*Swadeshi And Quality*

Since 1928

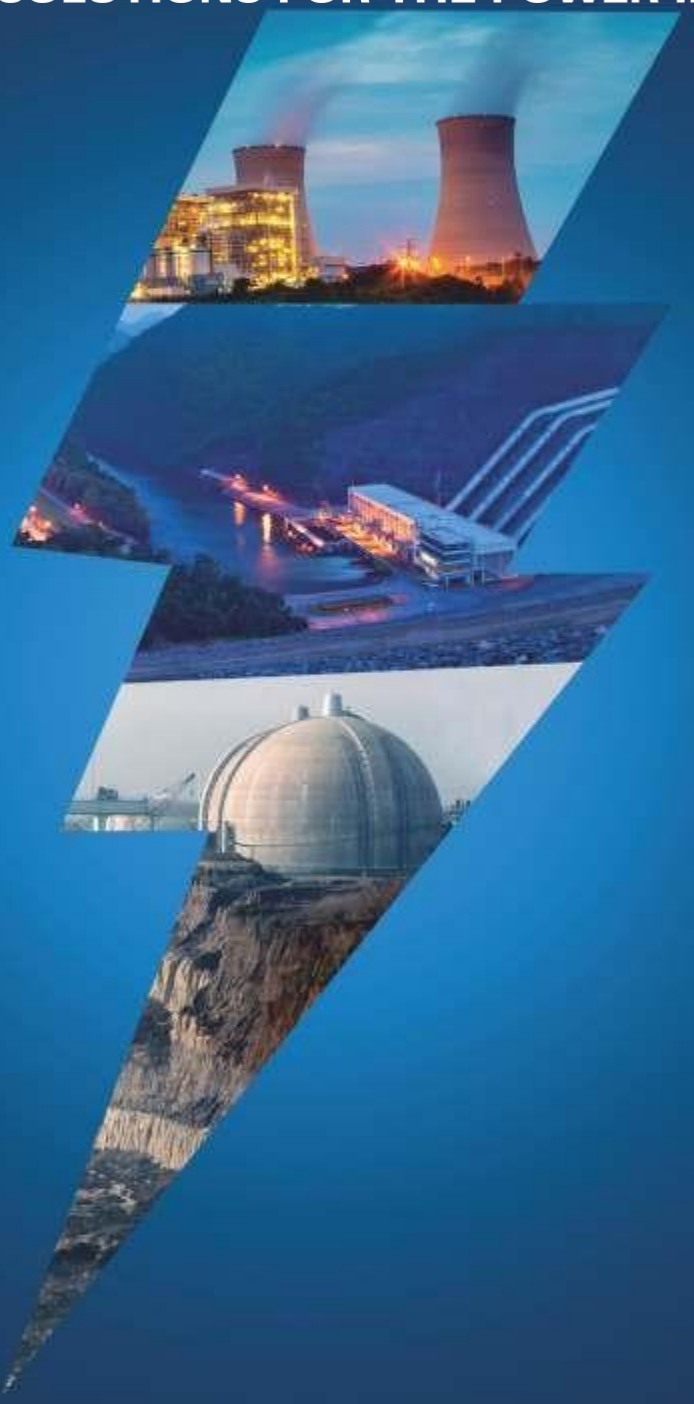
Enriching Lives

# W. R. TALWALKER BROTHERS PVT. LTD.

An ISO 9001:2015 Certified Company

Authorised Distributors For Kirloskar Products

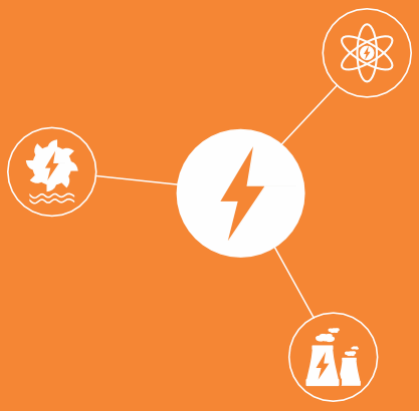
## PUMPING SOLUTIONS FOR THE POWER INDUSTRY



**KIRLOSKAR BROTHERS LIMITED**

A Kirloskar Group Company

Established 1888



# THE POWER TO ACHIEVE

At the present growth rate of 3% per annum, global demand for power is set to get double by 2030. This is expected to create set of opportunities and challenges in providing clean, green and optimal solutions for the power industry. Global demand for power is expected to rise on account of rise in world population, industrial demand and a quest for better lifestyles around the world.

At Kirloskar Brothers Limited, we recognise these changes in the horizon and are fully geared to cater to the global customer base for fluid management solutions for power generation and distribution.

# CONTENT

# ABOUT KIRLOSKAR BROTHERS LIMITED (KBL)

Kirloskar Brothers Limited (KBL) is a world-class pump manufacturing company with expertise in engineering and manufacture of systems for fluid management. Established in 1888 and incorporated in 1920, KBL is the flagship company of the $ 2.1 billion Kirloskar Group. KBL, a market leader, provides complete fluid management solutions for large infrastructure projects in the areas of water supply, power plants, irrigation, oil & gas and marine & defence. We engineer and manufacture industrial, agriculture and domestic pumps, valves and hydroturbines.

In 2003, KBL acquired SPP Pumps, United Kingdom and established SPP INC., Atlanta, USA, as a wholly owned subsidiary of SPP, UK to expand its international presence. In 2007, Kirloskar Brothers International B.V., The Netherlands and Kirloskar Brothers (Thailand) Ltd., a wholly owned subsidiary in Thailand, were incorporated. In 2008, KBL incorporated Kirloskar Brothers Europe B.V. (Kirloskar Pompen B.V. since June 2014), a joint venture between Kirloskar International B.V. and Industrial Pump Group, The Netherlands. In 2010, KBL further consolidated its global position by acquiring Braybar Pumps, South Africa. SPP MENA was established in Egypt in 2012. In 2014, KBL acquired SyncroFlo Inc., the largest independent fabricator of commercial and municipal domestic water booster pumps.

To further strengthen its global position, in 2015, Kirloskar Pompen B.V. acquired Rodelta Pumps International, The Netherlands.

KBL has joint venture cooperation with Ebara, Japan since 1988 for the manufacture of API 610 standard pumps. Kirloskar Corrocoat Private Limited is a joint venture cooperation with Corrocoat, UK since 2006. KBL acquired The Kolhapur Steel Limited in 2007 and Hematic Motors in 2010.

KBL has eight manufacturing facilities in India at Kirloskarvadi, Dewas, Kondhapuri, Shirwal, Sanand, Kaniyur, Kolhapur and Karad. In addition, KBL has global manufacturing and packaging facilities in Egypt, South Africa,Thailand, The Netherlands, United Arab Emirates, United Kingdom and United States of America. KBL has 12,700 channel partners in India and 80 overseas and is supported by best-in-class network of authorised centres and authorised refurbishment centres across the country.

All plants of KBL are ISO 9001 & ISO 14001, OHSAS 18001, ISO 14000 Environment standard certified. We apply total quality management tools using European Foundation for Quality Management (EFQM) model. The Kirloskarvadi plant of KBL is a state-of-the-art integrated manufacturing facility having Asia's largest hydraulic research centre with testing facility up to 5000 kW and 50,000 $m^3$/hr.

KBL is the ninth pump manufacturing company to be accredited with the N and NPT certification by American Society of Mechanical Engineers (ASME).

# PIONEERING ACHIEVEMENTS OF KIRLOSKAR BROTHERS LIMITED

India's first Centrifugal Pump

India's first Concrete Volute Pump

India's first FM/UL Pump

One of India's first Large Capacity Vertical Turbine Pump

India's first Canned Motor Pump

India's first Metallic Volute Pump

India's first Solar Pump

# PRESENCE IN THE POWER SECTOR

Kirloskar Brothers Limited is associated with the power industry, from generation to distribution, through its comprehensive pumping systems and solutions.

Generation:

Turnkey solutions for small hydro power projects up to 20MW single unit capacity

**Pumping Solutions:**

Kirloskar Brothers Limited provides turnkey solutions including design, manufacturing, supply, erection, testing & commissioning of pumping systems for power plants

Various types of power plants that KBL is associated with include:

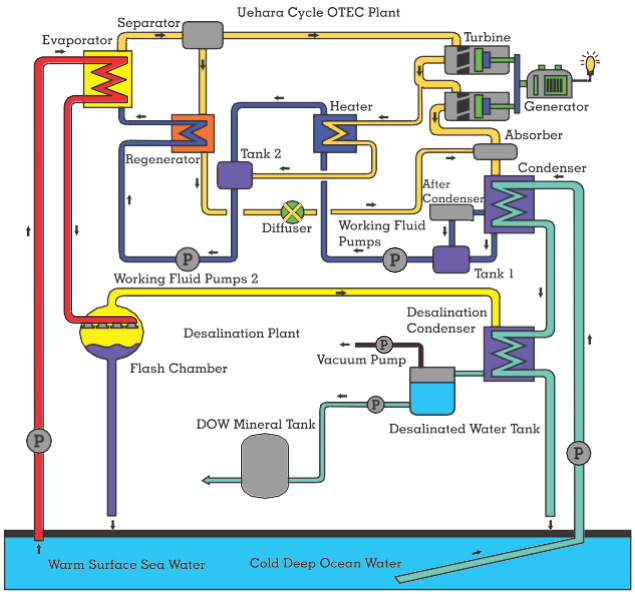
Thermal/Gas Based/Combined Cycle Power Plants

Hydro Power Plants

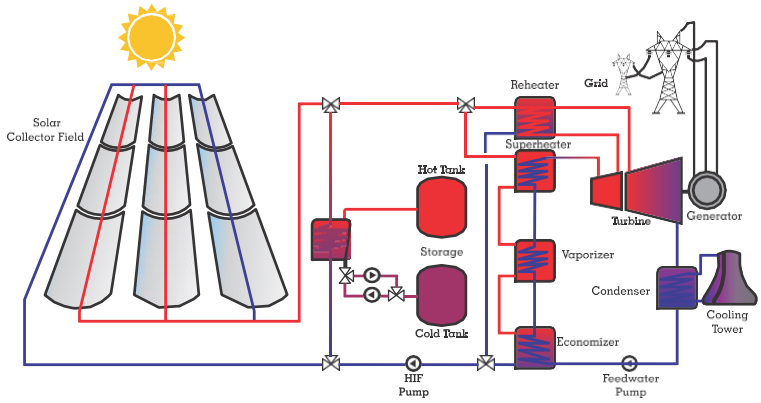
Nuclear Power Plants

# POWER CYCLE-THERMAL POWER PLANT

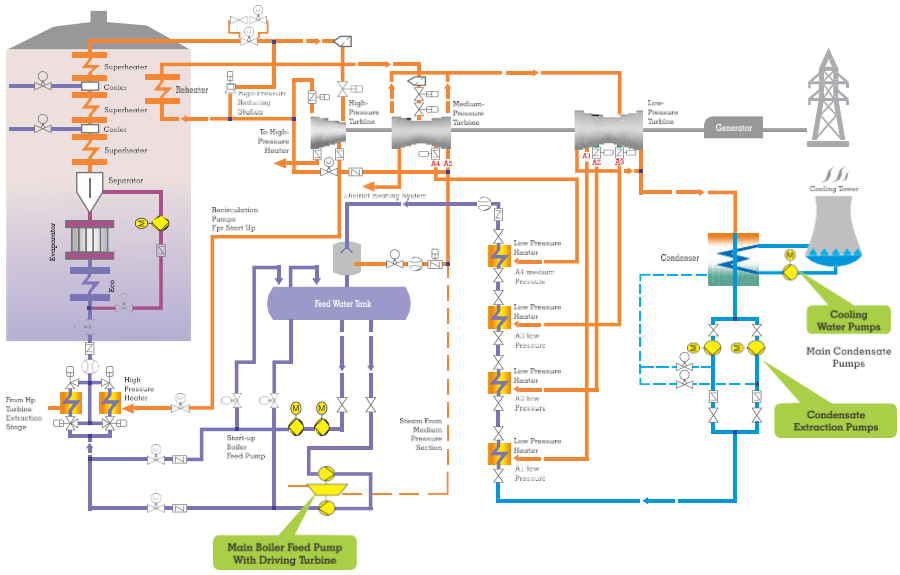
## OTEC Plant




## Concentrated Solar Power Plant




## Typical Power Plant Schematic



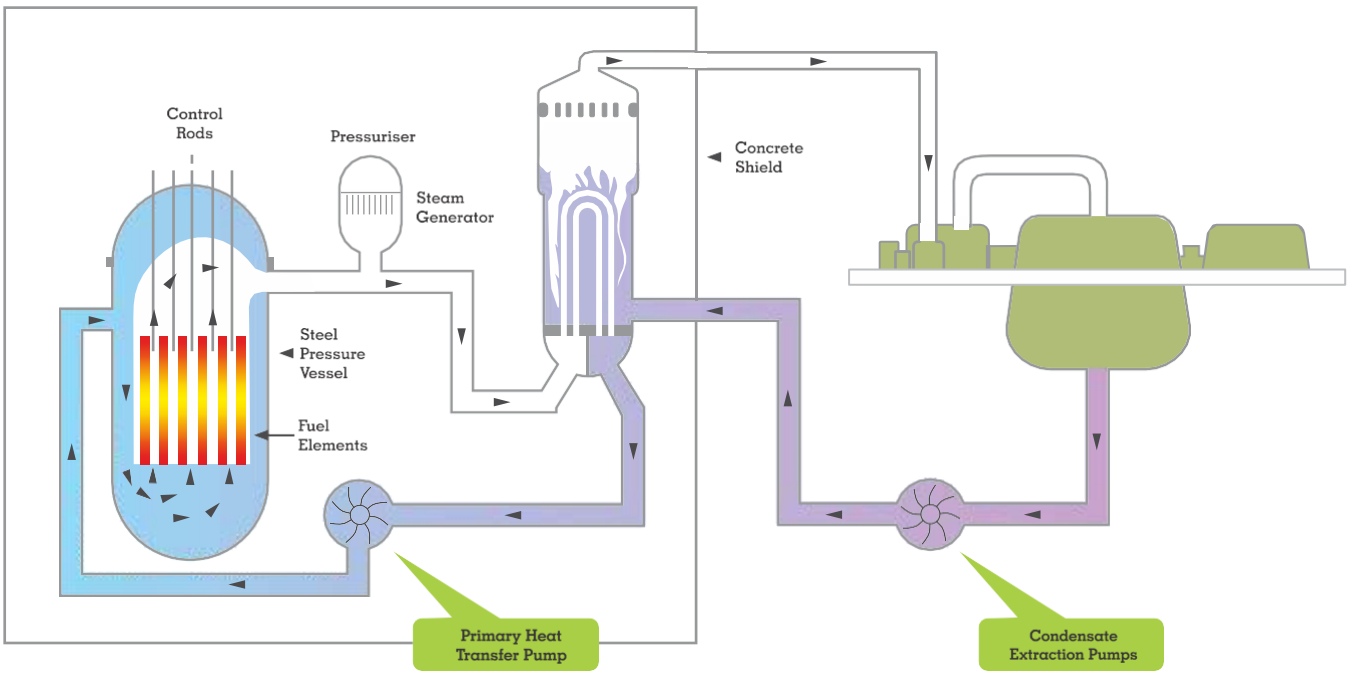
# PUMP APPLICATIONS IN THERMAL POWER PLANTS

| Pump Type / Application | Multi-stage | Multi-stage Can Type | Vertical Turbine | Horizontal Split Casing | End Suction | Concrete Volute Pump | Metallic Volute Pump |
|---|---|---|---|---|---|---|---|
| River Water Intake | | | ✓ | | ✓ | ✓ | |
| Circulating Water/Cooling Tower | | | ✓ | ✓ | | ✓ | ✓ |
| Boiler Feed Pump | ✓ | | | | | | |
| Condensate Extraction | ✓ | ✓ | | | | | |
| Boiler Fill Pump | ✓ | | | | | | |
| Auxiliary Cooling Water for Booster Services | | | ✓ | ✓ | ✓ | | |
| Service Water | | | ✓ | ✓ | ✓ | | |
| Demineralised Water | | | | ✓ | ✓ | | |
| Make-up Water | | | ✓ | ✓ | ✓ | | |
| Sealing and Lubricating Water | ✓ | | | ✓ | ✓ | | |
| Fire Fighting Services | | | ✓ | ✓ | ✓ | | |
| Water Treatment Services | | | ✓ | ✓ | ✓ | | |
| Air Preheater Wash | | | | ✓ | ✓ | | |
| Ash Water | | | ✓ | ✓ | ✓ | | |
| Drinking and Utility Services | | | | ✓ | ✓ | | |

# POWER CYCLE-NUCLEAR POWER PLANT

## Pumping Solutions for Nuclear Power Plant

Pressurised Water Reactor




KBL has rich experience in supplying specialised pumps to Nuclear Power Plants.

# PUMP APPLICATIONS IN NUCLEAR POWER PLANTS

| Circuit | Application | Pumps | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Canned Motor Pump | Special Pumps | Multistage | Multistage Can Type | Vertical Turbine | Horizontal Split Casing | End Suction | Concrete Volute Pump | High Pressure Multistage | Metallic Volute Pump |
| Primary Circuit | Primary Heat Transfer Pump: Sodium & Heavy Water | | ✓ | | | | | | | | |
| | Secondary Heat Transfer Pump: Sodium & Heavy Water | | ✓ | | | | | | | | |
| | Primary Pressuring Pump: Barrel casing | | | ✓ | | | | | | | |
| | Moderator Circulating Pump | ✓ | | | | | | | | | |
| | Emergency Core Cooling Water Pump | | | | | ✓ | | | | | |
| | Shut Down Cooling Pump | | ✓ | | | | | | | | |
| | Special Application Pumps: High Temperature-High Pressure | ✓ | ✓ | | | | | | | | |
| Secondary Circuit | Cooling Water Pumps | | | | | ✓ | ✓ | | ✓ | | ✓ |
| | Condensate Extraction | | | | ✓ | | | | | | |
| | Raw Water Intake | | | | | ✓ | | | ✓ | | ✓ |
| | Make-up Water | | | | | ✓ | ✓ | ✓ | | | |
| | Auxiliary Cooling Water | | | | | ✓ | ✓ | ✓ | | | ✓ |
| | Closed Cycle Cooling Water | | | | | ✓ | ✓ | ✓ | | | |
| | Auxiliary Boiler Feed Water | | | | | | | | | ✓ | |
| | Main Boiler Feed Water | | | | | | | | | ✓ | |
| | Fire Fighting Package | | | | | ✓ | ✓ | ✓ | | | |
| | De-watering Package | | | ✓ | | ✓ | ✓ | ✓ | | | |
| | Other General Service Application Pumps | | | ✓ | | ✓ | ✓ | ✓ | | | |

# OUR RANGE OF PRODUCTS

| Product | Range | Features |
|---|---|---|
| Concrete Volute Pumps  | - Size: Up to 4000 mm<br>- Capacity: Up to 120000 $m^3$/hr<br>- Head: Up to 50 metre<br>- Temperature: Up to 90$^0$ C | - Oil lubricated bearings<br>- No water contact with shaft hence no corrosion<br>- Corrosion proof volute casing-Reinforced Concrete<br>- Shaft, impeller and other components with special material available |
| Metallic Volute Pumps  | - Size: Up to 4000 mm<br>- Capacity: Up to 120,000 $m^3$/hr<br>- Head: Up to 50 metre<br>- Temperature: Up to 90$^0$ C | - Oil lubricated bearings<br>- No water contact with shaft; hence no corrosion<br>- Shaft, impeller and other components with special material available |
| Vertical Turbine Pumps Type: BHR/BHQ/ BHM/BHMA/BHA  | - Size: 150 mm to 2200 mm<br>- Capacity: Up to 40000 $m^3$/hr<br>- Head: Up to 200 metre<br>- Temperature: Up to 90$^0$ C | - Vertical mounting<br>- Single stage or double stage<br>- Enclosed or semi-open impellers<br>- Single suction<br>- Direct or right angle drive<br>- Dry pit or wet pit arrangement<br>- Special material of construction<br>- Operating at 50 Hz or 60 Hz |
| Condensate Extraction Pumps Type: BHRc/ MNCV  | - Delivery Size: Up to 500 mm<br>- Capacity: Up to 2200 $m^3$/hr<br>- Head: Up to 380 metre | - With double suction impeller<br>- Francis type impeller with bowl<br>- Radial type impeller with diffuser |
| Horizontal Axially Split Casing Pumps Type: UP/UPLV/UPH/UP(T)  | - Size: 50 mm to 1200 mm<br>- Capacity: Up to 20000 $m^3$/hr<br>- Head: Up to 330 metre<br>- Temperature: Up to 90$^0$C | - Horizontal mounting<br>- Axially split casing<br>- Single stage or double stage<br>- Single suction or double suction<br>- Single volute or double volute<br>- Operating at 50 Hz or 60 Hz |

# OUR RANGE OF PRODUCTS

| Product | Range | Features |
|---|---|---|
| Horizontal Axially Split Casing Pumps<br>Type: SCT<br>  | - Size: 50 mm to 350 mm<br>- Capacity: Up to 4500 $m^3$/hr<br>- Head: Up to 330 metre<br>- Temperature: Up to 100$^0$C | - Horizontal or vertical axis<br>- Gland packed or mechanical seal<br>- Operating at 50 Hz or 60 Hz |
| Multi-stage Pumps<br>Type: RKB<br>  | - Delivery Size: Up to 32 mm to 250 mm<br>- Capacity: Up to 850 $m^3$/hr<br>- Head: Up to 850 metre<br>- Temperature: (-) 40$^0$C to 140$^0$C | - Also available in vertical execution<br>- Gland packed or mechanical seal<br>- 50 Hz/60 Hz availability |
| End Suction Pumps<br>Type DB (Large Size)<br>  | - Size: 150 mm to 300 mm<br>- Capacity: Up to 1900 $m^3$/hr<br>- Head: Up to 35 metre<br>- Temperature: Up to 90$^0$C | - Horizontal mounting<br>- Back pull out type<br>- Single stage<br>- Single suction<br>- Operating at 50 Hz or 60 Hz |
| Mixed Flow Pumps<br>Type: MF/MFX<br>  | - Size: 200 mm to 650 mm<br>- Capacity: Up to 7000 $m^3$/hr<br>- Head: Up to 30 metre<br>- Temperature: Up to 90$^0$C | - Horizontal/Vertical mounting<br>- Single stage<br>- Single suction<br>- Volute casing<br>- Operating at 50 Hz or 60 Hz |
| Horizontal Axially Split Casing Pumps<br>Type: DSM/DSM (T)<br>  | - Size: 50 mm to 150 mm<br>- Capacity: Up to 470 $m^3$/hr<br>- Head: Up to 180 metre<br>- Temperature: Up to 90$^0$C | - Horizontal mounting<br>- Axially split casing<br>- Single stage or double stage<br>- Single suction<br>- Single volute<br>- Operating at 50 Hz or 60 Hz |

| Product | Range | Features |
|---|---|---|
| Canned Motor Pumps<br>Type: KCS<br>  | - Delivery Size: From 20 mm to 250 mm<br>- Capacity: Up to 1000 $m^3$/hr<br>- Head: Up to 135 metre<br>- Temperature: (-) 40°C to 250°C | - Non seal pump<br>- Integral construction of pump and motor<br>- Pumped liquid cools the motor and lubricates motor bearing<br>- Horizontal/vertical execution |
| End Suction<br>Process Pumps<br>Type: KPD/KPDS<br>  | - Delivery Size: From 20 mm to 200 mm<br>- Capacity: Up to 750 $m^3$/hr<br>- Head: Up to 150 metre<br>- Temperature: (-) 50° C to 350° C | - Complying to DIN 24256 & ISO 2858<br>- Back pull out design<br>- Generally in accordance to API 610<br>- Gland packed or mechanical seal<br>- 50 Hz/60 Hz availability<br>- Also available in vertical execution |
| End Suction Pumps<br>Type: CPHM/CE/DB<br>  | - Delivery Size: From 20 mm to 200 mm<br>- Capacity: Up to 750 $m^3$/hr<br>- Head: Up to 150 metre<br>- Temperature: (-) 30°C to 90°C | - Complying to DIN 24256 & ISO 2858<br>- Back pull out design<br>- Gland packed or mechanical seal<br>- 50 Hz/60 Hz availability |
| Solid Handling Pumps<br>Type: SHM/SHL<br>  | - Size: 50 mm to 900 mm<br>- Capacity: Up to 17000 $m^3$/hr<br>- Head: Up to 90 metre<br>- Solid size: Up to 100 mm (max)<br>- Temperature: Up to 90°C | - Horizontal/vertical mounting<br>- Single stage<br>- Single suction<br>- Volute casing<br>- Operating at 50 Hz or 60 Hz |
| Submersible Sewage<br>Pumps Type: NS<br>  | - Size: 40 mm to 250 mm<br>- Capacity: Up to 750 $m^3$/hr<br>- Head: Up to 48 metre<br>- Temperature: Up to 90° C | - Non-clog two vane or single vane enclosed impeller<br>- Permissible solid size up to 150 mm (max)<br>- Gland packed or mechanical seal<br>- Operating at 50 Hz or 60 Hz |

# OUR RANGE OF PRODUCTS

| Product | Range | Features |
|---|---|---|
| Magnetic Drive Pump  | - Delivery head (H): Up to 150 metre (at 2900 rpm)<br>- Available nominal speed (n): 2900, 1450, 980 rpm at 50 Hz and 3500, 1750, 1150 rpm at 60 Hz<br>- Max. operating pressure (P): 16 bar (25 bar) (Max. Suction pressure 5 bar)<br>- Temperature range (t): -50°C up to +180°C | - Pump dimensions are fully confirming to ISO 2858/DIN EN 22858 and technically meeting requirements of ISO 5199<br>- The casing has axial suction and top centre line delivery with self venting design<br>- Pump shaft is supported between anti-friction ball bearings<br>- Pumps can be driven by an electric motor |
| Vacuum Pumps Type: DV  | - Vacuum: Up to 650 mm to Mercury<br>- Air Flow Rate: Up to 162 $m^3$/hr<br>- Power rating: 3.7 kW to 7.5 kW (5.0 HP to 10.0) | - Sturdy casing, provided with foot, suction and delivery nozzles<br>- Grease lubricated<br>- Deep grooved ball bearings<br>- Easy maintenance and spares availability |
| Self-Priming Pumps Type: SP/SPM  | - Delivery Size: From 40 mm to 150 mm<br>- Capacity: Up to 275 $m^3$/hr<br>- Head: Up to 34 metre<br>- Power Rating: 0.75 kW to 19.5 kW | - Available in monobloc version<br>- Self priming |
| Submersible Pumps Type: KU  | - Capacity: Up to 144 $m^3$/hr (634 US gpm)<br>- Head: Up to 447 metre (1431 ft)<br>- Power: Up to 33 kW<br>- Voltage: 220V/415V | - Suitable for high voltage fluctuation<br>- Suitable for borewell-100 mm (4") 150 mm (6"). 200 mm (8") |

| Product | Range | Features |
|---|---|---|
| Francis Turbines<br>  | - Horizontal or vertical<br>- Unit Output: Up to 20 MW<br>- Head: Up to 300 metre | - Optimised selection and sizing for high efficiency<br>- Delivered with high-quality self-lubricating bearings as standard, which have higher specifications and are environment-friendly<br>- Supplied in two configurations<br>(a) Turbine runner and flywheel are directly mounted on generator shaft<br>(b) Turbine and generator have their own separate shafts and bearings |
| Kaplan Turbines<br>  | - Horizontal or Vertical<br>- Unit Output: Up to 20 MW<br>- Head: Up to 60 metre | - Low head and high flow<br>- Supplied in following configurations<br>(a) Full Kaplan<br>(b) Semi Kaplan<br>(c) Propeller<br>(d) S Type tubular Kaplan (horizontal shaft) |
| Pelton wheel Turbines<br>  | - Horizontal or vertical<br>- Unit output: Up to 10 MW<br>- Head: Up to 350 metre | - High head and low discharge<br>- Supplied in following configurations<br>(a) Single jet horizontal<br>(b) Double jet horizontal<br>(c) Four jet vertical<br>(d) Control mechanism with nozzle and deflector |

# OUR RANGE OF PRODUCTS

| Product | Range | Features |
|---|---|---|
| Butterfly Valves<br>  | - Manufacturing Standard: IS13095/BS EN 593 (BS5155)/AWWA C504/ IS7326/AWWA C516/API 609<br>- Size: 50 to 5000 mm<br>- 50 to 700 mm Size Centric Type<br>- 80 to 5000 mm Size Single Eccentric & Double Eccentric Type<br>- Pressure Ratings: PN6, PN10, PN16, PN 25, PN 30, PN 40,CL 75, 150, 250<br>- End Connection: 50 to 700 mm: Wafer/Double Flanged 600 to 5000 mm: Double Flanged | |
| Globe Valves (Cast Steel)<br>  | - Manufacturing Standard: BS: 1873<br>- Size Range<br>: 50 mm to 600 mm: CL 150<br>: 50 mm to 500 mm: CL 300<br>: 50 mm to 350 mm: CL 600 | |
| Sluice Valves/Gate Valves<br>  | - Manufacturing Standards: IS 14846/BS 5163<br>- Size Range<br>: S 14846 (32 to 1800 mm)<br>: BS 5163 (50 to 600 mm)<br>- Pressure Ratings: PN1.0 & PN1.6 (For IS 14846), PN 2.0, PN 2.4 (As per KBL design) PN10 & PN16 (For BS5163) | - Rigid and sturdy design<br>- Low pressure loss across the valve<br>- Available in non rising as well as in rising spindle type<br>- Suitable for clear water up to 45°C and 5000 ppm turbidity and other fluids with maximum pressure/temperature conditions within the scope of IS: 14846<br>- Long service life and leak-tightness even after thousands of open/close operations |
| Check Valves/NRV (Cast Steel)<br>  | - Manufacturing Standard: BS 1868<br>- Size Range & Pressure Rating<br>: 50 mm to 800 mm: CL 150<br>: 50 mm to 700 mm: CL 300<br>: 50 mm to 600 mm: CL 600 | - Swing check type, double flanged/butt weld end, bolted cover design<br>- Rigid and sturdy design with long service life |
| Single Air Valve<br>  | - Size: 50 mm to 200 mm (single door)<br>- Ratings: PN 1.00 and PN 1.6 Complying with IS 14845 | - Rigid and sturdy design<br>- Double orifice type<br>- Long service life |

| Product | Range | Features |
|---|---|---|
| Energy Efficient Steam Trap Device  | - Size: 15 mm (½")<br>- Max Operating Pressure: Up to 42 Bar<br>- Max Operating Temperature: Up to 450°C | - Internationally patented design for minimum loss of live steam<br>- Combination of thermodynamic and impulse valve type design<br>- Long service life |
| Non Return (Reflux) Valve  | - Manufacturing Standard<br>: BS EN 12334 (BS 5153)/IS 5312 Part 1 (Single door)& IS 5312 Part 2 (Multi door)<br>- Size Range<br>: 40 to 2000 mm (as per IS 5312)<br>: 50 to 600 mm (as per BSEN 12334)<br>- Pressure Rating Features<br>: PN 0.6, PN 1.0, PN 1.6 as per IS 5312<br>: PN 2.0, PN 2.4, PN 3.0 as per KBL Design<br>: PN6, PN10, PN16 as per BSEN 12334 | - Swing check type design<br>- Rigid and sturdy design with minimum head loss<br>- Long service life and leak-tightness of high order<br>- Single door non-return valves are being supplied with Dash-pot arrangements |
| Dual Plate Check Valve  | - Manufacturing Standard: API 594<br>- Size Range: 80 mm to 2600 mm<br>- Pressure Ratings: CL 150, CL 300, CL 600, CL 150, CL 250<br>- End Connection: Double Flanged/Wafer | - Dual plate, torsion spring loaded, compact design<br>- Non-slam and quick closing<br>- Wafer/double flanged ends<br>- Installation in horizontal as well as vertical pipelines<br>- Superior hydro-dynamic performance |
| Kinetic Air Valve  | - Manufacturing Standard:<br>IS 14845/AWWA C512<br>- Size Range: 50 to 250 mm<br>- Pressure Ratings<br>:PN1.0 &. PN 1.6 as per IS 14845 PN 2.0, PN 2.4,<br>:PN .3.0 as per KBL Design | - Double orifice type (small and large orifice), kinetic type<br>- Non clogging and self sealing balls for trouble free operation<br>- Totally tamper proof kinetic air valve series available<br>- Suited for turbid or clear water, sewage; releasing air when water mains are being filled and admitting air while being emptied<br>- Cuts loss of water when water mains are full<br>- Releasing air accumulated under pressure in pipe during normal conditions |
| FM Approved & UL Listed Gate Valve  | - Manufacturing Standard : IS 14846 (Generally)<br>- Size Range: 50 mm(2") to 250 mm (10") for FM approved: 50 mm(2") to 400 mm (16") for UL Listed<br>- Flanges Drilling: BSEN 1092-2 PN 16 FF (Flat Faced)/ANSI B16.1 Cl125 (Flat Faced)<br>- Pressure Class<br>:FM valves :50 mm to 250 mm-250 PSI<br>:UL valves :50 mm to 300 mm-175 PSI<br>:350 mm to 400 mm-150 PSI | - Metal to metal seating for longer service life<br>- Rigid and sturdy design with minimum loss of head across the valve<br>- Accurate interchangeability of components<br>- Accurate parallelism between side flanges<br>- Equal taper between wedge faces<br>- Perfect machining and press fitting of body and wedge rings<br>- Excellent finish on spindle threads resulting in low friction and smooth operation of valves<br>- Leak-tightness even after thousands of open/close cycles<br>- Unique spindle with integral forged collar design |

# OUR RANGE OF PRODUCTS

| Product | Range | Features |
|---|---|---|
| Cast Steel Gate Valve<br>  | - Manufacturing Standard: API 600<br>- Size Range<br>: 50 mm to 1200 mm, CL 150<br>: 50 mm to 600 mm, CL 300<br>: 50 mm to 600 mm, CL 600 | - Double flanged/butt weld end, outside screw rising stem, yoke type bonnet<br>- Back seating bush arrangement to enable re-packing under pressure<br>- Rigid and sturdy design<br>- Low pressure loss across the valve<br>- Long service life and leak tightness |
| Steam Trap Device<br>  | - Size: 15, 20 and 25 mm<br>- Max Operating pressure: Up to 31.64 bar (450 Psig)<br>- Max Operating Temperature: 450°C | - Internationally patented design for minimum loss of live steam<br>- Multi-concept, high energy saving, efficient impulse cum thermodynamic steam trapping device<br>- Double chamber acting steam trap<br>- Low noise level<br>- Ends-flanged/socket/screwed<br>- IBR approved |
| Knife Edge Gate Valve<br>  | - Manufacturing Standard: MSS SP 81<br>- Size: 50 mm-1000mm<br>- Pressure Rating: PN 10<br>- Ends : Wafer Lugged, suitable for IS-1538, 5, 4&6; BS 10, Table-D/E/F<br>:IS 6392: ANSI B 16.1/16.5 | - Body is robust in construction to cater to the extreme demanding application<br>- Ensure higher flow capacity and minimal pressure drop<br>- Super ground and super finish on both sides of blade to assure positive shutoff<br>- The machined gland packing chamber enhances the packing life and sealing property |
| Forged Steel Gate, Globe & Check Valve<br>  | - Gate Valves:<br>API/602/ BSEN 15761 (BS 5352)<br>- Globe Valves: BSEN 15761 (BS 5352)<br>- Check Valves: BSEN 15761 (BS 5352)<br>- Size Range: 1/4" (8mm) to 2" (50mm)<br>- Pressure Class: Class 800<br>- Ends: Screwed/Socket Weld | Features (Gate Valve)<br>- Outside screw and yoke type bolted bonnet construction<br>- Rigid and sturdy construction<br>- Long service life<br>- leaktight<br>- Back seating surface provided integral to bonnet<br>- Ends-socket weld/screwed<br>Features (Globe Valve)<br>- Outside screw and yoke type bolted bonnet construction<br>- Rigid and sturdy construction<br>- Long Service life<br>- Leaktight<br>- Back seating surface provided is integral to bonnet<br>- Ends-socket weld/screwed<br>Features (Check Valve)<br>- Piston lift check type results in self cushioning effect<br>- Streamlined flow passages designed to minimise pressure losses and erosion<br>- Guided piston assures accurate return to seat ring to achieve leak-tightness |

# OUR RANGE OF PRODUCTS-BOILER FEED PUMPS

## SS/SSD (KBSH/KBDH)

API/Non API

## Between Bearing BB4

### Rating

| | | |
|---|---|---|
| Capacity ($m^3$/hr) | Up to 650 | *Higher capacity and head is possible when pumps are operated at higher speeds |
| Head (m) | Up to 2500 | *Higher capacity and head is possible when pumps are operated at higher speeds |
| Temperature Range (°C) | -5 to 200 | |
| Discharge Pressure | Up to Cl. 2500 # | |
| Suction Pressure kg/$cm^2$(g) | Up to 17 (higher on request) | |
| Nozzle Orientation (Suc./Dis.) | Top-Top & Side-Top | |
| Motor Synchoronous Speeds (rpm) | 3000/3600 | |
| Max. Operating Speed (rpm) | 7000 | |
| Direction of Rotation | Clockwise when viewed from coupling end | |
| Flange Ratings (#RF) | Cl. 300/600/900/1500/2500 | |

### Features

- Design and manufacture as per company standard; can meet API 610 latest edition requirements
- Multi-stage pump with ring section diffuser casing design with centerline support to meet high temperature and high pressure BFW application
- Easy inspection and repair maintenance of bearings and mechanical seal after removal of coupling spacer only
- First stage impeller with double suction is provided in SSD models to improvise NPSH3 performance
- Specially designed to meet high performance and extended low cost operation
- Bleed off flow extraction from Intermediate casing
- Axial thrust balancing with the help of options like piston & balancing dise, double piston

### Applications

- Medium/high pressure boiler feed water applications
- High pressure mine drainage applications
- High pressure applications in water treatment plant
- Hydraulic power recovery turbine in water treatment plants
- Descaling

# DCS/DCD (KBDS/KBDD)

API/Non API

## Between Bearing BB5

### Rating

| | | |
|---|---|---|
| Capacity ($m^3$/hr) | Up to 650 | *Higher capacity and head is possible when pumps are operated at higher speeds |
| Head (m) | Up to 2500 | *Higher capacity and head is possible when pumps are operated at higher speeds |
| Temperature Range (°C) | -104 to 425 | |
| Discharge Pressure | Up to Cl. 2500 # | |
| Suction Pressure kg/$cm^2$(g) | Up to 80 | |
| Nozzle Orientation (Suc./Dis.) | Top-Top & Side-Top | |
| Motor Synchoronous Speeds (rpm) | 3000/3600 | |
| Max. Operating Speed (rpm) | 7000 | |
| Direction of Rotation | Clockwise when viewed from coupling end | |
| Flange Ratings (#RF) | Cl. 300/600/900/1500/2500 | |

### Features

- Design and manufacture as per API 610 latest edition or as per company standard
- Multi-stage centerline supported heavy duty double casing diffuser design for handling high pressure and high temperature applications
- Easy inspection and repair maintenance of bearings and mechanical seal after removal of coupling spacer only. The cartridge (assembly of all parts except outer casing) can be removed without disturbing suction/charger piping and driver
- Axial thrust balancing is possible with the help of options like piston & balance disc, double piston
- Low NPSH requirement can be met with first stage double suction impeller in DCD pumps
- Bleed of flame extraction at partial pressure

### Applications

- High pressure fluid handling in oil refineries and petrochemical industries
- LP, MP and HP boiler feed applications
- Light hydrocarbon and liquid gas transfer applications
- Sea water injection application in oil wells
- Mine dewatering
- Booster application in petroleum products
- As hydraulic power recovery turbine in chemical and process plants
- Descaling

# INSTALLATIONS

## THERMAL

Vizag-
Andhra Pradesh,
India

Hinduja National
Power Corporation
Limited (HNPCL)
2 x 520 MW
Thermal Power

Mundra-
Gujarat, India

Circulating Water
System for
5 x 800 MW
CGPL Mundra
Ultra Mega Power Project
(UMPP) of Tata Power

Bechtel-
Texas, USA

Circulating Water
Pumps for
565 MW-Sandow-5
electric station

Termozulia
Power Project,
Maracaibo,
Venezuela

Two Circulating
Water Pumpsets
for 480 MW
Power Project

Dabhol Power
Project, India

Circulating Water
System for
2 x 775 MW
Dabhol Power
Project, Phase II

Minergy Power
Corporation,
Philippines

Circulating
water system
for 3 x 55 MW
Balingasag
Thermal Power
Project

Simhadri Power
Project-NTPC,
India

KBL Circulating
Water Pumping
Systems,
Concrete Volute
Pumps at
Simhadri Power
Project

# INSTALLATIONS

## HYDRO

Hydro Power Project
Management Board,
Vietnam

Ankhe Kanak
(2 x 6500 kW) HEP
Vertical Kaplan

1200 MW DGEN Mega
Power Project
Dahej, Gujrat, India

Ascent Hydro
Projects Ltd.
(Mumbai) Project,
Himachal Pradesh
Sechi
(2 x 2250 kW) HEP
Horizontal Francis

MIRFA Independant
Water & Power Project,
Abu Dhabi-UAE

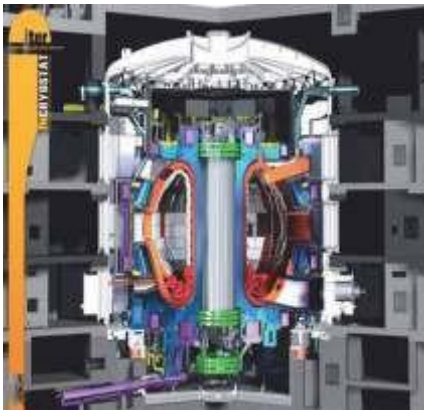
Kerala State
Electricity Board,
Thiruvananthapuram

Ranni Perunad
(2 x 2000 kW) HEP
Horizontal Kaplan S type

Ascent Hydro
Projects Ltd.
(Mumbai) Project,
Himachal Pradesh
Panavi
(2 x 2000 kW) HEP
Horizontal Pelton

# INSTALLATIONS

## NUCLEAR



ITER, France

Pumping Package for International Thermonuclear Experimental Reactor (ITER) in France through L&T India

Project: 1 x 500 MW Thermonuclear Reactor (Based on Fusion Technology)

Received Prestigious Contract for Supply of 45 Pump sets for CCW and Heat Recovery System

Tarapur Atomic Power Project, India

Primary Moderator Pumps

Tarapore Atomic Power Station, NPCIL

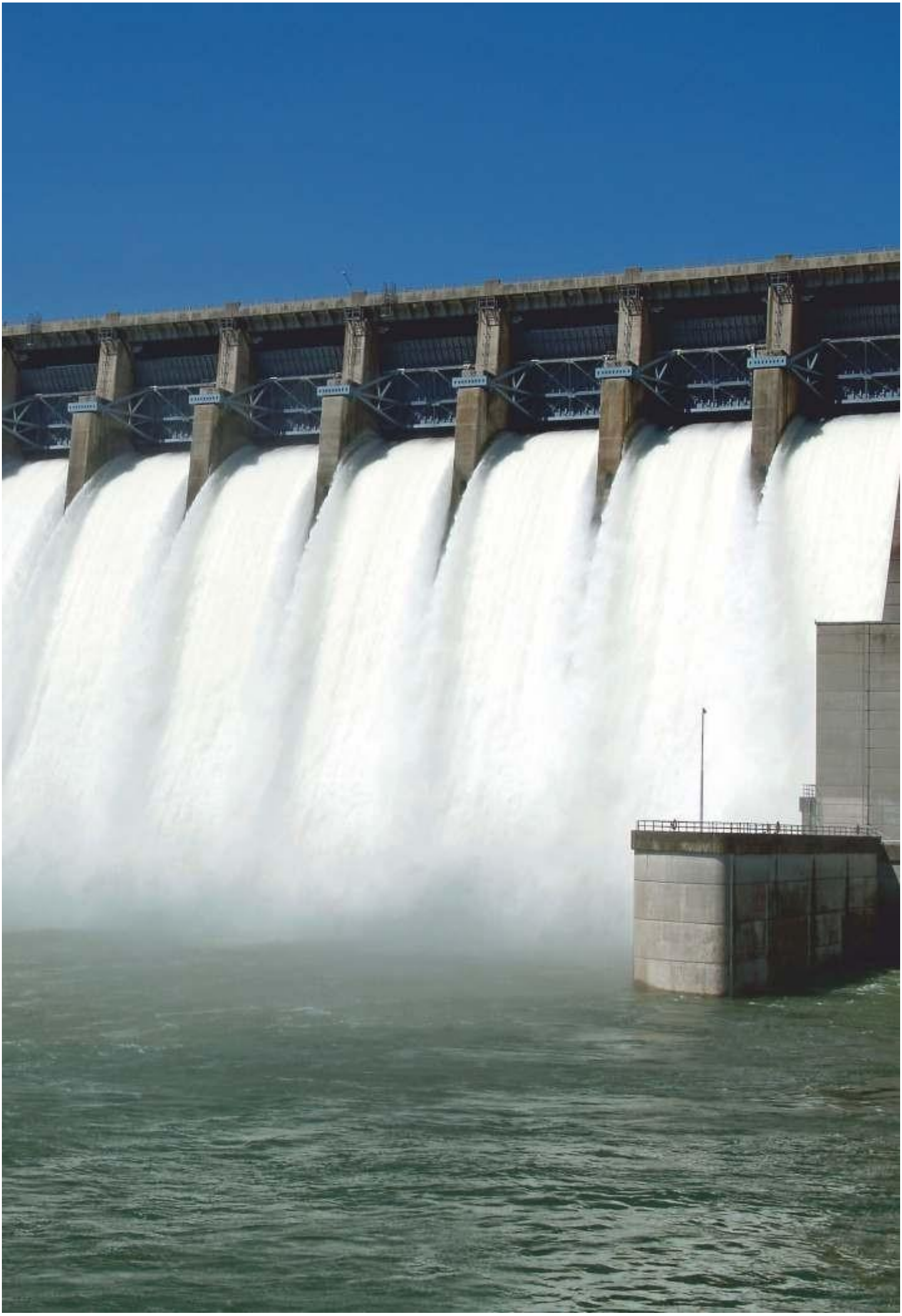
Circulating Water System (2 x 500 MW Tarapore Atomic Power station)

Kalpakkam, BHAVINI

Indigenously developed Primary Sodium Pump (1 x 500 MW Fast Breeder Reactor)

Kalpakkam, BHAVINI

Indigenously developed Secondary Sodium Pump (1 x 500 MW Fast Breeder Reactor)



# HYDRO TURBINES

KBL offers turnkey hydro turbine solutions, from Concept to Commissioning, with a special emphasis on planning, engineering, design, manufacturing, supply, transportation, insurance, erection, testing & commissioning of the electro-mechanical equipment for “Water to Wire” solutions for hydro projects.

The Company is capable of taking up single point responsibility from concept to commissioning

- Well-equipped research & development centre
- State of the art integrated manufacturing facilities
- Modern in-house foundry and machining facilities
- System engineering for design of high efficient system
- Complete mechanical/electrical/instrumentation design
- Comprehensive project management capabilities
- Enterprise resource planning
- Installation, testing & commissioning of equipment
- Quality control and assurance
- Integrated site services and support
- Performance guarantee testing
- Operation & maintenance

# HYDRO TURBINES

## KAPLAN TURBINE

2 x 5500 kW Konal HEP

2 x 2450 kW Darna HEP

KBL offers full range of Kaplan turbines in vertical as well as horizontal orientation for lower heads applications. (from 5-60 metre head)

- Vertical full and semi-kaplan turbines
- S type tubular in horizontal orientation
- Up to 20 MW single unit capacity

Major Projects:

- 2 x 5500 kW Konal HEP
- 1 x 3607 kW TPC Zho Suwei HEP, Taiwan
- 2 x 6500 kW Ankhe-Kanak HEP, Vietnam
- 2 x 2450 kW Darna HEP
- 2 x 2000 kW Ranni-Perunad HEP
- 2 x 2000 kW Periyar Vagai-I HEP
- 2 x 1250 kW Periyar Vagai-II HEP
- 2 x 2000 kW Periyar Vagai-III HEP

## FRANCIS TURBINE

2 x 2250 kW Sechi HEP

2 x 1500 + 1 x 500 kW Adyanpara HEP

KBL offers full range of Francis turbines for medium and high heads application. KBL has various proven & efficient models of Francis turbine with horizontal as well as vertical orientation. KBL offers Francis turbine of capacity up to 20 MW Single unit.

Major Projects:

- 2 x 2250 kW Sechi HEP
- 1 x 3500 kW Dhom Balkewadi HEP
- 2 x 1750 kW Balij-ka-Nala HEP
- 3 x 3000 kW Sarju-III HEP
- 2 x 1500 + 1 x 500 kW Adyanpara HEP
- 3 x 5000 kW Barapole HEP
- 3 x 3500 kW Sarju-II HEP

# HYDRO TURBINES

## PELTON TURBINE

Pelton Runner at works

2 x 2000 kW Panwi HEP

KBL offers full range of Pelton turbines for higher head applications.

- Single & twin jet pelton turbine in horizontal configuration

Major Projects:

- 2 x 2250 kW Panwi HEP
- 3 x 4000 kW Raura HEP

## Pump as Turbine (pat)-an Innovative Solution

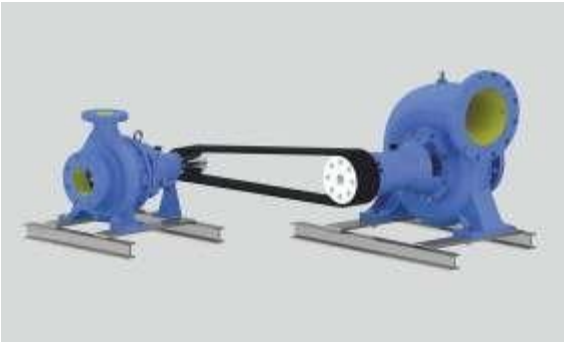
KBL has developed a unique solution in the form of Pump As Turbine (PAT) for micro hydro power (Up to 100 kW). Pump as turbine offers a distinct advantage of economy combined with balance of ecology and protection of environment.

A centrifugal pump that operates in reverse mode as a turbine, works on the same principle as a Francis turbine. The energy is recovered from pressure differences (head); while flow is fed back into the existing system. Both, direct drives of machinery (e.g. a pump) and electricity generation (grid connected or isolated) or combinations of both of these are possible using PAT just as with a conventional turbine.

To improve the accuracy of prediction, Kirloskar Brothers Limited has invested in testing and verifying of results, using computational techniques of large number of pumps of various capacities and specific speeds in turbine modes and have acquired the capabilities to offer the pump as turbine as per the specific needs of the customers.

Advantages:

- Lower initial cost as it is a standard pump (almost half the cost of conventional hydro-turbine of equivalent size)
- Easy maintenance. No special equipment or skill is required for maintenance
- Unique solutions for remote hilly region

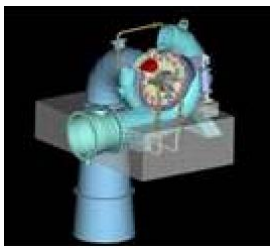
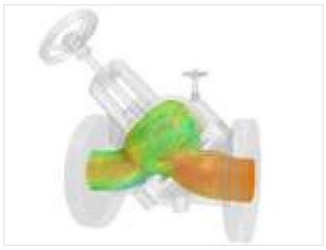
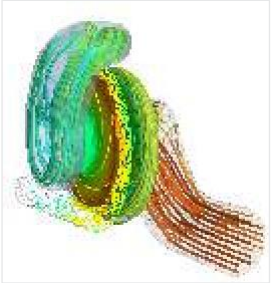
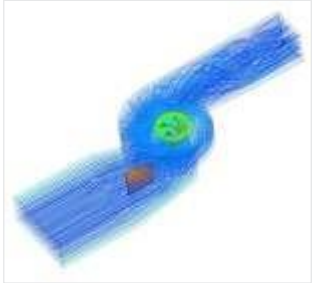
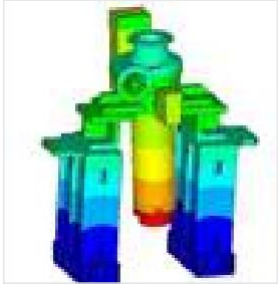


# ENGINEERING EXCELLENCE

KBL's Corporate Research & Engineering Division (CRED) is equipped with the latest computational facilities. The testing facilities are available at our manufacturing plants.

CRED is equipped with softwares like:

| Software in Use | No. of sets/units |
|---|---|
| Pro-E Wildfire (for Solid Modelling) creo 1.0 | 44 seats |
| Pro Mechanical (for preliminary structural analysis | 3 seats |
| Ansys Mechanical/Pre-processor (for mechanical behavior) | 3 seats |
| MSC Nastran/FEMAP (for mechanical behavior) | 3 seats |
| Ansys CFX (For CFD studies) 14.0 | 4 sears |
| Surge Analysis Package | 1 seat |
| Turbo Design-1 (for inverse design) (V-5) | 1 seat |
| Star CCM (Comprehension engineering physics integrated inside single package) 7.011 | 2 seats |
| AFT Phathom (Piping system design for incompressible fluid) | 1 seat |
| Windchill-M-90 | 50 seats |
| JMAG V 10.5 (Electrical machines by finite element method) | 1 seat |
| Hyperworks V-11 | 25 units |
| L S Dyna | 1 seat |
| Math CAD | 1 seat |
| Autodesk ultimate (for solid modeling, surface modeling & 2D drawing) | 13 seats |
| Autodesk standard (for surface modeling & 2D drawing) | 25 seats |
| AFT Arrow (Piping system design for compressible fluid) | 1 seat |

Capabilities

- High performance product design and development
- Sump model studies
- Intake study analysis using computational fluid dynamic techniques
- Surge analysis
- Structural analysis
- Cavitation studies
- Seismic analysis
- Thermal analysis
- Vibration analysis
- Transient analysis
- Heat transfer

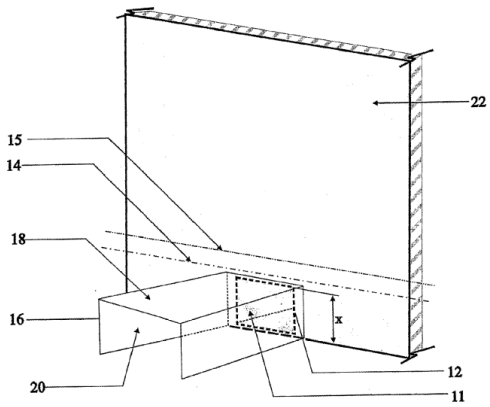
## Rapid Prototyping

Rapid prototyping is the automatic construction of physical objects using solid free form fabrication. It takes virtual designs from computer aided design or animation modeling software, which creates each cross section in physical space. The primary advantage is its ability to create almost any shape or geometric feature.

## US Patents

### Sump Design To Reduce Submergence

A patent titled “arrangements for pumping fluids from sumps” was published in US on March 4, 2010. The patented technology and design is helpful in elimination of air entrainment and reduction of minimum submergence.




As a result of reduction of minimum submergence, overall excavation of the pump house reduces. This helps save cost of excavation of the pit as well as in the concrete lining.

### Siphon Creation and Breaking for Pumps

US patent has been awarded for siphon creation and breaking arrangement designed by KBL for concrete volute and vertical turbine pumps for Sardar Sarovar Project.

This energy efficient siphon arrangement facilitates:

- Reduction in installed power by 8.5 MW
- Energy conservation of 34.96 million units per annum
- Saving in electricity cost worth INR 200 million (4.16 M USD) per annum

# FM/UL FIRE FIGHTING SOLUTIONS

Horizontal Pump Sets

Vertical Pump Sets

FM/UI Approved Gate Valves

Suction Diffuser and Triple Duty Valves

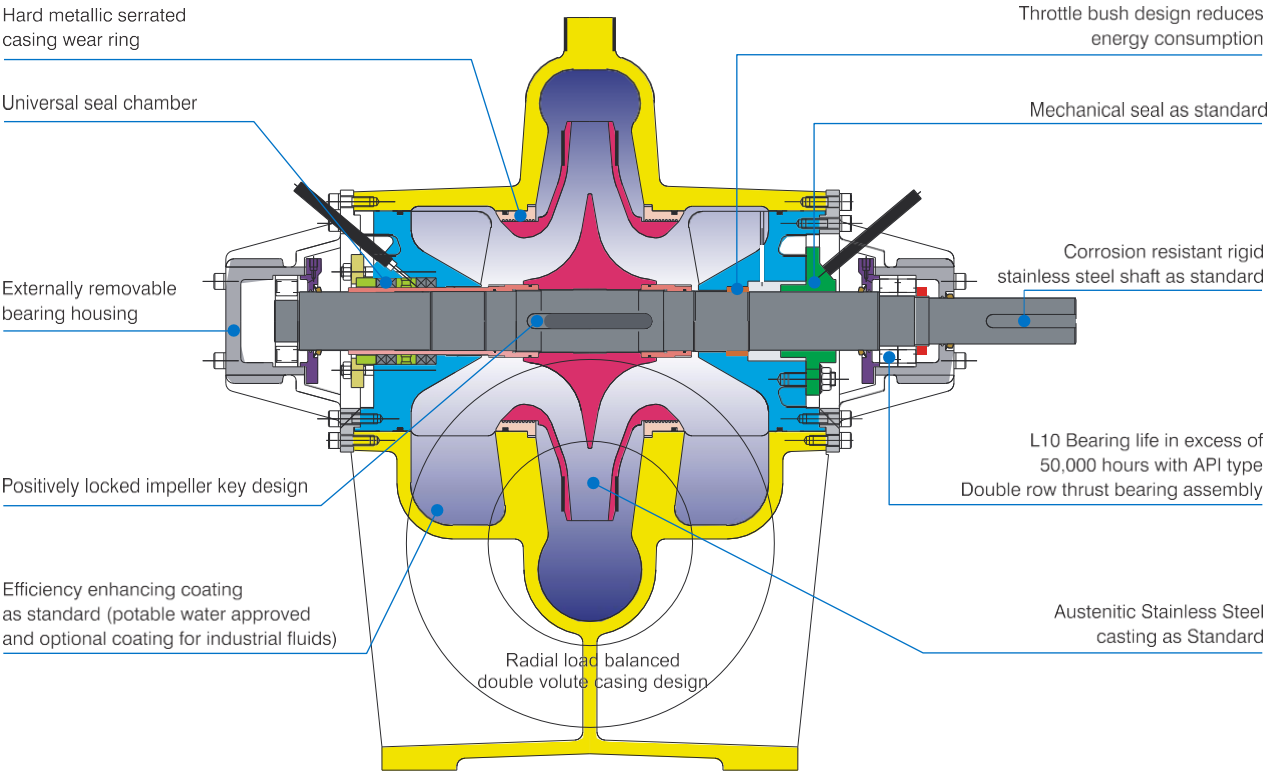
# LOWEST LIFE CYCLE COST (LLC)™: A CONCEPT

- The Life Cycle Cost (LLC) of any equipment is the total "Lifetime Cost" incurred to purchase, install, operate, maintain and dispose it. Typically out of the total cost of running the equipment, the energy cost works out to 80-85%, vis-á-vis capital cost of 1%

- It is in the fundamental interest of the user to evaluate the Life Cycle Cost of different pumping systems before installing a new pumping station and/or carrying out a major overhaul

- Capital expenditure should be thoroughly evaluated, vis-á-vis total Life Cycle Cost over a period of 20 to 25 years

LOWEST LIFE CYCLE COST (LLC)™ SERIES HORIZONTAL PUMP

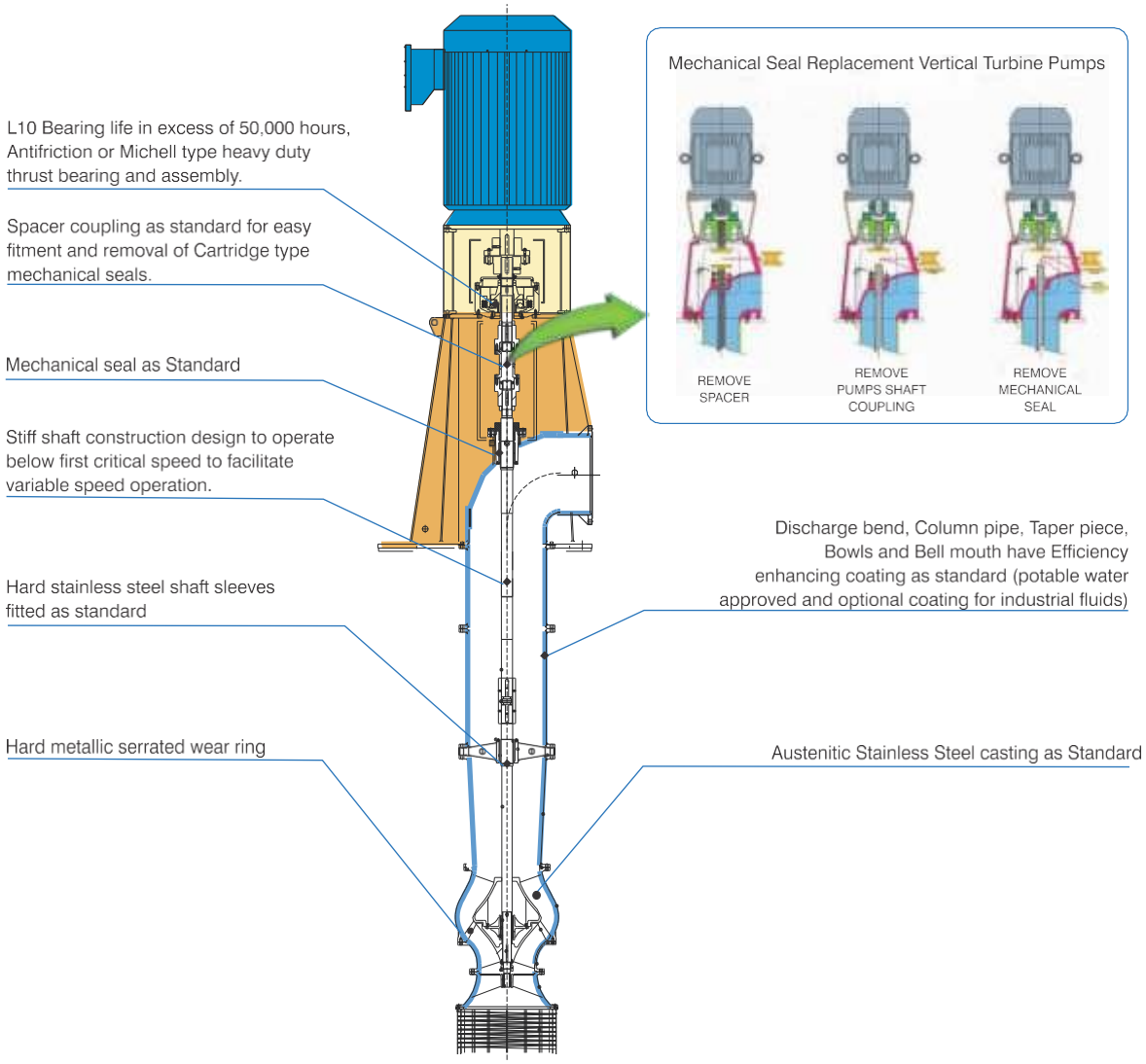



Benefits:

- Enhanced product life
- Sustained efficiency-saving energy
- Accelerated capital cost recovery
- Reduced maintenance and down time
- Reduced carbon footprint
- Cost effective solution

# LOWEST LIFE CYCLE COST (LLC)™: A CONCEPT

## LOWEST LIFE CYCLE COST SERIES (LLC)™ VERTICAL PUMP




Typical Cross-sectional View of KBL-LLC VT Pump

Benefits:

- Enhanced product life
- Sustained efficiency-saving energy
- Accelerated capital cost recovery
- Reduced maintenance and down time
- Reduced carbon footprint
- Cost effective solution

# CUSTOMER SERVICES AND SPARES

Impeccable customer service and use of genuine spares play a vital role in enhancing overall productivity of an organisation. Our Customer Service and Spares Division (CSSD) provides a range of services, right from installation to refurbishment.

Genuine Spare Parts

- Quick delivery and reduced downtime
- Perfect fitment
- Cost savings

**24 x 7 Reliable Service**

- SAP CRM 7.1
- Toll free customer help desk (1800 10 34443)
- Training and workshops
- QR Code
- Web based pump and valves troubleshooting guide

**Refurbishment Centre Services**

- Replacement of Old Pumps
- Annual Maintenance Contract (AMC)
- Overhauling
- Pump Testing
- Anti-corrosive Coating
- Energy Audit
- Dynamic Balancing

# ASSOCIATIONS AND GLOBAL APPROVALS

KBL's association with global consultants, EPC contractors and end users for pump projects in different sectors:

- AES
- Ansaldo Energia
- Blake Durr
- Bechtel
- Black and Veatch
- Daelim Engineers and Contractors
- Doosan Heavy Industries & Construction Ltd.
- Glow Energy
- G E Power & Water
- Hanjung
- Humphreys and Glasgow
- Hyundai
- Hitachi
- Iberese
- Metka S.A.
- Kvaerner Power Gas
- Marubeni Corporation
- Man Ferrostaal
- Mitsubishi Corporation
- Raytheon Engineering
- Rolls Royce
- Siemens Power Gen
- Sumitomo Corporation
- Technip
- Technimont
- Toshiba Corporation
- Toyo Engineering India Ltd.
- JGC Corporation
- Chiyoda Corporation

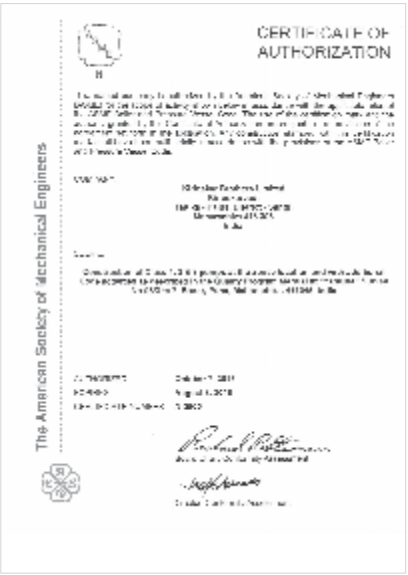
Kirloskarvadi Plant
ISO 14001

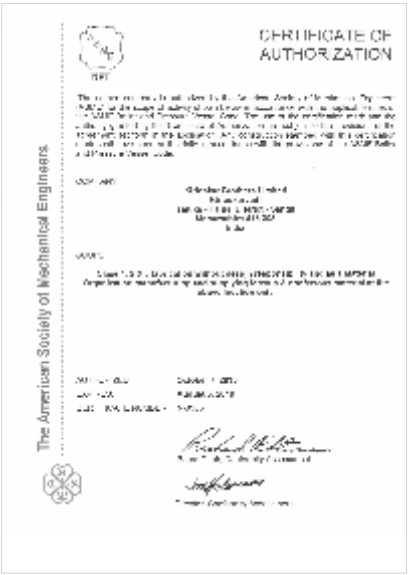
Kirloskarvadi Plant
ISO 9001

Kirloskarvadi Plant
ISO 18001

CE Certificate

N and NPT Certification from ASME



# AWARDS & ACHIEVEMENTS

- Golden Peacock Innovative Product/Service Award
- Best New Firefighting Product Award
- National Award for Excellence in Energy Management
- Marico Foundation's The Innovation for India Awards 2008
- Star Performer in Export Excellence
- Award in Energy Sector for Sustainable Development

# SUBSIDIARIES AND JOINT VENTURES

| | | |
|---|---|---|
| SPP Pumps Ltd., UK | : | Lowest life-cycle cost pumps, packaged pumping system, LPCB, FM/UL fire packages |
| Syncroflo Inc, USA | : | Leading American pump packager, booster and HVAC packages |
| Rodelta Pumps International, The Netherlands | : | Leading manufacturer of API and non API Pumps for oil & gas, pulp & paper, chemicals, fluid management applications |
| Kirloskar Brothers (Thailand) Limited, Thailand | : | Centrifugal pumps for South East Asian markets |
| Kirloskar Pompen BV, The Netherlands | : | Centrifugal pumps for European markets |
| Braybar Pumps Limited, South Africa | : | High head Multi-stage pumps, rubber lined slurry pumps and white metal lined bearings |
| Kirloskar Ebara Pumps Ltd. | : | Boiler feed and API process pumps |
| Kirloskar Corrocoat Pvt. Ltd. | : | Anti-corrosion glass flake coatings |
| The Kolhapur Steel Ltd. | : | Casting In High End metallurgies, including duplex and super duplex |
| Karad Projects & Motors Limited | : | Stators, rotors and electric motors |
| Kirloskar Systech Limited | : | Information technology services, patents and IP creation, system engineering services |

# MANUFACTURING CAPABILITIES


KBL's manufacturing plant at Kirloskarvadi, one of the largest pump manufacturing facilities in Asia.

We offer

- Comprehensive products range
- System engineering
- Project Management
- Manufacturing-Pattern Shop, Foundry, Machining, Testing, Quality Assurance
- Research and Engineering
- Procurement
- Erection and Commissioning
- Product Support

All facilities under one roof captive foundries

- Cast Iron Foundries
- Alloy Cast Steel Foundry
- Non ferrous Foundry
- Centralised Pattern Shop
- Mechanised Sand Processing System
- Automatic Moulding and Metal Pouring System
- Independent units for Cast Iron, Alloy Steel and Non-ferrous Metals and Exotic materials like Duplex and Super Duplex
- Single Casting (CI) weighing up to 14,000 Kg (single piece)
- Extensive and well equipped material testing laboratory

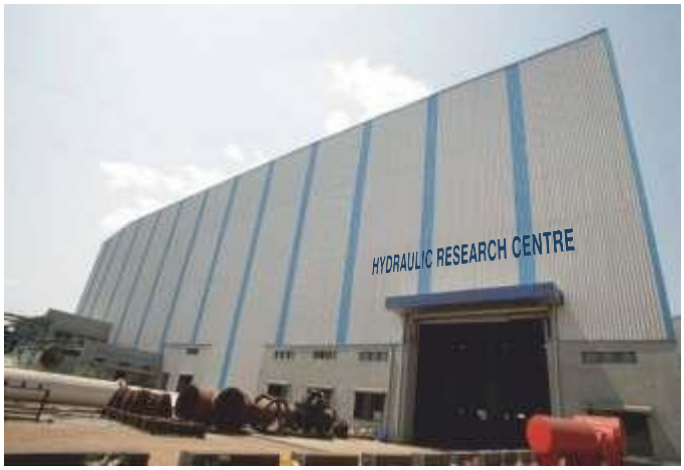
## HYDRAULIC RESEARCH CENTRE

KBL's Hydraulic Research Centre is one of the largest hydraulic research centres in Asia for testing pumps at duty conditions
- for motors up to 5,000 kW (6800 HP)
- discharge up to 50,000 $m^3$/hr (220,000) US GPM

It is equipped with closed circuit NPSH testing capabilities and computerised data acquisition system.

The centre was designed and built under the supervision of British Hydraulic Research Association (BHRA), UK.

This facility is capable of testing pumps at 50 Hz and 60 Hz frequency, covering all global supply voltages (3.3 to13.2 kV).



# MANUFACTURING CAPABILITIES

A view of the automated foundry at Kirloskarvadi.

An impeller core of a large pump is being set in the mould.


Pinnacle machine for aluminium, gun metal patterns.

A large pump component being poured.

CNC machining centre.

A pump impeller under machining on a CNC vertical boring machine.

Metallic volute pump casing.

Assembly and Testing

# MANUFACTURING FACILITIES: INDIA

KIRLOSKARVADI - KIRLOSKAR BROTHERS LIMITED
Western India, Established: 1910

DEWAS - KIRLOSKAR BROTHERS LIMITED
Central India, Established: 1962

KONDHAPURI - KIRLOSKAR BROTHERS LIMITED
Western India, Established: 2001

COIMBATORE - KIRLOSKAR BROTHERS LIMITED
Southern India, Established: 2011


KOLHAPUR - THE KOLHAPUR STEEL LIMITED
Western India, Established: 1965

AHMEDABAD - KIRLOSKAR BROTHERS LIMITED
Western India, Established: 2012


SHIRWAL PLANT - KIRLOSKAR BROTHERS LTD.
Western India, Established: 1992

KIRLOSKARVADI - KIRLOSKAR CORROCOAT PVT. LTD.
Western India, Established: 2006

KIRLOSKARVADI - KIRLOSKAR EBARA PUMPS LTD.
Western India, Established: 1988

# MANUFACTURING FACILITIES: INTERNATIONAL

Industrial and Engineered Pumps

Coleford, United Kingdom

Industrial Pumps

Johannesburg, South Africa

Industrial Pumps

Atlanta, United States of America

Industrial Pumps

Bangkok, Thailand

Industrial Pumps


Velsen Noord, The Netherlands

Packaged Pumping Systems


Atlanta, United States of America

Industrial Pumps

Hengelo, The Netherlands

Since 1928

SWADESHI AND QUALITY

# W. R. TALWALKER BROTHERS PVT. LTD.

An ISO 9001:2015 Certified Company

Authorised Distributors For Kirloskar Products

## Registerd Office

Sharif House, 74, Shahid Bhagatsingh Road, Fort, Mumbai - 400 001
Tel.: +91 22 2266 1110

## Marketing & Sales Mumbai Office

Lentin Chambers, Dalal Street, Fort, Mumbai - 400 001
Tel.: +91 22 22 2265 1774 / 1657 / 1875 Mob No.: +91 98202 79994
*Email:- enquiry@wrtbros.com / wrtbrothers@gmail.com*

## Marketing & Sales Panvel Office / Warehouse

Kolkhe Village, Mumbai - Pune Highway (NH-04), Panvel - 410 206
Tel.: +91 2143 221876 / 77 / 78 / 83 Mob No.: +91 98198 06122
*Email:- wrtpnv@wrtbros.com*

## Associate Group Companies Presence

Mahad | Nagpur | Surat | Vadodara

***www.wrtbros.com***

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