'Developing indigenous capabilities important for critical national projects'

Dileep Athavale | TNN

Pune: Kirloskar Brothers Limited recently flagged off a 'primary sodium pump' for the prototype fast breed reactor (PFBR) at Nuclear Power Corporation's power station at Kalpakkam, Tamilnadu. This was an assertion of India's capability in development of high-tech pumps and pumping solutions for future nuclear projects. The PFBR is the forerunner of India's future Fast Breeder Reactors programme, which will lead to higher self reliance in nuclear power generation fuel. Excerpts of an interview with KBL chairman Sanjay Kirloskar, in which he discusses the challenges of developing the equipment for nuclear power generation, right from design, procurement, manufacturing and testing.

■ What is the project where NPC will install the sodium pump and allied equipment/ pumps which you have supplied?

The Primary Sodium Pumps will be installed in 1x500MW Prototype Fast Breeder Reactor (PFBR) which NPC is installing at Kalpakkam. This is one of the largest Plutonium-based fast breeder reactor in the world. Successful development of the Primary Sodium Pump is a significant achievement for the fast breeder reactor and the most important milestone in India's 3-stage nuclear development programme. India's long – term nuclear power programme focuses on the vast local thorium resources for electricity generation. India's uranium resources can support a first – stage programme of about 12,000 MWe based on Pressurized Heavy Water Reactors (PHWRs) using natural uranium as fuel and heavy water as moderator and coolant. The energy potential of natural uranium can be increased to about 55,000 MWe in the second stage through Fast Breeder Reactors (FBR's) which utilize plutonium obtained from the recycled spent fuel of the first stage along with depleted uranium as blanket, to produce more plutonium or thorium in blanket to produce U-233. With the deployment of thorium at third stage using U-233 as fuel, the energy potential for electricity generation can be large and can produce abundant energy for future generation.

Successful development of the Primary Sodium Pump is a significant achievement for the fast breeder reactor and the most important milestone in India's 3-stage nuclear development programme

Sanjay Kirloskar| CHAIRMAN, KBL

■ What are the specifications to which the pumps are built?

The PSPs weigh 135 tons and they will handle 5.16 lakh liters of liquid Sodium per minute when installed at Prototype Fast Breeder Reactor (PFBR). At 590 RPM (rotations per minute), these pumps will handle liquid sodium at 400 °C to 550 °C.

■ Elaborate on the nature of the order and the process in which the sodium pump will be of significance.

Primary sodium pumps will be used for pumping the liquid sodium from the reactor vessel for transferring the heat to the secondary circuit. The secondary sodium pump will transfer the heat through heat exchanger to convert the water into steam for generating electricity. Since the Primary Sodium Pumps are installed in the reactor vessels, the reliability and fail-safe operation of these pumps is of great importance. This being the country's first fast breeder reactor, manufacturing of Primary Sodium pump is the joint development programme undertaken with NPC and other government bodies by KBL. There were many technical challenges right from design, procurement, manufacturing and testing. KBL along with its customer organization has successfully developed this engineering marvel.

■ What made KBL the right choice for the project and what were the different steps to develop the pump?

For a critical project like this, having relevant expertise and experience in the field is the most important criteria while selecting a partner. KBL is not only the largest pump manufacturing company in the country but it also has more than 100 years of domain expertise in the field of hydraulics. KBL has been closely associated with Nuclear Power projects for more than 40 years. KBL has been associated with Department of Atomic Energy (DAE) for the last 30 years for various stages development of this Primary Sodium Pump like finalization of design parameters, basic hydraulic design, pump model study and manufacturing of Prototype pump etc.

■ Where did the capabilities of KBL's UK-based company SPP and your other global capabilities help in this development?

There were various challenges for development of the Primary Sodium pumps right from design , procurement, manufacturing and testing. Developing some of the dedicated in-house infrastructure was another challenge as many of specialised facilities such as heat treatment furnace, balancing machine, test bed were not available in the country. All these development activities were carried out by KBL indigenously based on in-house R&D and manufacturing capabilities with support from all customer organisations like, Nuclear Power Corporation of India Limited(NPCIL) and Indira Gandhi Centre for Atomic Research (IGCAR).

■ What are the long-term capacity building takeaways from this order and how will they add to the company's promise in other sectors or as nuclear power sector vendor in other countries?

Our team learned many important lessons during this very high end of technological development. Our engineers developed many innovative ideas and solutions in the process. The expertise and experience gained during this process will be very useful for development of other high tech pumps and pumping solutions not only for future Nuclear projects but for other critical applications in the Industry.