



SIKA AT WORK

DIAMER BASHA DAM, GILGIT BALTISTAN, PAKISTAN

DIGITALIZATION IN CONCRETE PRODUCTION USING
SIKA SAND APP AND SIKA MIX DESIGN APP

BUILDING TRUST



IMPLEMENTATION OF DIGITAL MIX DESIGN APPS FOR CONCRETE PRODUCTION

TIME SAVING AND MIX DESIGN OPTIMIZATION

PROJECT DESCRIPTION

The Diemer Basha Dam is the world's biggest RCC dam in the initial stage of construction, located in the Paskistani region of Gilgit Baltistan. The dam body is built with 17 million cubic meters of Roller Compacted Concrete, together with further 2 million cubic meters of conventional concrete and shotcrete for slope stabilization, construction of the underground power houses and accessory tunnels. The dam, owned by WAPDA, will provide clean energy through an installed capacity of 4,500 MW / 12 x 375 MW turbines.

CVC (CONVENTIONAL VIBRATED CONCRETE) CONCRETE MIXES

While the start of RCC casting will come toward Q3-Q4/2022, CVC and shotcrete casts at site are running at high daily rates. For this Sika Pakistan has been supplying the Sika® ViscoCrete® range and Sigunit® alkali-free accelerator with deliveries that started in summer 2021.

The introduction of the new concrete mixes, to be cast both through pumps and buckets with low binder content and long slump life, showed segregation issues and too long setting times. The complete review of the mix design by changing the binders blend, grading curve, admixture dosage and air entrainer would have taken a long trials program and a new approval from the supervisors.

The approach of Sika Pakistan, through the use of the new Sika Sand App and Sika Mix Design App, could significantly reduce the number of trial mixes from ten to fifteen down to just three.

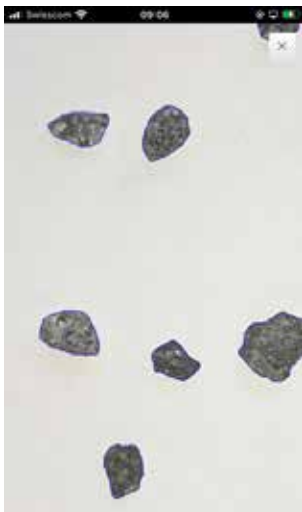
An easy tailoring of the formulation of the admixture was quickly developed after the few checks with the digital tools. The analysis on sands and gravels, performed by the mobile phone, showed that the aggregate quality and fines content were appropriate.

The data imported from the Sand App into the Mix Design App demonstrated that the total paste volume and fines weight was acceptable for both a directly cast and a pumped concrete. The total water content of the mix measured through the accelerated drying process – after deducting the aggregates absorption – matched the designed one, thus demonstrating that the aggregates' absorption values were congruent.



Since no issue was visible in the designed concrete mixture, based on above outcome, and in direct connection with the R&D department in the Lahore labs, the Sika Pakistan team adapted the formulation of the admixture directly at site. A small change in the chemical formulation could produce a perfectly cohesive concrete, without any segregation, long slump life (loss in slump 3 cm in 60 minutes. Initial setting time at room temperature of 18.3 h, final setting time at room temperature of 20.4 h. In accelerated conditions (oven temperature of 35°C) initial setting time was 11.5 h and final setting time 14.5 h. No bleeding was visible and the air content was around 6%.

Despite a forecast testing program of 8 - 10 days, all issues could be solved in less than 2 days to the full satisfaction of the contractor and of the supervisors. As the global technology and market leader in the concrete market, Sika is committed to provide the customers with the most reliable services and the best solutions which include the onsite technical and sales support and the state-of-art digital tools which helps to realize the project in a smarter way.



BATCHING CARD (1000 L), MODE: WET

Ingredient	Type	Product	Amount
Cement	Cem I 42.5 N	-	262.000 kg/m ³
Supplementary Cementitious Materials (SCM)	Fly Ash	-	88.000 kg
Water content	W/C	-	0.59 (155.000 L)
Air expected	-	-	5 % (50 L)
Plasticizer / Superplasticizer	Superplasticizer	Sika ViscoCrete HT-P-58 PK	0.42 % bwoc (1.100 kg)
Value Added Products	Durability / Quality Enhancer	Sika Aer	0.014 % bwoc (0.037 kg)
Aggregate 44.0 %	Basha sand 0-4mm	-	863.677 kg
Aggregate 14.0 %	Basha gravel 5-10mm	-	272.614 kg
Aggregate 42.0 %	Basha crushed 10-19mm	-	820.653 kg
Batching Water	-	-	157.911 L

AGGREGATES MOISTURE / ABSORPTION

Aggregate	Moisture	Absorption
Basha sand 0-4mm	1.2 %	0.9 %
Basha gravel 5-10mm	0.2 %	0.7 %
Basha crushed 10-19mm	0.1 %	0.6 %

Total balance: +2.911 L

DIAMER BASHA DAM



PROJECT PARTICIPANTS

Client: W.A.P.D.A
(Pakistan Water & Power Development Authority)
Contractors: JV Power China and F.W.O. (Frontier Works Organization)
Supplier: Sika Pakistan

Our most current General Sales Conditions shall apply. Please consult the most current local Product Data Sheet prior to any use.



SIKA SERVICES AG
Tueffenwies 16
CH-8048 Zurich
Switzerland

Contact
Phone +41 58 436 40 40
www.sika.com

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