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CRACK CONTROL TECHNOLOGY FOR THE OVERALL FLOOR OF AN ULTRA-LONG AND LARGE EXHIBITION HALL

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Abstract: Construction cracks are prone to occur in the construction of large-area flooring, which affects the integrity, aesthetics and quality of the flooring. How to better control construction cracks has become an important issue that construction units must consider. This article will analyze the specific causes and control techniques of construction cracks in large-area flooring of buildings based on actual conditions, in order to provide reference and reference for related construction operations.
Keywords: Large-area flooring; Cracks; Construction; Exhibition hall

1 INTRODUCTION

With the gradual acceleration of urbanization and modernization in my country, more and more large public buildings are under rapid construction, such as colleges and universities, airports, large stadiums, hospitals, large factories and other buildings. These buildings have a common feature, that is, the length of a single building is long, the area is large, and the construction period is tight. During the construction of the building, there will be super-long and large-area floors. Super-long and large-area floors will produce small cracks under the action of temperature shrinkage creep, which will cause quality hazards such as seepage and leakage in the later stage [1-4]. Therefore, how to effectively reduce the generation of super-long area concrete temperature cracks is a technical problem that every construction technician has to overcome. Diamond abrasive concrete wear-resistant floor has been widely used in commercial and office building projects due to its excellent wear resistance, excellent durability, high reliability and convenient maintenance.

2 PROJECT OVERVIEW

A certain exhibition project has a total of 8 steel structure exhibition halls, central corridors and supporting rooms. Due to its functional requirements, different exhibitions need to be arranged. The exhibition hall floor is required to withstand the impact of heavy loads and meet the durability requirements. The underground floor is a large-area concrete floor, which should be considered comprehensively.

3 DESIGN OF CRACK CONTROL TECHNOLOGY FOR LARGE-AREA FLOOR CONSTRUCTION

During the construction of large-area floor, cracks are prone to occur due to the constraint of concrete deformation. Therefore, in order to effectively control cracks, high-performance casting materials need to be configured. First, it is necessary to determine the configuration principle of casting materials. The casting materials on the upper and lower sides of the floor are different, and the constraint stress and friction coefficient are different. Therefore, asphalt can be appropriately added to the casting materials to compensate for shrinkage deformation. There is also a constraint between the casting materials and the columns. Therefore, partitions can be made in advance to determine the constraint strength of the front and rear poured concrete, reduce the constraint tensile stress, and add mortar to the casting materials to avoid evaporation of material water.
During the construction process, it is necessary to effectively control the hydration heat of concrete. Therefore, this paper selects the TSTM stress testing machine to quantitatively analyze different types of concrete mixtures, and selects the casting concrete that meets the construction requirements according to the obtained parameters.
This paper selects the TSTM stress testing machine to quantitatively analyze different types of concrete mixtures, and selects the pouring concrete that meets the construction requirements based on the obtained parameters. When pouring the floor in special foundations such as rock, a sliding layer is required to reduce the cushion constraint. Steel fiber and polypropylene fiber can effectively increase the tensile strength of the pouring material. Therefore, the technology designed in this paper uses orthogonal processing, and the parameters of different test blocks are shown in Table 1.
As can be seen from Table 1, by comparing the above test blocks, the trial strength f_{cu} of the pouring material can be calculated

Table 1 Parameters of Different Test Blocks

serial number	A steel fiber content (%)	B Polypropylene content (%)	C Polypropylene aspect ratio
1	1	1	1
2	1	2	2
3	1	3	3
4	2	1	2
5	2	2	3
6	2	3	1
7	3	1	3
8	3	2	1
9	3	3	2
10	0	0	-

$f=f_{cuk}+\sigma$ （1）

Wherein, fcuk represents the trial strength, and σ represents the standard deviation of lightweight aggregate. According to the above-mentioned matching strength of the casting material, the amount of cement can be determined and the density grade of the lightweight aggregate can be adjusted. In order to meet the high-strength goal of floor construction, this paper uses the slump interpolation method to adjust the amount of clean water and determine the volume sand ratio. At this time, the total volume VS of coarse and fine aggregates can be calculated according to the bulk density relationship of the material:

$V_S=V_T\times S_p$ （2）

Wherein, VT represents the volume of fine aggregate, and SP represents the volume sand ratio. Combined with the above-mentioned floor casting material preparation parameters, high-performance floor casting materials can be mixed to reduce the risk of cracks in floor construction.

4 LIGHTWEIGHT HEAVY-LOAD FLOOR DIAMOND SURFACE CRACK CONTROL

4.1 Problems with Diamond Wear-Resistant Floor

Just like Figure 1, diamond floor is mainly composed of high-strength cement, inorganic wear-resistant aggregate and pigment powder. In the initial stage of construction, the surface is treated with corresponding technical methods to achieve a solid, durable and beautiful effect. Because this type of floor has good impact resistance and compression resistance, it is widely used in industrial sites, docks, parking lots, logistics warehouses and other buildings. However, the construction technology of diamond abrasive floor is strict. Some construction units carry out on-site construction without correctly grasping the application points, resulting in many quality defects in the floor. It is easy to have disease problems in subsequent use, and cracks are one of the most common problems. The emergence of quality problems makes it lose its flatness, which not only affects its use, but also causes certain hidden dangers.

Figure 1 Cracks in Corundum Floor

4.2 Methods for Repairing Cracks in Corundum Wear-Resistant Floor

(1) Repair with pure corundum. Repair with pure corundum can effectively solve the color difference problem, make the crack repair position consistent with the color of the overall floor, and have good aesthetics. In the application of the pure corundum repair method, it should be noted that the corundum aggregate used needs to be filled in two times to ensure that the filling is dense and full. The pure corundum repair method also has certain disadvantages. During the repair process, the corundum and concrete are not firmly bonded, and it is easy to fall off, and the durability is poor.

(2) Repair with corundum mixed with cement. The repair method of corundum mixed with cement can make the contact between the filler and the floor more firm, and achieve higher strength and good durability. However, since the cement material used will appear white after solidification, it has a significant color difference from the original corundum floor, and the overall aesthetics is poor. From the perspective of use, this method has great limitations.

(3) Repair with corundum mixed with yellow sand and resin. The repair method of diamond sand mixed with yellow sand and resin has the advantages of high strength, no obvious color difference, good durability, etc. However, before the repair begins, the crack position must be cleaned in detail to ensure that there are no impurities before repairing. The repair work must be poured in batches, and the grinder can be used for polishing one week after the repair is completed.

5 CONCLUSION

The crack problem should not be underestimated. We should pay attention to it, study it more and improve it. It can bring the quality of the project to a higher level, and safety, quality and production can all be improved.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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