



Short distances: the new double-curved arch structure is being built directly in front of the existing dam. The different recipes from the SBM mixing systems can be processed immediately using a crane bucket.

IMAGE SOURCE: SBM Mineral Processing GmbH

SBM LINEMIX® produces dam wall concrete under most extreme conditions

7 July 2021 by SBM Mineral Processing GmbH

A new arch dam will be built in front of the monumental Spittallamm dam on the Grimsel that needs renovation. **SBM Mineral Processing** installed two plants type LINEMIX® 3500 CM 800-6 H plus a recycling plant for residual concrete at this challenging large-scale construction site located at 1,900 m above sea level. Just like the certified concrete mixtures, these plants fulfil all the sophisticated requirements of this centennial project in Switzerland.

Around 1930 the Spitalamm dam – one of the first and biggest arch-gravity dams, a real pioneering work – was built in the Swiss region Bernese Oberland. The need for action now arose because of a crack that has been running through the wall interior for some time. Instead of demolishing or renovating the massive dam, it was decided to build a new double curvature arch dam immediately in front of the existing dam. Costs: CHF 125 million. A big advantage of this new dam is that the power plant operator KWO can continue to produce environmentally friendly hydro energy from Lake Grimsel during the 6-year construction period. The concrete required for the replacement dam wall is supplied by SBM high-performance plants. Below the old dam wall, two plants type LINEMIX 3500 CM 800-6 H have been installed to ensure output peaks of more than 900 m³ hardened concrete per day and production reliability in the short but very intensive construction seasons.

SBM plants are up to tough conditions in high mountain regions

At almost 2,000 m above sea level, logistics is an enormous challenge indeed: Transportation over mountain roads, through tunnels and via material ropeways, confined space conditions, wind speeds far exceeding 200 km/h, snow dust avalanches, heavy snow loads and extreme temperatures make working conditions very difficult. Because of the long and snowy winters, building seasons last only from May to October, when more than 70 experts of the Joint Venture Grimsel are working there day after day.

In 2019, the large high-alpine construction site was developed and SBM Mineral Processing was placed with the order. In summer 2020, construction work began, and immediately flexibility was asked for. But thanks to the excellent construction site management, almost daily interruptions due to blasting operations as well as the restrictions caused by COVID-19 could be mastered very well. Thus, SBM could complete the installation of the big LINEMIX plants in close co-operation with the well-experienced Swiss service partner Amatech in 3 months only. After complex test series the plants and the special concrete mixtures were certified in September, so that the concrete production for the construction of the new dam wall can start in June 2021. Equipped with insulation cladding the LINEMIX plants can then reliably produce concrete, and they need not be tempered in the long winter break when they sometimes stand in metres of snow. Technical support will be supplied by Amatech GmbH with its spare parts store and decades of branch experience.



The two highly compact LINEMIX 3500 CM 800-6 H units only take up around 650 m² of floor space. Together, both systems guarantee daily peaks of around 900 m³ of hardened concrete.

Image source: SBM Mineral Processing GmbH

Up-to-date technology ensures optimum concrete mixtures

While the existing arch-gravity dam with a concrete thickness of up to 70 m at the base withstands the water pressure also due to its own mass, the new dam wall is designed as a slim, double curvature arch dam. This poses very special demands on the concrete mix and requires an extremely high dosing accuracy which is assured by the latest technology of the SBM plants. The height of 113 m and the crest length of 212 m result in a concrete volume of 210,000 m³ – all mixed in the container-mobile high-performance plants made by SBM Mineral Processing. The plant LINEMIX 3500 CM 800-6 H convinced the Joint Venture ARGE Grimsel thanks to its excellent concrete quality, simple and easy maintenance, optimum spaciousness, and profitability. “The SBM plants meet the very specific demands of dam concrete according to EN 206: face

concrete, contact concrete, and mass concrete for the core zone,” explains construction manager Olivier Balmer. For the latter concrete type grain sizes up to 125 mm can be used, which is twice as big as usual. Therefore, nearby material – 700,000 tons Grimsel granite originating from a power plant construction in the 1970s – can be processed to produce the concrete required for the replacement dam.

Both mixing plants are equipped with twin shaft batch mixers for dams, aggregate feed by conveyors, aggregate storage for 6 different types, and 3 cement silos. Concrete is mainly discharged to 7-m³ crane buckets.

No comparable dam wall has been built in Switzerland in the last 40 years. The challenge was all the greater to develop concrete mixtures that optimally fulfil the extreme demands of the different parts of the wall. After all, the new dam must withstand the hydrostatic pressure for at least 100 years. Good processability, resistance to weather conditions and temperature fluctuations, and the reuse the existing material were also essential issues in the test phase lasting several months. The various concrete mixtures were poured in cubes and tested both on the site and in external laboratories concerning compressive strength and heat development, as quality and safety have the highest priority.



The transport-optimized dimensions of the LINEMIX container modules also enabled fast and uncomplicated delivery of the individual components in high alpine terrain.

Image source: SBM Mineral Processing GmbH

Sophisticated economic and ecologic project

As an environmentally and economically very useful supplement SBM Mineral Processing provided a recycling plant for residual concrete to the Swiss “multi-tasking construction site”. “The washing water used to clean mixer trucks, crane buckets and mixers is processed, and residues are re-fed to concrete production creating a closed material cycle”, explains Helmuth Neubacher who is responsible for the sale of concrete mixing plants in Switzerland at SBM.

In 2025, almost a century after the construction of the old dam was started, the new dam shall be finished. It will have the same height, and construction time will again be 6 years, but this time only a small number of

people will be required. Whereas back then 600 workers were employed at the large-scale construction site, now fewer than 100 will be needed – thanks to modern technology and powerful plants like those made by SBM, but also because there is no special time pressure as the operation of the power plant continues as before. Due to their modular design the LINEMIX plants can be easily and without loss of substance dismantled and then moved on to their new place of action. As soon as the new dam can come on stream, lower discharge tunnel and operational discharge tunnel of the existing dam will be opened in the winter season, and above of the drawdown level additional flooding holes will be bored to evenly distribute the stress on the new dam wall. This decision was made for reasons of the preservation of historic monuments and to save the immense effort and costs otherwise required for the demolition and disposal of the concrete.

Source: SBM Mineral Processing GmbH