



CAPABILITY STATEMENT

HIGH EARLY STRENGTH CONCRETE
**CONSTRUCTION
SOLUTIONS**

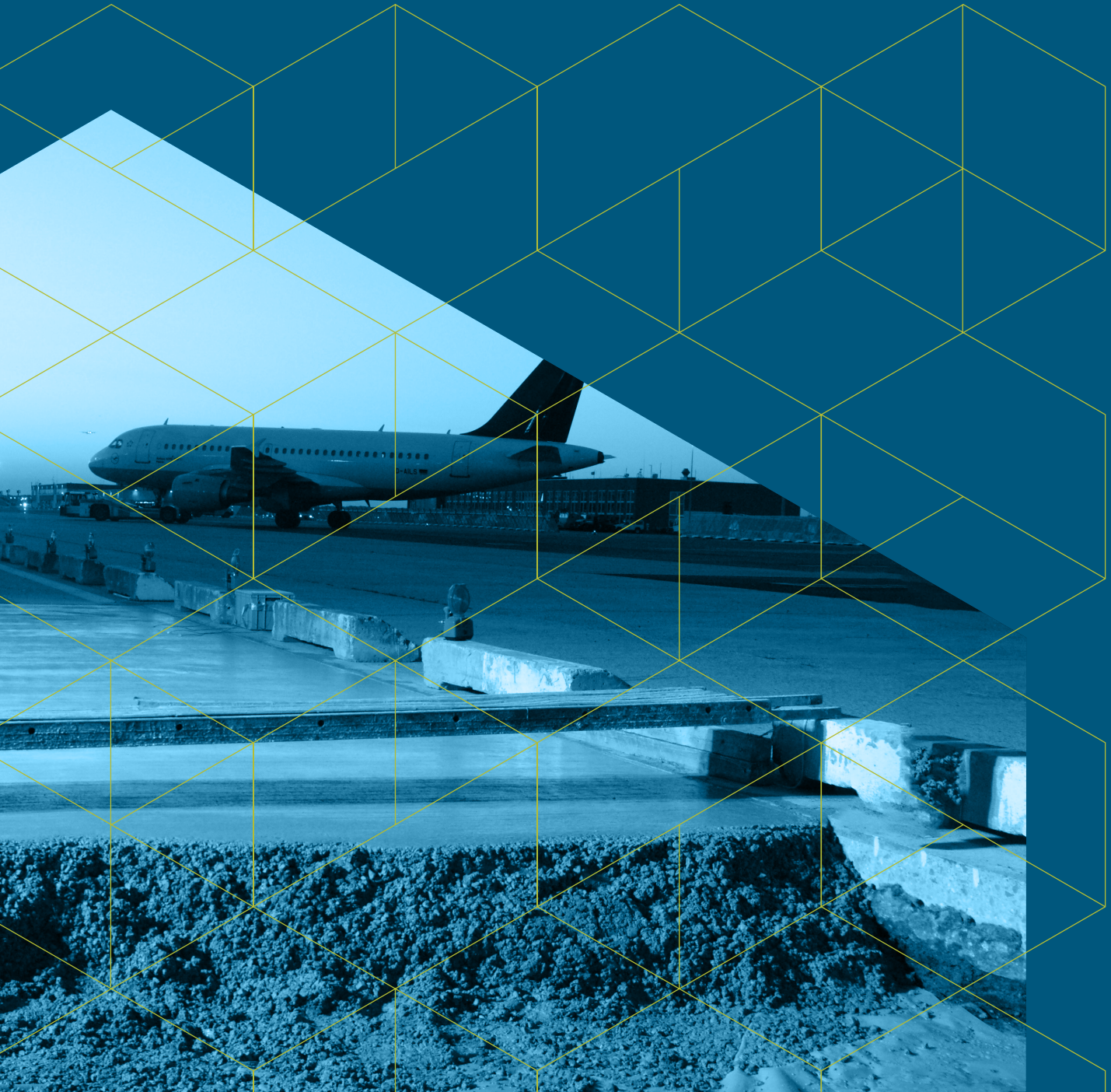


ENGINEERED **IQ**

A DIVISION OF

 **Fulton Hogan**

FASTER BETTER **STRONGER**





Engineered IQ

Bringing together Fulton Hogan's construction expertise with high early strength concrete solutions

Engineered IQ offers quality-focused, rapid construction solutions using Concretum's® patented high early strength concrete (HESC) products and our installation service.

As a division of Fulton Hogan, Engineered IQ is supported by Fulton Hogan's extensive major project experience as well as Concretum's® world-class engineering support.

Engineered IQ uses Fulton Hogan's industry-leading safety (ISO 45001:2018), quality (ISO 9001:2015) and environmental (ISO 14001:2015) management systems and processes, and draws on company-wide experts in these areas to offer best-practice outcomes, every time.



Concretum® high early strength concrete products are the leading choice across Europe

Concretum®

A global leader in concrete technology

Fulton Hogan's Engineered IQ is the exclusive distributor of Concretum® rapid-hardening products in Australia and New Zealand.

Concretum® is a global leader in developing and producing high-performance concretes and concrete admixtures.

The range of products are designed to support easy, reliable and repeatable production for high-tech concrete, combining innovative properties with new production methods to offer solutions that outperform the service life of conventional concrete.

Concretum's® rapid-hardening concrete technology, **Q-FLASH 2/20**, is increasingly becoming the international standard for reconstructing large concrete transport surfaces, such as runways and motorways.

The Engineered IQ team has worked closely with Concretum® to develop a superior HESC solution for the Australian and New Zealand markets based on Concretum's® innovations.



Istanbul Sabiha Gökçen International Airport (SAW)



VIEW MORE PROJECTS

Engineered IQ X Concretum®

What's the difference?



Faster

Compressive strength of 20MPa and a flexural strength of 3MPa in just two hours after pouring. In airport environments, multiple slabs can be mixed and placed in a single shift.



Better

Flexible mix design controls consistency with open times typically between 30-120 minutes, offering the longest open time for a rapid-hardening concrete product in Australia and New Zealand.



Stronger

Rapid-hardening concrete with rapid strength development delivering long-term quality, superior productivity and an operations-ready result.

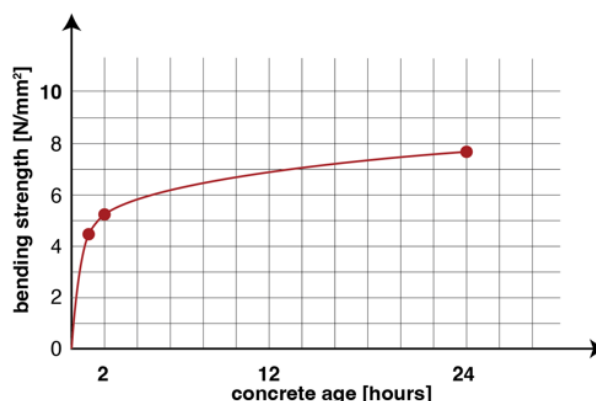
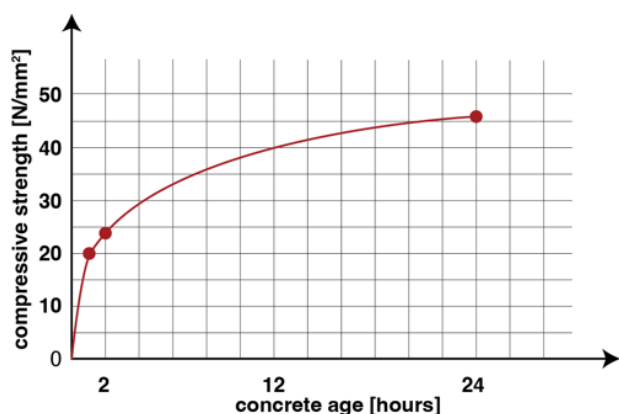


Faster

Concretum® **Q-FLASH 2/20** can be placed, compacted and finished using conventional methods and equipment. It can be mixed using truck-mounted volumetric mixers or using Engineered IQ's mobile concrete batch plant.

With multiple slabs able to be mixed and placed in a single shift, **Q-FLASH 2/20** is the ideal solution for time-critical infrastructure when a short closure and rapid return to service are vital.

Express pavement slab replacements for airports, roadways and other areas where a short closure and rapid return to service are vital.



Rapid hardening Q-FLASH 2/20 is the ideal solution when a short closure and rapid return to service are vital. Graphs indicate high early strength concrete results at Zurich Airport (ZRH).



Better

A flexible mix design optimises each project's mixing and placing method, using Concretum® engineered admixtures to control consistency and open time.

Open times are typically designed between 30-120 minutes, offering the longest open time for an HESC product in Australia and New Zealand.

This unique, client-determined parameter, creates flexibility in production and placement methods. It enables off-site mixing and transport, on-site mixing via Engineered IQ's mobile batch plant, and placement via conventional methods such as pumping or slip form paver.

Latest generation of rapid-hardening concrete.

Concretum's® **Q-FLASH 2/20** is the latest generation of rapid-hardening concrete. It allows critical slab replacement and pavement construction with the least possible interruption – even during 24/7 operations.

Flexible methods

Uses conventional placement methods such as a slipform paver for large scale installations or via manual placement using a screed.

Adaptable temperatures

Can be installed within a wide range of ambient temperatures.

Adjustable set-ups

Suits different production set-ups such as on-site or batch plant production.

Scalable solution

A scalable solution that can be used for large-scale, single slabs, or small patches.

CONCRETUM®
Q-FLASH 2/20



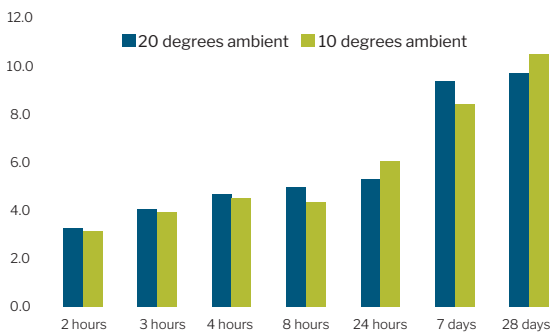
Stronger

Concretum's® **Q-FLASH 2/20** delivers rapid-hardening concrete with rapid strength development and it can be installed within a wide range of ambient temperatures.

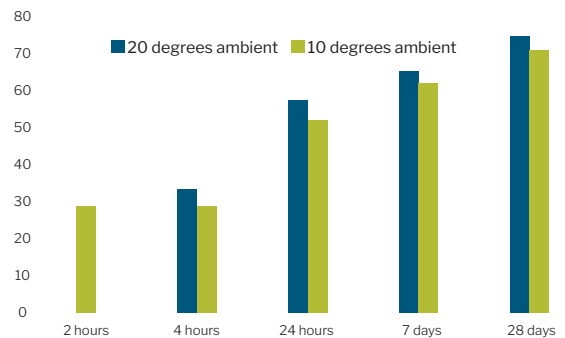
Engineered IQ's best-practice construction methods and quality control ensures all stages, from mix design to concrete placement, delivers unrivaled quality and durability outcomes for an operations-ready result.

Delivers long-term quality, superior productivity and an operations-ready result.

Flexural strength development



Compressive strength development



Efficiencies with Engineered IQ's mobile batch plant



In addition to truck-mounted volumetric trucks, Engineered IQ uses a CON-E-CO LO-PRO 327SS HP mobile batch plant. A batch plant reduces quality risk, and improves on-site production and installation efficiencies.

With an on-board silo capacity of approximately 45t of cement, our mobile batch plant can produce 110m³ of concrete per hour when using a slump stand.

The Engineered IQ mobile batch plant offers a scalable solution for major or remote projects.

Concretum[®] Q-FLASH 2/20

An ideal solution for high-risk and time sensitive environments

| Q-FLASH 2/20 product summary* | |
|--|--|
| Specification | XC4, XD3, XF4 |
| Compressive strength (20 N/mm ²) | 1-2 hours after placing |
| Open time | 30-120 minutes (adjustable) |
| Drying <4CM-% | 2 hours after placing |
| Production | Batch plant or volumetric mixing truck |
| Placement type | Manual placement, pump, slipform paver |
| Slab / element thickness | >15cm |





A global leader at international airports

With Concretum's® global experience and Engineered IQ's Australian expertise, **Q-FLASH 2/20** is becoming the international standard for reconstructing large concrete transport surfaces at major airports.

MELBOURNE
AIRPORT

Frankfurt
Airport

ISG ISTANBUL
SABIHA
GOKCEN

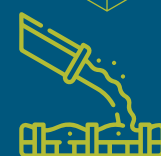
Zurich
Airport

PARIS AÉROPORT

Heathrow
Making every journey better

aena
Aeropuerto
Adolfo Suárez
Madrid-Barajas

aena
Aeroport Josep Tarradellas Barcelona-El Prat
Aeroport Josep Tarradellas Barcelona-El Prat



50,000m²
poured since 2004



Concretum® rapid-hardening
concrete is used in
20+ countries
around the world

YOUR QUESTIONS ANSWERED



Maximising local content

What percentage of local material is used within a completed slab?

Concretum® concretes and concrete admixtures are imported and locally blended. Depending on mix design, ~82% of the final mix may be produced from local materials.



Low carbon options

Is there a low carbon product offering?

We can provide concrete mix designs to blend calcium sulfoaluminate (CSA) cement up to 30% of a Cem50 mix design which can lower embodied carbon emissions (A1-A3) by ~10%, depending on the blend, when compared to traditional cement products. The clinkersation process of CSA cement is also achieved at a lower temperature when compared to portland cement (1250°C vs. 1450°C) which can further reduce the embodied carbon emission of the product.



Approved mix designs

Do you have approved mix designs?

We work closely with clients to develop a mix design suitable to each application. Drawing on international expertise through Concretum® we're able to make adaptations for location- and project-specific conditions.



Productivity

What productivity is possible?

As an example, in an airport environment it's possible to replace rigid concrete slabs between 66m³ and 100m³ per shift, using a batch plant. Using truck-mounted volumetric mixers, our recent experience was 33m³ per shift (one slab per shift). However, this will depend on the available working windows.



High temperature environments

Can Concretum® Q-FLASH 2/20 withstand heat?

Yes, it can be placed within a wide range of ambient temperatures. We completed a series of day shift pours in Melbourne during February when the ambient temperature was >30°C. There was no impact to the integrity of the mix or the installation.



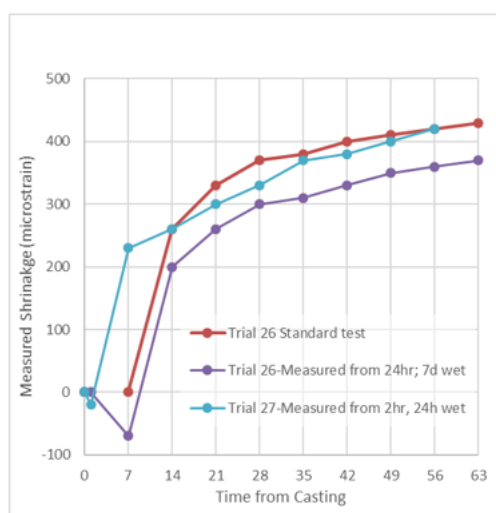
Quality

Are there any issues with shrinkage cracks?

Concrete pavements made with Concretum® Q-FLASH rapid-hardening concrete have a much longer maintenance-free service life (when compared to asphalt). Drying shrinkage testing of **Q-FLASH 2/20** undertaken recently in Australia (results shown below) demonstrates durability and resistance to shrinkage cracks.

SHRINKAGE TESTING RESULTS

| Summary of Shrinkage testing conducted | Trial 26 Standard AS1012-13 test | Trial 26 Measured from 24h; 7d wet | Trial 27 Measured from 2h, 24h wet |
|--|----------------------------------|------------------------------------|--|
| Standard Testing? | Yes | NO – measurement started early. | NO – measured earlier; less wet curing |
| Age at demoulding | 24h | 24h | 2h |
| Wet Cure? | Yes, up to 7d | Yes, up to 7d | Yes, only up to 24h |
| Age into drying room | 7d | 7d | 24h |
| Start Measure | 7d | 24h | 2h |
| Time from casting (days) | 1 | - | 0µ |
| | 7 | 0µ | -70µ |
| | 14 | 260µ (e.g. 7d drying) | 200µ |
| | 21 | 330µ | 260µ |
| | 28 | 370µ | 300µ |
| | 35 | 380µ | 310µ |
| | 42 | 400µ | 330µ |
| | 49 | 410µ | 350µ |
| | 56 | 420µ | 360µ |
| | 63 | 430µ (e.g. 56d drying) | 370µ |



Source: Concretum Repair Concrete Submission for TfNSW – VMW014-01-REP-0004_RevE_20042021

SPOTLIGHT: Melbourne Airport

| | |
|---------------------------|---|
| Project | Melbourne Airport Pavement Maintenance Program DP 2.0 – Expedient Concrete Works |
| Client | Melbourne Airport (Tullamarine) |
| Start / completion | April 2023 – February 2024 |

Overview

The project involved replacement of 144 concrete taxiway and aircraft apron slabs.

Concretum® **Q-FLASH 2/20** was mixed on-site using truck-mounted volumetric mixers to replace a slab overnight—ready for service upon handover.

Achievements

Our installation process ensured tight cycle times could be met with maximum productivity and an operations-ready result.

Faster

- 4,888m³ of concrete placed.
- Each 7.6m x 7.6m slab removed and replaced using **Q-FLASH 2/20** (one slab per shift).
- Works completed within a 6 hour closure, ready for all airport traffic at handover.

Better

- Engineered IQ undertook on-site trials to ensure the right slump was incorporated into final mix design based on the chosen production and installation methods (truck-mounted volumetric mixers and manual placement).
- Flexibility in the mix design reduces the long-term risk of cracking.

Stronger

- **Q-FLASH 2/20** outperforms the service life of conventional concrete to deliver unrivaled durability outcomes for the client.





...I think the team can be very proud of what we have achieved.

144 slabs replaced with little disruption to our Airline partners, this was only possible with tight teamwork across Contractors, Airfield Operations, and our Consultants.

Fulton Hogan's (Engineered IQ) diligent staff and solid internal systems were an outstanding contributor to our overall success.

Ben Torwick, Airfield Program Manager

Melbourne Airport Pavement Maintenance Program 2.0 – Expedient Concrete Works

International case studies

Q-FLASH 2/20

| | |
|---------------------------|-----------------------------|
| Project | Zurich Airport (ZRH) |
| Client | Flughafen Zürich AG |
| Start / completion | 2004 - ongoing |

Overview

In 2004, Zurich Airport was the first in the world to use Concretum® rapid-hardening concrete.

When compared to previous quick concrete products used at the airport, the technical superiority of Concretum® technology was clear.

Since 2004, Concretum® concrete quantities at the airport have constantly increased, owing to the material's outstanding durability and reliability. After 20 years of experience using Concretum® concrete at the airport, it has allowed for a realistic assessment of the proven performance of the durability of finished concrete slabs.

The excellent long-term durability of Concretum® rapid-hardening concrete has been demonstrated to have no limitations regarding type and size of its applications. Zurich Airport uses Concretum® rapid-hardening concrete for both operational and economical reasons. Due to limited space and constantly increasing number of aircraft movements, this is more important than ever.

The rapid-hardening concrete is produced in one of the ready-mix concrete plants, located near Zurich Airport, and most of the works are performed during the night with flight restrictions between 11pm and 6am.

Achievements

- More than 20,000 m² of concrete pavements replaced with Concretum® rapid-hardening concrete on runways, taxiways, aprons, and stands (both manually and with pavers) since 2004.
- In 2010 alone, 4,000 m² of concrete surfaces were replaced with Concretum® rapid-hardening concrete.
- Concretum® **Q-FLASH 2/20** reaches a compressive strength of 20 N/mm² in a maximum of two hours after setting.
- The consistency of **Q-FLASH 2/20** could be customised to allow for various mixing and placement methods – manually or machine laid.



| | |
|---------------------------|--|
| Project | Paris Airport Charles de Gaulle (CDG) |
| Client | Groupe ADP (Airport Operator) |
| Start / completion | 2022 |

Overview

Charles de Gaulle (CDG) accommodates 57 million passengers annually (2022). Across its vast area, each pavement segment contends with constant airplane movement.

This challenge is compounded by the presence of ongoing construction and maintenance projects that temporarily diverted taxiways. As a result, the ability to address deteriorated sections of the concrete pavement through essential maintenance and repairs is significantly limited.

Using Concretum® **Q-FLASH 2/20**, concrete bays were able to be fully or partially reconstructed, leaving adjacent areas operational. A volumetric continuous concrete batching truck ensured precise, on-time placement.

Achievements

- 5,000m² of **Q-FLASH 2/20** was placed with on-site production using mobile volumetric mixing trucks.

- Adjusted the concrete's open time to fit the bay size and placing duration to meet the contractor's needs.
- Within 30 minutes of placement, the area became load-bearing, and in just four hours post-batching, the concrete had achieved the required 3.3 N/mm² splitting tensile strength.
- Repairs proceeded incident-free, enabling prompt return to regular airplane traffic.



| | |
|---------------------------|--|
| Project | Charlotte Douglas International Airport (CLT) |
| Client | The City of Charlotte |
| Start / completion | 2023 |

Overview

Replacement of five slabs on one of the busiest taxilanes at CLT—proving Concretum® Q-FLASH 2/20’s multi decade-long lifespan and resistance against high traffic load and aging factors.

The taxilane underwent a surface replacement of 350 yd² for enhanced durability and appearance. The prevailing air temperature during the project ranged between 77-86 °F, proving that the concrete is also workable in tough conditions. The concrete maintained a temperature of 81-86 °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.

Achievements

This was the first placement of Concretum® **Q-FLASH 2/20** in the USA.

- The concrete reached a compressive strength of 3000 psi in less than two hours after concrete production.

- Flexural strength of 500 psi in less than four hours after production (500 psi is the FFA minimum requirement to reopen the pavement section).
- Full slab replacement in a night shift, minimising disruption to air traffic.





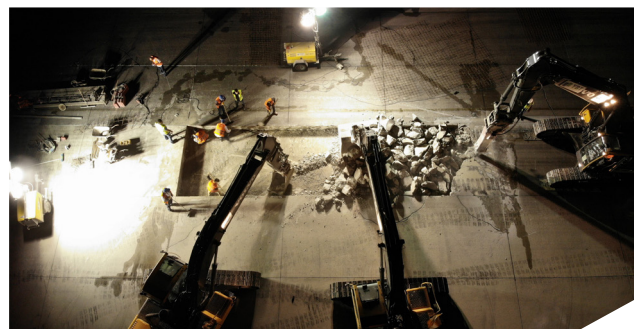
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|---------------------------|---|
| Project | Istanbul Sabiha Gökçen International Airport (SAW) |
| Client | IGA (Airport Operator) |
| Start / completion | 2018 - 2022 |

Overview

Overnight reconstruction of the runway and taxiways at Istanbul Sabiha Gökçen Airport.

Concretum® **Q-FLASH 2/20** was an efficient repair solution as it did not require prolonged closure times. It achieved the required compressive strength of 20 N/mm², enabling aircraft to land on newly poured slabs within just 1- 2 hours after placement.

Leveraging this rapid-hardening characteristic, 18,000m² of damaged runway areas were systematically replaced during five-hour overnight closures.



WATCH NOW

Achievements

- 6,000m³ of concreting material using **Q-FLASH 2/20**.
- 18,000m² successfully reconstructed without disrupting airport operations.
- Nightly average of seven slabs, each measuring 3.75m x 5m, systematically replaced, effectively covering 130m².



OUR APPROACH

Collaborative, innovative, flexible.
We're asked back again and again...

At Engineered IQ, we have a proven track record of working together with our partners to deliver optimal project outcomes.

The broad experience and diverse skill sets of our people continually benefit our customers. We work closely with our customers to address issues and are proud to say we're collaborative, flexible and committed to enduring partnerships.

Our approach allows us to go the extra mile – delivering customers better, faster and longer-lasting results.

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Visit our website for more information



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