



Editorial Message

Dear Reader,

Water is a limited resource! About 2.7% of the world's water is fresh, whilst 97.5% comprises saline sea water. Without sufficient water, socio-economic development becomes virtually impossible.

According to IWMI (International Water Management Institute), India's water demand is set to double by 2030 as its population is expected to grow from 1.2 billion to around 1.7 billion. This demand is expected to be driven by a burgeoning population, massive urbanisation and relentless industrialisation. A focused action is required to conserve water, minimise waste while ensuring its more equitable distribution across and within states. Addressing these multiple dimensions requires integrated management of water and infrastructure.

Recognizing this, the Government of India is driving the initiative under various schemes like 'Smart Cities 100', AMRUT (Atal Mission for Rejuvenation and Urban Transformation) project, so as to establish infrastructure that could ensure adequate water supply and robust sewerage networks.

Against this framework, the current issue of 'Canvas' highlights the contribution that our Control & Automation (C&A) business has made to the Water Industry. We play a vital role by delivering solutions right from design to commissioning for urban and rural water supply; water treatment plants; waste water treatment and network, industrial & water effluent treatment and lift irrigation projects.

A key component of our offerings includes innovation and integration through adoption of state-of-the-art technologies. We have continued to expand and build our basket of solution capabilities for businesses in the water industry. For more details about our solutions, please look up the 'What's New' section.

Today, Water Distribution Management system has become a strategic choice that ensures appropriate levels of service and reliability at minimum cost. A case study on Water Distribution Management System commissioned at Delhi Jal board demonstrates C&A's capabilities in this area.

It is predicted that by 2020, over 50 billion smart devices will be installed worldwide, and these will share timely information required for crucial decision-making. With this in mind, we have focused on the role of information-enabled systems for unlocking the hidden potential and achieving our organizational goals.

Our 'Customer Speak' section, has featured feedback from PHED, Rajasthan which provides valuable project insights.

Finally, recognizing the importance of water, we are committed to optimizing its use and better management with a view to meeting the growing water demand!

Looking forward to your constructive feedback and invaluable support to serve you better!

Happy Reading !!



J. K. Chattopadhyay



The Water GAP ...



This summer when India experienced drought, we realised that we are not yet geared up to handle such crisis situations which affect millions of people. The increasing demand for water is expected to rise in the near future due to population growth, over extraction of water, climate change or even changing lifestyle.

Although around 70% of the earth's surface comprises water, our concern is how to use water in the most effective and efficient manner. Water management is a key issue, as it is a large scale system, involving a lot of processes such as source water management, purification, distribution to users, sewerage disposal and so on.

The major problems faced by the water supply system are Non-Revenue Water (NRW), leakage or wastage of water, maintaining the quality of water, energy consumption, operation and maintenance.

A recent study revealed that large amounts of water are lost during distribution. Such leaks are costly for Utility companies as well as increase the pressure on the environment. It does not make

commercial sense to invest millions in additional reservoirs, treatment plants and pumping stations, when as much as 60% water is unaccounted for.

To overcome the challenge, utilities need information-enabled systems which can identify the losses, manage operations and help key stakeholders make better operational decisions.

The Internet of Things (IoT)..

During the last few years, the internet revolution has redefined the way information is shared amongst various systems, with more and more devices now being connected over internet. IoT is creating a "Solid Platform" through which assets, people, products and services act as an enabler to help take real-time decisions, improve asset performance, reduce risks, empower people and help to ensure product quality and operational excellence.

IoT is also playing a significant role in the utilities industry. With a global focus on water efficiency, conservation of water and water sources and reduction in energy consumption, the industry is



opting for intelligent instruments, faster and reliable communication technologies and newer applications to enhance operations.

IoT is breaking down traditional industry boundaries and more and more field devices are now connected over internet through SCADA system and with the use of intelligent controllers and field devices..

Accordingly, IoT's most widely cited applications include Advanced Metering Infrastructure, Remote Assets Management and Predictive Maintenance, which can help the water sector to reduce equipment failure and unexpected downtime.

For water utility companies, adoption of IoT will be beneficial to lower costs, optimise asset utilisation and improve services.

Advanced Metering Infrastructure (AMI)

AMI system is one of the technologies adopted by utility companies to reduce distribution losses. It enables two-way communication over a fixed network between the utility system and the metering endpoints. It provides utility companies with real-

time data about water consumption and allows customers to make informed choices about water usage based on the price at the time of use.

The use of AMI applications are expanded from meter reading to remote connect-disconnect, flow/pressure monitoring, pump monitoring and others.

The projected benefits from these investments are water demand forecasting, accurate estimation, consumption pattern and assets monitoring.

Remote Assets Management

In recent years, advances in information gathering techniques over internet of remote assets spread across geographies are helping utilities to dramatically improve operation, maintenance and optimise performance.

Asset Management includes various stages such as identification of assets, their criticality, acceptable levels of service, health/condition monitoring, maintenance record keeping and monitoring asset life.

24x7 asset monitoring helps to provide real time information about equipment conditions, allowing operators / technicians to assess internal components using metrics to determine when corrective action is needed.

With this information, operators can decide on replacements, rehabilitation, repair or surplus schedules and develop budgets.

For example, the sensors enable operators to conduct Motor Vibration Analysis, and determine whether vibration levels developed within a motor are within limits. The levels of specific vibrations alert technicians to potential future equipment failure. When equipment conditions fall outside normal conditions, operators have the information needed to identify causes. With this information, corrective action can be taken if required.

Asset management can help water utilities in maximising the value of an asset over its life cycle, prevent costly unplanned system outages, conduct timely asset maintenance which further extends equipment life and ensures reliable water supply for its consumers.

Energy Efficiency

Water industry operations are relatively energy intensive due to use of large size equipment like pumps, compressors and motors. The rising energy cost and tighter budgets are forcing utilities to adopt new ways of managing energy consumption. With the help of intelligent communicable devices, communication infrastructure and smart applications, there is a great potential for energy saving.

IoT systems can help water utilities to manage plant assets better and take intelligent and informed operational decisions.



Our solutions for Water segment

The challenges of efficient water distribution, maintaining water quality, increasing equipment efficiency, minimising leakages and maximising energy use, magnify the need for a robust infrastructure system.

The world is looking for answers.. We, at L&T Electrical & Automation's Control & Automation (C&A) business unit, offer proven solutions which effectively manage water resources by monitoring the production, distribution and consumption of fresh water as well as the collection and treatment of wastewater.

Managing multiple reservoirs, dams and ensuring effective distribution calls for a high degree of technical expertise and experience. Our association with the water industry spans over 20 years. We have been offering integrated Electrical & Automation solutions for Water Management and Distribution which meet the end to end needs of customers. The solutions we offer have become an integral part of the urban system of many cities.

Our integrated solutions are ideally suited for applications with several levels of automation encompassing: water treatment, seawater desalination, sewage treatment and city water distribution.

We also offer electrical & automation solutions for Water Transmission & Distribution, Water Pumping Stations & Water treatment Plants, Reverse Osmosis & Desalination Plants, Reservoirs, Catchment areas, MBR, ESRs and GSRs. Our solutions are based on SCADA and/or DCS/PLC platforms and include RTU & Telemetry systems, telecommunication systems, control products & turnkey instrumentation and Geographical Information System.

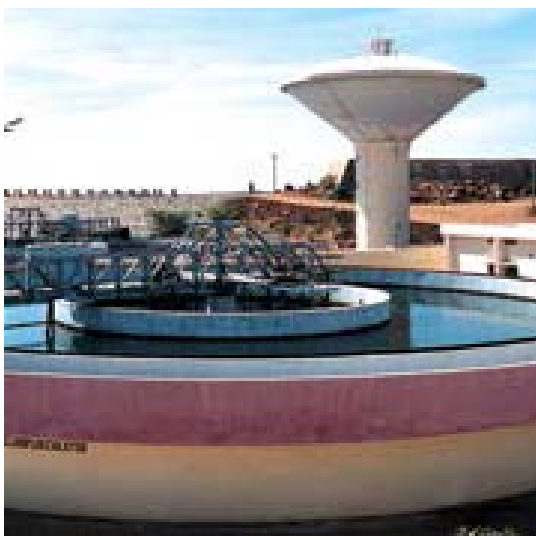
Our Solutions...

We continually strive to enhance our capabilities in the electrical & automation field in order to satisfy the needs and emerging demands of the Water Industry. Our solutions include:

- Water Information Management System
- SCADA, Control & Instrumentation
- Remote Telemetry Unit (RTU) & Telemetry Integration
- Turnkey Instrumentation
- Sub-station Automation, Remote Load Management
- Variable Frequency Drives & Soft Starters
- LV & MV Switchboards, Substation, Power Distribution
- Leak Detection System,
- Water Quality Management System
- Security & Surveillance solutions

We serve EPC Contractors / OEMs, Consultants and end customers through our committed team of engineers who architect solutions backed by robust engineering and intelligent software development, supported by domain experts.

With proven capabilities across the value chain from Proposal Project Planning, Project Engineering, Application Engineering, System Study and Integration Design, Interface Development, Integrated Testing / FAT, Commissioning / SAT to After Sales Service, we assume single-point responsibility to deliver engineered solutions at the agreed time and cost.





Pumping Stations

We provide engineered solutions that cover the entire electrical and automation systems for pumping stations. Our solution covers drives; low, medium and high-voltage switchgear; transformers; instrumentation; control systems, SCADA and Information Management Systems.

City Water Distribution

We have a wide range of offerings for urban water distribution and serve many such installations with solutions that help manage the distribution network. This includes technologies such as SCADA, instrumentation, water leakage management, telecom, asset management and bill generation.

We combine in-house technology with process know-how to deliver complete and integrated solutions that operate water pipelines reliably and efficiently to transport water for human consumption, industrial and agricultural use.

Desalination plants

We provide integrated electrical and automation systems for all types of desalination plants. These include supply and commissioning of an electrical system for the desalination plant (motors, drives, switchgear, transformers, cabling, and lighting), distributed control systems and wireless communication system, and the instrumentation for measuring, monitoring and analyzing the entire desalination process. Our solutions offer operational benefits to owners in the form of better plant availability, energy efficiency and plant productivity.

Rural water solutions

Effective use of automation plays a vital role in water distribution & irrigation projects to increase energy efficiency, water savings, and operational efficiency. It can help in maintaining the right pressure and flow right from the reservoir to sprinklers, remote monitoring & control and quality analysis. We offer turnkey electrical & automation solutions for irrigation projects. Our integrated solutions are designed to manage Pumping stations, Pipelines as well as in Distribution management





Integrated water management system for Delhi Jal Board.



About Customer

Delhi Jal Board (DJB) is the government agency which manages one of the largest water infrastructures in New Delhi, spanning a network of 11350 km which serves nearly 18 million consumers. The utility is responsible for the production and distribution of potable water as well as for collection, treatment and disposal of domestic sewage in the capital. It also manages a complex water supply system which carries water to various areas, based on requirements.

Need

Delhi is one of India's fastest growing metropolises. From among the six Indian mega-cities having a population of over 5 million people, only Delhi's population grew at an annual growth rate exceeding 4% during the last decade. Due to this, the water supply in Delhi has been under strain and it has been facing scarcity of water resources.

DJB is responsible for entire Delhi's water supply and sewage system. It owns and operates several Water Treatment Plants (WTPs) and associated pumping and booster pumping substations to serve the citizens of Delhi. One such WTP is Bhagirathi, which was designed and commissioned in the year 1983. It works on proven conventional treatment technologies. It provides quality potable water 24x7 to entire east Delhi covering a population of 40 lakhs.

DJB has decided to improve operations of Bhagirathi's WTP by minimising operation and maintenance costs, minimising water losses due to wastages and monitoring effective utilisation of water and power.

DJB conducted multiple surveys by engaging various consultants. Based on their reports, DJB concluded that by rehabilitation and automation of the plant and outsourcing its operation and maintenance, it would be possible to: reduce the cost of potable water production, save electricity charges and effectively utilise manpower. Incurring a marginal cost would result in total rehabilitation of the plant, thus giving it a new look. It would also enhance equipment life and equip the plant to run for many more years.

The task of implementing this project, the first of its kind, was awarded to Larsen & Toubro's Construction Group. The entire Bhagirathi WTP was handed over to it for rehabilitation and automation, with one year defect liability and 10 years of operation and maintenance.

The existing Bhagirathi WTP being manually operated, was not flexible and did not allow DJB to react quickly to variation in water demand. In addition, there was substantial loss of water (in excess of 10 MGD) both from sludge drainage and filter backwash. In order to reduce the loss of water, it was necessary to operate the plant in auto mode.

L&T Construction awarded the contract for turnkey electrical, control and instrumentation solution for Bhagirathi WTP and Distribution Areas to L&T Electrical & Automation's C&A business unit, which is one of India's leading electrical & automation companies.

As part of the contract, C&A was responsible for the design, engineering, development, testing and commissioning of a state-of-the-art SCADA system, control systems along with instruments for automation of Bhagirathi WTP with the Central Control Room at Bhagirathi, Muradnagar Pumping Station, Sangam Raw Water Pump House, Distribution Control Room, 21 nos underground reservoirs across Delhi and 5 control stations for operators.

To achieve the desired level of automation for remote monitoring and control, C&A installed **iVision_{max}** SCADA with Programmable Logic Controllers (PLCs) and Remote Terminal Units.

As part of this, C&A has commissioned 7 nos Hot Redundant PLC system with SCADA, 21 nos RTUs, 48 Standalone PLC panels and consoles, SCADA, setup wireless network and central command centre. All these systems connected with each other on multiple communication channels including GPRS, WiFi, leased line and Local LAN.

1. SCADA for Remote Monitoring at Distribution Central Control room at Mandawali BPS on leased line.
2. SCADA on Web Interface at office of DJB Headquarters.
3. RTU at 21 underground reservoir locations, over GPRS Network to monitor various Convert Rooms mentioned above.
4. RTU inside plant for 8 Nos Clarifiers over WiFi.

The SCADA solutions monitor and control Bhagirathi WTP, Substation, Chemical house, 2 Filter houses with 40 nos filter console desks, Sludge pump house, Dirty Backwash pump house, 10 MGDs, 6 MGD Recycling plants, Sangam Raw water Pump house and Murad pumping station.

The distributed architecture helps in remote monitoring and management of 21 nos underground reservoir units (UGR), 20 wells using the GPRS data transmission.

The systems communicate with a variety of sensors to monitor parameters such as flow and pressure from water sources into tanks, flow and pressure from tanks into the towns and tank level. It also controls pumps and valves in each station to allow or disallow the water flowing to the other.

The **iVision_{max}** SCADA allows operators to view the status of pumps and water levels. The software which can generate alarms, allows users to access their system information over the internet using web client.

The system comprises redundant server configured in main/standby set-up, with the standby server operating from the disaster recovery site.

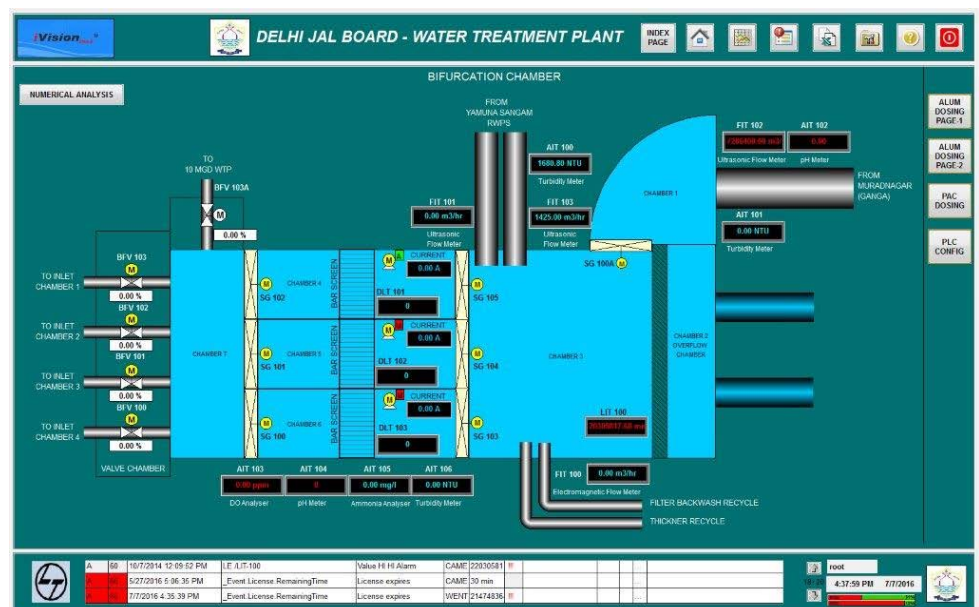
Accurate real-time alerts and online reports provided over web through user friendly dashboards, help DJB in close monitoring of operations, identification of losses, decision support and automation of operations, improving efficiency and network command.

Result

DJB is now able to monitor the entire operation and performance of equipment in real time. It provides visibility and early awareness of potential problems, which has averted critical issues in several cases.

Some of the benefits after the implementation of reliable and cost-effective L&T iVision_{max} SCADA solution at DJB are summarised below:

- Improved and/or consistent product quality
- Repeatable performance
- Greater environmental compliance and values
- Increased productivity
- Reduction in downtime and maintenance costs
- Reduction in operation costs
- Use of manpower in other value creating activities
- Availability of accurate data/information, enabling timely decision making and better process control
- Real time information minimises the reaction time to problems and prevents critical situations. It also provides precise and real time guidance to the field service team so that problems can be quickly identified.
- Greater customer satisfaction





An interview with Mr. Shubhanshu Dixit, Superintending Engineer, PHED, Nagaur, Rajasthan

Please brief us on PHED's role and responsibility for water distribution in Rajasthan state.

The primary responsibility of PHED is to provide safe drinking water to the state's entire population. Despite adverse geographical and climatic conditions, PHED is striving to achieve this objective by embracing technological advances i.e. Automation & SCADA, GIS enabled solutions, Energy efficient projects, solar energy, water treatment technologies and efficient management of scarce water resources.

How did PHED envisage the Bisalpur Jaipur Water Supply Project ? What was the main aim of this project ?

With limited ground water potential and deteriorating water quality, the department had been on the lookout for a sustainable source of drinking water supply for Jaipur City. Bisalpur, with its moderate distance from Jaipur and long term sustainability fitted the bill. The project's aim was to provide safe drinking water to the population of Jaipur, reduce ground water extraction, arrest the non revenue water and ensure long term sustainability to Jaipur City's water supply system.

Now that the project has been completed, are there any benefits to the end user with the L&T solution?

The infrastructure created under this project has proved more or less dependable and has been successful in providing secure and safe water supply to Jaipur's population. The commissioning of the Bisalpur Project has resulted in a large section of the population being freed from consuming water with high nitrate content. Through this project, it has been possible to bring large numbers of new areas under water supply network coverage. I may add here, that with C&A's solution for SCADA Package, Jaipur is probably the only Indian city that supplies water to nearly 70 distribution centers scattered across entire boundaries of cities, which are monitored, regulated, controlled and audited. The solution provided controlled water supplies to the distribution system in terms of volume, levels of reservoirs, pressure in pipelines, etc. and may even be demand driven.

Please share your experience of working with C&A? Would you like to continue this association for your forthcoming projects?

Working with C&A has been a great learning experience. What has impressed us most, is C&A's professional excellence, out-of-the-box approach, innovative thinking and conducive work environment. Moreover, its emphasis on non-core sectors of project implementation like Safety, Quality Control, Environment conservation are worth emulating. I look forward to associating with C&A for future projects.