



Aluminum Factory's Water Supply System

San Mang Strait Mining Company constructed a control system for a long-distance water supply application and reduced significant manpower by using ADAM-4000 and 5000 data acquisition systems in a RS-485 network.

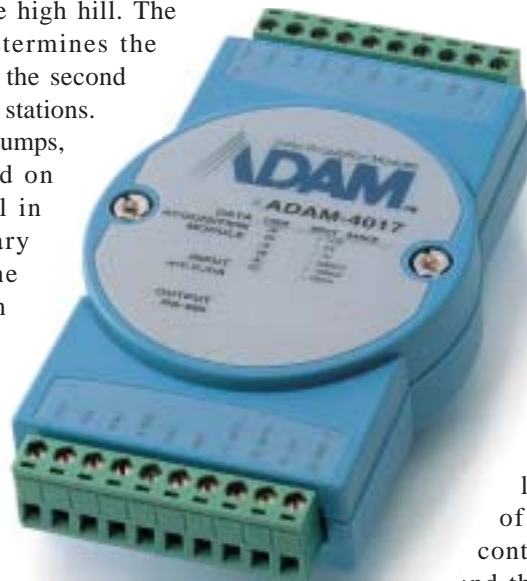
*Yan-Pei
Application Engineer
Advantech, Beijing
People Republic of China*

INTRODUCTION

Due to the huge electrical power requirement for electrolyzing aluminum ore, China's San Mang Strait Aluminum Refinery is built their own power generator. However, the cooling water for the generator is supplied by eleven deep water wells along the Yellow River, 10 km away. Because of the long distance involved, a secondary pump station and a water reservoir installed 1.5km from the river. A pump station was located 2 km further on from the secondary pump station. A second large water reservoir was installed on a high hill between the river and the refinery also for the use in power generation, all of the pumps and deposits above are affected by seasonal problems. The primary pumps are submerged under water for the two months that Yellow River runs at flood stage.

SYSTEM REQUIREMENTS

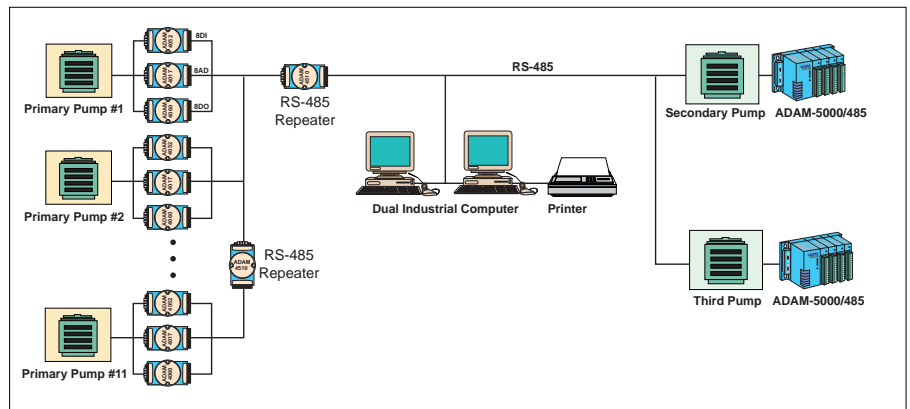
The key to controlling the power generation's water supply is controlling the water level in the reservoir on the high hill. The water level determines the on/off status of the second and third pump stations. The river-side pumps, in turn, depend on the water level in the secondary reservoir. The control system for this group of water valves and pump stations is controlled from the plant control center. It monitors water, water pressure and flow speed in the water supply, plus voltage and current in the power supply for the water system. Traditional PLCs have difficulty meeting the demands of the control system in the harsh environment.



SYSTEM DESCRIPTION

The local system integrator reviewed both domestic and foreign suppliers. Advantech ADAM-4000 remote data acquisition modules and ADAM-5000 distributed data acquisition system were chosen. Please refer to the system architecture diagram.

The central control unit is located at the center of the network and controls the secondary and third pump stations. Two Advantech IPC-610/P166 industrial controllers were installed for redundancy. The HMI interface is designed using Advantech AnphaDAQ software and provides historical trending and report generation.





The second and third pump stations were built using one ADAM-5000/485. Each ADAM-5000/485 supervises the whole pump station using the following modules:

- One ADAM-5051 - 16-channel DI for

monitoring water level signals, third pump working status

- One ADAM-5060 - 6-channel DO for monitoring third pumps' on/off status
- One ADAM-5017 - 8-channel AD for monitoring current, voltage, pump's

current and voltage at the pump

- One ADAM-5017 - 8-channel AD for monitoring flow pressure

The primary pump station uses ADAM-4000 modules for local data acquisition and control functions. Two ADAM-4510 repeaters are located at No. 1 & 6 pumps to ensure data transmission reliability in the long distance network.

- ADAM-4052 - 8-channel DI for primary pump and waste-water pump's status, gate open/close status
- ADAM-4017 - 8-channel AD for pump supply and current, and voltage, water flow volume, and water level
- ADAM-4060 - 4-channel DO for primary pump & waste-water pump on/off control

The advantages of ADAM-4000 & 5000 system are:

- The RS-485 network's twisted pair wiring requirements are inexpensive and easy to build.
- Remote and modularized low-density & high-density I/O module combinations contribute to making a flexibility & cost-effective system
- System is more price competitive than PLC's.

CONCLUSION

Since completion of water supply control system, the staff has had no need to travel back and forth between the river and the second and third pump stations. Pump on/off control and reservoir's gate open/close control takes place at the plant control center. The supervisor can view the whole process on monitor screen. The entire process operates automatically and save labor costs. ■

