

# Water is Life . . . .



# . . . . We give Life to Water



Enriching Lives

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# **A PRESENTATION BY KIRLOSKAR BROTHERS LIMITED**



Enriching Lives

## The Kirloskar Group Company profiles

The Kirloskar Group, one of the India's leading engineering conglomerates has diverse business interest ranging from Centrifugal Pumps, Engines, Ferrous Metals & Screw & Reciprocating Compressors with over a century of experience and US \$ 1340 M in revenues\*.

\* Consolidated group revenues, FY 2009 – 10

# Kirloskar Brothers Limited



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<b>Established</b>	1888
<b>Incorporated</b>	1920
<b>Core business</b>	Centrifugal pumps, Valves, Hydel turbines, Pumping Projects

<b>Summary financials</b>	<b>(FY: 2009-10)</b>
---------------------------	----------------------

<b>Revenues</b>	US \$ 597 Million
<b>Net worth</b>	US \$ 176 Million
<b>Pre tax profit</b>	US \$ 43 Million
<b>Market Cap</b>	US \$ 511 Million



**'Yamuna'** – Global Headquarters, Kirloskar Brothers Limited, India , LEED Certified Platinum Rated Green Building.

**Leader in fluid handling and largest manufacturer and exporter of Centrifugal pumps.**



# Kirloskar Oil Engines Limited



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Business Summary	
Incorporated	1946
Main business	Diesel / gas engines, thin walled bearings
Summary Financials (FY: 2009-10)	
Revenues	US \$ 493 Million
Net worth	US \$ 151 Million
Pre tax profit	US \$ 59 Million



**Manufacturer of the widest range of diesel engines in India**

# Kirloskar Ferrous Industries Limited



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## Business Summary

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Incorporated	1994
Main business	Grey iron castings, pig iron

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## Summary Financials (FY: 2009-10)

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Revenues	US \$ 180 Million
Net worth	US \$ 73 Million
Pre tax profit	US \$ 16 Million

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The only foundry in Asia that is backward integrated to pig iron.

# Joint Ventures and Subsidiaries



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<b>Kirloskar Toyota (1995)</b>	Textile machinery and auto transmission components
<b>Kirloskar Chillers (1995)</b>	Large air-conditioning systems on turn key basis
<b>Toyota Kirloskar Motors Limited (1997)</b>	Light motor vehicles . Second largest manufacturer of utility vehicles in India
<b>Denso Kirloskar (1998)</b>	Engine radiators
<b>Toyota Gosei (1998)</b>	Non-metallic auto components such as steering wheels, dashboards, etc.
<b>Kirloskar Tsusho (1998)</b>	Steel supply to car companies and ancillaries
<b>Toyota Kirloskar Auto Parts ( 2002)</b>	Metallic auto components such as transmissions, steering gears, front and rear axles

# Business Of KBL



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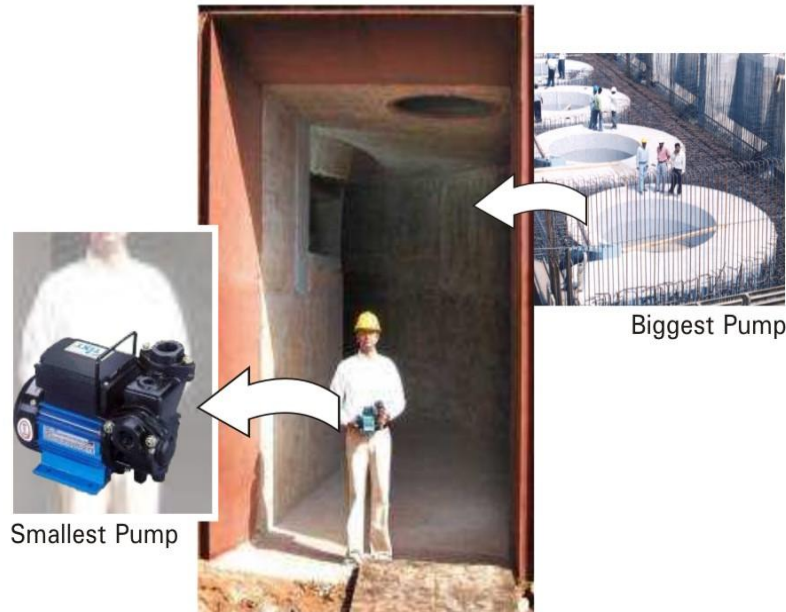
- Largest manufacturer and exporter of centrifugal pumps from India
- Leading manufacturer of Valves and Hydel Turbines
- Energy efficient innovative pumping solutions for core sectors such as Power, Water, Irrigation and Industries
- Manufactures the largest pumps by size and horsepower in India
- Commands the highest market capitalization amongst the pump manufacturers in India
- Pioneered centrifugal pumps in India and introduced the following in India:
  - Split-case pumps
  - Process pumps
  - Large Vertical Mixed flow pumps
  - Canned motor pumps
  - Metallic Volute pumps
  - Concrete Volute pumps
  - Primary / secondary moderator pumps for liquid sodium for fast breeder reactor technology for Nuclear Power Plants

# Giving Life To Water



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- Pumps up to 26 MW
- Valves up to 4500 mm Nominal Bore
- Hydel turbines up to 25 MW
- Turnkey and EPC Pump Projects
- Large Engineered Pumps
- Industrial Pumps
- Agricultural & Domestic Pumps
- Hydel Power Projects
- LT Induction Motors up to 315 frame



A man standing at the discharge pipe of KBL's biggest pump & holding KBL's smallest pump

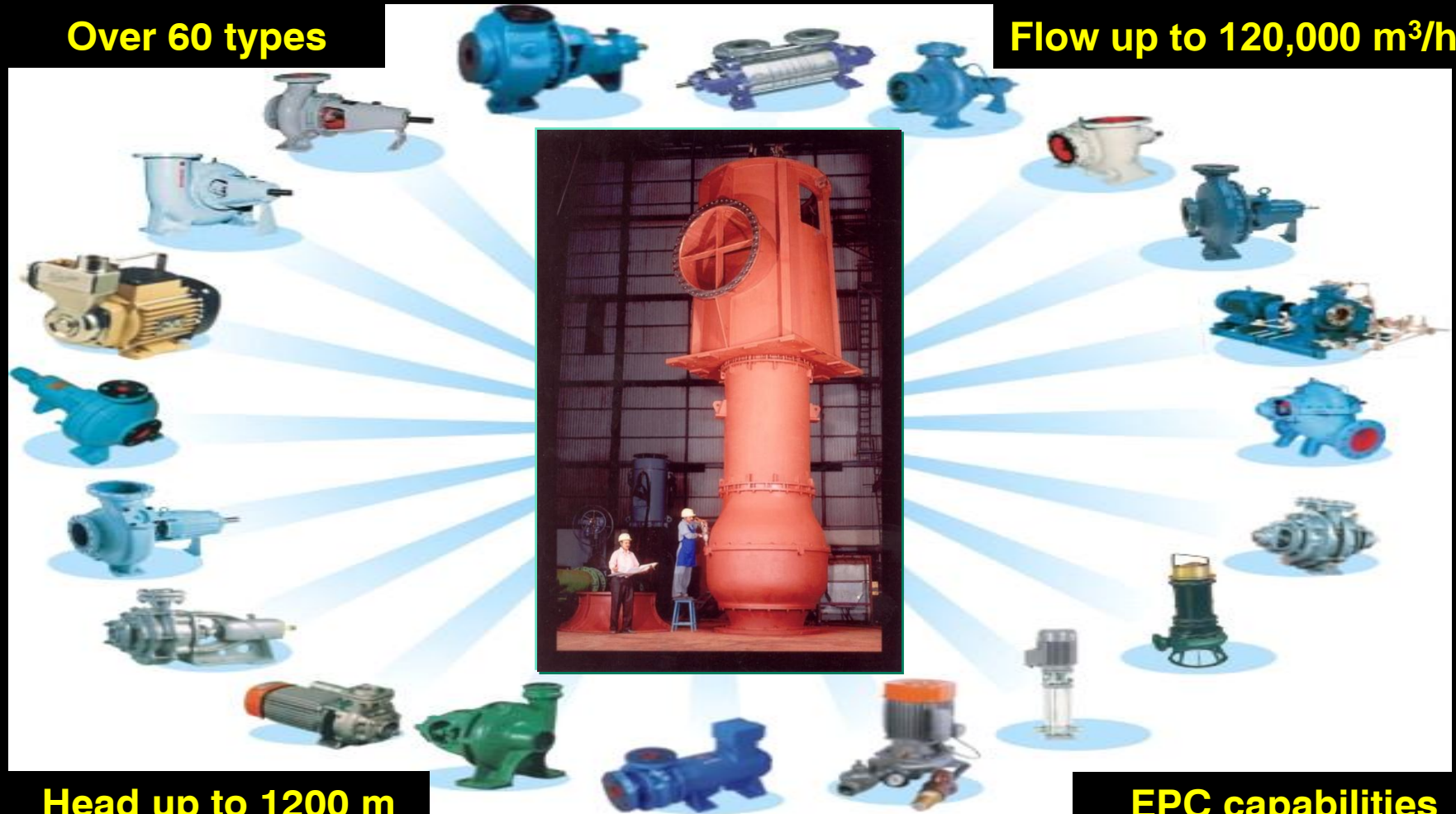
# Range Of Pumps



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**Over 60 types**

**Flow up to 120,000 m<sup>3</sup>/hr**



**Head up to 1200 m**

**EPC capabilities**



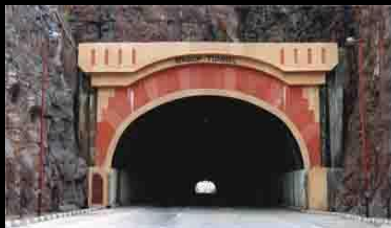
# Domestic Subsidiaries



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## KIRLOSKAR BROTHERS LIMITED

Kirloskar  
Construction and  
Engineers Limited  
(2006)



- Cross country and submarine pipelines
- Tunneling and underground caverns
- Bridges and roads
- Civil construction

Gondwana  
Engineers  
Private Limited  
(2007)



- Turnkey sewage and effluent treatment plants

The Kolhapur  
Steel Limited  
(2007)



- Large alloy steel castings foundry
- Single piece casting of 14 Ton
- 600 Tons / month capacity

Hematic Motors Pvt  
Limited  
(2009)



- Manufacturing of stators, rotors and electric motors

# International Subsidiaries



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## KIRLOSKAR BROTHERS INTERNATIONAL B.V. (2008)

SPP Pumps Limited  
– UK (2003)



- Leading market presence in Fire Pump Packages business
- Lowest life cycle cost pump range
- Assembly units in USA and South Africa

Kirloskar Brothers  
Europe BV – The  
Netherlands (2008)



- Sales and Packaging of centrifugal pumps with focus on European markets

Kirloskar Brothers  
(Thailand) Limited –  
Thailand (2009)



- Sales and Packaging of centrifugal pumps with focus on South East Asian markets

Braybar Pumps  
Limited South Africa  
(2010)



- Manufacturing and Sales of high head multi-Stage pumps, Rubber lined slurry pumps and white metal lined bearings



# Subsidiaries and Joint Ventures



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Kirloskar Corrocoat  
Private Limited

## Core Competencies

- Pump energy efficiency coatings
- Sea Water application
- Single point solution provider

## Opportunities

- Short paybacks on refurbishments
- Growing infrastructure and ports
- Demand for preservation of equipment life



# Subsidiaries and Joint Ventures



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Kirloskar Ebara Pumps  
Limited

## Core Competencies

- API process pumps
- Boiler feed pumps
- Elliot steam turbines

## Opportunities

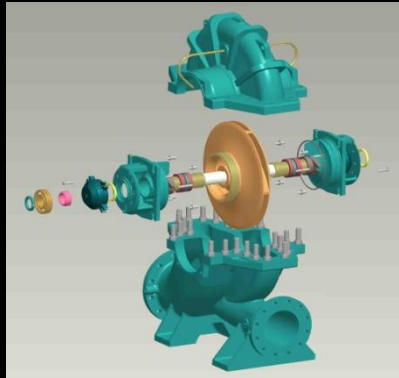
- Growing refinery and power market of India
- Need to address the market using synergy with "KBL marketing" to enhance reach



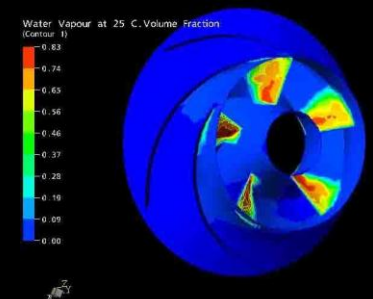
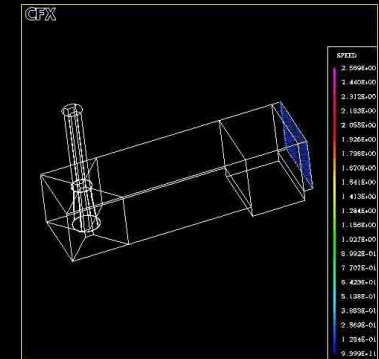
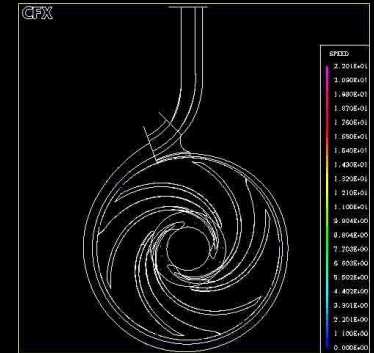
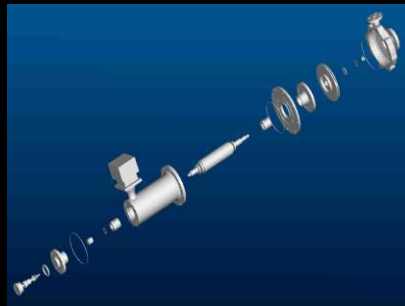
# Research And Engineering Capabilities



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



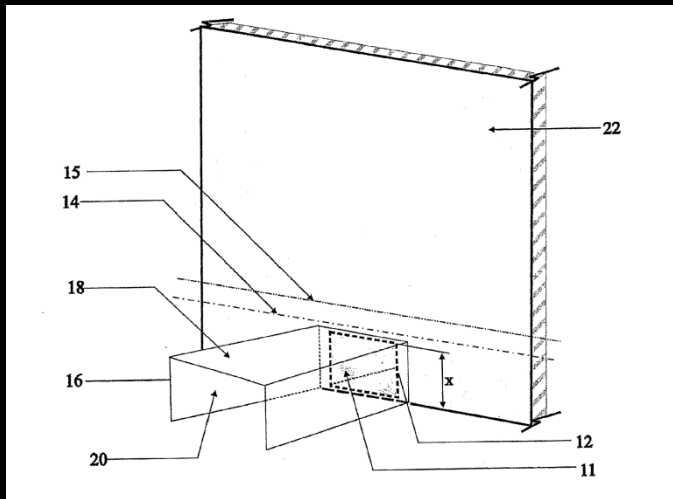
# Recent Achievements



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## US Patent

A Patent titled “Arrangements for pumping fluids from sumps” is published in US on March 04, 2010. This patent 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 saves in the cost of excavation of the pit as well as in the concrete lining.



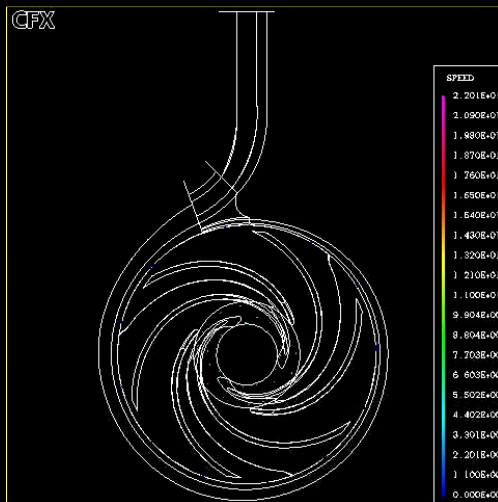
## COMPUTATIONAL FLUID DYNAMICS (CFD)

- Study and visualize flow pattern through complex geometries at design stage.
- Study of compressible and incompressible flows, multiple flows, free surface flows and flow through rotating machines.
- An alternative tool to verify the design.

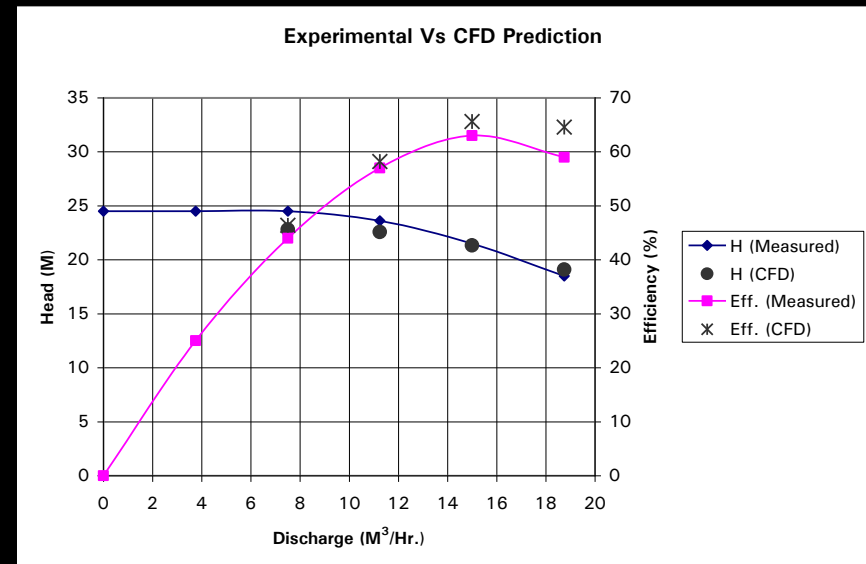
## CFD ANALYSIS

- Flow through pumps
- Flow through draft tubes
- Flow through turbines
- Flow through piping systems
- Flow through sumps
- Multiphase flow studies

## Computational Fluid Dynamics Analysis – Pump



The software is used to verify the design. The rotating impeller and casing are analyzed. The streamlines showing the flow pattern is brought out in rotating impeller and the stationary casing. The colours are indicative of the velocity magnitude.



The CFD results provide much more information than that can be measured. The numerical results are compared with test results from experimental measurements.

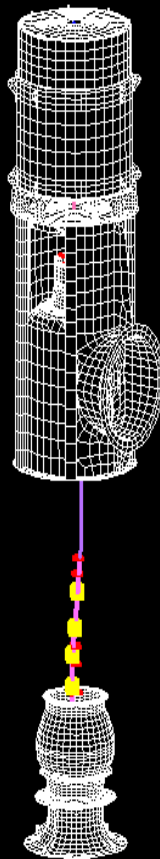


## Structural Analysis

- Study mechanical behavior of the structure.
- Capabilities include
  - Stress Analysis
  - Natural Frequency Estimation,
  - Vibration / Seismic Analysis

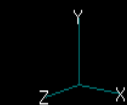
## Natural Frequency Analysis Of Verticle Mixed Flow Pump

V1  
C1



Pump : BHMa120  
Client : DSD Germany  
RPM : 395 (6.58 Hz)  
First Mode -8.75Hz

The first mode of vibration is associated with rotating assembly. The column pipe is removed to show the vibration mode.

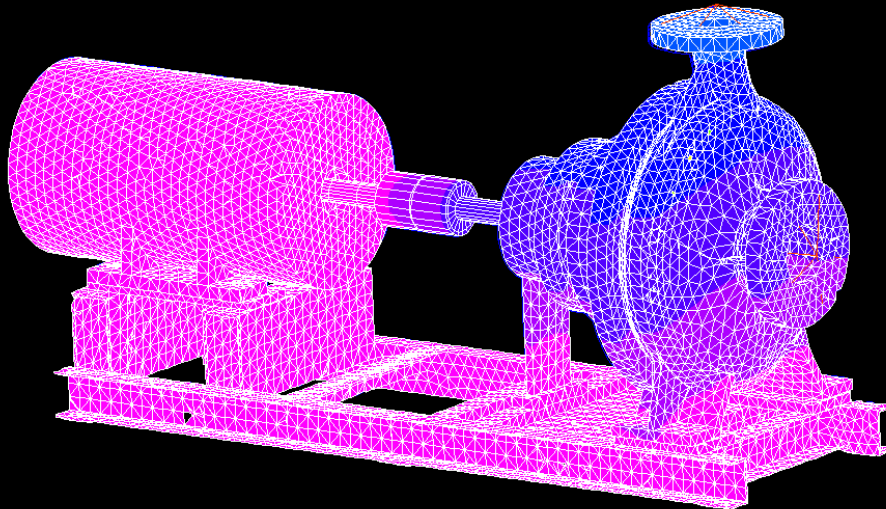


Output Set: Mode 10 24.98957 Hz  
Animate(0.0287): Total Translation



## Seismic Qualification Of End Suction Pump

V1  
L4  
C1



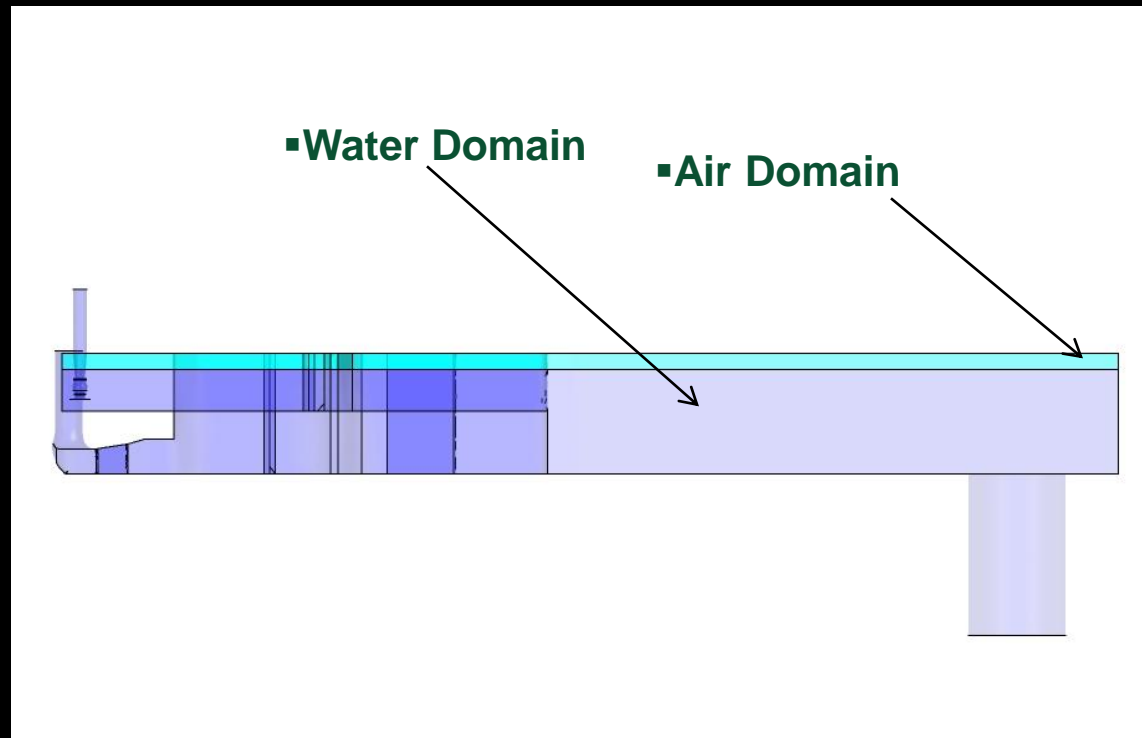
Output Set: Mode 9 252.4481 Hz  
Animate(0.394): Total Translation  
Contour: Total Translation

Pump KPD 65/43  
Client NPCIL, Mumbai  
Project TAPP 3 & 4  
Frequency Associated with 9th  
Mode of Vibration 252.44 Hz

The estimation of natural frequency is the first step towards Seismic Qualification

The Seismic Qualification is carried out as per norms specified in ASME Section III.

## CFD Analysis of Sump using Multiphase flow

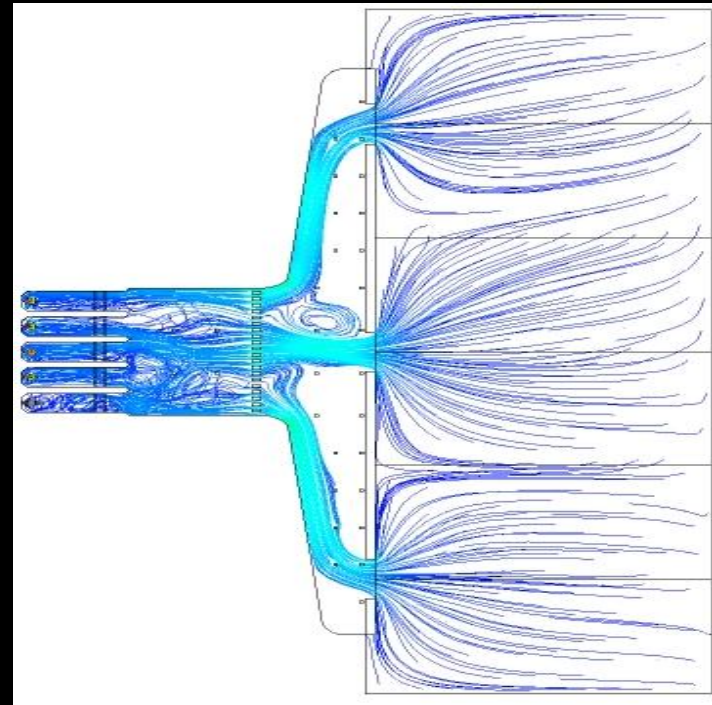
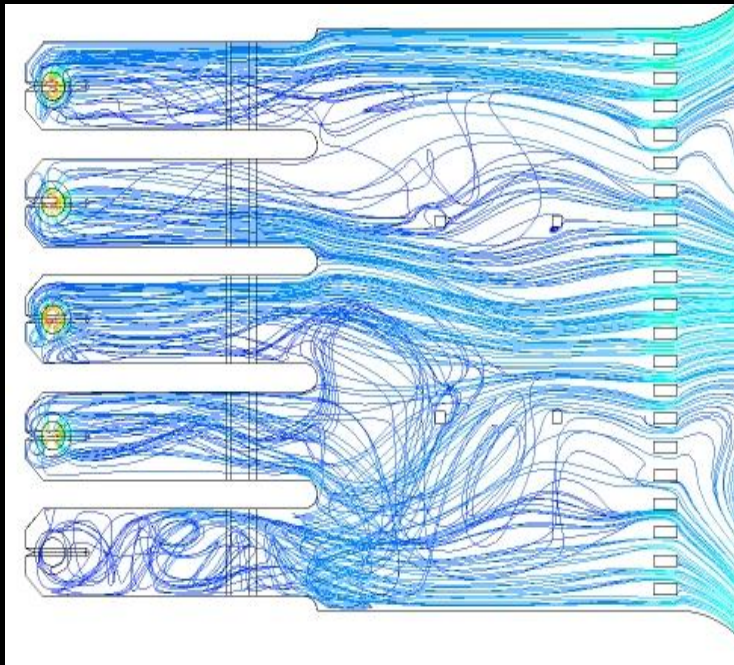


Objective of this study is to predict air entrainment in the pump intake structure using CFD analysis. The problem has been solved using the concept of multiphase flow analysis. The flow domain has been divided into two separate regions namely air and Water.

An artificial air domain has been created above the minimum Water level of the sump structure to perform the analysis. This artificially generated air domain will act as free atmospheric region.

## CFD analysis for Sumps

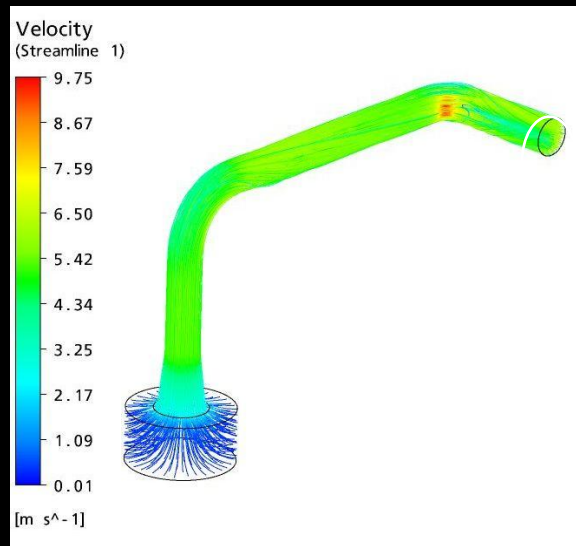
CFD analysis of Meenakshi Coastal thermal power project (For Thermax) – Industry sector



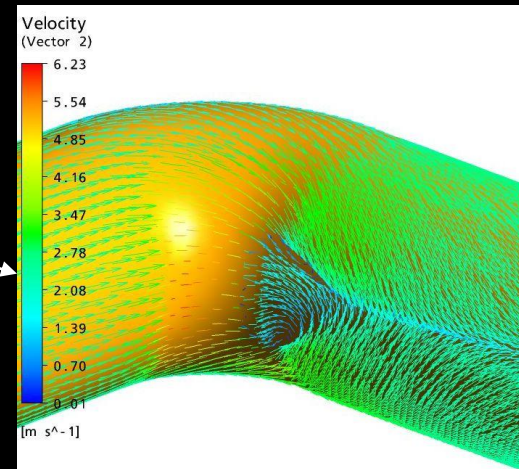
The geometry was modified to get improved flow pattern and reduced swirl angle.

## CFD analysis of Suction piping Layout for Tata steel SCT 350/39 – A/c Industry Sector

Objective- Analysis has been done to check whether the removal of existing Eccentric reducer can help the improvement of flow quality.



**Streamline plot of the piping layout (original)**



**Vector plot at pump entrance**

*The vorticity is very high at the pump entrance and the flow is non uniform. Therefore the present piping layout is not suitable for smooth operation of pump. Same in conveyed to the client.*

## Surge Analysis

Pump delivery mains will have an adverse effect of surge pressure due to sudden closure of valve or sudden stoppage of pumps. KBL is capable to provide solution for surge phenomenon

### Steps Involved:

- Detail study of system
- Modeling the system
- Several iteration for suitable protection devices
- Optimized and Economic solution
- Report generation

# Research And Engineering Capabilities

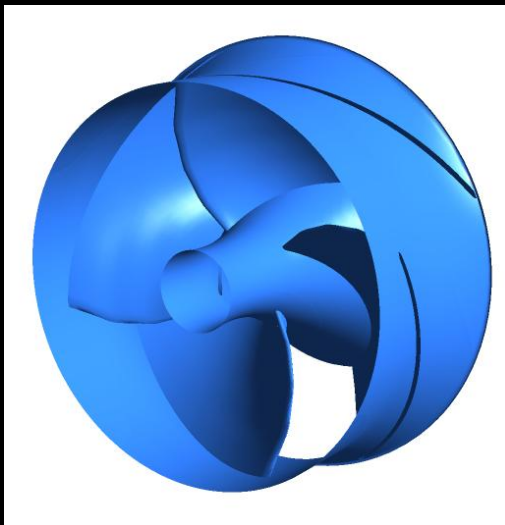


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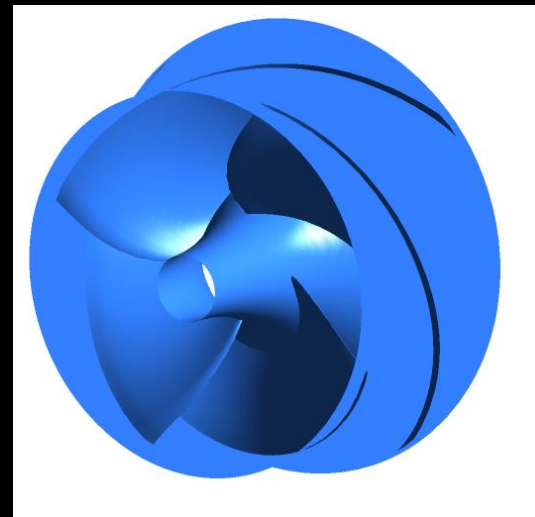
## Turbo Design -1

The inverse design approach is the latest in turbo machinery design. The software input is blade loading and the blade geometry is the outcome of the Software.

At KBL, the software is inducted and the new designs are providing improved performance as regards to efficiency, and cavitation performance.



**ORIGINAL IMPELLER**  
**PUMP EFF. – 83%**



**MODIFIED IMPELLER**  
**PUMP EFF – 87%**

## Resources

### Software Facilities

Advanced computational and experimental facilities including

- |  |   |          |
|--|---|----------|
| • Pro-E Wildfire (For Solid Modeling)                      | : | 10 seats |
| • Pro-Mechanica (For preliminary structural analysis)      | : | 10 seats |
| • Ansys Mechanical/Pre-processor (For mechanical behavior) | : | 3 seats  |
| • MSC Nastran/FEMAP (For mechanical behavior)              | : | 2 seats  |
| • Ansys CFX (For CFD studies)                              | : | 8 seats  |
| • Surge Analysis Package                                   | : | 2 seat   |
| • Turbo Design <sup>n1</sup> (For inverse design)          | : | 4 seat   |



# Research And Engineering Capabilities



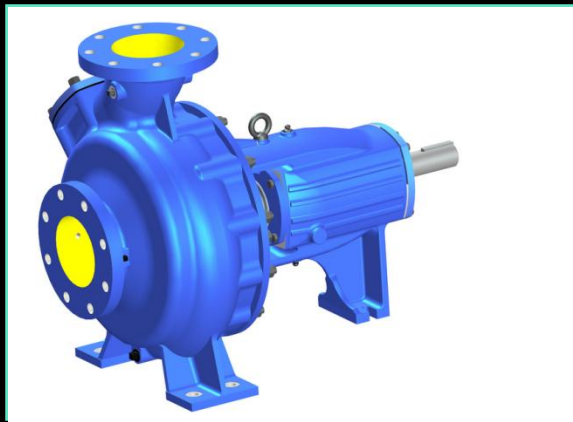
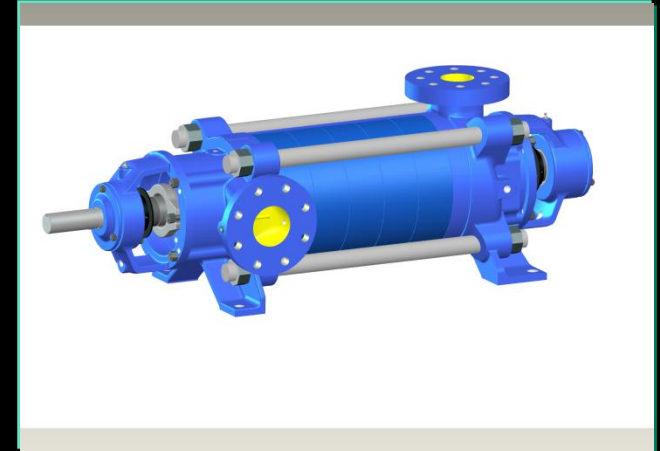
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## Solid models for different Pump types



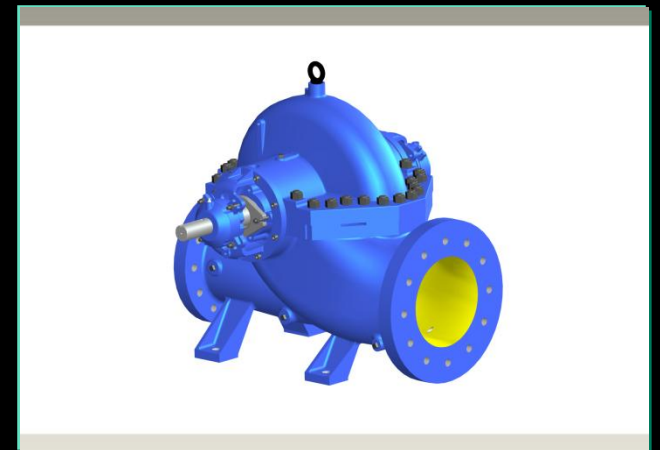
END SUCTION  
DB

MULTISTAGE  
RKB



END SUCTION  
SHL

SPLIT CASE  
SCT



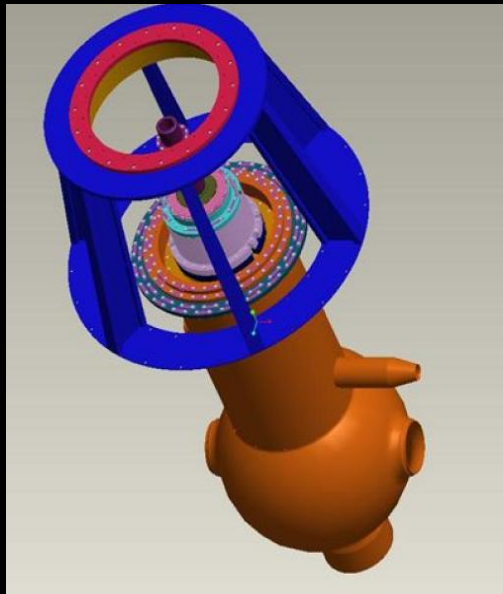


# Research And Engineering Capabilities

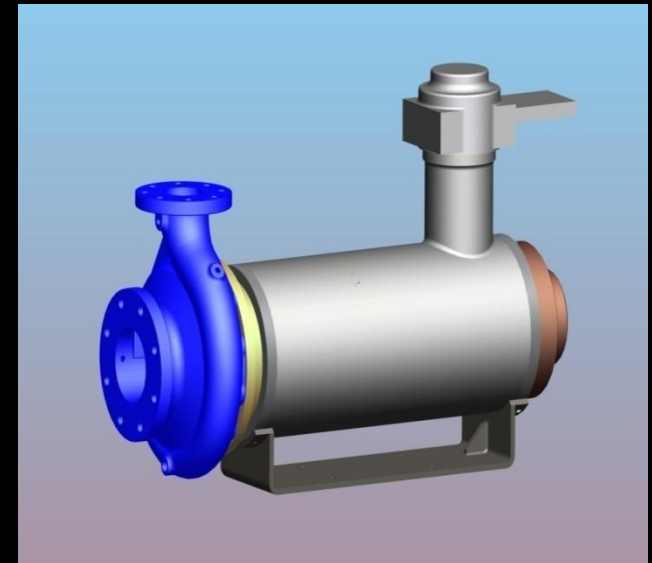


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## Process Pumps



Secondary Heat Transfer Pump  
SSP 600/90



Canned Motor Pump  
CM 40/260-15/2F

# Research And Engineering Capabilities



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## Kirloskarvadi R&D Infrastructure



Stress Relieving Furnace



4mw Electric Motor For Testing Of Primary Sodium Pump

# Hydraulic Research Centre



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- One of Asia's largest Hydraulic Research Centre (HRC) for testing pumps at duty conditions up to 5000 kW motor and discharge up to 50,000 m<sup>3</sup>/hr
- Closed circuit NPSH testing capabilities
- Computerized data acquisition system
- Physical Sump and Pump model study
- Conceptualized and built under the guidance and supervision of British Hydraulic Research Association
- Testing at 50 Hz & 60 Hz frequency covering all global supply voltages (3.3 to 13.2 kV)



# Research Papers Presented by KBL



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S No	Topic	Occasion	Date
1	Numerical Prediction of cavitation free zone operation for Francis Turbine	ASME 2009 Fluids Engineering division Colorado USA	Aug -09
2	Numerical simulation of drawdown in Pump Sumps	4th Int. Symp. on Fluid Mach. & Fluid Engg., Beijing China	Nov-08
3	Numerical prediction of cavitation in model pump	ASME Int. Mech. Engg. Cong. & Expo, Boston, Massachusetts	Nov-08
4	Numerical Simulation of tip clearance in Semi-open impeller pump	5th Joint ASME / JSME Fluid Engineering Conference, San Diego, USA	Jun-07
5	Numerical & experimental investigation of pump in Turbine mode	23rd International Pump User Conference, USA	Sep-06
6	Numerical experiments with solid Handling pumps	ASME fluid summer meeting, Miami, USA	May -06

# Research Papers Presented by KBL



Enriching Lives

S No	Topic	Occasion	Date
7	Experimental and numerical simulation of cavitations in a pump	ASME FEDSM 2005, Houston	Jun-05
8	Investigation of Siphon action in a discharge duct for two phase flow modeling and experimentation	Pisa, Italy, 3 <sup>rd</sup> International Symposium	Sep-04
9	Experimental and computational studies of the effect of 'casing eye rib' on the swirl flow at the exit of a pump as turbine	ASME, HT/FEDSC, 2004, Charlotte, North Carolina, USA	Jul-04
10	Investigation of air entrainment a numerical approach	4th ASME_JSME Joint Fluids Engineering Conference Honolulu, Hawaii, USA	Jul-03
11	Cavitations studies on a model of primary sodium pump	ASME FEDSM 2002 Montreal	Jul-02
12	Numerical experiments on a centrifugal pump	ASME FEDSM 2002 Montreal	Jul-02



# Market Oriented Organization



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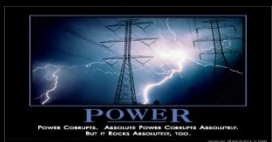
*“one stop shop for most optimized pumping solutions from conceptualization to commissioning across market segments.”*



IRRIGATION



Water



POWER



INDUSTRY



BUILDING &  
CONSTRUCTION



OIL & GAS and MARINE



DISTRIBUTION



CUSTOMER SUPPORT  
&  
SERVICE

# Approved Vendors for Global Consultants and EPC Contractors



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# Association with Governments



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**Angola**



**Cambodia**



**Egypt**



**Ghana**



**Jamaica**



**Laos**



**Lesotho**



**Senegal**



**Sudan**



**Suriname**



**Zimbabwe**






# Across 6 Continents




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 KBL Headquarters

 KBL Offices Worldwide

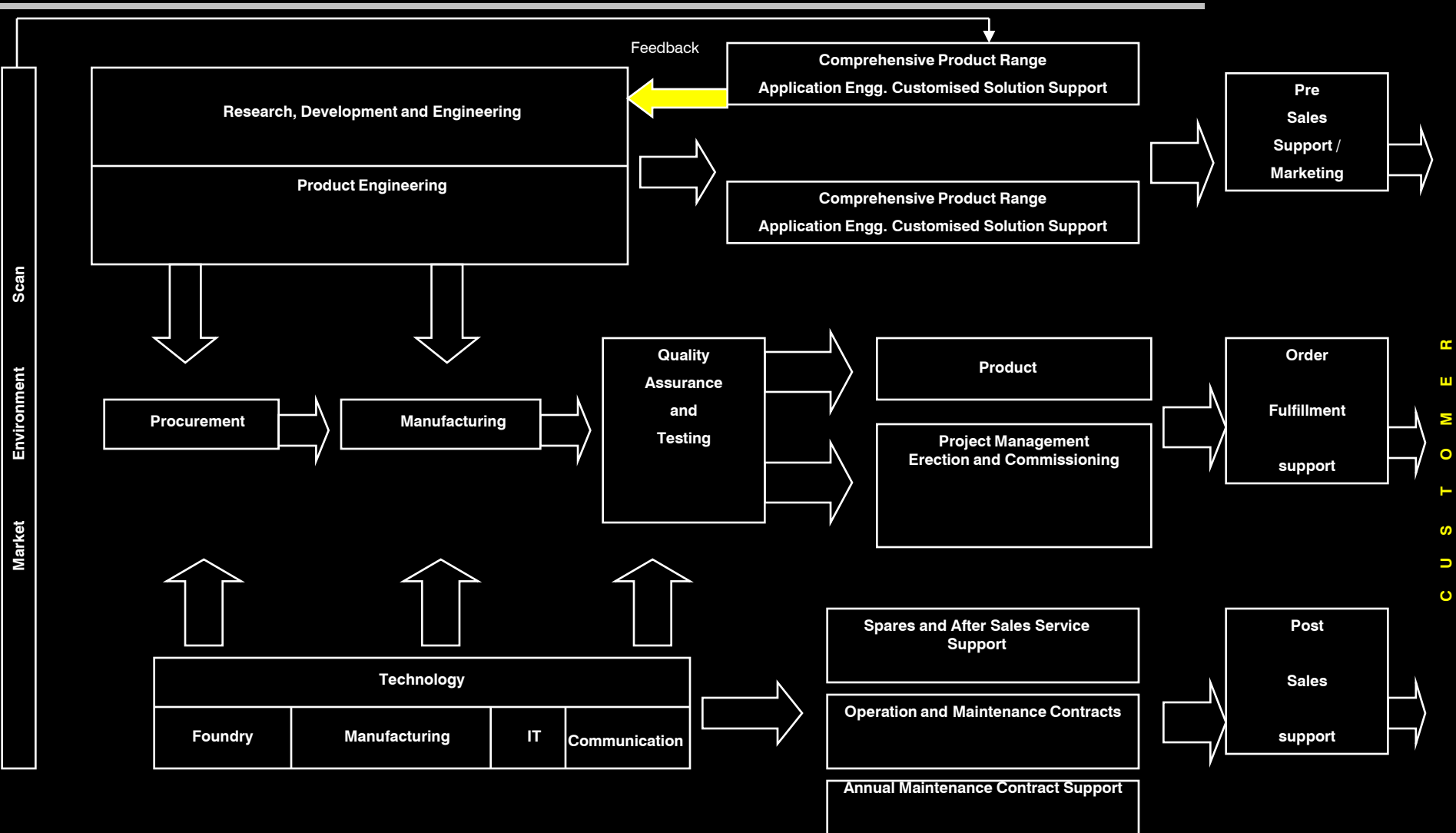
 KBL Presence

 Manufacturing Facilities

# End to End Solution Delivery Capability



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# Kirloskar Pumps & Systems



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This is a proprietary document of Kirloskar Brothers Limited

# Split Case Range

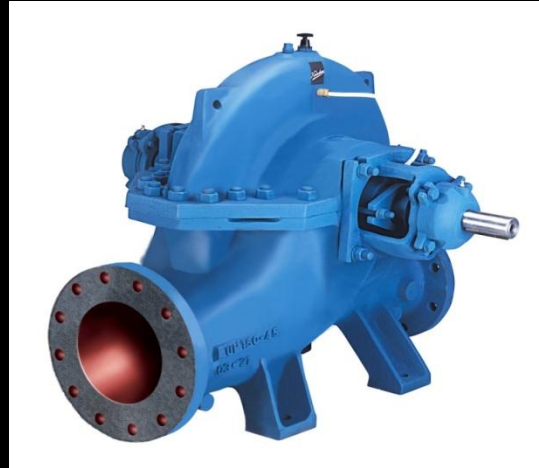


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UPM (Vertical Execution)



UP



SCT



DSM  
2 stage



## Range

- Delivery size 50 mm to 1200 mm
- Capacity up to 25,000 m<sup>3</sup>/hr
- Head up to 350 m
- Temp. - 10 degree C to +150 deg C
- Speed - 970,1450,2900
- Suitable for variable Speed Drive
- Suitable for 60 Hz Power Supply

# Split Case Range



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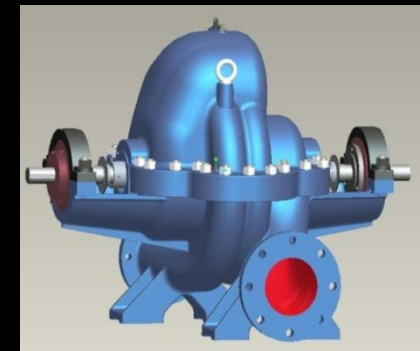
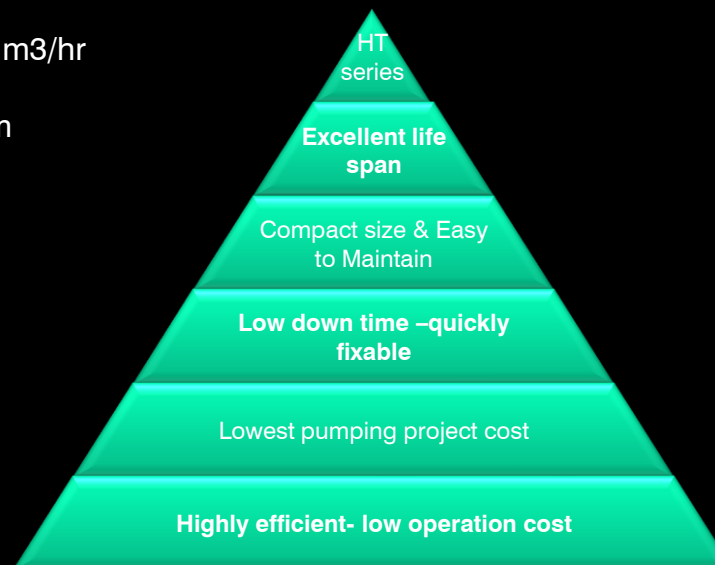
## i-HT series

### RANGE

Delivery size : up to 300 mm

Capacity : 1300 m<sup>3</sup>/hr

Head : 250 m



Two Stage Pump



Single Stage Pump

We closely watched ,listened to your need and used CFD technology, our wide experience and expertise to innovate a **smart choice** for you  
-Enriching Lives



# Multistage Pumps

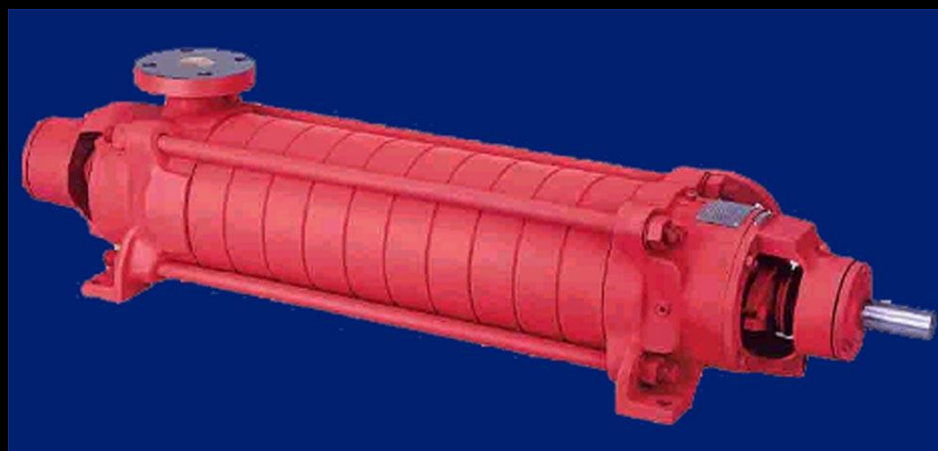


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Side Channel Pumps CF  
Delivery size up to 50 mm  
Capacity up to 20 m<sup>3</sup>/hr.  
Head up to 315 metres

Horizontal Multistage Pumps RKB  
Delivery size up to 250 mm  
Capacity up to 850 m<sup>3</sup>/hr.  
Head up to 850 metres





# Multistage Pumps



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Vertical Multistage Monobloc Pumps  
Delivery size up to 40 mm  
Capacity up to 10 m<sup>3</sup>/hr.  
Head up to 44 metres



Vertical Inline Multistage Pumps IL  
Delivery size up to 100 mm  
Capacity up to 75 m<sup>3</sup>/hr.  
Head up to 220 metres



Vertical Multistage Pumps RKB  
Delivery size up to 250 mm  
Capacity up to 750 m<sup>3</sup>/hr.  
Head up to 580 metres



# Vertical Turbine Range



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## Condensate Extraction Pumps

(With double suction Impeller at first stage)

Delivery size up to 500 mm

Capacity up to 2000 m<sup>3</sup>/hr

Head up to 350 meters



## Vertical Turbine Pumps

Delivery size up to 2200 mm

Capacity up to 40,000 m<sup>3</sup>/hr

Head up to 400 meters

# End Suction



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## **DB (Small)**

Delivery size up to 150 mm  
Capacity up to 550 m<sup>3</sup>/hr.  
Head up to 100 metres



## **CE Energy Efficient**

Delivery size 32 to 125mm  
Capacity up to 660 m<sup>3</sup>/hr.  
Head up to 100 metres



## **DB (Large)**

Delivery size 150 to 300mm  
Capacity up to 1900 m<sup>3</sup>/hr.  
Head up to 35 meters

# End Suction



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## Mixed Flow Pumps (MF)

Delivery size up to 650 mm

Capacity up to 7000 m<sup>3</sup>/hr.

Head up to 30 metres



## CPHM

Delivery size 20 to 200mm

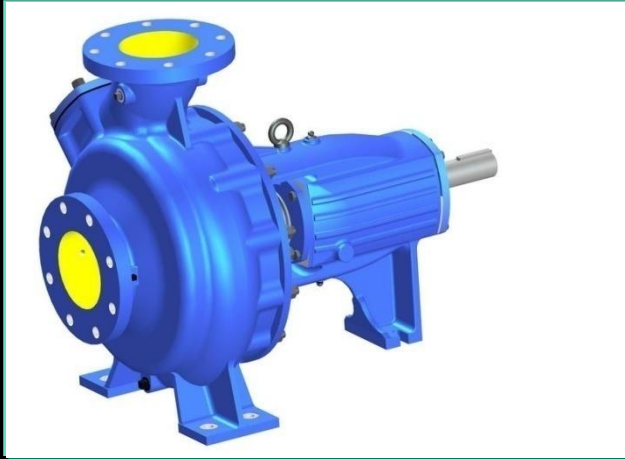
Capacity up to 750 m<sup>3</sup>/hr.

Head up to 150 metres

# End Suction



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## Range

Delivery size : up to 200 mm  
3 Capacity : up to 800 m /hr  
Head : up to 90 m  
Maximum : up to 105 mm permissible depending  
on the solid size model consistency  
up to 5%

QP impellers for more than 6% consistency

Q impellers for more than 4% consistency



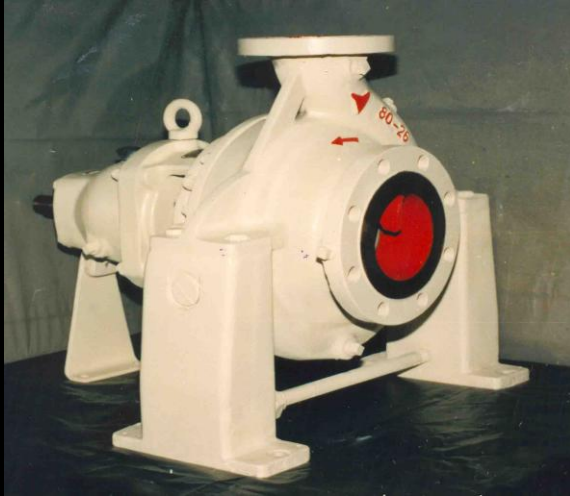
## Range

Delivery size : 250 mm to 900 mm  
3 Capacity : up to 13000 m /hr  
Head : up to 82 m  
Temp : (-) 10° C to 90° C

# End Suction

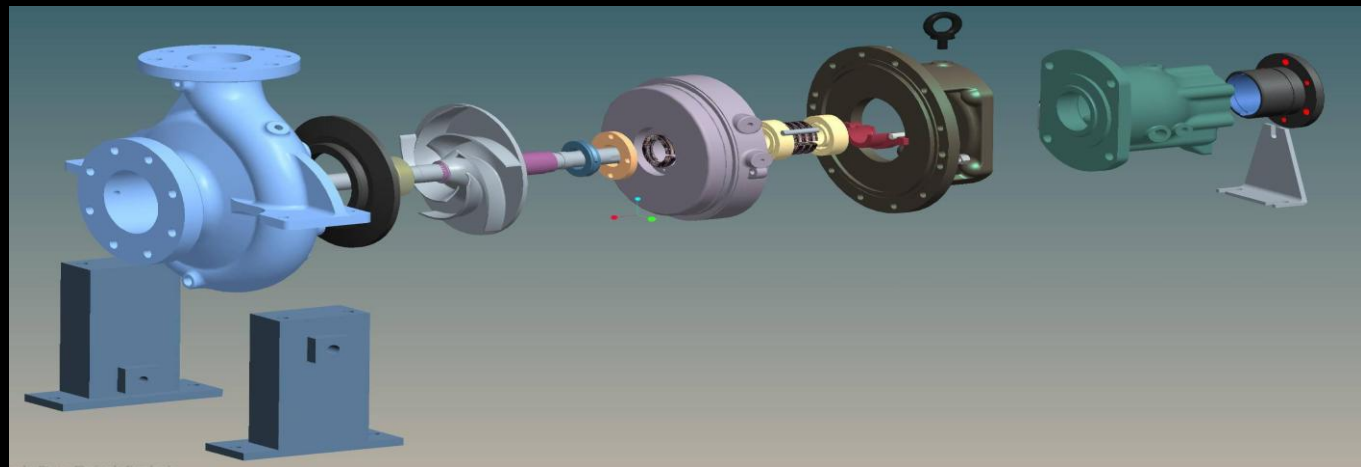


Enriching Lives



## Range

- Delivery size 20 mm to 200 mm
- Capacity up to 750 m<sup>3</sup>/hr
- Head up to 150 m
- Temp. - 50 degree C to +350 deg C
- Speed - 970,1450,2900

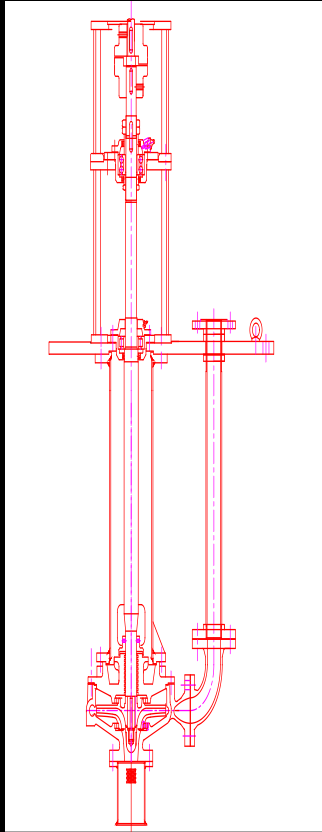
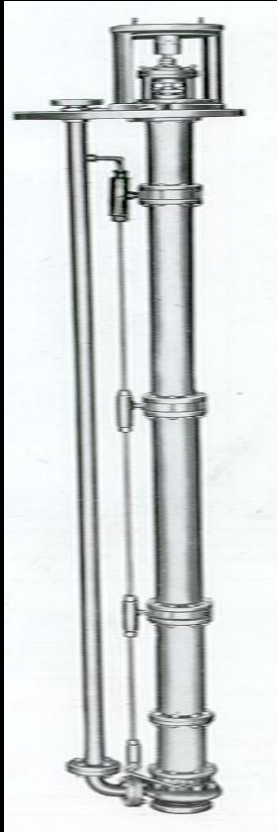




# End Suction



Enriching Lives



**KPD-SSA PUMP CANTILEVER  
DESIGN**

Range:

**Delivery size:** up to 200 mm **Capacity :** up to 2400 m<sup>3</sup>/hr **Head:** up to 90 m

# End Suction



Enriching Lives



## End Suction Process Pumps

Type-KPD (Magnetic Drive)

Delivery size up to 200 mm

Capacity up to 350 m<sup>3</sup>/hr

Head up to 62 metres



## End Suction Process Pumps

Type-KPD (Jacketed Pump)

Delivery size up to 200 mm

Capacity up to 350 m<sup>3</sup>/hr

Head up to 62 metres

# End Suction



Enriching Lives

- Maintenance-free
- Zero leakage from Stuffing Box
- No soft Gland Packing or Mechanical Seal; no flushing
- Sealed Bearings; no lubrication to bearings
- Self venting design
- Completely protected shaft
- Energy Efficient Design
- Conforming to ISO 2858
- Back pull out design
- Less no. of components
- Sturdy yet light-weight

**1450 rpm 50 Hz** - with rate of flow up to **180 m<sup>3</sup>/hr** and head up to **55 m**, available in **14** different **models** to suit various applications.

**2900 rpm at 50Hz** - with rate of flow up to **150 m<sup>3</sup>/hr** and head up to **92 m**, available in **11** different **models**.

**1750 rpm at 60Hz** - with rate of flow up to **220 m<sup>3</sup>/hr** and head up to **80 m**, available in **14** different **models**.

## Innovative Chemical Process Pump – i CP



# Sewage and Dewatering Pumps



Enriching Lives



## Submersible SEWAGE Pumps

Delivery size 40mm up to 300 mm

Capacity up to 1600 m<sup>3</sup>/hr.

Head up to 140 meters

Max Solid size 150mm



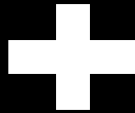
Submersible DeWatering



# Fire Pump Packages ( Protecting Life and Property)



Enriching Lives



- World's largest Fire pump business
- FM approved & UL listed
- LPCB approved
- Multistage Multi-Outlet
- Vertical Turbine
- Special packages



# FM / UL Fire Fighting Pump Sets



Enriching Lives

- World's largest fire pump business
- FM approved & UL listed
- LPCB approved
- Multistage Multi-Outlet
- Vertical Turbine
- Special Packages



Horizontal Split Case :

Flows up to 18940 l/m (5000 US gpm)

Pressure up to 37 bar (537 psi)





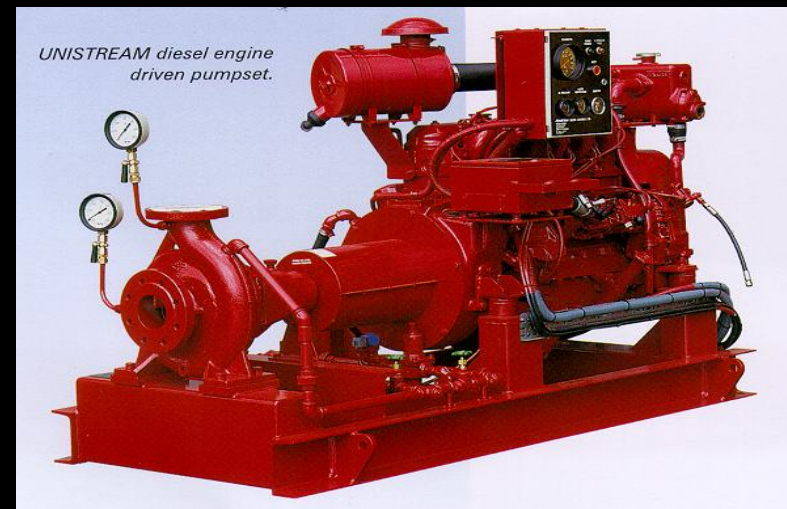
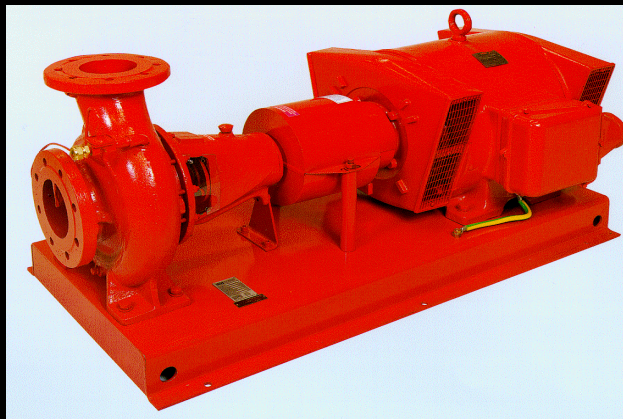
## **FM / UL APPROVED & LISTED FIRE PUMPS**

# FM / UL Approved and Listed Fire Pumps



Enriching Lives

End Suction Pumps : Flows up to 1500 USgpm  
Pressures up to 10.95 bar (159 psi)  
Sizes : Up to 150 mm (6 inch)



# Over 500 International



Enriching Lives

- Ford Motor
- Company, Poland
- General Motors, Portugal
- Caterpillar, Belgium
- Coca Cola, USA
- Kodak, Greece
- IBM, Italy
- Dunlop England
- Pirelli, England
- Michelin, Thailand
- Sheraton, Kuwait
- Hilton, Dubai
- Marriott, Turkey
- GlaxoSmithKline, Thailand
- 3M Group, England
- Motorola, Malaysia
- Texaco, Trinidad
- Mobil, Cyprus
- Shell, Uganda
- Dulux (ICI), Taiwan
- GEC Alstom, Spain

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**PRESTEGIOUS**

**FM/UL APPROVED & LISTED**

**FIRE PUMP PACKAGES**

**ORDERS FROM**

**INDUSTRIES**

## Oil & Gas Fire Protection

Project: Bohai



## Oil & Gas Fire Protection

Project: Dung Quat





# **LPCB APPROVED & LISTED MULTISTAGE MULTI-OUTLET FIRE PUMP PACKAGES**

*“ The Only Officially Approved &  
Listed Multi Stage Multioutlet  
Fire Pump In The World ”*

# Multi Stage – Multi Outlet Pump



Enriching Lives



# VERTICAL TURBINE FIRE PUMP PACKAGES

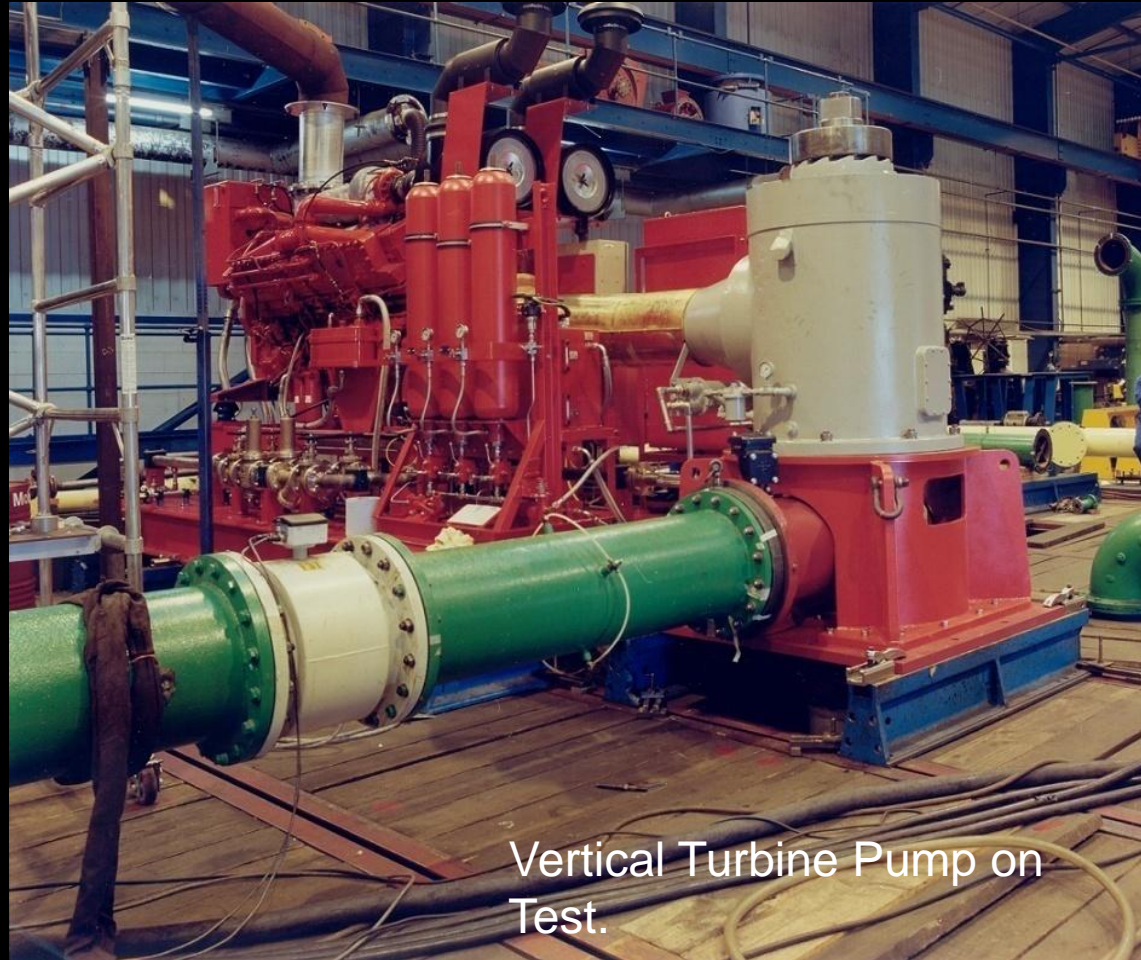
# Vertical Turbine Fire Pump



Enriching Lives



SPP vertical lineshaft pump  
directly driven by a  
1200kw electric motor



Vertical Turbine Pump on  
Test.

# SPECIAL APPLICATIONS

# FIRE PUMP PACKAGES



# Fire Containerised Pump set



Enriching Lives





# Generator Packages



Enriching Lives

Emergency service and dedicated fire pump up to 3.0 Mw



# Auto Prime



Enriching Lives





# Auto Prime in Coal Mines



Enriching Lives



## Life-cycle Cost Analysis

### WHOLE LIFE COST

**CAPITAL COSTS**  
Pumps Civil Works  
M & E

**ENERGY COSTS**  
Efficiency Process  
Optimisation

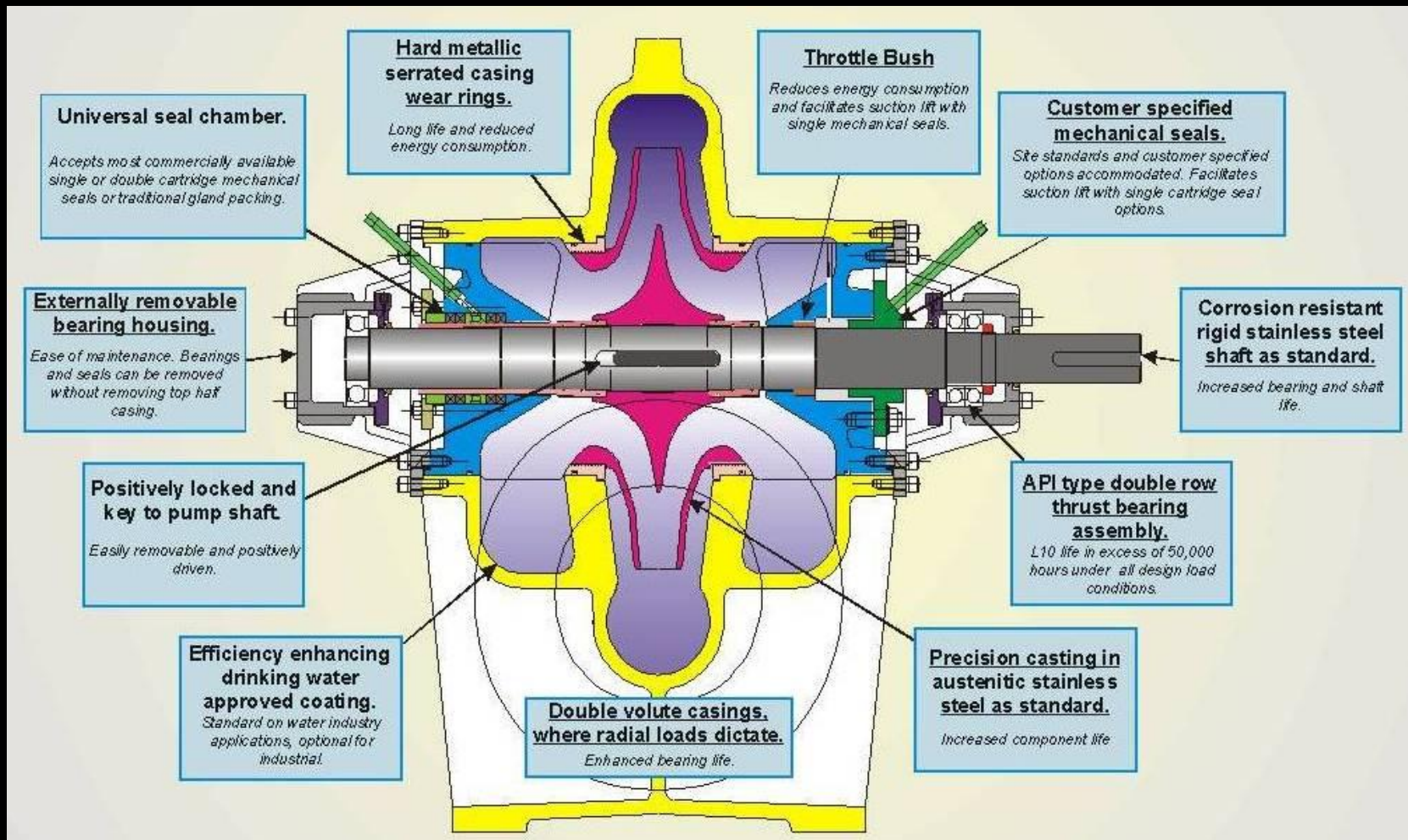
**MAINTENANCE**  
COTST MTBF  
Replacement Parts  
Downtime

**DISPOSAL COSTS**

# Low Life Cycle Cost Series



Enriching Lives

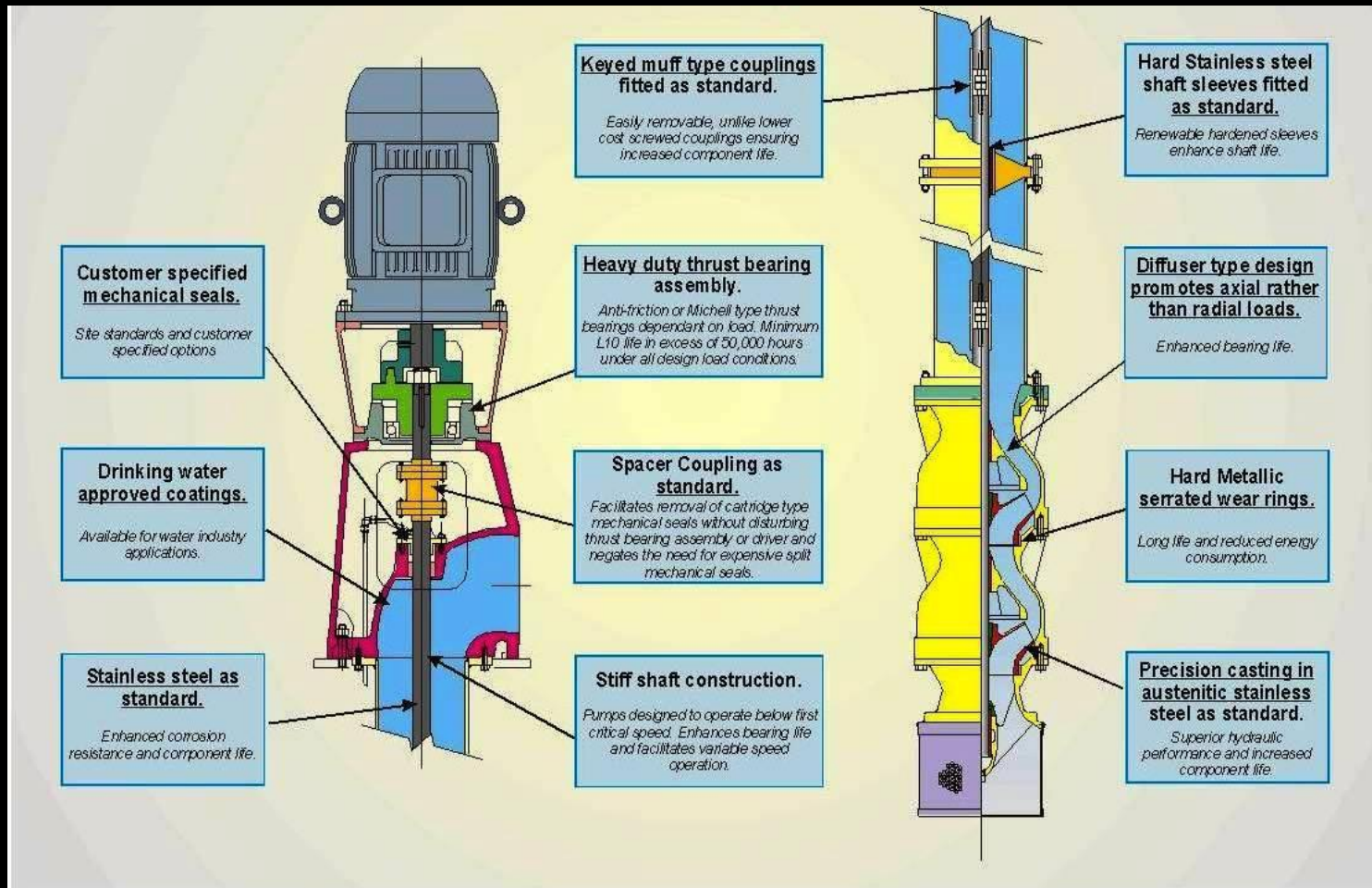




# Low Life Cycle Cost Series



Enriching Lives





# Low Life Cycle Cost Series



Enriching Lives

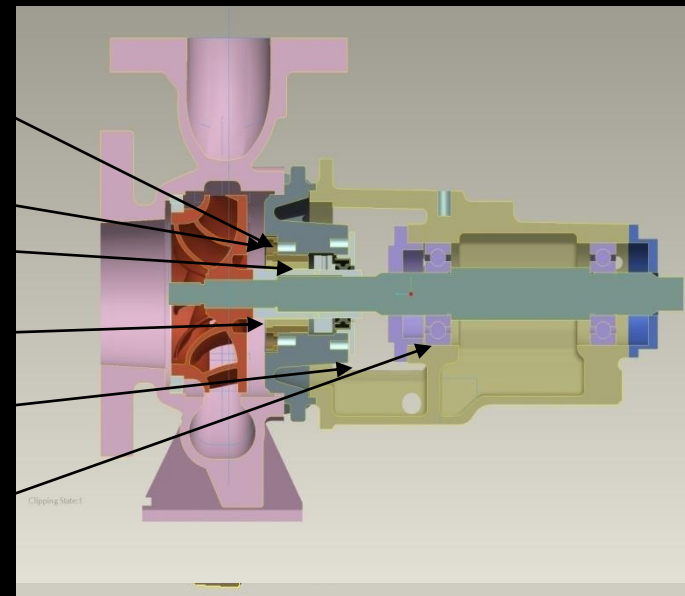
- Developed for the 21<sup>st</sup> Century commercially aware End User
- Utilities Applications (Power, Water Supply, Cooling Water)
- Highly Evolved. Not A New Product
- Benefits Generally Post Installation
- Highest wire to water efficiency
- Highest Quality & Longevity
- Greatly Reduced Energy Cost
- Very Reliable – Low on maintenance cost
- Provides the “Lowest Whole life Cost”

# Low Life Cycle Cost Series



Enriching Lives

- Pump without Mechanical Seal (Avoid Seal Maintenance & Failure)
- Pump Without Gland Packing.(No need of external water )
- No Lantern Ring (No question of removal)
- Sealing water not required ( Reduced Running cost)
- Enough space for Maintenance
- Pump with Pre Lubricated Sealed Bearings ( No oil spoilage & Bearing removal for 3 years)
- Eliminated Lantern Bracket ( More compact & breakage Problem)
- New hydraulic combination for Better efficiency



Patent Pending

# Concrete Volute Pump



Enriching Lives

- World's number 1 in concrete volute pump technology with orders for 166 pumps to date
- More than 100 CV Pumps in operation for major projects across the country

## *Operating Range:*

Head	:	up to 50 m
Flow	:	up to 120,000 m <sup>3</sup> /hr
Delivery Size	:	up to 6000 mm

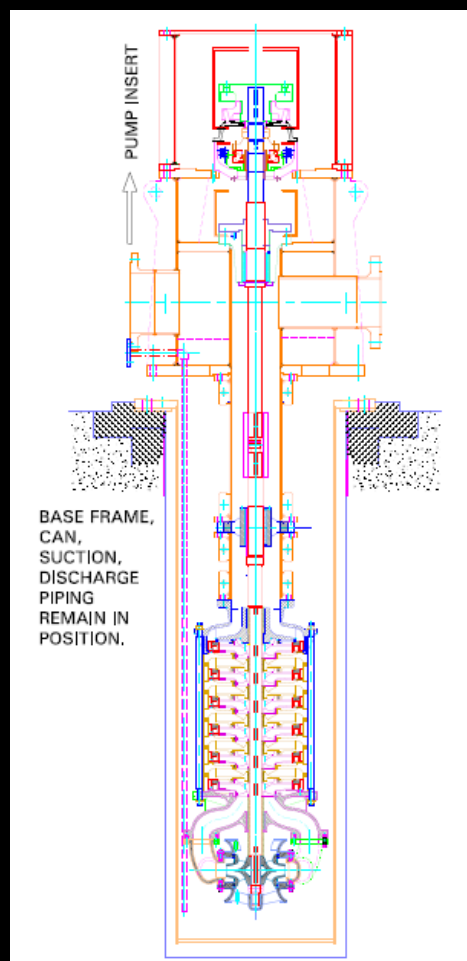


# Condensate Extraction Pump



Enriching Lives

## Technical Data



Capacity	: up to 2000 m <sup>3</sup> /h
Suction Nozzle Sizes	: up to DN 600
Discharge Nozzle Sizes	: up to DN 500
Head	: up to 400 m
Operating Disc. Pr	: up to 40 kg/cm <sup>2</sup>
Suction Pressure	: up to 3 kg/cm <sup>2</sup>
Temperature	: up to 100 °C
Operating Speed	: 980 to 1780 rpm

### Special Design Features:

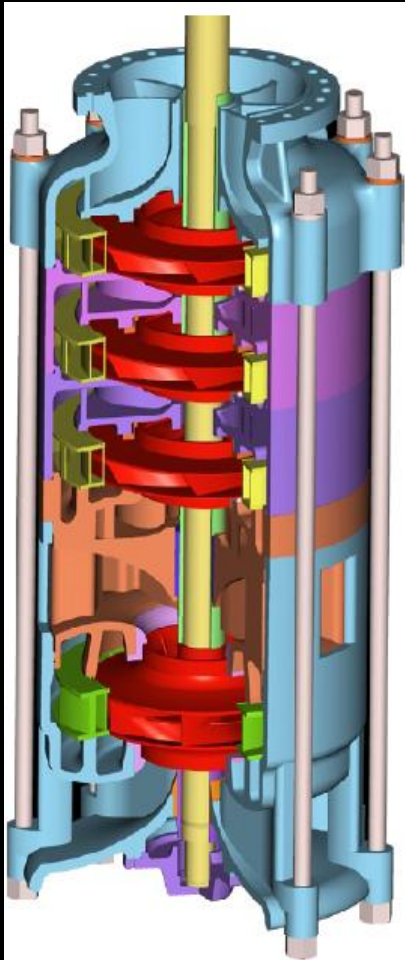
- Double Entry First Stage Impeller for very low NPSH required
- Re-entry design for condensate polishing unit

# Condensate Extraction Pump

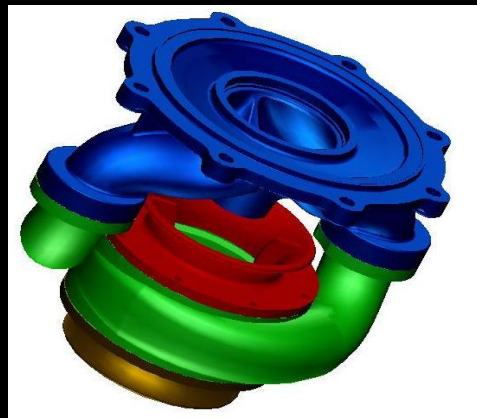


Enriching Lives

## Suction stage – Double Entry Impeller- Advantages



- Lower value of suction specific speed to meet the customer requirements; which is normally less than 11000 US unit
- Double suction impeller results in lower NPSHr
- Due to lower NPSHr Can (Barrel) length will be shorter which results in lower cost of handling , excavations, installation and reduction in crane height at turbine room
- Even though head achieved is higher there is no additional increase in hydraulic axial thrust



# Condensate Extraction Pump



Enriching Lives



Special Design	: First Stage Impeller Double Suction
Customer	: NPCIL
Project	: Tarapur Atomic Power Project, India
Pump Model	: BHRC 7
Qty	: 6 Sets
<i>Duty parameters</i>	
Discharge	: 1210 m <sup>3</sup> / hr
Head	: 200 m
Efficiency	: 82%
Speed	: 990 rpm
Motor	: 1150 kW
NPSHR	: 2 m



# KBL In The Power Sector



Enriching Lives



## Powering The Future

- Global Brand – Global Sales and Service Network
- Market leader in pumps, valves and pumping system in India
- World's number 1 for concrete volute pumps
- Comprehensive pump manufacturing facilities under one roof
- Unique pump testing facility for 50 / 60 Hz and up to 5,000 kW
- Highest pump market share in power plant business in India
- Specialty pumps for nuclear application – Canned Motor, Moderator pumps, Primary and Secondary Heat Transfer pump for PFBR
- Successful execution of turnkey Hydro power projects - Total hydel power generation from the installed turbines is 40 MW

# Global Footprint in Power Sector



Enriching Lives



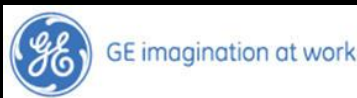
# Kirloskar In Nuclear Power Projects



Enriching Lives



**AREVA NP**



- Associated with Nuclear Power Projects programme since inception
- Working closely with organizations viz. NPCIL, BARC, HWB, IGCAR, BHAVINI etc.
- All Nuclear Power Plants in India are working with Kirloskar Pumps
- Possesses expertise and requisite infrastructure to meet stringent quality and safety requirements
- Has developed indigenous technology for critical application such as Canned Motor pump for moderator duty & primary & secondary heat transfer pumps for fast breeder reactors
- Approved by major Global Players : AREVA,ALSTOM, Bechtel, EDF, GE, Westinghouse

# Kirloskar In Nuclear Power Projects



Enriching Lives

Plant	Unit	Type	Capacity (MWe)	KBL's Contribution
TARAPUR ATOMIC POWER STATION (TAPS) , Maharashtra	1	BWR	160	Primary Circuit, Circulating Water Pumps, Condensate Extraction Pump, Miscellaneous Pumps
	2	BWR	160	
	3	PHWR	540	
	4	PHWR	540	
RAJASTHAN ATOMIC POWER STATION (RAPS), Rajasthan	1	PHWR	100	Primary Circuit, Circulating Water Pumps, Miscellaneous Pumps
	2	PHWR	200	
	3	PHWR	220	
	4	PHWR	220	
MADRAS ATOMIC POWER STATION (MAPS), Tamil Nadu	1	PHWR	220	Circulating Water Pumps, Miscellaneous Pumps
	2	PHWR	220	
KAIGA GENERATING STATION, Karnataka	1	PHWR	220	Primary Circuit, Circulating Water Pumps, Condensate Extraction Pump, Miscellaneous Pumps
	2	PHWR	220	
	3	PHWR	220	
NARORA ATOMIC POWER STATION (NAPS) , Uttar Pradesh	1	PHWR	220	Primary Circuit, Circulating Water Pumps, Miscellaneous Pumps
	2	PHWR	220	
KAKRAPAR ATOMIC POWER STATION (KAPS), Gujarat	1	PHWR	220	Circulating Water Pumps, Miscellaneous Pumps
	2	PHWR	220	

# Kirloskar In Nuclear Power Projects



Enriching Lives

Primary Moderator Circulation Canned Motor Pumps (220 kW) installed at the Nuclear Power Corporation of India Limited, Tarapur, for 2x500 MW nuclear power plants.





# Kirloskar In Hydel Power Projects



Enriching Lives

KBL is committed to become a leader in micro, small and medium hydro turbine business offering “Concept to Commissioning” turbine solutions framework.

<b>Turbine Type</b>	<b>Max. Runner Dia. (mm)</b>	<b>Specific Speed (m-kW)</b>
Semi & Full Kaplan Type Tubular Turbine	3000	397 ~ 513
Vertical Semi & Full Kaplan Turbine	3800	234 ~ 427
Vertical Shaft Francis Turbine	3000	234 ~ 427
Horizontal Shaft Francis Turbine	1200	





Enriching Lives

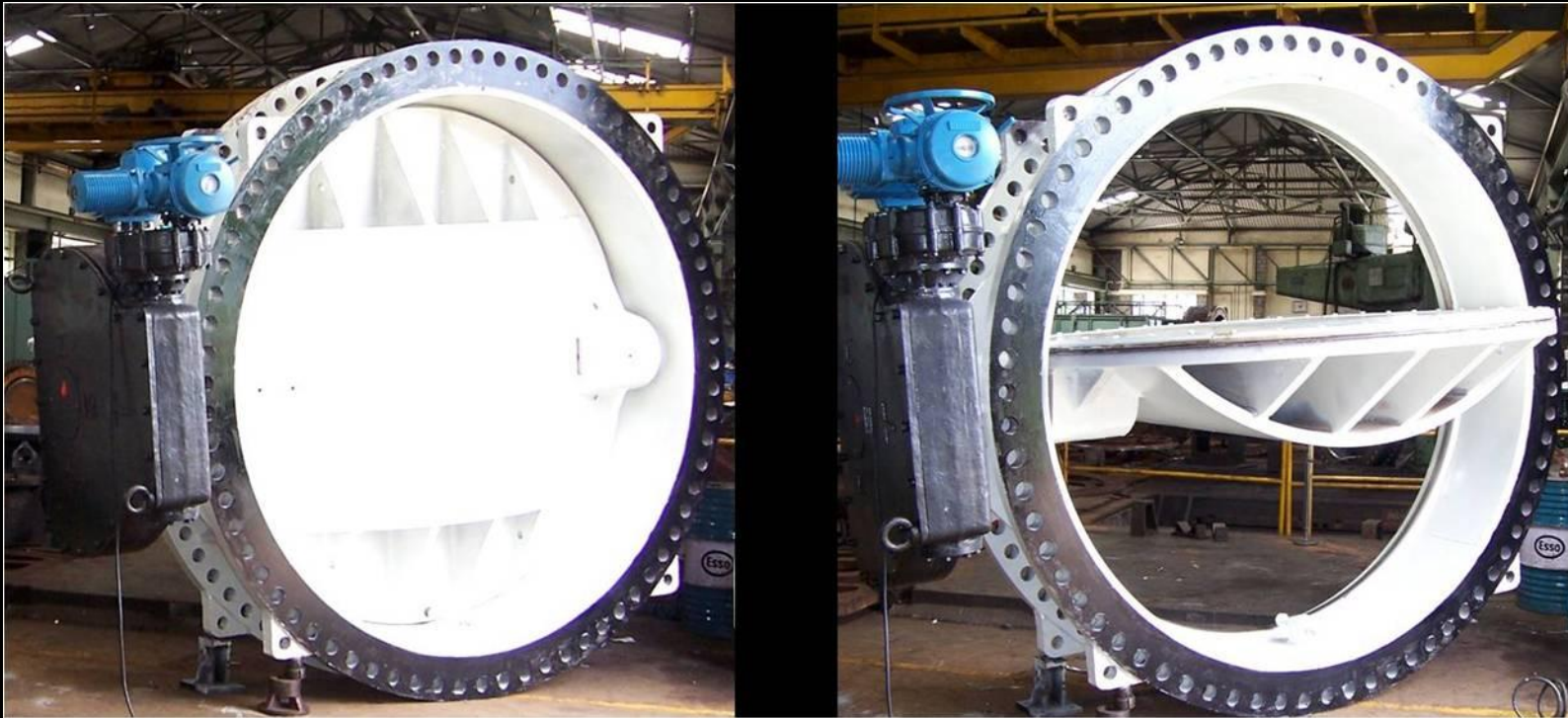
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# REFERENCES

# Kirloskar In Power Sector



Enriching Lives



2600 mm Butterfly Valve supplied to National Thermal Power Corporation, Sipat, India

# Kirloskar In Power Sector



Enriching Lives

1800 mm Turbine Inlet Valve supplied to Massachusetts Water  
Resources Authority, Boston (MWRA), Boston, USA

**Application** : By-pass to Turbine Inlet

**Project** : Oakdale Power Station ,  
Boston , USA

**Year of Supply** : 2005

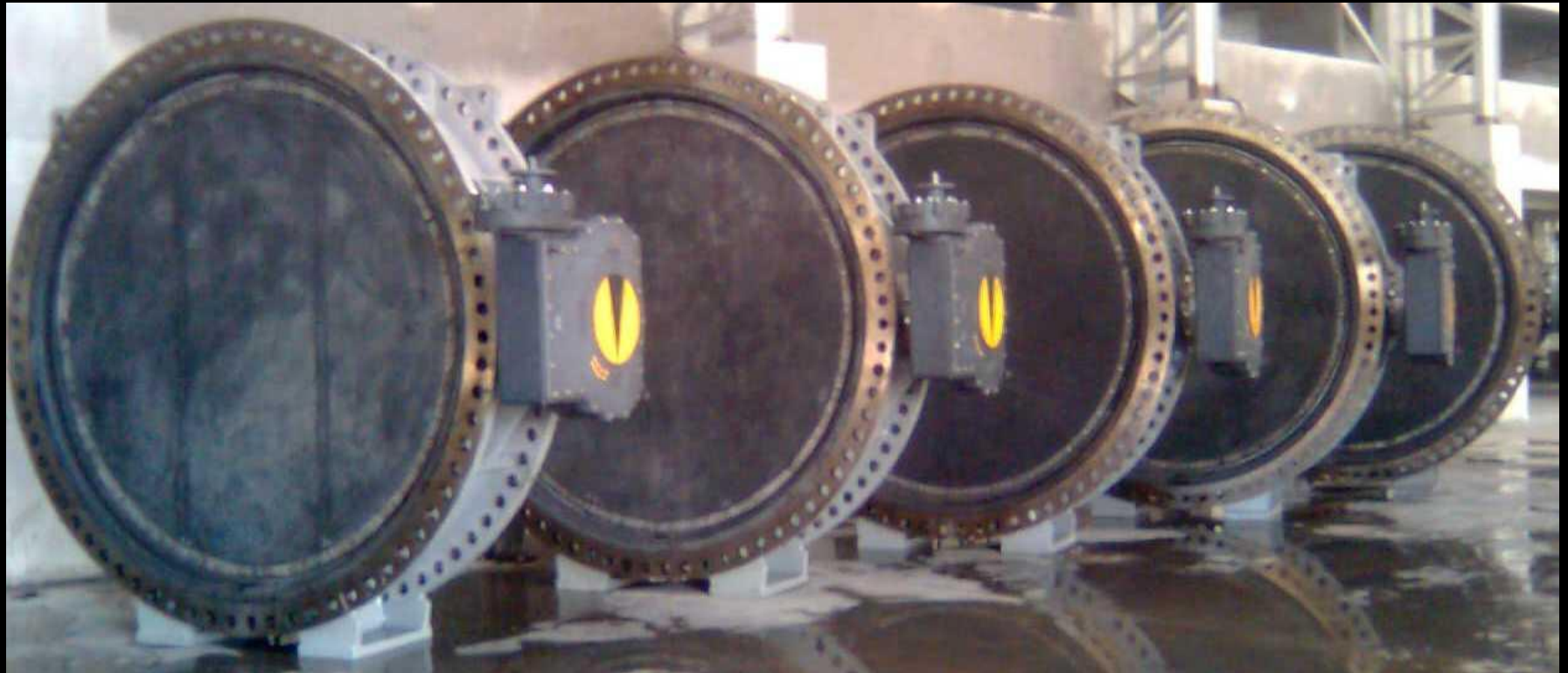




# Kirloskar In Power Sector



Enriching Lives



Large size Butterfly valves (2600 & 2200mm) Internally Ebonite lined and external surface with Polyurethane coating.

**Customer** : Lanco Infrastructure Ltd  
**Project** : Udupi Thermal Power Project(2x507MW)  
**Year of supply** : 2009

## 2100 mm Turbine Inlet (Butterfly) Valve, Massachusetts Water Resources Authority, Boston , Boston, USA

- Complete range of Butterfly, Sluice Gate, Globe and Check Valves
- CW pump control valve – Electrically & hydraulically operated Butterfly Valves up to 4000 mm dia
- Proof-of-design approved by NTPC for 2600 mm BFV
- Suitable Materials for Sea , Brackish and River water
- Innovative design of see through camera





# Kirloskar In Power Sector



Enriching Lives

KBL will supply 3 pumps for Bharatiya Vidyut Nigam (BHAVINI)

– Nuclear Power Corporation of India Limited.

**Liquid** : Sodium  
**Flow** : 14,868 M<sup>3</sup>/hr  
**Head** : 75 m (246 Ft.)  
**Speed** : 590 rpm  
**Temp** : 670 °C (1238 F)  
**Motor** : 3600 kW (4825 HP)



# Kirloskar In Power Sector



Enriching Lives

<b>Project</b>	: 1 x 500 MW -Bhavini (Bharatiya Nabhikiya Vidyut Nigam Limited) Prototype Fast Breeder Reactor (PFBR)
<b>Customer</b>	: Nuclear Power Corporation of India Limited
<b>Liquid</b>	: Sea Water
<b>Pump Type</b>	: Concrete Volute
<b>Design Capacity</b>	: 49,000 m <sup>3</sup> /hr
<b>Total Head</b>	: 20.0 m
<b>Speed</b>	: 271 rpm
<b>Motor Rating</b>	: 4370 kW

CW system for world's first 500 MW Prototype Fast Breeder Reactor- under construction



## CW Pump – Bechtel, USA

**Project** : 568 MW Sandow 5, Texas, USA

**Customer** : Bechtel Power Corporation, USA

**Pump Model** : BHM 130

**Quantity** : 2 Nos.

### *Duty Parameters*

**Discharge** : 34,635 M<sup>3</sup>/hr

**Head** : 23.93 M

**Speed** : 358 RPM

**Motor** : 2975 KW @ 60Hz



# Kirloskar In Power Sector



Enriching Lives

**Project** : (2 x 800 MW) Prairie State Energy Campus, USA

**Customer** : Bechtel Power Corporation, USA

**Pump Model** : BHM 130

**Quantity** : 6 Nos

## *Duty Parameters*

**Discharge** : 31,075 M<sup>3</sup>/hr

**Head** : 26.82 M

**Speed** : 356 RPM

**Motor** : 2825 KW @ 60Hz





# Kirloskar In Power Sector



Enriching Lives

KBL successfully completed the contract for 2 sets of Circulating Water Pump sets

<b>Project</b>	: 480 MW Termozulia CCPP, Venezuela
<b>Owner</b>	: ENELVEN C.A. Energia Electrica de Venezuela
<b>EPC Contractor</b>	: MAN Ferrostaal AG ( Formerly DSD Industrieanlagen); Germany
<b>Liquid</b>	: Brackish water
<b>Pump Type</b>	: Vertical mixed flow
<b>Design Capacity</b>	: 27,750 m <sup>3</sup> /hr
<b>Total Head</b>	: 14.5 m
<b>Speed</b>	: 400 rpm
<b>Motor Rating</b>	: 1700 kW



# Kirloskar In Power Sector



Enriching Lives

**Project** : 350 MW Puerto Coronel Coal Fired Power Plant, Chile

**Customer** : Maire Engineering, Italy

**Pump Model** : BHQ95D, Bowl Pull out

**Liquid** : Sea Water

**Material** : Duplex

Stainless Steel

## *Duty Parameters*

**Flow** : 25,000 M<sup>3</sup>/Hr

**Head** : 26 m

**Motor rating** : 2400 KW

**Speed** : 425 RPM



**KBL's 2nd Installation for CW Pump in South America.**



# Kirloskar In Power Sector



Enriching Lives

<b>Project</b>	: EPC For Sea Water Pumping System Of CCWS
<b>Customer</b>	: Sohar, Oman
<b>Liquid</b>	: Sea Water
<b>Pump Type</b>	: Vertical mixed flow
<b>Qty</b>	: 3 Sets
<b>Design Capacity</b>	: 15,000 m <sup>3</sup> /hr
<b>Total Head</b>	: 35 m
<b>Speed</b>	: 490 rpm
<b>Motor Rating</b>	: 1900 kW



# Kirloskar in Irrigation Sector



Enriching Lives

The worlds largest pumping scheme - Sardar Sarovar Narmada Nigam Project in partnership with the State Government of Gujarat

- 26 CV Pumps
- 22 VT Pumps
- 5 Pump Stations
- 410,000 litres/sec
- 132 towns & villages to benefit
- Drinking water to over 30 million people
- 1.8 Million hectares under irrigation



**Power Saving: Reduction in Installed power by 8.5MW saving 34.96 Million Units/ annum**

# Kirloskar in Irrigation Sector



Enriching Lives

## Takari Lift Irrigation Scheme , India

32 Vertical Turbine pump-sets with associated electromechanical equipment are irrigating over 27,000 hectares of farmland in Maharashtra, India.



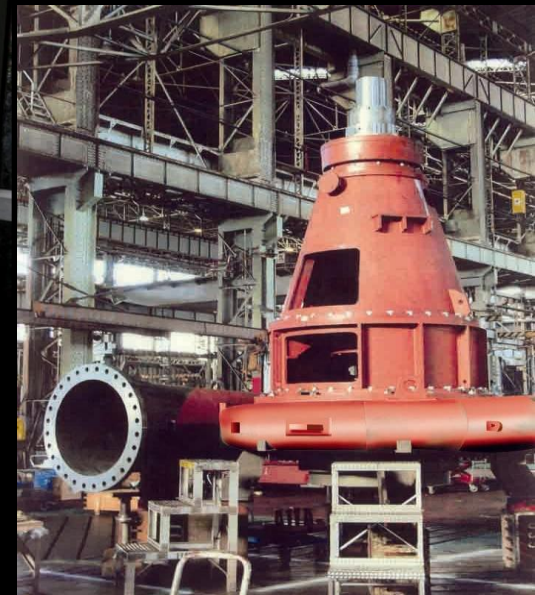
# Kirloskar in Irrigation Sector



Enriching Lives

## Irrigation Scheme With World's Second Largest Lift, Godavari Lift Irrigation Scheme, Andhra Pradesh, India

- 36000 M3/hr of Godavari water transported across 135 kms at a height of 400 m
- 2500 mm dia steel pipes
- 120,000 tonnes of steel used.
- 8500 kW / 12000 Hp motors
- Metallic Volute pumps.





# Kirloskar in Irrigation Sector



Enriching Lives

## Africa- Egypt



**UMM –RESH CANAL**

- In Egypt a pump is called “**Kirloskar**” !!
- More than 100,000 Kirloskar Pump sets greening 200,000 ha of desert land along the NILE.
- More than 50 large pumping stations are operating with Kirloskar Pump sets for the last 30 years.

# Kirloskar in Irrigation Sector



Enriching Lives

## Africa - Sudan



1800 HP Large split case pump sets at Guneid Sugar Factory, Sudan.



# Kirloskar in Irrigation Sector



Enriching Lives

## Africa- Ethiopia



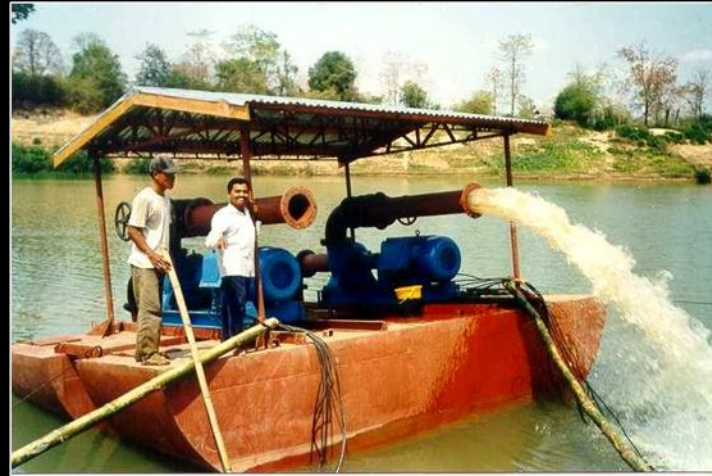
Kirloskar split case pump sets in operation at FINCHAA Sugar factory, Ethiopia.

# Kirloskar in Irrigation Sector



Enriching Lives

## Asia- Lao PDR



- Over 7000 Kirloskar Pump sets are working across the country along the river Mekong.
- In 1996, Laos was importing rice extensively, but with the help of Kirloskar pump sets & irrigation systems rice production went up 25 times to about 2.2 Million tonnes in 2004. Now Laos is a rice exporting nation.
- Rice production in the dry season increased from 25,000 tonnes to 700,000 tonnes, due to Affordable, Adaptable and Appropriate Kirloskar Irrigation Systems.

# Kirloskar in Irrigation Sector



Enriching Lives

## Vertical Turbine pumps for Engigas, PORTUGAL





# Kirloskar in Water Sector



Enriching Lives

## Latin America- Suriname



Ministry of Public works,  
Republic of Suriname



23 Vertical Turbine Pump Sets  
Across 9 Pumping Stations For  
Irrigation & Dewatering

# Kirloskar in Water Sector



Enriching Lives

## Africa – South Africa



15 numbers of 1.5 / 2.7 MW Kirloskar Split Case pump sets in operation at RAND WATER BOARD, Johannesburg, SOUTH AFRICA for providing drinking water.



## Hunter Water Corporation, South Wales, Australia

### Scope of Supply

- 2 Vertical Turbine Pumps (BHQ70), Motor 650 KW



Public Utility Board, Singapore

Changi Water Reclamation Plant (CWRP)

Scope of Supply

- 3 - 20UPH3M1DV-V  
Split Case Pumpsets,  
Motor Rating 900 KW



# Kirloskar in Water Sector



Enriching Lives

CUSTOMER : IPCO ASAL JOINT VENTURE, MALAYSIA

LOCATION : LANGKAWI WATER SUPPLY, MALAYSIA

## KBL Scope

Design, Manufacture, Supply, supervision of  
Installation and Commissioning of 4 Nos Vertical  
Turbine Pumpsets-BHR42/4 ST with, 1450rpm  
750kW/ 11kV HT Motors & 4 Nos Horizontal Split  
Case Pumps Model 12UPH8 with 1000kW/  
1450rpm, 11kV HT Motor

Each Set

Flow: 1137.6 m<sup>3</sup>/hr

Head 176m

Commissioned 1997



# Kirloskar in Water Sector



Enriching Lives

Customer : Pelubang Water Supply Scheme

Consultant : Jurutera Konsultants Sdn Bhd, Malaysia

Location : Pelubang Water Supply ,Malaysia

Year Of Supply : 1983

## KBL Scope

Design, Manufacture, Supply, supervision of Installation and Commissioning

8 Nos Horizontal Split Case Pumps  
Model 14UPH4M (BOTTOM  
SUCTION, SIDE DELIVERY) with 737  
kW/ 993 rpm, 11kV HT Motor

Each Set

Flow: 570.6 m<sup>3</sup>/hr Head 98m

## Pumps Working For The Last 27 Years



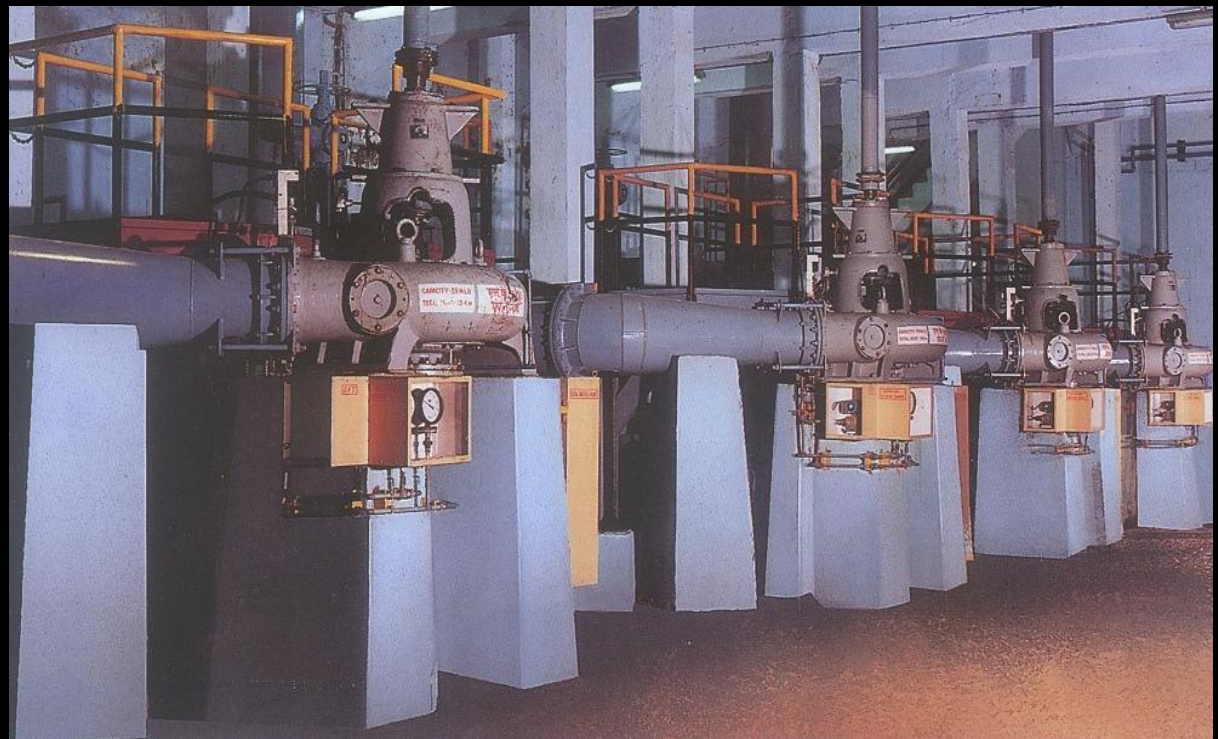


# Kirloskar in Water Sector



Enriching Lives

## Warsova Sewerage Treatment Plant





# Kirloskar in Industry Sector



Enriching Lives

## Canned Motor Pumps- Refrigeration, (Ammonia), India

VARIOUS OEM's and customers in

1. Cold Storages
2. Dairy's



# Kirloskar in Industry Sector



Enriching Lives

## Textiles – Spin bath



### TO WHOM SO EVER IT MAY CONCERN

We, Thai Rayon Public Co. Ltd., producer of Viscose Rayon Fiber in Thailand and part of AV Birla Group, have purchased centrifugal pumps for Process application from Kirloskar Brothers Limited, India (KBL) for various applications in our plant. Two major lot of KPD model pumps have been purchased from KBL for our Line # 5 and Line # 6 expansion projects.

Line # 5 Expansion : Total 75 Pumps

Line # 6 Expansion : Total 90 pump sets.

The pumps were supplied in 2007 and 2008 and all the pumps are working satisfactorily till now for all the application.

KBL has also supplied pumps for one of the highly corrosive applications – Spin Bath in our process, wherein we use R-55 Material of construction pumps.

All the pumps supplied by KBL are working satisfactorily and operating to the satisfaction of our technical team and plant operating requirements.

For and on behalf of Thai Rayon Public Co. Limited

*[Signature]*  
25.02.2010  
Head -Procurement



Birla Cellulose  
A Division of Birla Group

**THAI RAYON PUBLIC COMPANY LIMITED** (Purchase & Logistic Section).

Office : Mahatma Plaza 12th Fl- 088/127, Ploenchit Road, Bangkok 10330 Tel : 02-2530745-54 Fax : 02-25273804  
Factory : 36 Moo 2, Ayuthaya-Angthong Highway, T.Posa, A. Muang, Angthong 14000 Tel : 06-35-611227-30 Fax : 06-35-811508  
Website : [www.thairayon.com](http://www.thairayon.com), [www.birlagroup.com](http://www.birlagroup.com), [www.birlacellulose.com](http://www.birlacellulose.com)

# Kirloskar in Industry Sector



Enriching Lives

## Textiles – Spin bath

	
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PHONE	+62 (0)264 200 636, 201 414 Ext. 626
FAX	+62 (0)264 213 173
E-MAIL	Bhurat@pt-spv.com
REF.	
DATE	March 8, 2010

**TO WHOMSOEVER IT MAY CONCERN**

**TESTIMONIAL CERTIFICATE FOR PROCESS PUMPS SUPPLIED BY KIRLOSKAR BROTHERS LIMITED**

We, South Pacific Viscose Co. Ltd, are pleased to certify, that we are using Kirloskar Brothers Limited, India (KBL) process pumps for various applications in our plant.

We are operating KPD series process pumps manufactured by KBL for several years. All the pumps are working adequately, in line with the design parameters and to our satisfaction.

  
8.03  
  
**M.C. BHURAT**  
Vice President Technical Services

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HEAD OFFICE: PT. South Pacific Viscose, SAMPOERNA STRATEGIC SQUARE  
SOUTH TOWER 22nd floor, Jl. Jend. Sudirman Kav. 45-46, Jakarta, 12930-Indonesia  
PHONE: +62 (0)21 577 1630 FAX: +62 (0)21 577 1640

# Kirloskar in Industry Sector



Enriching Lives

Installation in Europe

Client (end user): AS Baltic Chemical Terminal





# Kirloskar in Oil & Gas Sector



Enriching Lives

Client (end user): Rosendaal Energy, the Netherlands





# Kirloskar in Oil & Gas Sector



Enriching Lives

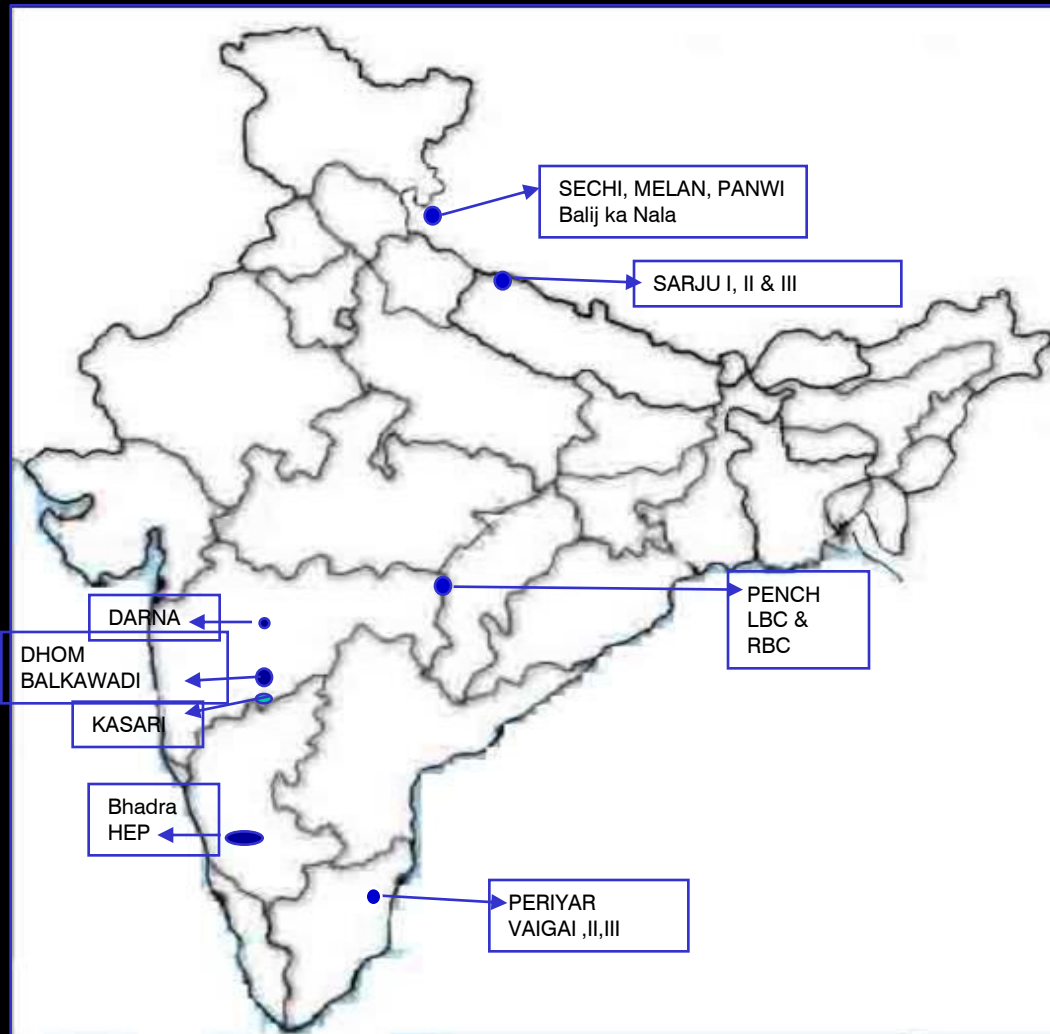
## AKZO Nobel: Rotterdam, the Netherlands



# Hydel Power Projects Under Execution / Commissioning



Enriching Lives



- SARJU I : 2 x 3000 KW
- SARJU II : 3 x 3500 KW
- SARJU III : 3 x 3000 KW

- SECHI : 2 x 2250 KW
- MELAN : 2 x 2250 KW
- PANWI : 2 x 2500 KW

- PENCH LBC : 2 x 2200 KW
- PENCH RBC : 2 x 700 KW

- D.KASARI : 1 x 2500 KW

- DHOM BALKAWADI : 1 x 3500 KW
- DARNIA : 2 x 2450 KW
- Maniyar HEP : 2x2000KW

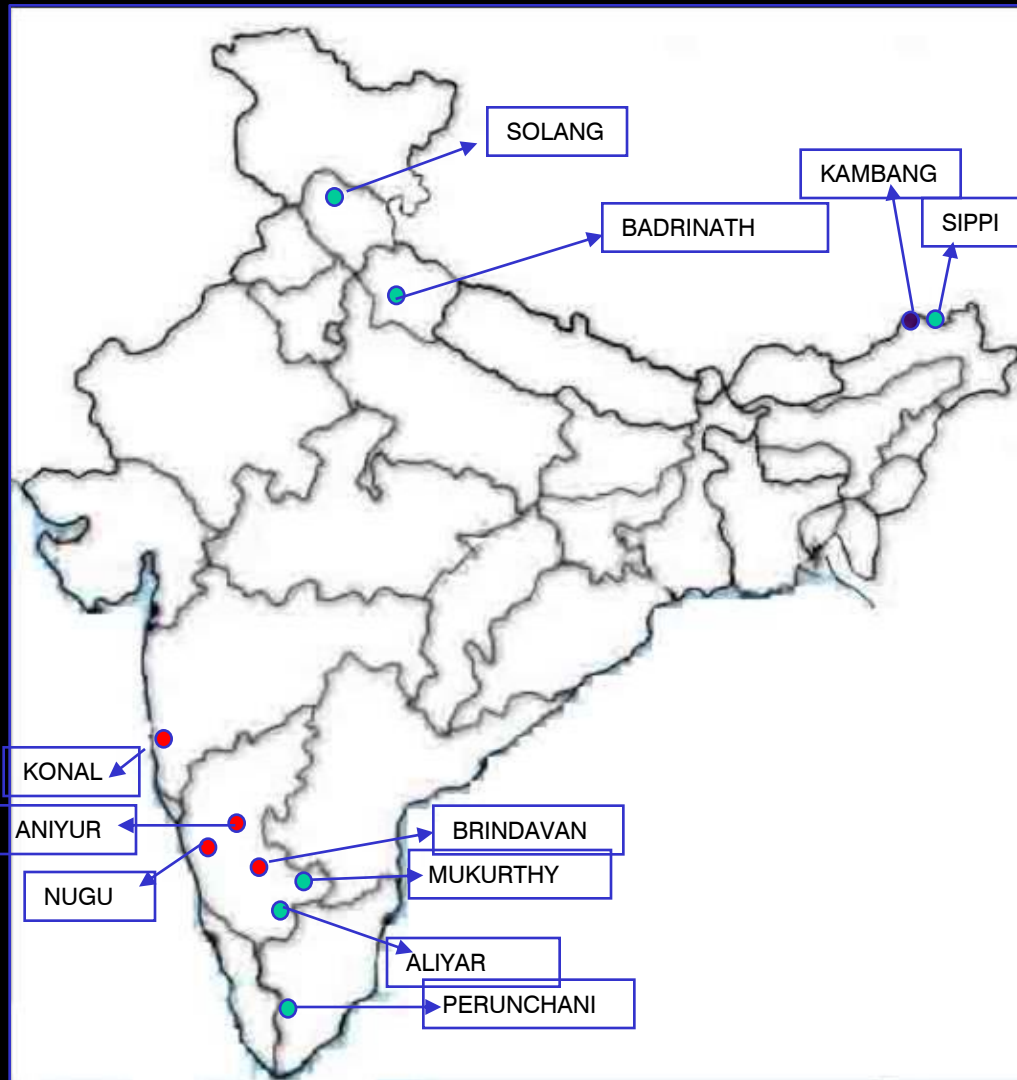
- Periyar Vaigai I : 2 x 2000 KW
- Periyar Vaigai II : 2 x 1250 KW
- Periyar Vaigai III : 2 x 2000 KW
- Periyar Vaigai IV : 2 x 1250 KW
- Bhadra HEP : 1 x 1500 KW
- Balij KA NALA : 2 x 1750 KW

- **Total Capacity**  
**Under execution = 72.20MW**

# Kirloskar In Hydel Power Projects



Enriching Lives



- SOLANG : 2 x 500 KW
- BADRINATH : 2 x 625 KW
- NUGU : 4 x 750 KW
- MUKURTHY : 2 x 350 KW
- ALIYAR : 2 x 1250 KW
- PERUNCHANI : 2 x 650 KW
- KAMBANG : 3 x 2000 KW
- SIPPI : 2 x 2000 KW
- ANIYUR : 2 x 3000 KW
- KONAL : 2 x 5500 KW
- BRINDAVAN : 2 x 2250 KW
- **Total Installed Capacity= 40.221 MW**
- Project commissioned and Handed Over.
- Project commissioned but not handed Over.

# Kirloskar In Hydel Power Projects



Enriching Lives

## Aniyur Hydel Power House

**Capacity** : 2 x 3000 kW

**Head** : 48.00 m

**Discharge** : 7.21 m<sup>3</sup>/s

**Runner Dia** : 1010 mm

**Rated Speed** : 600 rpm





# Kirloskar In Hydel Power Projects



Enriching Lives

## Konal Hydro Electric Project

Capacity : 2 x 5500 kW

Head : 28 to 60 m

Discharge : 12.7 m<sup>3</sup>/sec

Rated Speed : 600 rpm





# Kirloskar In Hydel Power Projects



Enriching Lives

## Top View Of TG Set Assembly – Aliyar Power House

**Capacity** : 2 x 1250 kW

**Head** : 30.00 m

**Discharge** : 5.000 m<sup>3</sup>/s

**Runner Dia** : 950 mm

**Rated Speed** : 500 rpm





Enriching Lives

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## **The Kirloskar Group**

### **Corporate social responsibility**

The Group is committed to fulfilling its social responsibility and actively promotes developmental projects in and around the locations where it operates

# Fulfilling Corporate Social Responsibility



Enriching Lives

Public utilities,  
medical  
facilities, cultural  
programs etc.

Some of the projects which the group has undertaken include :

- Support to social welfare organizations for drinking water schemes and medical facilities in rural areas
- Promotion of cultural activities such as literature and arts
- Contributions to relief funds for natural calamities
- Sponsorships and aid for socially under-privileged and the physically handicapped
- Support / sponsorship for utility projects for Indian Armed Forces such as water purification plants at Army Camps

Education  
and  
child welfare ...

The Group believes that education is integral to a nation's development

In line with this belief, the Group conducts a number of developmental programs for education and child welfare

# Fulfilling Corporate Social Responsibility



Enriching Lives

... Education  
and  
child welfare ...

**Some of the projects which the group has undertaken in this direction include the following,**

- School children eye check up with free distribution of glasses
- School teachers health check up and lifestyle management
- Community health camps for underprivileged sections of society





Enriching Lives

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# THANK YOU