control of technical points of mass concrete construction. In this paper, the causes of cracks in mass concrete construction in architectural engineering and the technical points of mass concrete construction in architectural engineering are discussed and analyzed.

1. Introduction

With the gradual increase of building height, volume and thickness, the load on building foundation is getting bigger and bigger, and mass concrete structure is widely used in soil-wood building engineering construction. A large number of engineering practice surveys have found that mass concrete has been widely used in engineering because of its thick structure, large size, dense steel bars, large concrete volume, complex engineering conditions and high construction technical requirements [1]. At the same time, the proportion of high-rise buildings in buildings is increasing, and the application of mass concrete is more and more extensive. Adopting the best mass concrete construction technology for concrete construction is the key to ensure the quality of foundation engineering [2]. This is because cracks in buildings will often bring different degrees of harm to the structure, and the light ones will cause structural leakage and concrete carbonization, while the heavy ones will cause buildings and structures to tilt and collapse, which will seriously endanger people's lives and cause certain economic losses and property losses to the country and the people [3]. The author will analyze the construction technology of mass concrete in order to provide feasible suggestions for the construction of mass concrete.

2. Causes of Cracks in Mass Concrete Construction in Construction Engineering

2.1 Cause of Temperature

During the construction of mass concrete, the pouring temperature changes with the change of external temperature. When the outside air temperature rises, the temperature difference between the inside and outside of concrete will be reduced, resulting in temperature stress [4]. When the outside air temperature rises, the temperature difference between inside and outside concrete will be reduced, resulting in temperature stress. The greater the temperature difference, the greater the stress of temperature, and the greater the cracks. For example, water pipes are embedded in mass concrete, and cold water is injected into the concrete to effectively control the internal temperature of concrete. Therefore, the main reason of concrete cracks caused by temperature stress and hydration heat of cement should be attributed to the difference of temperature.

2.2 Factors of Concrete Self-Shrinkage

Shrinkage is an important inherent characteristic of concrete. Under the condition of no load, the

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cracking of concrete is often caused by shrinkage deformation. Mass concrete is hardened by 20% moisture, and the rest is evaporated by the outside world. When the evaporated water exceeds the water that should be evaporated in essence, it will cause concrete to shrink. In addition, a lot of additives and slag are mixed in the massive concrete materials, which are also important factors affecting it. In addition, the water-cement ratio, the content and type of aggregate also have great influence on the self-shrinkage value of concrete [5].

2.3 Strong Binding Force

In civil engineering, mass concrete is always a thick monolithic structure, which leads to the obvious binding force of foundation. This binding force from outside will lead to serious cracks in concrete. In structural calculation, the relevant parameters of the stress system of the structure should be assumed first, but the conventional calculation model is different from the actual working state of many structures. Because of the dense spacing of the bottom reinforcement, the vibrating hand is responsible for the concrete flowing into the bottom of the lower reinforcement to ensure the compactness of the lower reinforced concrete [6]. During night construction, there should be enough lighting to ensure that the bottom reinforcement can be seen. This binding force from outside will lead to cracks in concrete, and sometimes there will be internal binding force, which is mainly caused by temperature difference.

3. Key Points of Mass Concrete Construction Technology

3.1 Design and Construction Requirements

To do a good job of safety technical disclosure of construction workers, emphasize the control of concrete grade of beams, beams and slabs and shear walls, as well as vibrating time, spacing and so on. Check the specifications and sizes of steel bars, control templates, protective layers and other equipment, so that the deviation value meets the national acceptance evaluation standard [7]. According to the characteristics of mass concrete construction, the construction design of mass concrete foundation should not only meet the requirements of design specifications and production technology, but also allow the construction of mass concrete to set horizontal construction joints, which should be set according to the requirements of temperature crack control during concrete pouring; Determine the speed index, the temperature difference between inside and outside and the peak value of temperature rise, in other words, calculate the temperature stress and shrinkage stress of concrete by measuring the actual temperature when pouring the block; Try to use medium sand and strictly control the silt content of sand and stone; Control water cement ratio; Retarder is mixed in concrete to slow down the pouring speed, so as to facilitate heat dissipation. There are many ways to remedy the cracks. Grouting construction structure and emerging mass concrete structure can achieve great results in repairing cracks.

3.2 Concrete Mix Ratio and Its Materials

To put it simply, the principle of reasonable allocation is to determine the mix proportion of concrete through calculation and trial allocation, so that it must meet the design specifications (most reference standards are 450 kg/m), and the fundamental purpose is to reduce the hydration heat of cement [8]. When selecting the mix proportion of mass concrete, it should be considered that before the mix proportion of construction concrete meets the design requirements and construction technology requirements, the amount of cement should be reduced as much as possible to reduce the adiabatic temperature rise of concrete. For example, admixtures such as high-efficiency water reducing agent are added into concrete to control the unit water consumption, or high-quality admixtures are used to replace part of the cement consumption, so that the cement consumption can be greatly reduced on the premise of ensuring the workability strength of the same benchmark concrete, and the hydration heat and shrinkage of concrete can be reduced. The silt content of sand and gravel has a strong influence on the tensile strength of concrete, and improper control may lead to serious cracking of the structure, so the silt content of sand should be $\leq 2\%$ and that of stone

should be ≤ 1%; The maximum particle size of block stone is limited in the range of 150 ~ 250 mm by adding coarse aggregate ≤ 25% of concrete volume. The insertion point of the vibrating rod moves in the order of determinant, and the distance of each movement does not exceed 1.25 times of the effective action radius of the concrete vibrating rod. In addition, it is also possible to use the same pouring temperature control method to choose the time period when the ambient temperature is lower, so as to reduce the internal temperature stress of concrete.

3.3 Pouring and Curing of Concrete

The equipment should be overhauled frequently to ensure the normal operation of the equipment. In order to prevent temporary power failure and water cut-off, it is necessary to prepare tools for manual mixing and vibrating. The core of concrete maintenance is to prevent water loss on the early surface of concrete. Meanwhile, maintenance can supplement the water needed for early hydration of concrete, which is helpful for cement hydration. Layered continuous casting or push continuous casting, try to shorten the interval time between layers, before the initial setting of the concrete in the previous layer, the concrete in the next layer should also be poured. The longest time interval between layers shall not exceed the initial setting time of concrete. A site should be selected until it meets the designed elevation, and the concrete forms a fan-shaped flow trend, and then continuous pouring is realized on the slope. After the concrete is poured in sections, secondary vibration or surface extrusion can be realized in the initial setting stage of concrete, so as to eliminate surface water accumulation, prevent surface cracks and improve the waterproof performance and surface perception of mass concrete. If the temperature in the construction site is relatively high, the awning should be reasonably set in the sand pile, and the cooling measures should be taken by spraying cold water according to the actual situation. The mixing water can be ice, so that the water temperature can be controlled within 5℃. It is reasonable to control the concrete outgoing temperature at 18-200C in actual construction. When vibrating with a flat vibrator, we must pay attention to the method, which should be carried out horizontally or longitudinally along the concrete, which will save time and effort.

4. Quality Control Measures of Mass Concrete Construction

4.1 Adjust the Reinforcement Configuration Scheme

By adjusting the configuration scheme of steel bars, it is possible to add temperature transmission distribution bars in mass concrete, and transfer the internal heat in time to prevent the internal heat from increasing. Not only can the water consumption, water leakage and concrete shrinkage be reduced correspondingly, but also the hydration heat of cement can be reduced by reducing the cement consumption. Moreover, the stone itself has a higher function of absorbing calorific value, which can effectively control the temperature rise of concrete. When the concrete is still in the setting stage, but the pouring work has been completed for 12 h, it is necessary to start pouring water into the concrete in order to keep the humidity of the concrete. After the concrete is poured, the extra laitance layer must be scraped off with a 2m long enclosed ruler in time, and the concrete surface should be enclosed and leveled according to the elevation control points laid out by the builder. Parts with pits must be filled with concrete, and the concrete surface should be polished twice when the concrete slurry is close to initial setting. Admixtures have the function of filling pores, which can effectively improve the impermeability and crack resistance of mass concrete. Mass concrete structures play an important role in dealing with cracks and other defects in civil buildings. It is necessary to make sure that the mass concrete structure has further development in the function and force.

4.2 Selection of Raw Materials

When preparing mass concrete, strict inspection should be carried out on the cement entering the site, and low-heat or medium-heat slag Portland cement should be reasonably selected on the basis of ensuring that the cement meets the strength and durability requirements; For example, we need to

consider the influence of cement releasing a lot of heat when it meets water, the influence of different environmental temperatures and the influence of concrete itself on construction. The formwork removal time should be prolonged as much as possible. After formwork removal, backfill soil or continue curing until the temperature difference between inside and outside concrete tends to be stable. At the same time, prevent the impact of sudden cooling climate, ensure that the temperature difference between inside and outside concrete is controlled within 25℃, and prevent the early and middle cracks of concrete. Adopt suitable materials to repair and solve the problem of cracks in mass concrete. The maintenance of mass concrete can protect mass concrete from adverse factors and deal with the problems existing in mass concrete. In this way, the shrinkage degree of concrete is reduced, and the heat in the middle can be quickly radiated by the way of overlapping up and down, thus reducing the probability of cracks. Dismantle the formwork as late as possible, and adopt secondary vibrating and plastering technology to improve the concrete strength and crack resistance. Cover concrete with heat preservation and moisture preservation materials in time.

4.3 Binding Control

By controlling the external binding force of the building, the building quality can be effectively improved. In the construction process, sliding layer can be set to reduce the influence and damage caused by foundation subsidence on large-volume concrete structure. In the pouring process, in order to prevent the concrete from flowing too much naturally and the concrete supply is slow, the concrete should have a certain retarding property. Mainly from the angle of how to reduce the binding force of foundation on concrete structure. In the current housing construction market, the method of reducing the binding force of foundation on coagulation and coagulation mainly refers to the method of setting sliding layer. Avoid cracks or honeycombs on the surface of mass concrete. The concrete work of curing mass concrete is to observe the solidification of mass concrete from time to time. If the concrete surface temperature is low, it is necessary to cover the concrete with plastic film to improve the concrete surface temperature; Eliminate the first surface cracks and improve the water-proof performance and surface perception of concrete. Concrete pouring should be carried out at night to reduce the temperature difference between new and old concrete and to reduce cracks caused by cold shrinkage deformation under limited conditions.

4.4 Controlling Pouring Temperature

According to the structural characteristics of the foundation of this project, the moisturizing method is determined under the climatic conditions. Within 12h after pouring, do a good job of curing concrete. Curing method: Cover the surface with plastic film and then with gunny bag. Sprinkle water for heat preservation and moisture preservation. Controlling the pouring temperature can effectively reduce the maximum temperature rise of concrete and reduce the loss of cooling capacity. Measures can be taken to control pouring temperature: control construction time, and low temperature construction is reasonable; According to the engineering situation, speed up the transportation and pouring time of concrete reasonably. The core of concrete curing is to prevent concrete from losing water on its early surface, and at the same time, curing can supplement the water needed for early hydration of concrete, which is helpful for cement hydration. In addition, cracks can be controlled by controlling cement consumption, and fly ash silicate cement can be selected to fully release the heat in concrete during the material mixing process, so as to effectively control the internal temperature of concrete.

5. Conclusion

At present, mass concrete structure is widely used in civil construction, which greatly promotes the improvement of construction technology and construction technology of civil construction, and there is more room for appreciation of earth-wood buildings. However, the construction quality of mass concrete will have a direct impact on the performance of concrete structures. Therefore, in the construction of mass concrete, construction personnel must carry out construction according to the engineering construction standards, and strictly control the construction quality, so as to avoid

bleeding and cracking as much as possible, so as to ensure that the quality of mass concrete structures can meet the requirements of engineering construction. To avoid concrete cracks, we need to make efforts from design, construction, materials and other directions, strictly control the production process, use scientific and effective technical measures to reduce cracks and ensure the construction quality, thus ensuring the overall construction quality of the project.

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