Research on Concrete Pouring Technology and Crack Control in Construction Engineering

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Abstract: The construction industry in China continues to expand, and the economic level is continuously improved, which leads to the diversification of construction technologies applied in construction projects. At present, the concrete pouring technology is in a relatively mature stage, and it has already become one of the common construction techniques for modern construction projects. But in general, during concrete pouring construction, we will encounter concrete cracking, which will not only affect the stability of the concrete structure but also affect the quality of the overall project. In view of this, this paperspecially studies the concrete casting technology and crack prevention technology in construction engineering, hoping to provide certain experience for reference to learn more about modern construction projects.

1. Introduction

In the following few years, modern construction application range of concrete pouring technology is gradually expanding and more practical in construction techniques has cultivated, become an indispensable part of construction. However, quality control is still the most important factor of all, and every aspect controlling the pouring method must be given high priority — especially crack control. Based on the project scale, construction cost, functional purpose and environmental condition of site, a concrete pouring construction scheme is configured to enhance field operation controllability. As a result, proper control cracks in concrete of modern construction engineering can make sure project quality and all-in-one advantages, extended the service-life of building engineer. Research on construction engineering stronger concrete pouring technology and cracking control technology is one of the development in practical significance.

2. Application Value of Concrete Pouring Technology in Modern Construction Engineering

2.1 Improving Building Structural Stability

Concrete material features high Compressive Strength When used as the primary building material, it significantly boosts the overall strength of the structure. How to make a solid and durable structural system through reasonable mix design, selection of raw materials, construction process and bear different loads to ensure the stability and safety of buildings is what construction technicians need to do. Nevertheless, conventional building structures have inadequate seismic resistance and are prone to structural cracks or even collapse during earthquakes and other natural disasters. The above advantages can greatly mitigate the adverse effects of natural disaster on building structural stability by adopting concrete pouring technology, because of its much better stability and durability performances. In addition, being dense, it resists against water seeping into the concrete walls yielding excellent waterproofing properties and only a few other building materials tend to be so low in flammability as this material. They essentially act as support for buildings, as they improve the structural integrity of the building.

2.2 Aligning with Green Environmental Concepts

According to the latest concept of modernization in China's construction engineering industry, many concepts of energy conservation and environmental protection have been included in

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engineering construction, which can ensure that the permanent structures can reduce pollutant emissions and waste generation during the production process and promote sustainable development. Concrete is a recyclable and reusable material. In construction projects has very good applicability, and in line with the green environmental concept advocated by industry [1]. Meanwhile, it has a low energy consumption and emission during the production and processing of concrete materials. That means that, for example—devices of low-energy consumption may be used to manufacture, and industrial waste furnace slag can also be involved as the concrete additive. This significantly mitigates the adverse impacts of construction activities on the environment.

3. Analysis of Key Points in Concrete Pouring Technology for Construction Engineering

3.1 Key Points of Formwork Construction Technology

Even when concrete pouring technology is applied nowadays, formwork construction is a crucial step of the works as well. Formwork is an essential part of concrete forming and the quality of structures depends on it That is, the construction time specifications of form work should have its strength, structure, dimension and other requirements acceptable to standards for carrying out every point in the project by obtaining results from all parameters. In addition, execute a stringent inspection of joint area before mesh connection procedure; joints must be tight, otherwise it may not only damage the quality of concrete but also create conditions for grout leakage at joints which will consequently affect subsequent works [2]. Certain formwork area surfaces are filthy and need to be cleaned appropriately to give an effective, clean smooth surface of contact with the concrete. To improve concrete adhesion and permit smooth follow-on pours, moisten the formwork before pouring.

3.2 Key Points of Concrete Mix Proportioning Technology

Concrete mix design is the most important step of modern construction pouring. Note that pouring quality and scientific proportioning for mix design should insist upon national regulations at first, then follow-up industry technical standards. Considerable care should be taken in establishing rational proportions of raw materials to ensure the stability of concrete structure [3]. When some tentative mix design has been made, initial samples of the prepared concrete can be tested either in small quantities or large amounts with appropriate instruments selected depending on project requirement. In the next stage of use, concrete must not be used until all indicators and parameters of raw materials and aggregates are checked to meet standards and regulations. Furthermore, thorough mixing is essential. The strength of concrete should follow the raw material class usage, so that the mixing is on target to alleviate your rework issues.

3.3 Key Points of Concrete Vibration Technology

It is directly associated with pouring quality of concrete. The stage just mentioned, construction manager and technicians need to manage properly including: choosing vibrators satisfy engineering needs of vibration determination; determine the intensity of vibration according to standard parameters, then conduct the operation of vibration. Air bubbles can remain during vibration and need to be removed quickly as that reduce the final strength of concrete [4]. The vibration process should also be in accordance with the principle of " first top and then bottom, first difficult than easy." First vibration and then layered vibration. For multilayer vibration, each layer needs to be strictly controlled with vibrating height and lying time, so that the intensity can meet the required level set by engineers. At present, insertion type vibrators are mainly used in modern construction concrete pouring For vibrators of this type, it is necessary to operate them according to up-down oscillation and vibration will be executed in the methods for construction work intended to have control over bubbles on surface formation and density enhancement of concrete [5].

4. Exploration of Crack Control Strategies for Concrete Pouring in Construction Engineering

Cracks Control During Concrete Pouring The control of cracks is a longtime subject of interest

for the industry. Concrete is a sensitive structural material whose strength directly affects the overall structure, if the newly-built buildings or engineering structures do not adopt proper construction technology and have no effective targeted crack control plan, it will lead to serious cement cracking problems and lower edge longevity. Therefore, the control of crack is considered as essential from the following perspectives:

4.1 Implementing Early-Stage Curing of Concrete

Generally, the concrete cracks in structures primarily occur with environmental influences, reactive temperature and liquid phases during solidification zone. In contrast, when the temperature changes frequently or internal-external concrete temperatures are more different, internal stress is generated effectively to cause cracking and quality of construction. Initial curing of concrete is crucial to minimise cracking. In Particular, Concrete have to be poured in environments temperature and humidity. Sunshade curing could be used for early stage repair [6]. Prevent concrete drying measures Good placement In terms of construction, the method of choosing a reasonable place or space to concrete materials is also important. You have to shelter to avoid sunlight so as not to cause cracks due to drying. They have moats filled with gravel, and many also use sunshades or nets to maintain an even internal temperature and humidity through their early curing phase. By the same token of preventing drying out concrete, it is possible to then consider moisture curing in that sense [7]. Usually, there are known moist curing methods that exist, spraying water or mist they preserve the hydraulic concrete so the performance place them on storage to avoid formations of cracks.

4.2 Implementing Foundation Settlement Prevention Measures

The cracks in the concrete itself—the causes of these are the settlement, which puts the structural stability and service life of the construction project to risk; So, concrete pouring is preformed but it necessary to finish all construction; precautions for foundation settlement need to be taken. As a matter of fact, cracks can be managed by adopting early stage preventive foundation settlement measures at the time when the concrete and foundation is constructed. For example, you can opt for foundation strengthening techniques. This involves an examination of the factual conditions of the building foundation, includes description and the parameters and stability indexes summary and also determination of specific bearing capacity factor for foundation construction [8]. Foundation strengthening must be done based on the previously mentioned elements like maximum scale, geographic environment, usability of the building etc. One is that design showed up the grouting reinforcement as it pressure a certain target slurry around the foundation structure's position to modify physical characteristics and support factors while wetness proof and reinforcement functionalization were dealt positively with. The alternative is to control how low groundwater levels get as a preventative maintenance for the settlement of foundations. Ground water level is the second reason that also leads to concrete crak in various modern construction work. Therefore, during the early stages of maintenance, a proper control of groundwater level should be concentrated to avoid windrow and consequently minimize apparent cracking [9]. Real-time Monitoring of Groundwater Levels: Construction units should monitor groundwater levels, record specific water level parameters after each monitoring session to ensure that they can promptly adjust levels, according to project needs real-time adjustment groundwater levels and keep appropriate groundwater levels so as to comprehensively reduce the possibility of settlement in order to prevent concrete cracks.

Additionally, admixtures are also important in preventing issues of foundation settlement. Mainly because admixtures are used to lengthen/shorten concrete set time, but its a fair trade off in terms of more manageable scheduling and less possibility of cracking if formwork is taken away too soon or construction sequencing goes unreasonable. You can also choose accelerators or retarders for the admixtures. Accelerators are used for shorting setting time, and retarders provide for longer setting time. In order to adopt a more controllable hardening speed for concrete pouring operations, the scientific and rational use of these admixtures can meet the needs.

5. Conclusion

In summary, the application of pouring technology in modern engineering construction is more and more extensive, which not only ensures the strength of main structure but also lays a good foundation for quality control. However, you need to fight cracking to get the desired effect in your concrete pouring technology. In practice, affected by environmental factors and field technical personnel during the construction process, it is also particular about the spots of concrete pouring construction, so targeted to perform crack prevention plan. Currently, it is effective to realize crack control through early concrete curing and foundation settlement prevention measures; ensure the quality of concrete pouring construction. First, the pouring technology system is just one step and there are continuously improvement ideas for major projects such as raw material selection, and mix design. The grass-roots tree estimates should be actively incorporated into green topics and eco-friendly construction ideas, the energy-saving characteristics and environmental characteristics of concrete pouring technology. This can guarantee the contemporary construction project software program excellent & benefits, and present a research foundation to direct later study in the subject of development engineering.

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