
Quality Control Technology of Airport Pavement Construction

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Abstract

For the common quality defects appeared in the airport pavement construction such as side or corner peeling, surface mesh or ring crack, plate fracture and honeycomb, according to the characteristics of large area concrete pavement construction and environmental factors, a comprehensive analysis of the causes of quality problems, and puts forward corresponding measures for construction control.

Keywords

Airport pavement; quality defects; construction; quality control.

1. Introduction

Due to the large area laying and hardening conditions of the concrete on the airport pavement, the pavement construction is mostly in the season of higher temperature. In the process of concrete construction, fresh concrete is exposed to the external environment, which is greatly influenced by it. Especially in the arid region of Northwest China in summer, mostly sunny, low air humidity, larger temperature difference between day and night, windy, have many adverse effects on the construction, easy to produce quality problems: side or corner peeling; surface mesh, strip or annular crack; plate fracture; honeycomb and pits etc.. If the construction time is not accurate and the construction method is unskilled, it is easier to produce more common quality problems [1]. Not only affects the quality and progress of the project, but also directly affects the durability and safe use of the pavement. Aiming at the airport pavement of large area concrete paving construction characteristics, considering the environmental impact factors of pavement concrete in the construction process of quality problem analysis, put forward the causes and measures, carefully control the construction quality of cement concrete pavement paving, long life and low maintenance.

2. Analysis of Causes of Common Quality Diseases

2.1 Side or Corner Peeling

Side or corner peeling refers to the concrete flaking at the corner of the concrete plate, as in Figure 1. The reason is: cutting time early, low strength concrete, slit panel edges, loss of bad sectors; cutting head from basting, concrete cutting seam shrinkage off, will crack the concrete slab corner spelling; mixture vibration compacting corrected expansion joint plate position when the plate edge coagulation soil damage; the pouring of concrete early, construction equipment was knocked off the corner on both sides to build strength of concrete pavement; Prematurely dismantling the formwork, the strength of the concrete, or the dismantling of the touchpad by careless operation, and breaking the concrete at the corner of the plate. [2]



Fig.1 Side or corner peeling



Fig.2 Reticulate crack

2.2 Reticulate Crack

Reticulate cracks on the surface of concrete, commonly known as crack, crack depth from 0.5 to 5 mm, such as Figure 2. The reasons are: (1) when the construction is windy or the temperature is higher, the coverage is not in good time, so that the concrete surface is dehydrated too fast at the initial stage of casting or solidification. Cracks appear on the pavement. After several years, especially in the cold regions of the north, under the combined action of freeze-thaw and airplane loads, the surface concrete will soon loose and peel off, reducing the durability of the pavement and threatening the safety of the flight. [1, 3]

2.3 Strip Type or Annular Crack

The strip or ring cracks on the surface of the concrete surface are generally 3~5 mm deep and are produced 1~2 days after casting, such as Figure 3. The reason is: mixing uneven, partial thin, dry shrinkage is not a; the uneven paving, coarse aggregate and fine aggregate is too concentrated, not a contraction; the nap after the end of the concrete surface to form a water bag, bleeding, shrinkage; curing early to sprinkle water or from the sun, leading to excessive water loss.

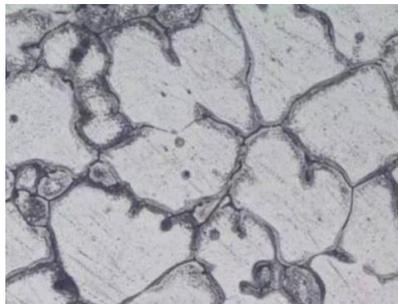


Fig.3 annular crack



Fig.4 slab rupture

2.4 Slab Rupture

Pavement concrete slab fracture, mainly in the longitudinal continuous pouring, cracks generally parallel to the transverse contraction, corrugated, such as Figure 4. In particular, the new concrete pavement of the old concrete pavement is directly cast in the concrete pavement, and the situation of the broken slab is more common. The main reason is: continuous casting, cutting time, fracture shrinkage concrete in hardening process; the concrete pouring construction interruption time is longer, then shop note, the uneven shrinkage fracture at the binding site; the same section of pouring slurry dilute differences, resulting in uneven shrinkage fracture at the interface; the old pavement "cover" the reflection crack during the construction, the new pouring concrete before cutting, or concrete cutting (basting construction) and old pavement joint dislocation, resulting in fracture of the joints is reflected; the pre cast concrete has basting fracture site, because the displacement of concrete shrinkage, just casting concrete tensile stress, the fracture of new concrete slab in this area. [4]

2.5 Honeycomb

The honeycomb refers to poor quality of concrete in local pouring, less mortar and more stone. There is a gap between the stones to form a honeycomb hole, as in Figure 5. The honeycomb is mostly on the side of the template. The main reasons are: (1) the ratio of water to cement is small, and the easy

sex is poor, and the pulp cannot be pulping; (2) the segregation of mixture in paving, so that the coarse aggregate is concentrated; (3) The quality of concrete construction is poor, and the vibration is not sufficient; (4) the imprecision of the template leads to the leakage of mortar. [1-5]

2.6 Pitting Surface

Pitting surface refers to the concrete surface pits or lack of pulp, there are many small holes, as shown in figure 6. The reasons are as follows: the concrete setting before rain or water erosion; the mixture is too dry, vibrating out of plaster slurry, the sand gradation is not difficult; good, small gravel grain side, more galling when the emergence of trachoma; concrete is covered and cured too early, and the surface slurry is covered with the cover.



Fig.5 honeycomb



Fig.6 pitting surface

3. Preventive Measures for Common Quality Diseases

3.1 Side or Corner Peeling

- (1) Master model and cutting time, too early, to reach the required strength of concrete formwork, cutting seam, prevent the insufficient strength of concrete, was knocked off corner.
- (2) Cut all the slit along the length direction. No template cannot be operated, should be timely fill cut after stripping.
- (3) Grain bin filling festival should be better late than early, on both sides of the pre cast concrete is strong enough to re-filling, avoid corner was knocked off the construction machinery. [6]
- (4) The construction joints should be set at the expansion joints as far as possible. If the expansion joints are needed for continuous casting, expansion joints shall be placed in a special mounting frame and vibrated at both sides of the joints. The loose mixture must be tamped when correcting the expansion joints.

3.2 Reticulate Crack

- (1) Concreting avoiding the midday wind and high temperature, if the wind suddenly encountered bad weather, unable to complete the pouring of concrete, it should be set with a wind barrier curing shed, the concrete surface treatment as soon as possible.
- (2) After the concrete is cast, the hand should be covered in time without obvious imprinting.
- (3) To keep the concrete surface moist during health maintenance, especially for the first three days, the surface of concrete should not be covered with health care and dry white. [7]
- (4) Strictly abide by the construction operation regulations, do not allow the other mortar cover surface, the surface of the surface of the surface of the pit, must be filled with the same mixture.

3.3 Strip Type or Annular Crack

- (1) When the water cement ratio is strictly controlled and the water content of the material is changed, it should be adjusted in time.
- (2) Mixing evenly, avoid uneven concrete bleeding, transportation, paving mixture segregation, shall fill in the surface pits for fine aggregate. [8]

(3) the first time wood wipe after finishing, to be sufficient to carry out concrete weep age finishing operation, avoid picking end is still bleeding, if local bleeding, to be slightly dry after use wipe the steel pressure several times.

3.4 Slab Rupture

(1) Cut the seam in time. Morning pouring concrete construction, when the air temperature is high, should be in the evening after cutting the basting. If it is not enough to slit all, a slit should be cut every 10~15 m to reduce the shrinkage distance of the concrete.

(2) In the hot season, when the temperature difference between day and night is large, it can be built at night, especially the construction of "cover" on the old road surface. This measure can effectively avoid the occurrence of reflective cracks when combined with the old pavement watering and cooling. Because of the low temperature at night, until the second hour before the afternoon of 20 hours, the temperature is on the rise stage, and the hydration heat inside the concrete is also large. The pavement slab will not produce shrinkage fracture.

(3) The concrete linoleum basting, isolation has been broken through the site, or brushing asphalt, or on site construction joints. [9]

(4) The old pavement directly "cover" construction, the old road surface should be strictly according to the design requirements on.

(5) When concrete pouring has been interrupted for a long time due to unexpected reasons, the construction joint should be set at the seam position, and it is not allowed to continue to be poured in other positions of the board.

(6) To strictly control the water cement ratio, to ensure that the mixture is evenly mixed, and to avoid the segregation of the mixture in the process of transportation and paving.

3.5 Honeycomb

(1) The mixture should be evenly mixed, the ratio of water to cement is small, and the difference of easy sex is not satisfied with the standard requirements. Or the mixture that has been separated should be forbidden to be used for pavement.

(2) When spreading, the spade should be buckled at the corner to avoid the segregation of the mixture. The material should be evenly distributed.

(3) Vibrate enough to ensure that the mixture is dense and cannot be leaked.

(4) Tight stitching and tight blocking at the bottom of the template to avoid leakage of mortar.

3.6 Pitting Surface

(1) Before the concrete construction, a certain amount of health shelter should be processed to prevent the pouring of concrete from pouring.

(2) Do well the concrete operation plan arrangement, prevent the rigid paving concrete and the first pouring concrete maintenance, cut the gap to cross the work, and construct the water to scour the concrete surface that just poured. [10]

(3) Strictly control the quality of sand. When the grain size is high, the grain size should be sifted. The mixture should be evenly mixed and easy to be easy. The pulp should be fully pulping during the operation of the ramming and roller, so as to ensure 3~5 mm thick mortar on the surface of the pavement.

(4) Plastering with wood wipe knead, pressure raised pebbles and float gravel, increase the surface mortar consistency, avoid wiping the steel grain gravel pits caused by blows.

4. Construction Proposal

In recent years, in the construction process of airport cement concrete pavement in northwest, North China and other areas, the construction unit has taken effective preventive measures against all kinds of reasons for the above common quality problems. First of all, raw materials such as cement, sand

and stone are selected strictly, and concrete mix proportion is carefully designed [11]. According to factors such as construction weather and moisture content change, timely adjustment is made to determine the construction mix proportion. Secondly, in the process of concrete mixing and transportation, we must control the mixing time well, choose the good transportation route, ensure the mixing of the concrete mixture is uniform, the water cement ratio is consistent, and avoid the mixture segregation. The construction of high temperature, windy and rainy days is avoided when the concrete is laid, and the working time of each process is well grasped.

5. Conclusion

The above measures are adopted in the construction of airport cement concrete pavement, effectively preventing the occurrence of quality defects, improving the quality of pavement construction, and achieving the excellent standard for completion and acceptance. In recent years, quality tracking shows that there are no surface spelling, edge falling, corner breaking and cracking and broken plates in the newly built and expanded airport cement concrete pavement. The control technology can be used as reference for the construction of cement concrete pavement.

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