

Infrastructure Pumping

Lifting water to lift up lives

Circa 2001! Sardar Sarovar Project changed the face of Saurashtra in Gujarat forever. This dry and arid land donned on a sparkling look to augur in green revolution. World Pumps India edit team met with R.K. Srivastava, Director, Kirloskar Brother Ltd.(KBL) who along with his dedicated team was responsible for opening up a new chapter on pumping which helped KBL to catapult into a top ranking pumping system manufacturer globally.

WPI: Where did this idea of harnessing water from Narmada river germinate from?

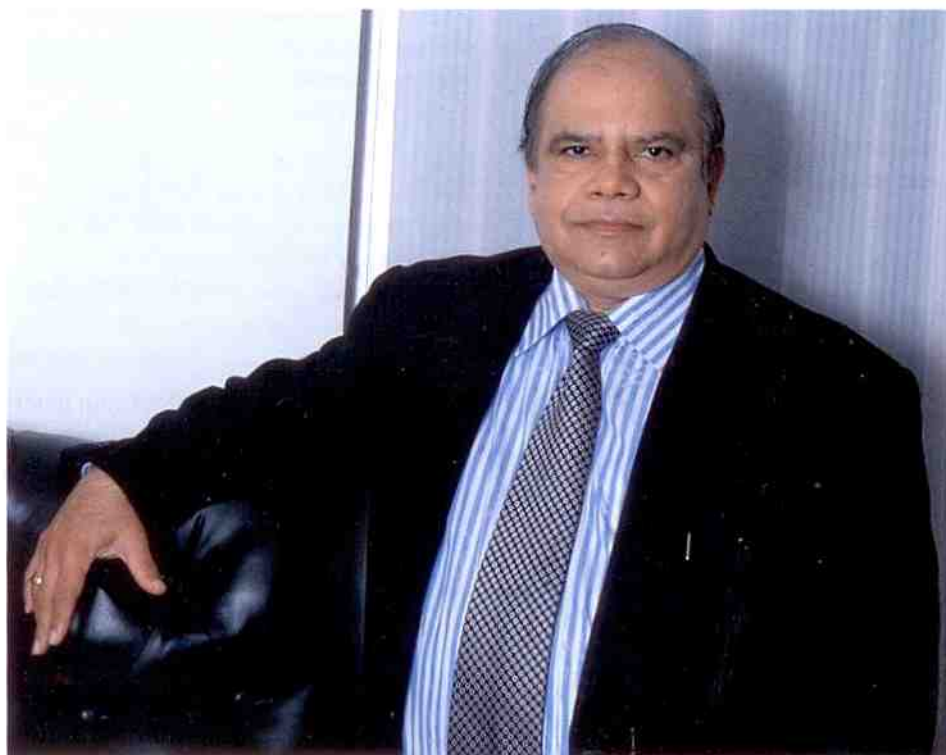
RKS: It was dream of the Iron Man of India - Late Sardar Vallabhai Patel in 1946 to network one of the largest rivers in India, the Narmada

WPI: What prompted this thought in him?

RKS: Narmada is the fifth largest river in India and the largest in Gujarat. The total basin area of the river is 97410 km² of which the drainage area up to the dam site was 88000 km². So 90 percent of the water went waste and remained unutilized. With this linkage he wanted to achieve the three main objectives of providing water for drinking to the communities living in its vicinity; to irrigate the dry and drought prone area of Saurashtra to pave way for green revolution; and last but not the least to generate hydropower for the region.

WPI: So when did the project actually start?

RKS: Although the plan for harnessing the river for irrigation and power generation in the Narmada basin was initiated in 1946, and the proposed dam at Gora in Gujarat with full reservoir level of 49.07 was selected and the foundation stone was laid on 5th April, 1961, but the actual Saurashtra Canal project with the largest pumping systems was initiated



R.K. SRIVASTAVA, Director - Kirloskar Brothers Ltd.

While conversing, he shared with us the first-hand account of the problems and challenges faced by them and how they overcame those to build and keep mammoth infrastructure pumping projects like Sardar Sarovar and Godavari Lift Irrigation Scheme successfully up and running.

WPI: Sardar Sarovar Project changed the course of KBL, isn't it?

RKS: Truly speaking, yes! There is an interesting story behind the building of the Saurashtra Branch Canal on Narmada Canal, the world's longest irrigation canal. Initially it was a company outside India that had proposed this scheme with financial aid from the World Bank and that too at a time when India's financial condition was precarious. However, the estimated cost of the project plus the borrowing terms were so stiff that the Gujarat government was in a quandary. Despite this, the Gujarat government decided to take up the challenge to fund this project itself.

WPI: How did KBL come into the picture?

RKS: The Gujarat Government then decided to turn to Indian companies and KBL was one amongst them from whom it sought a feasibility



study. Thermal Power Corporation (NTPC) also was involved in this project because the scope of

RKS: When we were thrown up the challenge, we took precedence from one of our own projects that we had done for a power generation project in Dahanu, Maharashtra wherein we had built Concrete Volute Cooling Water Pumps (CVP). Taking a cue from the Dahanu Project we decided that we shall consider the Dahanu Project as a scale model and to consider pump for Narmada Sarovar as a bigger prototype CVP.

WPI: Any specific reason for such a move?

RKS: Let me give you why we used this pump. In case of CVP, it is a highly suitable pump for handling large volumes of water and guarantees strength and rigidity and virtually eliminates the problems of corrosion and erosion. It also ensures higher and consistent pump efficiencies over a sustained period of operation. The reliability achieved is of the order of 99.95%, due to simplicity of construction and ease of maintenance.

Another reason being as the size of the pump increases, the dimensions and weights of its heaviest parts have a large influence on the choice of construction material used. Besides this, the concrete volute pumps comprise of the casing and suction draft tube that are in concrete. The rotating parts are metallic and a simple mechanical design is the major advantage of a concrete volute pump. Concrete therefore was the natural choice for the pump body.

Besides this, we have also used Vertical Turbine Pumps (VTP) in this project. As far as the VTPs are concerned, these pumps are externally water lubricated, single stage mixed flow type pumps with above floor discharge. VTPs are directly coupled to drive motors by flexible couplings

Water, is an important ingredient for infrastructure development. Be it urban or rural development project if water resources are erratic and are spread far and distant, then water management is a big challenge for those who administer these areas.

report, KBL was considered as the leader in fluid handling and largest manufacturer and exporter of centrifugal pumps from India having the largest indigenous hydraulic research centre.

Given this background, expertise and experience that it had KBL was confident that it would be able to come up with a viable solution. National

work included both lifting water and generation of hydropower as well and NTPC was the first and the best choice for implementing large power generation schemes.

WPI: Tell us more about how you went about designing the pumping scheme?



“ In AP, I think the schemes which are coming from Godavari are very important and when Godavari and Krishna get linked, then, the whole state can be converted into a green state. That is when the real green revolution will happen.



and the pump drives are induction squirrel cage type, vertical flange mounted motors suitable for 11 kv, 50 Hz, 3-phase power supply.

You would be happy to know that a US patent has also been awarded to KBL for the siphon creation and breaking arrangement for this project. The use of an energy efficient siphon arrangement will save motor rating with 8.5 MW in terms of annual energy conservation. I think my team comprising Gunasheelan, Y.S. Rana, S.G. Joshi and Dr.J.T. Kshirsagar deserve high praises for designing the siphon braking arrangement and for all the unstinted support that they have lent to KBL and me during the course of these projects.

WPI: What were the real challenges?

RKS: The Sardar Sarovar Project commences at Rajpipla, where water flows towards Saurashtra by a natural gradient. The main obstacle faced by us was how to keep the flow continuous from the canal on the ascending Saurashtra region. To overcome this, we built a pump house at this site which pumps the entire

region.

To negotiate the difficult topography, a comprehensive scheme with three power stations and five pumping stations has been designed on the Saurashtra branch canal.

WPI: So what is the final outcome of your creation?

RKS: KBL was given a mandate to link one of the largest rivers in India - Narmada to irrigate the dry and arid land of Saurashtra and I am proud to say that we have stood the toughest of the tests and have been able to come true on the faith reposed on us by the Gujarat government and the people of Saurashtra.

The pumping scheme thus designed at Saurashtra Branch Canal is the world's largest.

The project has incorporated the state-of-the-art technology of 26 concrete volute pumps driven by highly efficient HT motors and highly reliable 22 vertical epicyclic gear boxes. It has 3 power stations that use the power generated to run the scheme and 5 pumping stations that lift 630000 liters of water from the Narmada River

drinking to the Saurashtra and Kutch regions in Gujarat.

WPI: If we are correct, KBL is also involved in similar projects in Andhra Pradesh (AP)?

RKS: Yes. We are handling the Godavari Lift Irrigation Scheme as well as some of the popular irrigation schemes mooted by the government of AP.

WPI: Can you give us some background about these projects?

RKS: AP is blessed with many major rivers and important among them are Godavari, Krishna, Pennar and Vamsadhara. Since the state is predominately agrarian in nature, the total cultivable area of the state is 392 lakh acres and out of which 292 lakh acres are being cultivated from all sources. AP government is keen to usher in green revolution in the state and has thus launched a programme called as the Jalayagnam programme. Under this programme, in last five years numbers of irrigation projects have been launched out of which some projects have either been completed where water is

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already being utilized by the farmers for irrigation and drinking purpose and remaining projects are under execution.

WPI: How projects are being handled by KBL?

RKS: In AP, KBL has been working on the Rs.844 crore Devadula Project, Sripad Sagar Project, Handri Niva Sujala Sravanthi (NHSS), Ananthapur and Gandikota Lift Irrigation Scheme besides the Godavari Lift Irrigation Scheme (GLIS).

WPI: What does GLIS project envisages and entails?

RKS: Before enlisting the project details, I would like to draw up an analogy between power projects and such major irrigation projects. If power generation happens in West Bengal, it goes even to Delhi or any other region in the country. Similarly the irrigation projects too should have a vision wherein the networked river linkages should reach out to the entire country so that the whole country can prosper.

So in that sense all the schemes which are coming from Godavari are very important and

“ Out of the 5 phases in GLIS project, GLIS project Phase - I has been successfully completed and was commissioned on 20th March 2008 and dedicated to the people of AP. ”

When Godavari and Krishna get linked, then the whole state can be converted into a green state. That is when the real green revolution will happen.

WPI: Can you elaborate on the types of challenges you faced while doing this project?

RKS: From whatever schemes that are being handled by KBL, one thing is apparent that the main issue of AP state as far as water for irrigation is concerned is its flawed distribution system. Godavari is the lifeline of this state and the linkages of the river had to be handled properly.

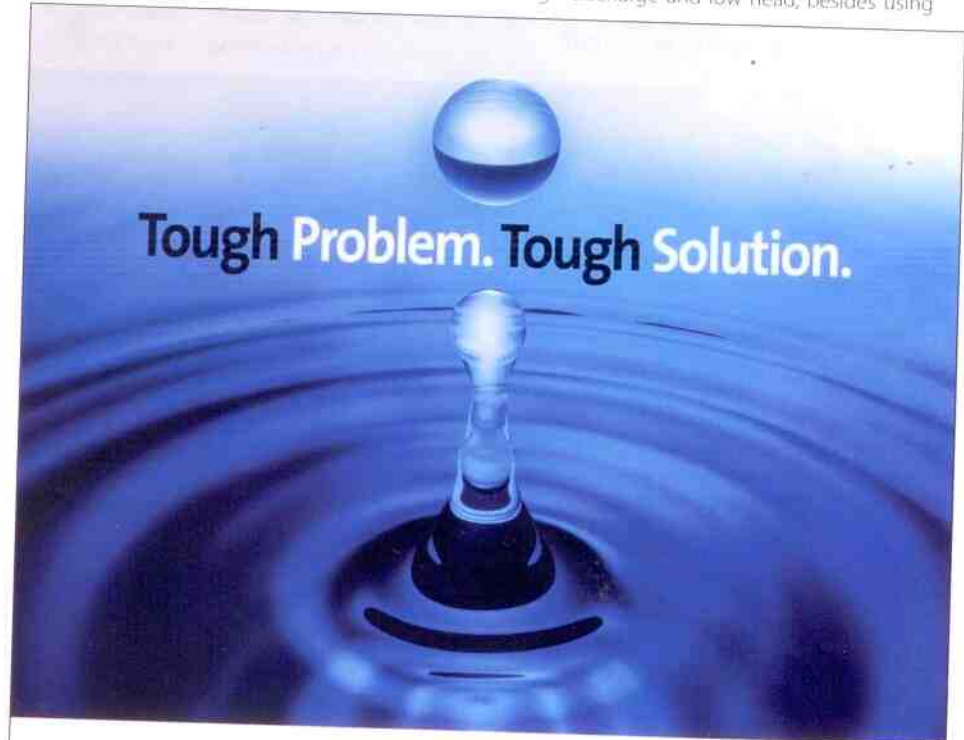
As we were developing GLIS scheme which is first of its kind in India, we had to put in extraordinary efforts to convince the members

who worked along with us about the technology, the type of pump to be used and the pumping design that needed to be adopted.

The implementation of the scheme was huge

WPI: What types of pumps and pumping system were used in this project?

RKS: We mainly used Concrete Volute pumps for high discharge and low head, besides using



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task because of the location of pump house, its accessibility due to the hilly and forest terrains. Transportation of huge equipments, tools and tackles for handling the project too was very challenging because of the lack of adequate expertise available locally. Even during the commissioning we underwent plenty of teething problems due to long distance piping and design of the pressure piping and water hammer protection devices.

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WPI: Has the project been commissioned; what is quantum of water that is being lifted by it and what is the energy saving achieved?

almost 15 MW power.

WPI: What is the difference between Sardar Sarovar and GLIS projects?

RKS: While the basic objective of the both projects are the same as that of creating major and continuous water resource for the regions for whom they have been designed, it's the

existence of those areas. If there is no water, then there can be no settlements.

Water, therefore, is an important ingredient for infrastructure development. Be it urban or rural development project if water resources are erratic and are spread far and distant, then water management is a big challenge for those



RKS: Yes. Out of the 5 phases in GLIS project, GLIS project Phase - I has been successfully completed and was commissioned on 20th March, 2008 and dedicated to the people of AP by UPA Chairperson Ms. Sonia Gandhi. Other 4 phases are under execution.

Presently 100 m³ water per second is being lifted and deployed to different irrigation areas of Telengana district in AP. The total area benefiting under this scheme is around 34 lakh acres. This project is also unique in the sense that it is for the first time in India water is being lifted to such high level. It also has another distinction of being the 2nd high water lifting project in the world next to Colorado River in the US where the water lifted is over 600 meters. The water that is being lifted is up to 490 meters. KBL through its reliable technology and design has been able to do away with 3 pumping stations and has been able to save

topography, approach and project implementation that are different.

While doing the Sardar Sarovar project, we had to navigate through difficult topography but the terrain was flat and offered natural gravity and high pressure at many places. So here we used pumping technology for pumping water from gravity canal.

But in case of GLIS, we had to negotiate through 400 kms of hilly and forest terrain to pump and deploy water and hence we adopted pressure piping scheme.

WPI: Do you think you have been able to achieve the objectives for which these projects were conceived?

RKS: Water supply for different purposes and management of water at different levels are the aspects that determine and sustain the

who administer these areas. In that context the Sardar Sarovar project of lifting water from Narmada and Godavari Lift Irrigation Scheme of lifting water from Godavari and Krishna to provide elixir of life to the people can be hailed as two of the largest and most successful water resource projects mooted in modern India.

When I look back I do get the satisfaction of having contributed majorly to these projects.

Creating two of their kinds – one the world's largest pumping schemes and the other the second highest lift irrigation scheme was definitely a big challenge. But what was more challenging was to put back sparkling smiles on the faces of the land and the people of Saurashtra, Kutch and Telengana who have been for very long deprived of natural and uninterrupted water resource. ■