On the Construction Technology of Mass Concrete Structure in Civil Engineering

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Abstract: The rational application of mass concrete construction technology plays an important basic role in promoting the quality improvement of civil engineering. However, due to the influence of nature, reinforcement and construction technology, mass concrete quality problems frequently occur. Under the background of big data era, building construction technology has developed by leaps and bounds, and mass concrete construction technology has been widely used. However, due to lack of experience, many details need to be further improved. Only by ensuring the stability and safety of mass concrete structures can we lay a foundation for the stability and safety of buildings, so as to ensure that the functionality of buildings will not be affected and they will be more safe after being put into use. This paper mainly discusses the construction technology of mass concrete structure in civil engineering buildings, analyzes the construction problems encountered in it, and puts forward targeted solutions according to the actual situation, so as to effectively improve the quality of civil engineering buildings and promote the sustainable development of the construction industry.

1. Introduction

With the growth of civil engineering scale, mass concrete has more applications in some important basic structures. Only by making it meet the requirements of higher structural strength, crack resistance and bearing capacity, can the quality of civil engineering construction be effectively promoted [1]. For mass concrete structures, they belong to structures with members over 1m. Compared with ordinary concrete structures, it is possible to suffer from water reaction and temperature during mass concrete construction [2]. The main feature of mass concrete structure is its large volume. In the construction of civil engineering, mass concrete is widely welcomed [3]. However, there are many deficiencies in the use of mass concrete during construction, for example, the most common occurrence of cracks in our life [4]. During the construction of mass concrete, because the heat energy generated in the concrete can not be discharged, and the external temperature is lower than the internal temperature, cracks are easy to appear [5]. In general, it is common to use mass concrete structures in civil engineering buildings. In order to ensure the quality of concrete engineering to meet the requirements, it is necessary to carry out technical treatment for mass concrete structure construction.

Usually, the construction technology of mass concrete structure is widely used in civil engineering construction, and it can ensure the quality of civil engineering construction to meet the use requirements [6]. At present, mass concrete construction technology is widely used in the foundation slab, and as the foundation engineering of buildings, it has higher requirements on the integrity and impermeability of mass concrete [7]. Due to the strong construction technology and many influencing factors, mass concrete is also a special construction technology, so it is necessary to formulate a scientific and reasonable construction scheme in combination with the actual situation in practice [8]. Mass concrete construction structure has an impact on the whole construction quality. In order to ensure the construction quality of civil engineering, it is necessary to further enhance the technical level [9]. When pouring, the mass concrete structure needs to be poured once, and no cracks are allowed. This paper mainly discusses the construction technology of mass concrete structure in civil engineering buildings, analyzes the construction problems encountered in it, and puts forward targeted solutions according to the actual situation, so as to

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effectively improve the quality of civil engineering buildings and promote the sustainable development of the construction industry.

2. Construction technology characteristics of mass concrete structure

Compared with ordinary concrete structure, during the concrete construction of mass concrete structure, because the internal hydration heat of concrete structure is difficult to be discharged in time, and the external temperature is relatively lower than the internal temperature, cracks may occur due to the influence of temperature difference. During construction, if the heat caused by hydrothermal treatment can not be dissipated in time, the temperature difference between the inside and outside of the structure will be too large, and even cracks will occur under large temperature stress. Under the condition of rapid temperature change, if the protection work is not done well, cracks will easily occur in the main structure. If the temperature is effectively controlled in the concrete solidification process, the potential safety hazards in the project will be greatly reduced, and the project quality will be more guaranteed. The related maintenance work should be kept up with in time. Only when the pouring and maintenance work are in place can the quality be guaranteed, and the concrete will not crack in the later period. Because mass concrete is mostly used as building foundation, such as underground diaphragm wall, if there is temperature crack, it will bring problems such as basement leakage [10]. Moreover, compared with conventional structural cracks, it is more difficult and costly to repair and deal with, which affects the actual use function of buildings. Mass concrete construction structure is the most important construction link in civil engineering buildings, and the whole construction quality has a very important influence on the quality of the whole process. If the concrete is not poured and maintained properly, dehydration will occur. Once this phenomenon occurs, the cement particles that have formed gel cannot be hydrated, which will have a direct impact on the overall strength of concrete structures.

After construction, some maintenance work is needed. The stability of mass concrete structure is easily affected by external factors. Maintenance personnel should do a good job of temperature monitoring to control the temperature difference between inside and outside within a reasonable range. In the concrete construction process, the mass concrete structure is easily affected by other factors, which leads to cracks, especially in wet environment. When the crack problem is particularly serious, it may pose a certain threat to the safety of people's lives and property. The allocation and selection of raw materials for mass concrete should be strictly controlled to effectively control the allocation of raw materials. Finally, after the completion of the construction, it is necessary to carry out scientific maintenance and fully control the temperature of the concrete structure, so as to prevent the unqualified mass concrete from affecting the whole project quality.

3. Application of mass concrete structure construction technology

In the process of selecting coarse aggregate, it is necessary to pay attention to continuous gradation and take sand as fine aggregate. Then, according to the actual situation, the proportion of admixture is appropriately adjusted to optimize the admixture. In civil construction, the key to quality control of mass concrete members lies in temperature. Among them, forced cooling is the most effective way. By embedding circulating water pipes and circulating cold water, the internal heat discharge is accelerated, and the temperature difference between inside and outside concrete is quickly controlled. In order to improve the engineering quality in construction, we can choose appropriate testing methods to complete the parameter inspection of concrete. According to the terrain and natural conditions around the building site, raw materials should be selected scientifically, and the mixing work should be carried out in strict accordance with the standards. In order to ensure the quality and safety of building structures, the strength of mass concrete structures in civil engineering buildings has certain requirements. If we want to achieve the application effect of mass concrete structure under design condition, we need to operate strictly according to the material ratio, which can ensure the rationality of material configuration and complete the preparation of high-quality concrete materials. In the process of curing, the most important key

word is moisture.

During the concrete construction of mass concrete structures, the construction technology used should be combined with the engineering specifications to restrict the actual construction operation. For front-line construction personnel, it is necessary to carry out regular training and professional quality education, so that they can complete the work within the specified time. Because temperature stress can easily lead to cracks in concrete, it is necessary for construction personnel to pay attention to temperature measurement. Only by controlling the temperature well can the construction quality of building concrete be improved. Since the reinforcement part will be buried inside after concrete pouring, it is difficult to check and adjust its quality and safety. Therefore, after completing this part of reinforcement construction, the construction unit needs to invite the supervision unit to conduct concealed acceptance on the basis of qualified self-inspection, and start concrete pouring operation under the condition of ensuring that this part of construction meets the quality standards. The construction process of mass concrete is also an important link of temperature control. It is necessary to control the temperature of concrete materials, choose suitable weather for pouring, and control the heat in the pouring process by cooling measures. A good concrete mix ratio should meet the technical requirements of concrete. For example, Table 1 is the cement index to be controlled.

Table 1 Cement index data

Cement index	Fineness	Initial setting time	Compressive strength	Standard consistency water
Ordinary silicon hydrochloric acid cement	45um	160	40.5	25.5

In the process of civil engineering construction, we should pay attention to the maintenance of moisture, and the most important thing is to ensure that concrete engineering does not have the phenomenon of water loss similar to the early surface. Of course, while preventing concrete from losing water at an early stage, water should be added to the early history of concrete. The relationship between compressive strength and age of concrete prepared with different aggregates is shown in Figure 1.

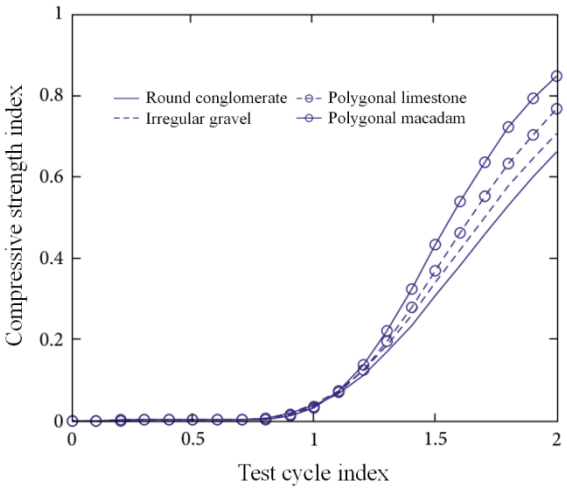

Figure 1 The relationship between compressive strength and age of concrete prepared with different aggregates

After the completion of the construction, the relevant technical personnel can judge the quality of the concrete structure through the relevant equipment and their own experience, and the inspection contents mainly include cracks, honeycombs, steel leakage and so on. Before materials enter the construction site, scientific experiments must be conducted to carefully analyze whether their performance meets the use requirements. Once problems are found, they must be replaced in time to cut off risks from the source. After pouring mass concrete, it is necessary to maintain it according to the actual situation, and properly control the temperature effectively. In addition, the concrete

structure should be insulated to further control the heat of concrete and appropriately reduce the temperature difference between inside and outside. The cracks of concrete are largely caused by its shrinkage characteristics and hydration reaction. Some additives and water reducing agents that inhibit the shrinkage of concrete can also optimize its crack resistance, thus ensuring the quality of mass concrete.

4. Conclusions

At present, China's modern concrete construction industry has developed rapidly, and the mass concrete structure has made great progress, which brings great promotion to mass concrete. Therefore, in the corresponding construction industry, for mass concrete, it brings more obvious requirements. Nowadays, mass concrete is common in civil engineering and plays an important role in foundation stability, but it also faces many quality risks. After pouring mass concrete, it is necessary to maintain it according to the actual situation, and properly control the temperature effectively. Construction technology is an important reason that affects the quality of the whole building. Therefore, during construction, it is necessary to choose suitable construction technology, and prepare materials and related operation procedures in strict accordance with standards, so as to avoid cracks in the construction process and ensure the improvement of the whole project quality. For the development of the industry is an inevitable choice, the construction department should supervise and manage the technology, control the quality through an effective management mechanism, and restrict the technical process, so as to ensure the improvement of efficiency and the perfection of construction quality.

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