

## CASE STUDY

# Extensive Irrigation Project San Salvador in Spain

The reservoir of San Salvador, presently under construction in the province of Huesca, northeast Spain, will serve the demands of 22,400 hectares and improve the irrigation system of the Canal of Aragón and Catalonia from the present annual volume of 5.3 km<sup>3</sup> up to 6.8 km<sup>3</sup>. The reservoir that has a total capacity of 136 million cubic meters will be filled up by mid-2016 and subsequently start ordinary operation.

The total investment is calculated to be 105 MEUR and the project is financed by the National Department for Agriculture, Food and Environment. The end customer is the Canal de Aragón y Cataluña Irrigators Community.



The San Salvador reservoir will leverage the use of a large irrigated agricultural land in northeast Spain, particularly during the summer season.

**“ We were able to offer the end-customer a package with a completely new and more efficient solution than our competitors, as well as our know-how and continuous support as the project proceeds. ”**

Daniel Sánchez Tadeo, project leader, Sulzer Pumps Wastewater Spain, S.A.

### The Sulzer difference

Sulzer developed a reliable pumping solution by designing a sophisticated control panel based in PC 441 controller device that, together with a distinctive pumping station design, is able to cope with a high variation of flows and heads and satisfy the highly challenging pumping and energy efficiency requirements.

### The challenge

The target is to increase the irrigation capacity in the area consistently, particularly during the dry season, with the lowest possible investment and operation costs. This entails highly challenging pumping and energy efficiency requirements.

End-user requirements:

- Minimum flow: 1.8 m<sup>3</sup>/s (down to 1.5 m<sup>3</sup>/s desirable)
- Maximum flow: 5.5 m<sup>3</sup>/s
- Minimum head: 3.36 m
- Maximum head: 20 m

The water level in the distribution canal has to be kept high enough for a proper irrigation system operation. If the inflow level to the reservoir is low, the outflow by gravity to the irrigation distribution canal will be insufficient. In this project, the task of the propeller pumps is to deliver water to feed the canal at defined water levels.

### The solution

A round-shaped two-storey pumping station will enable the pumps to operate on two different levels reducing the required pumping power and thus allowing the selection of smaller pump sizes.



AFLX about to be lowered into riser pipe.



Pumping station.

The complex programming ensures that more than four pumps will never be running together and that they operate at their optimum hydraulic efficiency. We successfully selected four large VUPX and four AFLX axial flow pumps with a total motor power of > 2.5 MW for this project. The heavy-duty pumps are automatically coupled into a DN1200 (extended to DN1300) rising mains.

The premium-efficiency IE3 submersible motors type PE7 are designed in accordance with IEC 60034-30 for low lifecycle costs by energy saving, significant carbon footprint reduction and increased lifetime by low winding temperature rise. Designed for Variable Frequency Drive (VFD) operation.

The control system is the key to meet the highly challenging pumping demands. To ensure a continuous water level in the distribution canal, the axial flow pumps will be started and operated by Variable Frequency Drives (VFD) governed by a PC441/PID controller.

The new CA 622 module - RS 485 communication module for ABS PC 441 concept - will be used to read the electrical parameters of the PM710MG power meter fitted in each pump, thus providing a really high performance level in terms of monitoring and registering these parameters in all types of electrical networks, even polluted ones.

### Customer benefit

The optimization of the pumps and the complex programming will reduce the energy costs by around 15% compared to our competitor's proposal.

The control unit has been designed for an optimum pump protection, controlling and monitoring eight pumps with only four VFDs. The automatic control system based on PC441 is programmed to operate the pumps close to the best efficiency point and with the lowest possible energy consumption.

The inverted syphon method used will keep the discharge pipe submerged in the water canal and maintain a constant flow that will result in energy savings.

### Product data

The delivery comprises a total of eight Sulzer submersible mixed-flow column type ABS AFLX pumps and submersible propeller type ABS VUPX pumps.

Pump type	Duty point
2 x AFLX 1207 PE 2500/10	875 l/s – 18 m
2 x AFLX 1202 M 4000/4-83 G	1855 l/s – 18 m
2 x VUPX 1001 PE 1600/10	2,725 l/s – 4 m
2 x VUPX 1002 PE 3000/10	2,861 l/s – 7 m

### Contact

daniel.sanchez@sulzer.com  
daniel.roman@sulzer.com  
oliver.guglielminetti@sulzer.com

### Applicable markets

Clean water, land irrigation

### Applicable products

Submersible mixed-flow column type ABS AFL/AFLX pumps  
Submersible propeller type ABS VUPX pumps  
Pump controller type ABS PC 441