substantial refurbishment and expansion of Kubratovo WWTP

GRUNDFOS THE EQUIPMENT PROVIDER FOR SUBSTANTIAL REFURBISHMENT AND EXPANSION OF KUBRATOVO WWTP, SOFIA, BULGARIA

TOPIC:
Wastewater Treatment Plant

LOCATION:
Sofia, Bulgaria

COMPANY:
Kubratovo wastewater treatment plant, Sofia

Grundfos was a primary supplier for the large-scale project for the refurbishment and expansion of the largest wastewater treatment plant in the Balkans.

The Sofia wastewater treatment plant (WWTP) at Kubratovo treats the domestic wastewater, process water and rain water from Sofia, the capital of Bulgaria. Pumping 480,000 cubic meters of wastewater from a population equivalent of 1,313,000, the Kubratovo WWTP meets the wastewater requirements of 90% of the city's population.

Spreading across 600 acres, The Kubratovo WWTP was brought in operation in 1984, following initiation of its design in 1973. Two thorough refurbishments followed in 1990 and 2001, and on 30 March 2009 a massive refurbishment and expansion project for the plant commenced. Grundfos contributed products, technology, and project and logistics know-how, and the project was brought in on time and as planned 20 months later, at the end of 2010.

The entry of Bulgaria into the EU made expansion of Kubratovo WWTP necessary. As a member state of the EU, Bulgaria is obliged to comply to the European Directives requiring member states to ensure that wastewater from big cities meets minimum requirements, for example with purity.

The main goal of the project was to accommodate the additional outlet of wastewater from 342,500 citizens to Kubratovo WWTP, which up to that point had been directly discharged into receiving water sources. This was necessary to meet the EU's urban wastewater directive and national regulations for emission norms

for the allowable content of harmful and hazardous substances in wastewater discharged in water bodies in so-called “sensitive areas”.

RECONSTRUCTION AND MODERNISATION AT TWO SITES

The two aspects of the project involved the reconstruction and modernization of the Sofia WWTP at Kubratovo and the construction of a Sewerage Pumping Station (SPS) and a pressure collector in Novi Iskar district. The project was carried out by the consortium Kubratovo, which included the companies Building Development Holding and ISA 2000, as well as the design firm Aquapartner. Provider of technology and equipment for ISA 2000 for the project was Grundfos Bulgaria. During the execution of the project it was important that the reconstruction and expansion of the treatment plant was carried out without halting the purification of wastewater entering the plant. This required the consortium to work with extreme flexibility and to surmount great difficulties, as purification standards had to be maintained at all times, meaning for example that the receiving water source – the Iskar River – was not to be polluted. For the modernisation of the Kubratovo WWTP, the refurbishment and reconstruction of four primary sedimentation tanks, six biotanks, six secondary sedimentation tanks, and mud and floating substances pits was carried out. Additionally, two new secondary sedimentation tanks, a pumping station for recirculation of active sludge, a mud water tank, a reagent plant and a power substation were built. Furthermore, additional underground infrastructure – over four kilometres in length – was created. It includes pipelines for process water with diameters from DN 300 to DN 1800. The second group of activities covered the construction of the Novi Iskar SPS and the refurbishment of the sewer collectors in the region. After the completion of the planned construction work the capacity of the plant was increased to a maximal rain water flow of 850 litres per second. Additionally, five kilometres of sewer collectors in the town of Novi Iskar were refurbished and a rising main was built using fibreglass pipes DN 600 with a total length of 5.6 kilometres.

GRUNDFOS RESOLVES MAJOR LOGISTICS ISSUES

Grundfos was chosen as equipment provider not only because Grundfos is the largest pump manufacturer in the world, but also due to the desire of the constructor to work with a company they can trust and which offers more than just products. In addition, the equipment provider had to be able to offer technical support and know-how to the designers and builders.
A project of this scale has not previously been realised in Bulgaria. Therefore the contractor needed a partner that can offer the necessary technological and logistical support, with knowledge about the processes. Grundfos was the only choice. Engaged in the project were Grundfos specialists not only from the Bulgarian office of the company

but also experts from abroad. Grundfos also has a global competency centre in Denmark from which substantial expertise and know-how could be drawn.
Resolving logistics issues was also part of the brief. Regular and on time delivery during the project execution was not a small challenge either.
The whole project was difficult in terms of logistics due to the fact that almost none of the Grundfos equipment in the project came via the standard logistics channels. The reason is that the size of the equipment was much larger than all of the standard deliveries, as explained by the company. Grundfos however took care of this. Despite the difficulties in terms of logistics the project was carried out according to schedule, without delays resulting from delivery problems.

THE OUTCOME

The required working parameters of the installation in Kubratovo were reached three months after its commissioning. The time was needed to adjust the system and its operation.
As part of the Kubratovo WWTP project, the six biotanks of the treatment plant, the primary sedimentation tanks and six of the eight secondary sedimentation tanks were renovated and two new secondary sedimentation tanks were constructed. The primary reconstruction activities for the treatment plant along the water flow consisted of reconstruction and refurbishment of the primary sedimentation tanks, including the replacement of mud cleaner bridges, reconstruction of the inner concrete surface of the sedimentation tanks, as well as a new booster system, because the sedimentation tanks are built on a modular construction principle with panels. In addition, the power substation and the installation for reagent dosage are new. The reagent plant with metering pumps for ferric chloride dosage was built for the removal of phosphorous using ferric chloride. The installation consists of a building in which three tanks for ferric chloride are placed each with a capacity of 70 cubic meters. The dosage of the ferric chloride is done using three operating and one standby Grundfos dosing pumps. All in all, five dosing pumps for ferric chloride were delivered for the reagent plant, each with a capacity of 375 l/h.
The treatment plant was equipped with control and measurement instruments, and a SCADA system for control of processes was installed. This ensures an automatic operation of the station, with the technological processes controlled and managed by the automated system.
The renovation project for the Novi Iskar SPS included reconstruction of the collectors, which consisted of their washing, cleaning and repair, cleaning of the pumping station and completion of the building, cultivation of the terrain and restoration of the pipeline to Kubratovo.
The pumping station was renovated and it now has entirely new equipment while keeping the original construction. The pumping station now has five big pumps; three for domestic wastewater (two operating and one standby) and two for surface water (one operating

and one standby) were mounted. It has two mixers in the draw tanks, which periodically stir the water to prevent the formation of crust and sludge. A small drainage pump was also mounted, which is used to pump water from leaks and so on out of the dry chamber where the pumps are installed, preventing flooding. All equipment for the Novi Iskar SPS, which includes pumps for domestic wastewater and surface water, was provided by Grundfos Bulgaria.

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