



Enriching Lives

HYDEL POWER

KIRLOSKAR BROTHERS LIMITED
A Kirloskar Group Company



A century of excellence

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. The market leader in fluid management, KBL 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 & domestic pumps, valves and hydro turbines.

In 2003 KBL acquired SPP Pumps, United Kingdom and established SPP INC, Atlanta, USA, as a wholly owned subsidiary of SPP, UK and expanded 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 BV, a joint venture between Kirloskar Brothers International BV and Industrial Pump Group, The Netherlands. In 2010 KBL further consolidated its global position by acquiring 90% stakes in Braybar Pumps, South Africa. SPP MENA was established in Egypt in 2012. KBL has joint venture cooperation with Ebara, Japan since 1988. Kirloskar Corrocoat Private Limited is 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 Ahmedabad, Coimbatore, Kolhapur and Karad. In addition, KBL has seven 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. They 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 m³/hour.

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



Adding reliability and efficiency to hydro power

Optimized pumping and Hydro Power solution – from concept to commissioning across market segments

- Being the largest manufacturer and exporter of Centrifugal Pumps from India, we export to over 80 countries across 6 continents. KBL Hydro turbines are also working satisfactorily in India as well as Abroad.
- Design, Engineering, Manufacture, Supply, Erection, Commissioning and testing of complete electro-mechanical System on “Water to Wire” Concept
- State-of-the-art integrated manufacturing facilities





Environment friendly largest pump & turbine manufacturing facility in India

In-built Strengths

Innovation, Research, Engineering and Development at KBL

For us practicing innovation is more important than being innovative.

We are always the exponent of implementing innovation in every segment of our business and no less than in our products.

We understand our market and it is our long-practiced research methodology to study the market pain areas in order to give a direction to our innovative thought process. Once the requirement is clearly studied our engineering expertise is coupled with a innovation and design products accordingly.

Numerous research papers presented at International Conferences including American Society of Mechanical Engineers(ASME).

KBL is India's first and only Pump Manufacturer to acquire prestigious 'N' and 'NPT' certification from ASME

Fully equipped facilities

- Cutting edge technology with Corporate Research & Engineering Development.
- State-of-the-art integrated manufacturing facility including four axis CNC machine for the profile machining
- In house pattern shop , foundry and quality assurance
- In house system engineering capabilities
- Complete electro mechanical solution provider
- Testing facility at one of Asia's largest Hydraulic Research Centres.

In-depth Expertise

- Design , Engineering, Manufacture, Supply, Installation ,Commissioning and Testing of Hydroelectric Project on " Concept to Commissioning " framework
- KBL is the only turbine manufacturer having one roof manufacturing solution for electromechanical equipments.
- One of Asia's largest Hydraulic Research Centres with state of the art testing facilities.

Product Range (Hydro)

- Francis / Kaplan/ Pelton/ Pump as Turbine(PAT) /Cross Flow turbine
- Horizontal & vertical configuration
- Single unit capacity up to 20MW

Infrastructure

- Non-destructive testing facilities comprising of Radiography, Ultrasonic Testing, Magnetic Particle Testing and Dye Penetrate Testing.
- Material testing laboratory conducting transverse compression and shear hardness test and impact tests, spectrometer for chemical analysis of materials
- Excellent manufacturing facilities including 4 Axis CNC machine for profile machining
- Largest Hydraulic Research Centre (HRC) in Asia outside Japan, for testing pumps at duty conditions up to 5000 kW(motors of 3.3/ 6.6/ 11K) and discharge up to 50,000 m³/hr.
- Conceptualized and built under the guidance and supervision of British Hydraulic Research Association
- Computerized data acquisition system



4-Axis CNC Machine



One of Asia's Largest Hydraulic Research Centre

Well-Equipped Research & Development Center

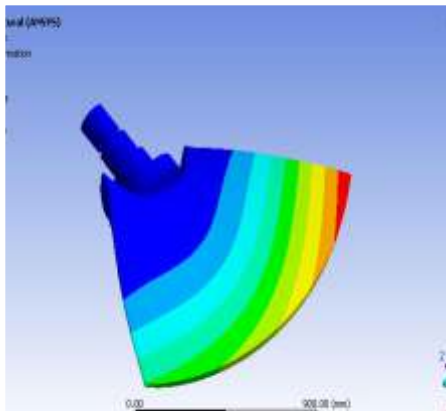
The applied research work conducted in KBL has resulted in appropriate technology for development of many new series of pumps, optimised draft tubes as per site requirement and other components of hydro turbines and many more to come.

Software

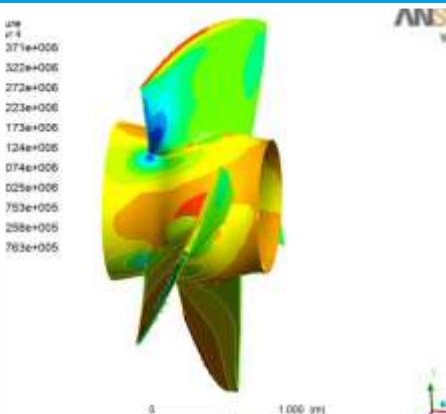
- Pro E wildfire for Solid Modeling
- Pro mechanics (for preliminary structural analysis)
- Ansys Mechanical/Pre processor /MSC Nastran/FEMAP (for mechanical behaviour)
- Ansys CFX (for CFD studies)
- Surge Analysis Package (SAP)
- Turbo Design for inverse design

Technical analysis done

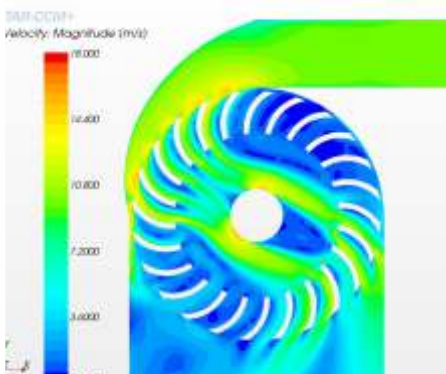
- High performance product design and development
- Torsion analysis
- Sump model studies
- CFD Analysis
- Surge analysis
- Structural analysis
- Cavitation studies
- Seismic analysis
- Thermal analysis
- Vibration Analysis
- Transient analysis
- Non-destructive testing



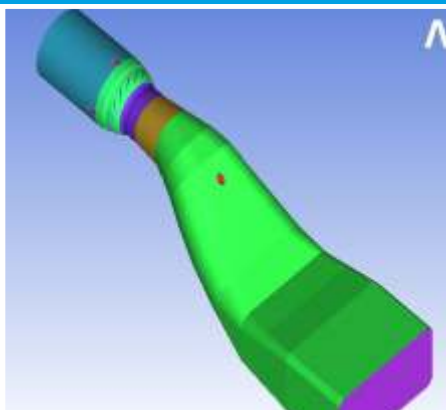
Deformation Pattern of Kaplan Runner Blade



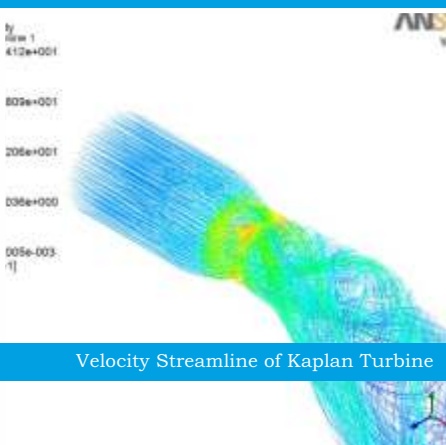
Pressure Contour of Kaplan Runner



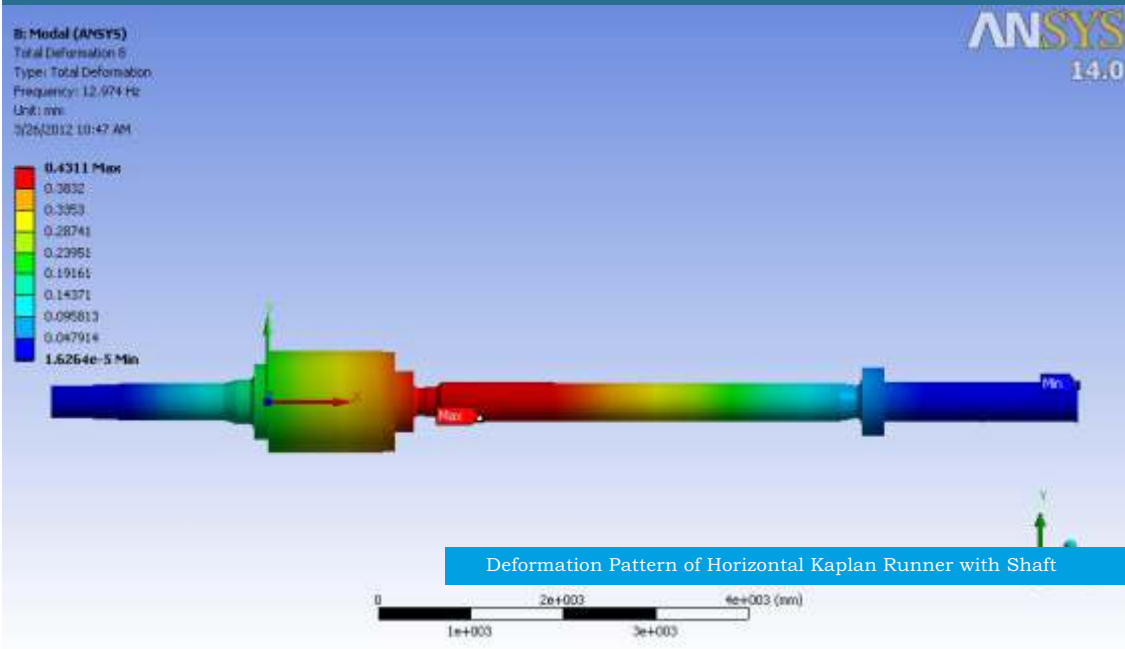
Velocity Contour of Cross flow Turbine



3-D Hydraulic Passage of Kaplan Turbine



Velocity Streamline of Kaplan Turbine



Deformation Pattern of Horizontal Kaplan Runner with Shaft

Manufacturing Excellence-Foundry & Machining

It is our constant endeavour to upgrade and implement the latest and most advanced technology for smooth functioning of our facilities for uninterrupted production and seamless services.

At Kirloskarvadi foundry, The set-up is equipped with centralised pattern shop, mechanised sand processing system, automatic moulding machines and metal pouring system. They are independent units for Cast Iron, Alloy Steel, and Non-Ferrous Metals. The Cast Iron foundry is capable of producing a single casting weighing up to 16000 kg and the Steel foundry unit can produce castings of special Alloy Steels of international standards.

- Cast Iron Foundry
- Alloy Cast Steel Foundry
- Non Ferrous Foundry
- Replicast® Foundry



Automated Foundry



Metal Pouring at Foundry



Kaplan Runner Hub machining on CNC VBM.



Francis Runner machining on CNC VBM



Francis Spiral Casing machining on SK 40 VTL.



Tubular Kaplan Casing Being Machined on WOTON CNC HBM

Project Management

Project management expertise

The strength of KBL lies in its long experience in designing, manufacturing, Installation and commissioning of Hydro Electric Generating System with commitment to innovation, quality and continuous technological advancement, making KBL a one-stop-solution for complete electromechanical package.

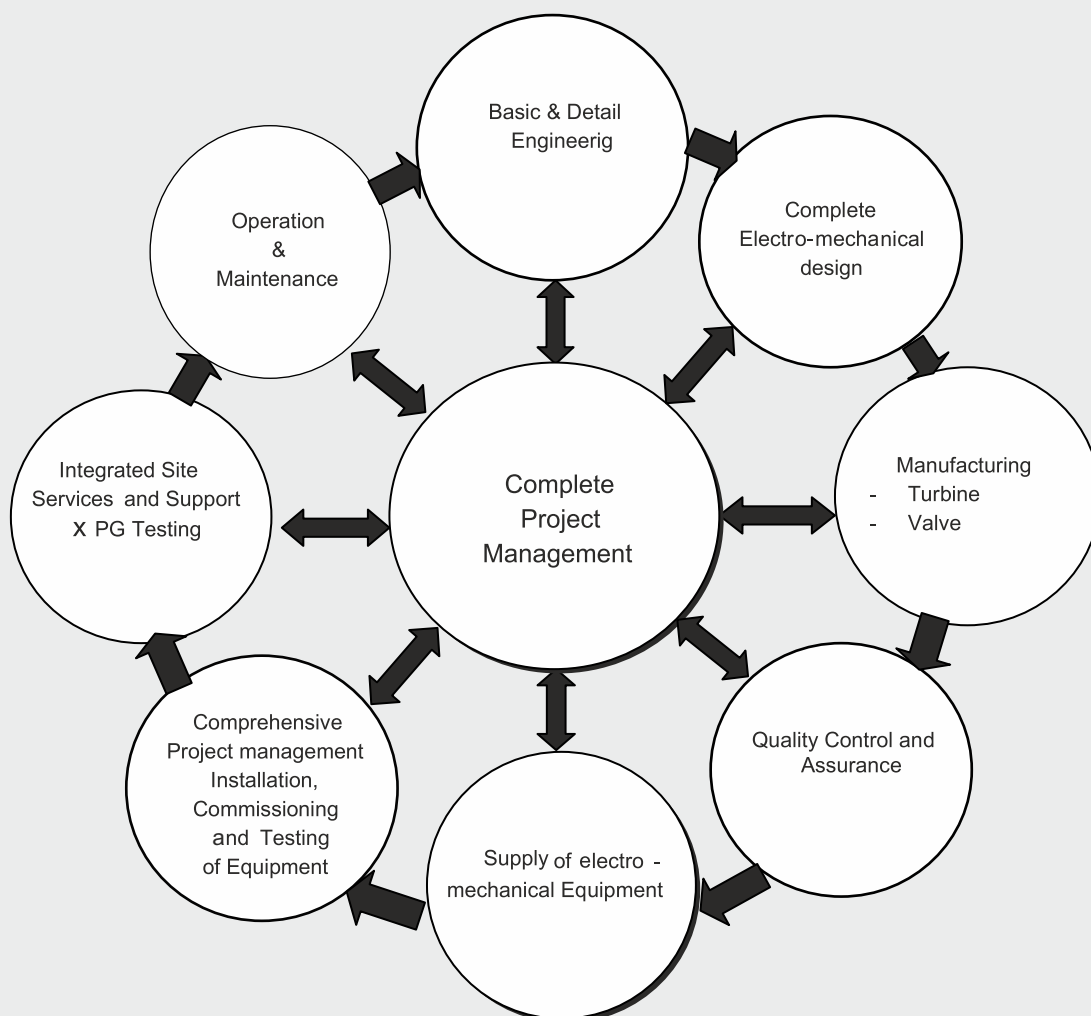
KBL's focus on developing unique, well designed, precisely engineered solutions to solve complex fluid handling problems has earned reputation. KBL's dedicated teams of resourceful engineers using the latest tools and techniques have consolidated KBL's standing as a company who enable timely execution of each project.

Association with international consultants and EPC contractors

KBL is associated with renowned consultants and EPC contractors for projects worldwide, such as ABB Power, Alstom, Ansaldo Energia, Bechtel, Binnie and Partner, Daelim, Dalal, DCL, Desein, ELI, DSD, Hanjung, Humphreys and Glasgow, Hyundai, Hitachi, Kvaerner, Marubeni, Mitsubishi, Rolls Royce, Siemens, Sumitomo, TCE, Toshiba, Toyo and Uhde India, to name a few.

Complete Project Management.....

.....Concept To Commissioning





Erection of Vertical Kaplan Runner Assembly at Site.



Erection of Vertical Generator

Capability Spectrum for Hydro Turbines

Concept to commissioning frame work

- Basic and detail engineering
- Complete Mechanical/ Electrical system design
- High efficient system design & engineering
- Complete instrumentation, PLC,SCADA
- Manufacturing of turbines
- Quality control and Assurance
- Supply of electro mechanical equipment
- Comprehensive project management
- Installation , commissioning ,and testing of equipment
- Intergrated site services and Support
- PG Testing
- Operation & Maintenance capability



Erection of Spiral Casing & Pit Liner



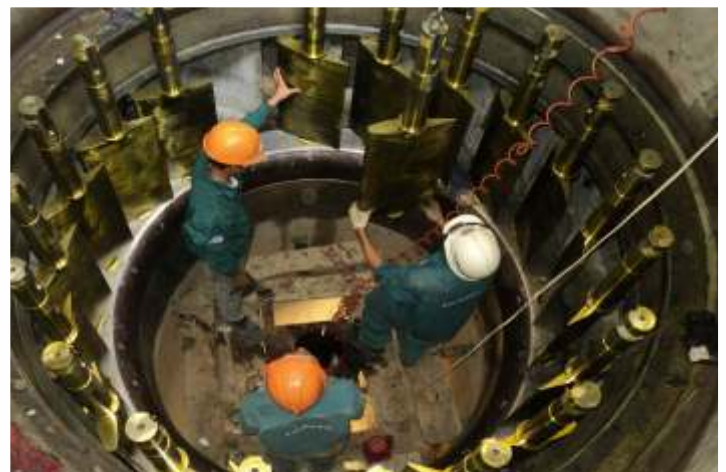
Erection of Spiral Casing



Erection of Draft Tube



Erection of Draft Tube

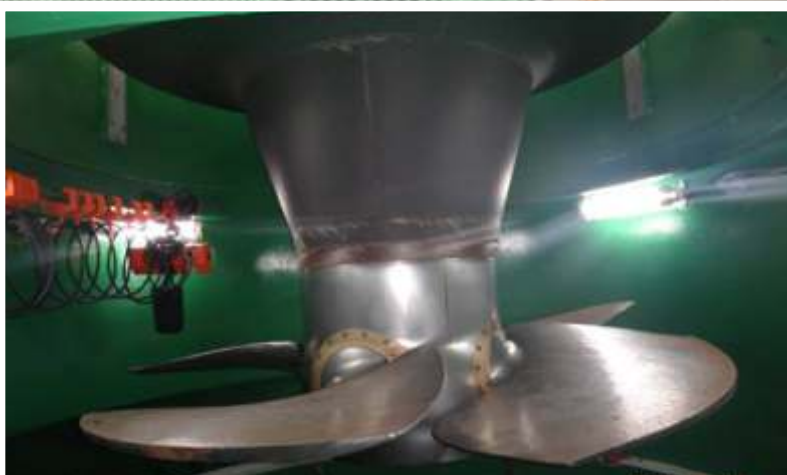


Guide Vane Assembly at Site

MARKET HIGHLIGHT: ABROAD

Capability spectrum for Hydro turbines

Zho Suwei Hydro Power Plant, Taiwan
1 x 3607 kW , Vertical Kaplan Turbine



Ankhe Kanak HEP, Vietnam
2 x 6.5 MW , Vertical Kaplan Turbine



MARKET HIGHLIGHT: INDIA

Vertical Kaplan Turbine



Konal HEP
2 x 5.5 MW Vertical Kaplan Turbines



Runner Assembly of Kasari HEP
1 X 2.5 MW , Vertical Kaplan Turbine



Switchyard

Horizontal S Type Tubular Kaplan Turbine



Ranni Perunad HEP
2 X 2 MW ,Horizontal Kaplan Turbine



Ranni Perunad HEP(Gearbox-generator Assembly)
2 X 2 MW ,Horizontal Kaplan Turbine



Darna HEP
2 X 2.45 MW ,Horizontal Kaplan Turbine



Assembly of Kaplan Runner of Ranni Perunad at works
2X2MW HEP



Periyar Vagai-I
2 X 2000 KW Horizontal Kaplan Turbine



Periyar Vagai-II
2 X 1.25 MW Horizontal Kaplan Turbine

Horizontal Francis Turbine



Sechi HEP
2X2.25MW , Horizontal Francis Turbine



Nugu-II HEP
2 X 750kW ,Horizontal Francis Turbine



Solang HEP
3 X 500 kW ,Horizontal Francis Turbine



Aniyur HEP
2 X 3 MW ,Horizontal Francis Turbine



Aliyar HEP
2 X 1.25 MW ,Horizontal Francis Turbine

Vertical Francis Turbine



Dhom-Balkewadi HEP
1 X 4 MW ,Vertical Francis Turbine



Vertical Francis Runner Assembly at work

Horizontal Twin Jet Pelton Turbine



Pelton Runner at work



2 X 2 MW ,Panvi HEP
Casing Assembly at Works



Panvi HEP
2 X 2 MW ,Horizontal Pelton Turbine at Site

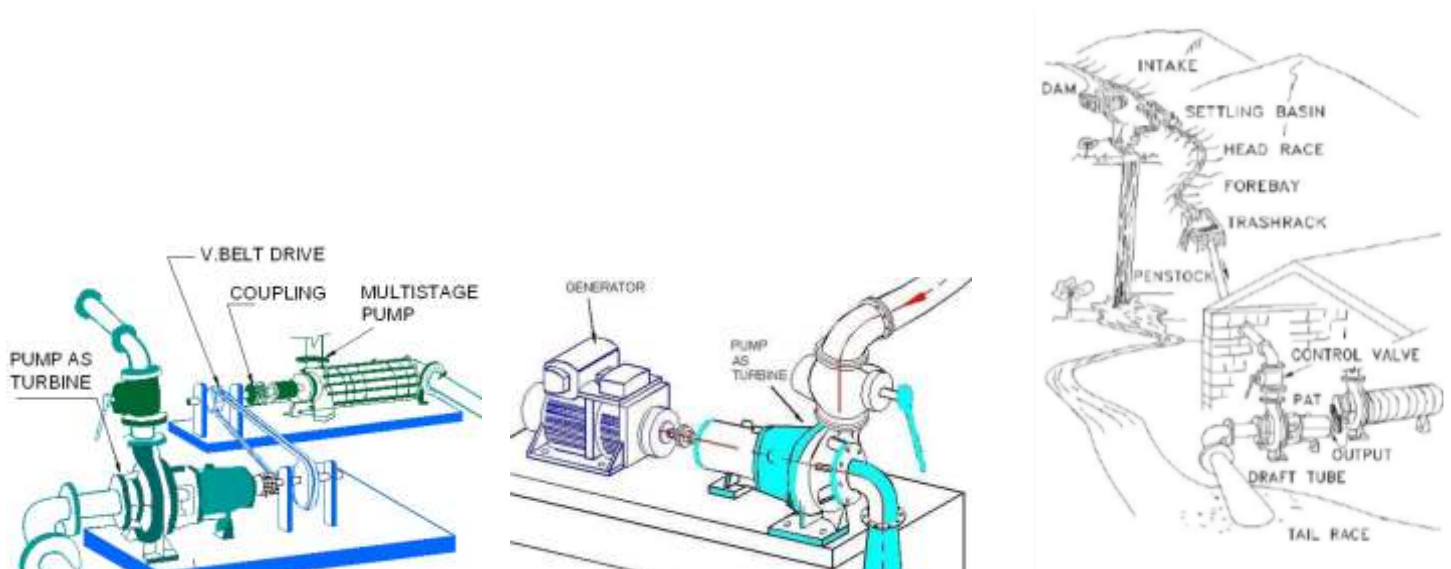
Pump as Turbine (PAT)



KBL has developed a unique solution in form of Pump as Turbine (PAT) for micro hydro power (upto 100 kW).

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.

Typical Project Layout- Pumping Scheme Driven by PAT



Key Benefits

Pump as Turbine (PAT)

- Lower initial cost as it is a standard pump (almost half the cost of conventional hydro turbine of equivalent size).
- Off the shelf product-hence Economic
- Simple and sturdy construction
- Easy maintenance, as pumps have fewer parts than turbines and maintenance personnel experience in pumps operation can as well be used for maintenance of pumps used as turbines.
- No special equipment or skill is required for maintenance
- Spares are also easily available
- The gestation period is relatively less
- Direct drive of machinery, electricity generation (in parallel to a large grid or isolated) or combinations of these is possible just as with a conventional turbine



KBL - Turbine Inlet Valves

- Spares are also easily available
- The gestation period is relatively less
- Direct drive of machinery, electricity generation (in parallel to a large grid or isolated) or combinations of these is possible just as with a conventional turbine



3000 mm Butterfly Valve
Customer : Tamil Nadu Electricity Board, Periyar Vaigai HEP



2100 mm Butterfly Valve
Customer : DLI Power (India) Pvt. Ltd., Darna HEP (2 x 2.45MW)

MARKET HIGHLIGHT: INDIA AND ABROAD



LIST OF HYDRO ELECTRIC PROJECTS

Sr. No.	Name of Project	Installed Capacity(kW)	Project Location (State)	Customer/ Client	Type of machine	Year of commissioning
1	Mukurthy HEP	2 x 350	Tamil Nadu	Tamil Nadu Electricity Board, Tamil Nadu, Chennai	Horizontal Francis	2000
2	Nugu-II HEP	2 x750	Karnataka	Kalson Power Tech Pvt. Ltd., Mumbai	Horizontal Francis	2002
3	Aliyar HEP	2 x 1250	Tamil Nadu	Tamil Nadu Electricity Board, Tamil Nadu, Chennai	Horizontal Francis	2003
4	Solang HEP	3 x 500	Himachal Pradesh	A Power Himalayas Pvt. Ltd. , Paonta Sahib	Horizontal Francis	2003
5	Badrinath HEP	2 x 625	Uttarakhand	Uttaranchal Jal Vidyut Nigam Ltd. Dehradun	Horizontal Francis	2004
6	Nugu-I HEP	2 x 750	Karnataka	Kalson Power Tech Pvt. Ltd., Mumbai	Horizontal Kaplan 'S' type tubular	2004
7	Perunchani HEP	2 x 650	Tamil Nadu	Tamil Nadu Electricity Board, Tamil Nadu, Chennai	Horizontal Kaplan 'S' type tubular	2006
8	Kambang HEP	3 x 2000	Arunachal Pradesh	NHPC, Faridabad	Horizontal Francis	2008
9	Sippi HEP	2 x 2000	Arunachal Pradesh	NHPC, Faridabad	Horizontal Francis	2008
10	Aniyur HEP	2 x 3000	Karnataka	Prasanna Power Ltd., Bangalore	Horizontal Francis	2009
11	Pacha HEP	2 x 1500	Arunachal Pradesh	Nortech Power Projects, Kolkata.	Horizontal Francis	2009
12	Periyar Vaigai-I HEP	2 x 2000	Tamil Nadu	Tamil Nadu Electricity Board, Chennai	Horizontal Kaplan 'S' type tubular	2010
13	Darna HEP	2 x 2450	Maharashtra	DLI Power India Pvt Ltd. Mumbai	Horizontal Kaplan 'S' type tubular	2010
14	Konal HEP	2 x 5500	Maharashtra	Mahalaxmi Vidyut Pvt. Limited ,Pune	Vertical Kaplan	2010
15	Rongli Khola HEP	2 x 2500	Sikkim	Nortech Power Projects Kolkata	Horizontal Francis	2010
16	Brindavan HEP	2 x 2000	Karnataka	Atria Brindavan Power Limited Bangalore	Horizontal Kaplan 'S' type tubular	2010
17	Zho Suwei HEP	1 x 3607	Taiwan	CHEM Taiwan	Vertical full Kaplan	2010
18	Periyar Vaigai-II HEP	2 x 1250	Tamil Nadu	Tamil Nadu Electricity Board, Tamil Nadu, Chennai	Horizontal Kaplan 'S' type tubular	2011
19	Dhom Balkewadi HEP	1 x 3500	Maharashtra	Vishwaj Energy Pvt. Ltd, Pune	Vertical Francis	2011
20	Kasari HEP	1 x 2500	Maharashtra	Vishwaj Energy Pvt. Ltd Pune	Vertical Kaplan	2011
21	Ranni Perunad HEP	2 x 2000	Kerala	Kerala State Electricity Board, Thiruvananthapuram	Horizontal Kaplan S' type tubular	2012
22	Pench-RBC HEP	2 x 700	Maharashtra	SMS Vidhyut Pvt. Ltd. Nagpur	Horizontal Kaplan 'S' type tubular	2012
23	Balij-ka-Nala HEP	2 x 1750	Himachal Pradesh	Batot Hydro PVT. Ltd. Mumbai	Horizontal Francis	2012
24	Sechi HEP	2 x 2250	Himachal Pradesh	Ascent Hydro Projects Ltd. Mumbai	Horizontal Francis	2012
25	Ankhe Kanak HPP	2 x 6500	Vietnam	Hydro Power Project Management Board No. 7, Quy Nhon city, Vietnam	Vertical Kaplan	2012

LIST OF HYDRO ELECTRIC PROJECTS

Sr. No.	Name of Project	Installed Capacity(kW)	Project Location (State)	Customer/ Client	Type of machine	Year of commissioning
26	Panavi HEP	2 x 2000	Himachal Pradesh	Ascent Hydro Projects Ltd. Mumbai	Horizontal Pelton	2013
27	Melan HEP	2 x 2250	Himachal Pradesh	Ascent Hydro Projects Ltd. Mumbai	Horizontal Francis	Under execution
28	Periyar Vaigai-IV HEP	2 x 1250	Tamil Nadu	Tamil Nadu Electricity Board, Chennai	Horizontal Kaplan ‘S’ type tubular	Under execution
29	Sarju-II HEP	3 x 3500	Uttarakhand	Uttar Bharat Hydro Power Limited, Delhi	Horizontal Francis	Under execution
30	Sarju-III HEP	3 x 3000	Uttarakhand	Uttar Bharat Hydro Power Limited Delhi	Horizontal Francis	Under execution
31	Pench-LBC HEP	2 x 2000	Maharashtra	SMS Vidhyut Pvt. Ltd. Maharashtra	Horizontal Kaplan ‘S’ type tubular	Under execution
32	Periyar Vaigai-III HEP	2 x 2000	Tamil Nadu	Tamil Nadu Electricity Board, Chennai	Horizontal Kaplan ‘S’ type tubular	Under Commissioning
33	Bhadravati HEP	1 x 1500	Karnataka	Sai Deepti Power Pvt. Ltd. Hyderabad	Horizontal Francis	Under execution
34	Barapole HEP	3 x 5000	Kerala	Kerala State Electricity Board, Thiruvananthapuram	Horizontal Francis	Under execution
35	Kakkayam HEP	2 x 1500	Kerala	Kerala State Electricity Board, Thiruvananthapuram	Horizontal Kaplan ‘S’ type tubular	Under execution
36	Adyanpara HEP	2 x 1500 + 1 x 500	Kerala	Kerala State Electricity Board, Thiruvananthapuram	Horizontal Francis	Under execution



Enriching Lives

KIRLOSKAR BROTHERS LIMITED

A Kirloskar Group Company

GLOBAL HEADQUARTERS

“Yamuna”, S. No. 98/3 to 7, Baner, Pune - 411045, India

Phone: +91-20-27214444 Email: kblin@kbl.co.in

REGISTERED OFFICE

Udyog Bhavan, Tilak Road, Pune - 411002, India

Phone: +91-20-24440156 Fax: +91-24440156

GLOBAL PRESENCE

Cambodia | Egypt | India | Lao PDR | Senegal | South Africa | Thailand | The Netherlands
| United Arab Emirates | United Kingdom | United States of America | Vietnam

www.kirloskarpumps.com

OUR COMPANIES



United Kingdom



U.S.A.



South Africa



India



The Netherlands