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MOX Group

MOX Group was originally formed to develop a number of innovative products for a select group of customers. The goal was to provide a total application’s solution that worked within the framework of existing systems and one that challenged traditional market solutions.

Since our early success, the MOX Group has grown to become a highly respected, multi-national organization. We are well recognised for our high level of capability in innovative product design, development, and manufacturing as well as our professional solution services and support. Our staff is proud to have achieved an ISO9001 Quality Accreditation.

The MOX Group has five distinct market focused areas of business: MOX Products, MOX Building Intelligence, MOX Communications, MOX IT and MOX Automation Services.

In the increasing global economy, the MOX Group is continuing to expand an established global presence. Regional operational offices have been developed in strategic locations that are to each distinct region and market. From the hub points, regional offices are opening on a regular basis to further expand our resources and presence. This has allowed a more focused supply and service offering to our customers within that local area.

Our mission and our vision continue to drive the direction of the various business units. We strive to achieve our goals and measure our success on the feedback we receive from our customers and target markets. The MOX Group remains focused on our customers’ requirements. Combined with this customer focus is our desire to create innovative designs that produce leading edge products and competitive solutions.

MOX Group has grown to become an industry leader in supplying smart technologies and innovative solutions for a broad range of applications across the globe.
MOX Products Pty Ltd.

MOX Products designs and manufactures a range of innovative industrial automation and control products. Product development has focused on the need to have a complete range of automation controllers and field I/O products. Although all products have a generic design and suit almost every industry group, MOX Group is continuously assessing customers’ needs and is developing new features to satisfy these needs.

MOX Products is considered by many clients to offer a unique approach to product development. Particular client requests, that would normally require a purpose built solution, are accepted as innovation challenges by MOX Products’ research and development teams. All developments are fully integrated into the product range, whether they be new products or functions and features of existing products. This provides consistency across the range and ensures ongoing support of the unique solution.

The company has achieved excellent market growth in many industries.

With the use and integration of relevant smart technologies, MOX Products has been able to take its range of industrial automation and control products into the industries of mining, minerals processing, petrochemical, manufacturing, energy and utilities and materials handling.

MOX Products maintains strong relationships with many international organisations, some of which are strategic client partners. The company continues to gain strength from these relationships through a sharing of knowledge, technology and market entry strategies.

MOX Products will maintain the established growth in product diversity and is market strength and global presence. Development of technologically advanced products and solutions continues to be the primary focus of the company.

MOX Products will continue to be recognised as a leading edge developer of products that are innovative, practical and smart by design.
MOX Unity Field Controller Application

The MOX Unity Field Controller is a powerful controller designed for modern SCADA applications where control and information management is intensive.

With the correct choice of communications architecture and protocol, such as DNP3 or IEC60870, the MOX Unity will work hand in hand with your SCADA Software to successfully capture, analyse and manage greater volumes of field data.

A typical MOX Unity station consists of the Controller as well as user selected on-board I/O modules. Additionally, onboard UPS (with external battery), GSM/GPRS module, Modern module and Video Capture module are available. The MOX Unity can easily be expanded to control more I/O by supporting up to 32 MOX 603 I/O modules directly.

The MOX Unity is designed with industry standards in mind and made from the best available technology.

Components are manufactured to high grade industrial specifications that allow for extreme environmental conditions and this gives the system operational capability in almost any location.

A wide variety of advanced communications options exist today for use in any new industrial system. The MOX Unity has been designed to take advantage of open systems and industry recognized protocols. Whether you require radio, GSM, GPRS, CDMA, ISDN, DDN or standard telephone modem, or whether you require an Ethernet, Serial or leading edge fieldbus solution, the MOX Unity system has an option ready to go.

Features
- Modularity with your choice of onboard I/O
- Open and Transportable IEC 61131-3 Control Software
- IPSec and Firewall security measures
- True Redundancy supported at multiple levels
- Expandable with up to two Ethernet and four RS232/RS485 ports with Integrated diagnostics
- Standard Serial and TCP/IP Communications
- Onboard Image Capture Module

- GPRS and modem options
- Supports Modbus, DNP3.0 and IEC60870-5-101/4

Water Industry Application
Applications for the MOX Unity Field Controller in the water industry include monitoring and control of equipment at pump stations, reservoirs, treatment plants, pipelines, meters, valve stations, dosing points, and water quality sites.
MOSAIC SCADA is a comprehensive, state of the art, SCADA solution providing all the features of standard SCADA systems but with the latest business integration and intelligence features required for the management of integrated water operations.

A wide range of RTUs connect to the water plant and send information via telephone, radio, satellite or fixed link to a real time database which presents up-to-the-second information. MOSAIC SCADA includes a data warehouse with proven high on line performance. It is able to manage real time data and decades of historical telemetry data.

MOSAIC SCADA allows users to manage their network by the management of alarm information. In addition, the historic database with its business reporting tools allows users to gain access to past asset performance information which can be used in asset planning. Open access interfaces allow simple yet effective automatic links to other business systems such as asset management, work management and third party access.

Based on open standard access technologies such as ODBC and JDBC, the data warehouse can provide all business users with secure access to asset and network information. This is from the real time data, through popular business reporting and data visualisation tools such as Business Objects and Open Viz.

Effective management of transmission and distribution networks, e.g. water involves ever increasing challenges like saving money and responding to changing market conditions. These must be achieved while improving the levels of accuracy in fiscal and non-fiscal information, meeting dead lines, improving data retention and increasing services, all in a cost effective manner. In an example, the controlling body of a water network must also respond to the development of competitive markets. Due to the increasing complexity of the commercial world, multiple parties are now requiring access and are also endeavouring to manage the transmission networks. While a managing body may have control over a physical network, it is not possible to have control over the external commercial market. It is this lack of commercial certainty, that makes managing the physical network more challenging.

Modern SCADA systems need to be able to provide network administration with the tools to manage a physical network in the modern competitive market. This requires the collection of more information from the network, greater ability to control the network, including increased automation, and flexible methods to integrate the SCADA system with the business systems.

The MOSAIC SCADA system provides the computing environment to meet these challenges through the integration of plant automation, telemetry, modelling, digital mapping, business integration, reporting and data mining systems. It facilitates the integration of existing and future systems to enable reduced operational and support costs and thus deliver maximum benefit from existing and future investments.

As businesses grow and organisations change, MOSAIC SCADA protects the investment made in SCADA through its flexible design and use of industry standard interfaces and protocols.
MOX Water Industry Project Reference

- Abu Dhabi Water and Electricity Authority Waste Water Reticulation Control Project
- Abu Dhabi Water and Electricity Authority City Irrigation Management Project
- Abu Dhabi Water and Electricity Authority Mafraq Plant Waste Treatment Project
- Brisbane Water Process Automation Control Project
- Central Highlands Water Pump Station Automation Control Project
- DongHua Hospital Water Process Automation Control Project
- Guangzhou Construction Engineering Company Waste Treatment Automation Control Project
- Henan International Trade Tendering Corporation Waste Treatment Project
- Honolulu Water SCADA Upgrade Project
- Hubei Tianmen No.2 Waterworks Automation Control Project
- Melbourne Water Corporation SCADA Upgrade Project
- Nanjing Jiangning Pump Station Automation Control Project
- Shanghai Fengting Waste Water Plant Waste Treatment Project
- Shanghai Pumping Station Automation Control Project
- Shanghai FuXingDao Pump Station PLC Project
- Shanghai JiaMuSi Pumping Station PLC Project
- Shanghai Songjiang Waste Treatment Automation Control Project
- Shanghai Wusong Waste Treatment Automation Control Project
- Shanghai Changqiao Waste Treatment Automation Control Project
- Shanghai Sitang Waste Treatment Monitoring & Control Project
- Shanghai South Songjiang Waste Water Station Automation Control Project
- Shanghai Changxin Island Water Supply Automation Control Project
- Shantou Chaoyang Sewage Drainage Plant Automation Control Project
- Shenzhen Water Ltd. Waste Treatment Automation
Challenge
Shanghai is China’s largest and most industrialized municipality, with a total population of about 14 million. The emphasis on growth in urban areas has strained the essential urban services, which are now inadequate for a city of such economic importance and size.

The Shanghai City Water Treatment Plant project involved three sites at Wusong, Sitang and Changqiao. The existing method of operation was highly inefficient as it mainly utilized manual control. It was identified that automation would be required to support an increase in production and to improve the overall system availability.

Solution
With financial assistance from the World Bank, the management board of Shanghai City Water chose MOX products to fully upgrade the entire water treatment plant to world-class automation standards.

Key features of the new system include:
- Automated operation according to preset programs
- Adjustable working time for devices in the same group
- Automatic shut down on detection of any system failure
- Triggered alarms based on abnormal operating status
The MOX SCADA system has successfully helped Shanghai City Water Treatment Plant provide a safe environmental solution for sustained long-term economic and industrial growth.

System Structure
There are three independent monitoring and control systems operating in Changqiao, Sitang and Wushong. Each system includes a MOX Origin field controller, MOX 603 modular I/O and SCADA operator stations. The SCADA software communicates to the MOX controller using Ethernet communications.

The process logic was developed, and is maintained, using MoxGRAF v3.4 software. MoxGRAF is a flexible development environment for designing powerful applications simply and without requiring knowledge of low-level computer languages.

Each control room has two operator stations. Each operator station consists of a Windows 2000 industrial PC running the SCADA software.

Main Functions of the Control System
- Data acquisition, display, alarm processing, trend and reporting functions.
- Comprehensive logging features, including event log, alarm log and operator log. All logged data is stored and there is also a management reporting feature.
- Daily monitoring and yearly reports are automatically generated and printed at specific times.
- Multiple levels of security are employed within the SCADA software to restrict user access.
- Operators can override automated device running times as required.
- The operation of fans is automatically controlled based on the percentage of dissolved oxygen.
- The controller shuts off any fans if their corresponding motor temperature exceeds a predefined limit. This helps to protect the motors and extend their useable life.
- Load balancing is employed for all motors and pumps in the process. Devices that have the lowest running time are given higher priority to extend device life.

Benefits
The automation upgrade of the Shanghai Water Treatment Plant has dramatically improved the production capabilities and overall system availability. The site operators can now easily monitor and control all devices from a single location to ensure efficient operations. MOX Products has met the exact needs of the client providing a reliable and flexible control solution.
Melbourne Water is owned by the Victorian Government and is responsible for managing Melbourne’s water supply catchments, removing and treating most of Melbourne’s sewage, and managing rivers and creeks and major drainage systems in and around Melbourne.

The company supplies approximately 500,000 megalitres of water annually to the retail water companies, City West Water, South East Water and Yarra Valley Water. It also supplies lesser amounts of water to Western Water, Gippsland Water and Southern Rural Water. Melbourne Water has undertaken long-term water resource planning studies with neighbouring authorities such as Western Water, Gippsland Water and Barwon Water.

MOX holds to core principles of design innovation and technological excellence. The strong foundation of high quality products has seen MOX Products widely accepted as a definitive and visionary company capable of developing and distributing customized solutions to a variety of industries. LogicaCMG as the strategic partner of MOX Products, has implemented one of the largest MOSAIC systems in Melbourne Water’s sewerage, drainage and water supply systems. The MOSAIC system will continue to be developed by MOX for Melbourne Water’s emerging needs.

MOSAIC is a powerful SCADA system that satisfies a full range of requirements for data acquisition and control. Available on the Microsoft Windows and UNIX platforms, MOSAIC combines a relational database model with industry leading history capabilities to provide a flexible, secure SCADA environment.
MOSAIC allows Melbourne Water to monitor and control equipment throughout the greater Melbourne area from three key control centers.

Features of the system
MOSAIC is a state of the art SCADA system, featuring a completely new Microsoft Windows based graphical user interface that offers many benefits, including:
- Advanced trending and historian system
- Enhanced sorting and filtering functionalities
- Fully developed user profiles
- A state of the art schematic engine
- Easy transfer of data into office automation products, such as Microsoft Excel.

MOSAIC allows Melbourne Water to monitor and control equipment throughout the greater Melbourne area from three key control centers at Brooklyn Pumping Station, the Western Treatment Plant in Werribee and the Winneke Treatment Plant in Christmas Hills. Operators at any of these control centers, or from any remote MOSAIC terminal, have access to real time plant data collected from the entire SCADA network.

Benefits
Utilizing a relational database at the heart of MOSAIC offers the following benefits:
- Rapid access to particular record sets using underlying database rules
- High level of database integrity - the DBMS ensures that configuration data entered by users is valid
- Powerful query capabilities using SQL compliant query language
- Truly scalable and distributable system

MOSAIC has also been installed at a number of sites within Australia and the Pacific Region. The system has also been selected by Energy Australia, one of the largest energy suppliers in Australia and also selected by a number of key gas companies in China. The successful implementation of MOSAIC at Melbourne Water is the result of 18 months of development. The MOSAIC system has gone into operation in one of the largest SCADA systems in the country. This provides a testament to the quality of the product.

Melbourne Water SCADA development manager, Andrew Wilson said, "MOSAIC brings us the unique benefits of a fully functional Microsoft Windows-based user interface, coupled with a high availability, geographically distributed, real time database."
**Challenge**

The Abu Dhabi Water and Electricity Authority (ADWEA) and its Group of Companies provide an essential service for all people living and working in the Emirate of Abu Dhabi, in the United Arab Emirates. It provides water and electricity services to homes, parks and gardens, schools and businesses.

Since its inception, ADWEA has remained committed to providing a safe, secure water and electricity supply to customers, improving efficiency and reducing costs, improving customer service, encouraging private sector investment in the water and electricity sector, developing employment opportunities for UAE nationals and maximizing returns from the sale of assets.

**Features of the MOX Unity Field Controller:**
- Modularity with your choice of onboard I/O
- Open and Transportable IEC 61131-3 Control Software
- True Redundancy supported at multiple levels
- Expandable with two Ethernet and four RS232/RS485 ports
- Enterprise Ready Solution
- Integrated diagnostics
- Standard Communications including DNP 3.0, Modbus and TCP/IP
- Image capture onboard
- Onboard GPRS delivers always-on network connection
MOX provides a complete system of operations and maintenance program covering preventative and corrective activities across the whole system.

Solution
Abu Dhabi Municipalities Public Gardens Department (PGD) operates a large distributed control and monitoring SCADA system. The system covers two main local control centers (LCCs) each has six servers in an online redundant topology with dual monitor work stations. Each of the LCCs communicate to the Town Drainage Control Center (TDCC) via dedicated lines. In the event of an outage in any of the LCCs the TDCC is configured to provide full control and monitoring.

The system spans an area of 77,700Km² from the border with Saudi Arabia across to the Emirate of Dubai, which also includes some offshore islands. Included in the system are many water irrigation networks taking produced water from a number of Waste Water Treatment Works (WWTW) ranging from 40,000ML flow through 340,000ML flow in a single day.

The primary use for the produced water is for the irrigation of ornamental verges beside roads and agricultural plantations producing ornamental plants. Potable water is used for the irrigation of public parks and agricultural areas that grows fruit and vegetables.

Some 280 pumping stations communicate to the system using DNP3 protocol as well as a number of flow meter site. This brings the RTU population to in excess of 340. Overall system point count is in excess of 60,000 field points.

Benefits
MOX provides a complete system of operations and maintenance program covering preventative and corrective activities within a time period of less than 4 hours of an emergency call across the whole system. In conjunction to the operations and maintenance activities, MOX carries out activities that implement new sites and a program of system upgrade and performance improvements. At all times MOX ensures that the system is kept in a fully operational and services able condition regardless of the work being performed.
Case Study

Challenge
In March 2004, ADWEA, through a number of its subsidiaries and partners, initiated contracts with MOX Middle East LLC. (MOX Middle East is a subsidiary of the MOX Group). These contracts were for works in water, irrigation and waste water divisions of ADWEA. Since that time, MOX has completed four medium sized projects and is near completion of the Telemetry and SCADA system for the Abu Dhabi Sewerage Services Company (ADSSCI). This project included a major upgrade of the communications infrastructure, plant automation, telemetry control and SCADA software.

Solution
ADSSC operates a large distributed control and monitoring SCADA system. The system covers 4 main local control centers (LCCs) each has 6 servers in an online redundant topology with dual monitor work stations. Each of the LCCs communicate to the Town Drainage Control Center (TDCC) via dedicated lines. In the event of an outage in any of the LCCs the TDCC is implemented to provide full control and monitoring. Another 12 Mini SCADA Control Centers (MSCCs) are also implemented in the remote regions of the Emirate of Abu Dhabi. The system spans an area of 77,700Km² from the border with Saudi Arabia across to the Emirate of Dubai, which includes some offshore islands as well.

The Abu Dhabi Water and Electricity Authority (ADWEA) and its group of companies provide an essential service for all people living and working in the Emirate of Abu Dhabi, in the United Arab Emirates. It provides water and electricity services to homes, parks and gardens, schools and businesses.

Since its inception, ADWEA has remained committed to providing a safe, secure water and electricity supply to customers, improving efficiency and reducing costs, improving customer service, encouraging private sector investment in the water and electricity sector, developing employment opportunities for UAE nationals and maximizing returns from the sale of assets.
Included in the system are several Waste Water Treatment Works (WWTW) ranging from 40,000ML flow through 340,000ML flow and successfully treated within operational specification in excess of 40,000ML flow in a single day. Some 480 pumping stations communicate to the system using the DNP3 protocol as well as a number of flow meter sites bringing the RTU population to in excess of 600. The overall system point counts is greater than 80,000 field points. A number of seasonal storm water sites are also present in the system to prevent flooding. These pump excess rain fall to the sea.

MOX provides a complete system operations and maintenance program covering preventative and corrective activities. Once an emergency call has been received, all activities can be completed within a 4 hour time period. In conjunction with the operations and maintenance activities, MOX also implements new sites and programs of system upgrades and performance improvements. New installations are completed with a combination of the entire large of MOX Controllers and I/O Products. At all times MOX ensure that the system is kept fully operational and serviceable regardless of the work being performed.

The SCADA system is a customized version of Citect 5.21 using DNP3 together with a number of special tasks. One notable task being the historical back filling of process information in to trend graphs for flow, levels station and pump condition monitoring, numbers of starts/stops etc. The RTU to SCADA communications is set up so that on process deviation it reports the process events using report-by-exception (RBE). Each time the communications is open between the RTU and the SCADA system all buffered events are also transferred. In the event that a remote station RTU cannot contact its primary LCC or MSCC it will report to the TDCC. Data is transferred between all sites and any lost data at any site is automatically refreshed from the other operational sites.

**Benefits**

MOX has provided products and services as part of the system implementation by offering a single overall point of responsibility to the clients. The products range from the MOX Industrial Automation range, MOX Fiber Optic Cabling and using telecommunications equipment as well as specialized Ethernet equipment. The services range from design and solution development, engineering and implementation services and ongoing maintenance and support services.
Challenges
Songjiang River is located at the upper reaches of the Huangpu River, which provides the drinking water to 10 million Shanghai residents. In 2002, the Shanghai government built the Shanghai Songjiang West Water Cleaning Plant and six pumping stations to clean the drinking water in the riverhead. The Songjiang West Water Cleaning Plant’s business mainly covers the water treatment and mud process. With the Water Treatment Technology and Mud Syneresis Technology, currently Songjiang West Water Plant cleans 50ML of water per day and plans to process 100ML per day in the future.

Solution
The Shanghai Songjiang West Water Cleaning system comprises one control center, three instrument control rooms and six pumping stations.

- Control Center
The control center includes a server, two operator stations and one other work station.
The server acquires data from three instrument rooms and six pumping stations. It also plays the roles of I/O server, alarm server, trend server and report server.

- Instrument Control Room
All three instrument control rooms are installed with operator stations. These operator stations exercise local control to the MOX Open Controller. The MOX Open Controller is an advanced product, which has an integrated Pentium process, an IEC 61131-3 software development environment and it supports multi-standard communication protocols. The controller has two bus modules. One module connects to the MOX VIO to acquire the local I/O signals via MoxBUS. The other bus connects to several Siemens S7-200 and S7-300 controllers via ProfitBus. Both of the bus modules and the CPU module are installed on a single base. In this way, the bus modules can send data to the CPU module. Also part of the instrument control room equipment is the network used to communicate with the control centre. This network is optical and configured in a redundanting. It uses highly reliable switches.

- Pumping Station
Each of the six pumping stations are in different locations. The pumping stations can be controlled locally through the use of the operation stations, which communicate to the MOX Unity Field Controllers. The MOX Unity Field Controllers provide the connection to the MOX603 I/O modules via MoxBUS. The MOX Unity Field Controller has a 32 bit real time processor, with four RS232/485 ports, two Ethernet ports, a GPRS communication module and 16 MBytes of expanded [EMS] memory. The pumping station connects to the control centre via a GPRS wireless network (main channel) and the PSTN dial up network (back up channel). China Mobile Ltd. has built the GPRS communications. The GPRS modules in the MOX Unity Connects the mobile access point name (APN) and communicates to the control system using the Modbus protocol over TCP/IP communications. The MOX Unity Field Controller can communicate with the control centre at any time wherever it is located. If the GPRS network fails, the backup PSTN dial up channel provides communications for the operator stations via an external modem and allows reading the data from the field controller.

System Configuration
- 3 sets of MOXoc
- 6 sets of MOX Unity field controllers
- MOX VIO I/O modules
- MOX603 I/O modules
- SCADA software
Leading edge Controllers by MOX Products has seen Shanghai Songjiang West Water Cleaning Plant realize its aim of an efficient and stable wastewater treatment process through data collection and process control.

Benefits
Leading edge products from MOX helped Shanghai Songjiang West Water Cleaning Plant collect data and control the system as well as realizing an efficient and stable wastewater treatment process. The control system can automatically start and stop equipment to balance the workload of various facilities. The real time water treatment process can continually acquire data, analyze and provide control to ensure the water quality can meet the required standards of drinking water.
Challenge
The Shanghai Baosteel Group is the 6th largest steel producer in the world. It is also the largest Chinese iron and steel conglomerate with a crude steel production capacity of about 20 million tons. The water treatment system for the hot roll plant is responsible for providing water to the entire plant’s production processes. The operation of recirculating filtered cooling water for the hot metal pretreatment unit can be achieved using an effective method, which stabilizes water quality. The process of removing scale is achieved through the use of strong magnetic fields. It was identified that automation of the existing water treatment system would be required for increased production and improvement of the overall system availability. A new system was proposed to allow greater potential for clean production and increase the rate of recirculating filtered water.

Solution
The management board of Baosteel Hot Roll Plant chose MOX Products to fully upgrade the entire water treatment system to world-class automation standards. The new system includes MOX Open Controllers, two redundant servers and three operator work stations. The system diagram and specifications are shown below.

System Scale
Domestic I/O station:
- AI: 217 points
- AO: 32 points
- DI: 674 points
- DO: 260 point
Remote I/O station:
- DI: 1250 points
- DO: 354 points
- Above are the real I/O points. The system also has 15% extra points.
The MOXoc control system offers Baosteel Hot Roll Plant a flexible and reliable solution. It gives improvements in the working environment as well as providing economic benefits.

System Features
The control system has been implemented with the following parts: sets of redundant Open Controllers, CPUs, power supplier, a communications network and two I/O servers. The implementation was completed without any disruption to data collection and processing. Adding the I/O servers to the system has further improved the reliability. Best practice methodologies were used to implement the network redundancy. The open connectivity of the system allows data to be networked and used by other systems. Operator work stations provide historical trends, reporting, alarm and event logging, and printing. The presence of user friendly interfaces with continuous trending and logging functionality, as well as the use of high quality graphic pages make the system easy to operate and maintain. These features dramatically improve system stability and reliability to ensure the system is operating normally.

Control Equipment
System A:
  ▪ Cooling water pressure control
  ▪ Cooling water tower’s temperature control
  ▪ Water level control
  ▪ Recirculating water’s temperature control
  ▪ Cooling water pump’s pressure control
System B:
  ▪ Cooling water tower’s water level control
  ▪ Cooling water pressure control
  ▪ Cooling water tower’s temperature control
  ▪ Water level control
  ▪ Sedimentation tank’s electrical conductivity control
System C:
  ▪ Water level control
  ▪ Filter system’s water pressure control
  ▪ Cooling water pressure control
  ▪ Cooling water tower’s temperature control
  ▪ 4Bar water’s electrical conductivity control

Benefits
The automation upgrade of the Baosteel water treatment system has dramatically improved the production capabilities and overall system availability. MOX Products has met the exact needs of the client providing a reliable a flexible control solution.
Challenge

China’s power industry has entered an era of high industrial and commercial growth. Power transmission technologies have also been improved greatly with recent rapid development and construction of power networks. One well-respected manufacturer and operator in the power generation industry is the Shijiazhuang Eastern Thermal Power Corporation. The corporation was to undergo a second thermal power plant construction project.

As part of the second thermal power plant construction project, the site’s chemical water treatment plant needed to operate the water treatment system to be shared between two generation units. The treatment process is composed of the following:

- Raw Water Tank and Pump
- High Efficiency Filter and Mixer
- Positive Ion Exchanger
- Decarbonization Water and Pump
- Negative Ion Exchanger
- Mixed Ion Exchanger
- Desalinization Water and Pump
- Neutralized Pool

This system of chemical water treatment provides water for boilers of the new plant. The operation will directly impact on daily production of the thermal power plant. According to the practical conditions (of the water treatment process, and the requirements for the control system), all water process parameters and information were to be included in this control system.
The redundant MOX DCS system has ensured changeover without any disturbance to data collection and processing in the Shijiazhuang Thermal Power Plant project.

Solution
The system solution that was adopted was the MOX Distributed Control System (DCS; MOX Open Controller + MOX VIO) and other automation hardware. It included dual hot standby controllers and SCADA I/O servers. These instruments and control devices were mounted in the control room of the chemical water treatment plant.

The control system is implemented with a pair of dual redundant, hot standby controllers. It has ensured changeover without any disruption to data collection and processing. The redundant SCADA I/O servers further improve reliability of the system. International best practice methodologies are used to implement the network redundancy. The open connectivity of the system allows data to be networked and shared by other systems.

Project Control Devices
Operator work stations provide historical trends, reporting, alarm and event logging, and printing. The presence of user friendly interfaces with continuous trending and logging functionality, as well as the use of high quality graphic pages make the system easy to operate and maintain. These features dramatically improve system stability and reliability to ensure the system is operating normally.

The control system mainly consists of chemical desalinization and acid/caustic subsystems. Apart from monitoring the instruments and devices, the system realizes remote control from the control room, and allows automatic or manual operation of the process.

Benefits
At present, thermal power plants may need to be expanded further, and with China’s national economy developing at a rapid speed, Shijiazhuang Thermal Power Plant must meet the high network capacity demands. Since commissioning, the system has been regarded as highly successful by the client and operations personnel.