Project Report

Reconstruction Works with Rapid-Hardening Concrete Concretum® Q-FLASH 2/20



Charlotte Douglas International Airport CLT



Stands

Taxilane

Apron



Project Overview

Concretum[®] Q-FLASH 2/20, the latest generation of rapidhardening concrete, was used for the replacement of 5 slabs, 31 yd³ each, on one of the busiest taxi lanes at CLT. The 5 slabs will prove Concretum[®] Q-FLASH 2/20's multi decadelonglifespan and its resistance against high traffic load and aging factors.

PROJECT FACTS

In this project, the taxilane underwent surface replacement of 350 yd² for enhanced durability and appearance. The prevailing air temperature during the project ranged between 77 to 86 °F, proving the concrete is also workable in tough conditions. The concrete maintained a temperature of 81 to 86 °F throughout its application, promoting effective curing. Notably, the project had an open time of approximately 60 minutes, providing a critical window for executing essential tasks efficiently.

MATERIAL DELIVERY AND PRODUCTION

The project was executed in July 2023. In total 5 containers containing 96 cement bags of 1000 kg each and 4000 kg of admixtures were shipped to Charlotte in previous months. The cement and admixtures can be handeled and stored like conventional products, ready to be used in a concrete batching plant.

For CLT's slabs replacement the concrete was initially tested and trialed in a concrete plant laboratory nearby the airport. The concrete production and the transportation time lasted around 20 minutes, the concrete remained workable for approximately 60 minutes, enough time to place and finish it.



Runway reconstruction with Concretum®



Concretum® CEM 100 cement bag delivery



Concrete trials before production



Rapid-hardening concrete trial track:

86 Concrete temp.

Workable time

Concrete per night 4 hrs flexural strength

CLT Airport finished slab

78 yd³ 515 psi 350 yd²

Total surface replaced



CLT Airport placement of concrete

CONCRETE SPECIFICATIONS

Product	Concretum [®] Q-FLASH 2/20				
Exposure class	XC4, XD3, XF4				
Strength class	C50/60				
Consistency	Slump 6 inches to 9 inches				
Max. aggregate size	1 inch, crushed				

CONCRETE PROPERTIES

Shrinkage ɛ _{SH}	≤ 0.25 ‰				
Heat of hydration (NF EN 196-9)	210 kJ/kg				
Flexural strength 4 h	515 psi				
Flexural strength 5 h	540 psi				
Flexural strength 24 h	990 psi				
Moisture content 3 h after setting	$\leq 4 \text{ CM-}\%$				

Concretum® Q-FLASH 2/20 high-early strength concrete was especially developed for time sensitive concrete constructions, while providing decades-long life span. One of its most common uses is the overnight airport concrete pavement replacement.

The concrete reaches a compressive strength of 3000 psi in less than 2 hours after concrete production and a flexural strength of 500 psi in less than four hours after production (500 psi is the FFA minimum requirement to reopen the pavement section). This allows full slab replacement in a night shift, minimizing the disruption to the air traffic.

Figure 1: Diagramm of possible effective production output of rapid-hardening concrete

Suggested Schedule	11 PM	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM
Preparation	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	2						
Runway closure by air traffic control	•							
Excavation of existing slabs Removal and cleaning								
Dowel placement								
Concrete production								
Concrete placement								
Strength development (500 psi flexural strength)					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
Joint cuts								
Cleaning								
Hand over to air traffic control							•	
Buffer/Contigency							·/////////	





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