



## **Dr. BHUPENDRA KUMAR GANDHI**

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### **Education**

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<b>Degree</b>	<b>Specialization</b>	<b>Year</b>	<b>Institute</b>
Ph. D.*	Fluids Engg.	1998	IIT Delhi
M.Tech.	Thermal & Fluid Engg.	1992	IIT Bombay
B.E.	Mechanical Engg.	1984	SGSITS Indore (MP)

\* Ph. D. thesis Topic: “Studies on Performance and Wear Characteristics of Centrifugal Slurry Pumps handling Multi-sized Concentrated Particulate Slurries”

### **Career**

2001- Cont. Mechanical and Industrial Engineering, IIT Roorkee – 247 667  
1985-2001 Mechanical Engineering Department, SGSITS Indore (MP)  
1984-1985 Kirloskar Brothers Ltd., Dewas (MP)

### **Research Interests**

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Fluid mechanics, Hydro turbomachines, Erosion wear, Flow measurement and Computational fluid dynamics

### **Development Work**

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- Modernization of Fluid Mechanics Laboratory, 1992-95.
- Development of Computational Fluid Dynamics Laboratory, 2003-07.
- Development of Pilot Plant for Slurry Transportation System, 2006-13.
- Development of Flow Diagnostic Lab with Particle Image Velocimetry (PIV) System, 2005-2012.
- Development of slurry erosion test facility, 2002-2005.
- Development of cavitation jet test rig, 2006-09
- Development of Hydro-turbine laboratory, 2010-contd.

### **Awards/ Recognition**

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- Post-Doctoral Fellowship, Japan Society for Promotion of Science (JSPS), Graduate School of Human Informatics, Nagoya University, Japan, 2002-2003.
- Star Performer, IIT Roorkee 2003-04.
- Member in panel of experts in area of Erosion wear of BHEL, India.
- Chair Professor-Hindustan Aeronautics Limited
- Chairman, Technical Committee on Hydro Research, CPRI,

### **Member**

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- Fellow, The Institution of Engineers (I)
- Member, American Society of Mechanical Engineers (ASME)
- Life Member, Indian Society for Technical Education
- Life Member, National Society of Fluid Mechanics and Fluid Power
- Life Member, Indian Society of Water Resource

### **Administrative Responsibilities**

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- General Secretary, Applied Mechanics Society (IIT Delhi), 1995-97
- Staff Advisor, Mechanical and Industrial Engineering Students' Society, 2003-05
- Staff Advisor, Lawn Tennis, 2005-07
- Co-coordinator, Continuing Education Centre and QIP Centre, 2007-11
- Member, Executive Committee, Institution of Engineers (I), Roorkee Local Center, 2008-09
- Coordinator, Thermal Engineering, 2009-11
- Coordinator, Continuing Education Centre, QIP Centre and CD Cell, 2015-contd.

## Subject Taught

### (A) Under Graduate (10)

Sr. No.	Course	Sole instructor or with others	Year
1	Engineering Drawing	With others	1985-2001
2	Fluid Machinery	Sole + with others	1985-01, 2002-08
3	Fluid Mechanics	Sole + with others	1985-00, 2001-05, 2013-15
4	Hydraulic and Pneumatic Control, and Fluidics	With others	1992-95
5	Heat Transfer	Sole	1993
6	Computational Fluid Dynamics	Sole	2004-06
7	Power Plants	Sole	2007
8	Thermodynamics	Coord. and teacher	2007
9	Energy Conversion and Management	Sole	2008
10	Fluid Power Systems	Sole	2013-2015

### (B) Post Graduate (3)

Sr. No.	Course	Sole instructor or with others	Year
1	Hydraulic and Pneumatic Control, and their Maintenance	With others	1999-2001, 2012-13
2	Advanced Fluid Dynamics	Sole	1999, 2009-2012
3	Hydro-dynamic Machines	Sole	2003-2013

### Courses developed

- M. Tech. program on Energy systems and Management has been designed and developed. The course has been recommended by DFC to Dean (Academic) for further consideration.
- A course on Fluid Power Systems (MI 418) has been developed and run as optional course in 2012-13. The course is being opted by 82 students in the spring semester, 2013-14.

## Students

### (A) Doctoral (9)

Sr. No.	Thesis title	Name of Student	Year of award	Co-supervisor	Status
1	Heat Transfer and Fluid Flow Characteristics of Rib-grooved Artificially Roughened Solar Air Heaters	Anand Rao Jaurkar	2002-2006	Prof. J. S. Saini	Completed
2	Study on Slurry Erosion Characteristics of Ductile Type Materials and Laser Cladded	Girish R. Desale	2002-2006	Prof. S. C. Jain	Completed

Surfaces					
3	Heat Transfer and Fluid Flow Characteristics of Discrete-rib Roughened Solar Air Heaters	Kashi Ram Aharwal	2004-2008	Prof. J. S. Saini	Completed
4	Heat Transfer & Fluid Flow Investigation in a Rectangular Duct	Md. Shaukat Ali	2007-2013	Dr. Andlib Tariq	Completed
5	Experimental and Numerical Investigations on Steady State and Transient Characteristics of a High Head Model Francis Turbine	Chirag Trivedi	2009-2014	Prof. Michel Cervantes	Completed
6	Study on Performance Characteristics of Centrifugal Slurry Pump handling Ash Slurries	Satish Kumar	2008-2014	Dr. S. K. Mohapatra	Completed
7	Study of Flow Field over a Square Prism for Vortex Load Reduction using Active and Feedback Control	Manish Chauhan	2011-contd	Dr. Sushanta Dutta	In Progress
8	Characterization of Wake and Suppression of Fluid Forces acting on a Row of Square Prisms using Passive and Active Flow Control	Bhupendra More	2012-contd	Dr. Sushanta Dutta	In Progress
9	Transient Flow Analysis of a Francis Turbine	Rahul Goyal	2013-contd	Prof. Michel Cervantes	In Progress
10	Performance and wear characteristics of centrifugal slurry pumps	Rahul Tarodia	2014-contd.	-	In Progress

#### (B) Post Graduate (44)

Sr No	Thesis title	Name of Student	Year	Co-supervisor
1	Condition Monitoring and Fault Diagnosis in Centrifugal Pumps	Vijay kumar Sukhawani	1993	Dr. D.P.S. Chauhan
2	Diagnosis of Deterioration in the Pump Characteristics with Vibration and Noise as Parameters	Deepesh Sunar	1993	Dr. A. G. Ambekar
3	Monitoring and Fault Detection in Centrifugal Pumps Using Vibration Analysis	Tribhuvan Narayan Rai	1994	Dr. D.P.S. Chauhan
4	Experimental Investigations on Cavitation in a Centrifugal Pump by Noise and Vibration Signals	Manmohan Pandey	1994	Dr. D.P.S. Chauhan
5	Computer Aided Performance Monitoring of Centrifugal Pumps Using Hydraulic Parameters	Raj Kumar Jain	1994	Dr. D.P.S. Chauhan
6	Effect of Particle Size and Size Distribution on Erosion Wear of Cast Iron In Sand-Water Mixture	Satish V. Borse	2001	-
7	Erosion Wear Characteristics of Cast Iron in Solid-Liquid Flows	Girish R. Desale	2001	R. K Porwal
8	Influence of Laser cladding on SS 304L Plate using Powders	Dheeraj Gupta	2004	Dr. S. R. Gupta
9	Improvement of Surface Properties of Aluminum Alloy by Laser cladding using Powders	Sudhakar Behera	2004	Dr. N. Arora
10	Numerical Study on Flow Field inside a Centrifugal Impeller Passage	Ashok Patidar	2004	-
11	Investigation of Surface Roughness Effect for	Sanjay	2004	-

	turbulent Flow in a Rectangular Duct	Kumar		
12	Measurement and Numerical Simulation of Turbulent Flow over a Rectangular Duct	Sumedh P. Pawar	2005	Dr. K. M. Singh
13	Numerical Simulation of Heat Transfer and Fluid Flow for Chamfered Rib Roughened Solar Air Heater Duct	Shyam Sunder Gupta	2006	Dr. K. M. Singh
14	Error Sources and Error Correction for Flow Measurement in Open Channel by Ultrasonic Transit Time Flow Meter and Propeller Current meters	Bobby Abraham Y.	2006	Dr. H. K. Verma
15	Evaluation of Different Velocity Measurement Methods of Turbine Testing	Naveen Gupta	2006	Mukesh Singhal
16	Numerical Investigation on Turbulent Flow over Transverse Ribs	Rakesh Kumar	2006	Dr. K. M. Singh
17	Computer Aided Design of High Speed Trains	Nitin Gupta	2007	Dr. K. M. Singh, Dr. A. Gairola
18	Experimental and Numerical Investigations on Centrifugal Slurry Pump Performance	Sanjay S. Patel	2007	-
19	Flow Measurement using UTTF	M. S. R. PavanKr.	2007	Dr. H. K. Verma
20	Measuring Water Flow Profile using Current-meters and Acoustic Doppler Profiler	S. B. Kusunedru	2007	Dr. H. K. Verma
21	Ground Water Pumping System: A Review	N. Verma	2007	Dr. D. Khare
22	Design of Hydro Turbines using Computational Fluid Dynamics	Gaurav Tayal	2007	Mukesh Singhal
23	Thermo-hydraulic Optimization of Solar Air Heater using Artificial Roughness	Pramod Kumar	2007	Dr. J. S. Saini
24	Investigations of the Effect of System and Operating Parameters on the Performance of Packed Bed Solar Air Heating System	Nitin B. Patel	2007	Dr. J. S. Saini
25	Body Shape Optimization of Indian Loco and Passenger Cars for Higher Running Speed	Lokendra Singh	2009	Dr. K. M. Singh
26	Numerical and Experimental Investigations on Clamp-on Ultrasonic Flowmeter	S. S. Rao	2009	Dr. R. P. Saini
27	Development of Non-Cobalt base Claddings for Improving Erosion Resistance using Laser Cladding Process	S. Raja Kiran	2009	Dr. D. K. Dwivedi
28	Heat Transfer Investigations over the Rib Roughened Wall using Liquid Crystal Thermography	Karamveer	2010	Dr. A. Tariq
29	Design and Development of Aerodynamic Braking System for High Speed Trans	Siddharth Jain	2010	Dr. K. M. Singh
30	Performance Characteristics of Centrifugal Slurry Pump handling Solid-liquid Mixtures	Jayant S. Pawar	2010	Dr. K. M. Singh
31	Investigations on Passive Techniques to minimize the effect of Stall on the Axial Flow Pump	Rakesh Kumar Soni	2010	Dr. S. Dutta
32	Design Analysis of Bulb Turbine	Vishwendra Singh	2010	Dr. R. P. Saini

33	Estimation of Performance Characteristics of Hydraulic Turbine using CFD	Tarun	2011	Dr. K. M. Singh
34	Numerical Simulation of Pollutant Dispersion in a Long Ventilated Highway Tunnel	Harish Kumar	2011	Dr. K. M. Singh
35	Numerical Simulation for flow of liquid through a centrifugal impeller	Praveen Singh	2011	Dr. K. M. Singh
36	Flow Analysis in Penstock	Praveen K. Kulkarni	2011	Dr. Arun Kumar
37	Investigation of Flow Field of Pot Tester	Vineet Singh	2012	- -
38	Design of Suitable Ventilation System for a Long Highway Tunnel using CFD	Jitendra Kumar	2012	Dr. K. M. Singh
39	Numerical Investigations on Flow through a Centrifugal Pump Handling Water and Ash Slurries	Bhola Kumar Gupta	2012	Dr. S. Dutta
40	Numerical Investigations of Flow Field behind Side by Side Triangular Prisms in Sequence at Low and High Reynolds Number	Laxman Singh Pawar	2012	Dr. S. Dutta
41	Experimental and Numerical Estimation of Performance Characteristics of a Centrifugal Slurry Pump Handling Ash-Water Slurries	Mithilesh Kumar	2013	Dr. S. Dutta
42	Flow Analysis of Penstock using CFD	Sudhandhu Kumar	2013	Mr. M. K. Singhal
43	Flow Analysis of Penstock for Multiple Outlets using Computational Fluid Dynamics	Rahul Goyal	2013	Prof. G. Chauhan
44	Study of Performance Characteristics of Discrete Rib Roughened Solar Air Heater	Rohit Sahu	2013-14	--
45	Numerical Simulation of Flow Field of Centrifugal Slurry Pump handling Multi-size Particulate Slurries	Subodh Khullar	2014-15	--

### (C) Under Graduate (41)

1. Major Project : 36
2. SURA Project : 04
3. Independent Study: 02

### Reviewer (Journal - 16)

- Journal of Fluids Engineering, Trans ASME
- Journal of Power and Energy: Proc. I Mech E. Part A
- Renewable Energy
- Journal of Hydraulic Research
- Journal of Heat Transfer Engineering
- Indian Journal of Engineering and Material Sciences

- International Journal of Impact Engineering
- Mechanical Engineering Journal of Institution of engineers (I)
- Optics and Lasers in Engineering
- Powder Technology
- Sadhana - Academy Proceedings in Engineering Science
- Surface and Coatings Technology
- Tribology International
- Wear
- Corrosion Science
- International Journal of Sustainable Built Environment

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**Publications (h-index = 15, Google scholar total citation = 699)**

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**(A) Journals (51)**

1. B. K. Gandhi and D. P. S. Chauhan, "Role of Volute Tongue on Performance and Noise Behaviour of Centrifugal Pump", J. Institution of Engineers (India), Vol. 75, Pt. MC4, 1994, pp.131-135.
2. D. P. S. Chauhan, B. K. Gandhi and Vijay Sukhwani, "Effect of Inlet Vane Passage Blockage in Centrifugal Pump and its Diagnosis", J. Institution of Engineers (India), Vol. 78, Pt. MC2, 1997, pp. 7-10.
3. B. K. Gandhi, S. N. Singh and V. Seshadri, "Prediction of Performance Characteristics of a Centrifugal Slurry Pump Handling Clear Liquid", Indian Journal of Engineering and Materials Sciences, Vol. 5, June 1998, pp. 91-96.
4. B. K. Gandhi, S. N. Singh and V. Seshadri, "Study of the Parametric Dependence of Erosion Wear for the Parallel Flow of Solid-Liquid Mixtures", Tribology International, Vol. 32, 1999, pp.275-282.
5. A. Biswas, B. K. Gandhi, S. N. Singh and V. Seshadri, "Characteristics of Coal Ash and their Role in Hydraulic Design of Ash Disposal Pipelines", Indian Journal of Engineering and Materials Sciences, Vol.7, February 2000, pp. 1-7.
6. B. K. Gandhi, S. N. Singh and V. Seshadri, "Improvements in the Prediction of Performance of Centrifugal Slurry Pumps handling Slurries", J. Energy and Power, Proc. Instn. Mech. Engrs. (UK), Part A, Vol. 214, 2000, pp. 473-486.
7. B. K. Gandhi, S. N. Singh and V. Seshadri, "Performance Characteristics of Centrifugal Slurry Pumps", ASME Journal of Fluids Engineering, Vol. 123, No.2, 2001, pp. 271-280.
8. B. K. Gandhi, S. N. Singh and V. Seshadri, "Variation of Wear along the Volute Casing of a Centrifugal Slurry Pump", JSME International Journal, Series B, Vol. 44, No.2, 2001, pp. 231-237.
9. B. K. Gandhi, S. N. Singh and V. Seshadri, "Effect of Speed on the Performance Characteristics of Centrifugal Slurry Pumps", Trans. ASCE, J. Hydraulic Engineering, Vol. 128/2, 2002, pp. 225-229.
10. H. S. Sondh, S. N. Singh, V. Seshadri and B. K. Gandhi, "Design and Development of Variable Area Orifice meter", Flow Measurement and Instrumentation, Vol. 13, No. 3, 2002, pp. 69-73.

11. P. K. Banchhor, S. N. Singh, V. Seshadri and B. K. Gandhi, "Performance Characteristics of Wedge Flowmeter using CFD ", *Computational Fluid Dynamics J.*, Vol. 11, No. 3, 2002, pp. 279-284.
12. B. K. Gandhi and S. V. Borse, "Effect of Particle Size and Size Distribution on Estimating Erosion Wear of Cast Iron in Sand-Water Slurries", *Indian Journal of Engineering and Materials Sciences*, Vol. 9, 2002, pp. 480-486.
13. B. K. Gandhi, S. N. Singh and V. Seshadri, "A Study of the Effect of Surface Orientation on Erosion Wear of Flat Specimens moving in a Solid-liquid Suspension", *Wear*, Vol. 254, 2003, pp. 1233-1238.
14. V. Seshadri, B. K. Gandhi, S. N. Singh and R. K. Pandey, "Analysis of the Effect of Body Shape on Annubar Factor using CFD", *Measurement*, Vol. 35, 2004, pp.25-32.
15. B. K. Gandhi and S. V. Borse, "Nominal Particle Size of Multi-sized Particulate Slurries for Evaluation of Erosion Wear and Effect of Fine Particles", *Wear*, Vol. 257, 2004, pp. 73-79.
16. S. N Singh, B. K. Gandhi, V. Seshadri and V. S. Chauhan, "Design of a Bluff Body for Development of Variable Area Orifice-meter", *Flow Measurement and Instrumentation*, Vol. 15, 2004, pp. 97-103.
17. B. K. Gandhi, S. N Singh, V. Seshadri and J. Singh, "Effect of Bluff Body Shape on Vortex Flow-meter Performance", *Indian Journal of Engineering and Materials Sciences*, Vol. 11 (5), October 2004, pp. 378-384.
18. G R. Desale, B. K. Gandhi and S. C. Jain, "Improvement in the Design of a Pot Tester to Simulate Erosion Wear due to Solid-liquid Mixture", *Wear*, Vol. 259, 2005, pp. 196-202.
19. A. R. Jaurker, J. S. Saini and B. K. Gandhi, "Heat Transfer and Friction Characteristics of Rectangular Solar Air Heater Duct using Rib-grooved Artificial Roughness", *J. Solar Energy*, Vol. 80/8, 2006, pp 895-907.
20. G R. Desale, B. K. Gandhi and S. C. Jain, "Effect of Erodent Properties of Erosion Wear of Ductile Type Materials", *Wear*, Vol. 261, 2006, pp. 914-921.
21. G R. Desale, B. K. Gandhi and S. C. Jain, "Slurry Erosion of Ductile Materials under Normal Impact Condition", *Wear*, Vol. 264, 2008, 322-330.
22. K R Aharwal, B K Gandhi and J S Saini, "Effect of Gap in Inclined Ribs on the Performance of Artificially Roughened Solar Air Heater Duct", *Renewable Energy*, Vol. 33, 2008, 585-596.
23. Dheeraj Gupta, B. K. Gandhi, S. R. Gupta, C P Paul and A K Nath, "Wear Behaviour of Laser Cladded Cr<sub>3</sub>C<sub>2</sub>, WC and Mo on Austenitic AISI 304L Stainless Steel", *J. Laser Applications*, Vol. 20, 2008, No. 3, pp. 140-145.
24. Girish R. Desale, C.P. Paul, B. K. Gandhi, "Slurry Erosion Wear Properties of Laser Cladding", *Kiran*, Vol. 20, No.2, 2009, pp. 26-33.
25. G R. Desale, B. K. Gandhi and S. C. Jain, "Erosion Wear Behavior of Laser Clad Surfaces of Low Carbon Austenitic Steel", *Wear*, 266, 2009, pp. 975-987.
26. G R. Desale, B. K. Gandhi and S. C. Jain, "Particle Size Effects on the Slurry Erosion of Aluminium Alloy (AA 6063)", *Wear*, 266, 2009, pp. 1066-1071.
27. K. R. Aharwal, B. K. Gandhi, and J. S. Saini, "Heat Transfer and Friction Characteristics of Solar Air Heater Ducts Having Integral Inclined Discrete Ribs on Absorber Plate", *International Journal of Heat and Mass transfer*, 52, 2009, pp. 5970-5977.
28. Anshul Mittal, B K Gandhi and K M Singh, "Improvement in design of Centrifugal Impeller used for Oil Cooling Blower System using CFD - A case study", *J. Power and Energy, Institution of Mechanical Engineers (UK) Part-A*, 223, 2009.



29. B. K. Gandhi, Krishna M. Singh and Sumedh Pawar, "Experimental and Numerical Investigations on Flow through Wedge Shape Rib Roughened Duct", J. Institution of Engineers (India), Mechanical Engineering Division, Vol. 90, 2010, pp 3-8.
30. S. Raja Kiran, B.K. Gandhi, D.K. Dwivedi, C.P. Paul, L.M. Kukreja, "Erosive Wear Behavior of Laser Clad Surfaces of Ni & Co Based Alloys", J. Tribology and Surface Engineering, Volume 2, Issue 1-2, 2011, pp. 33-40.
31. K. R. Aharwal, B. K. Gandhi and J. S. Saini, "An Experimental Investigation of Heat Transfer and Fluid Flow in a Rectangular Duct with Inclined Discrete Ribs" International Journal of Energy and Environment, Volume 1/6, 2010, pp.987-998.
32. G R. Desale, B. K. Gandhi and S. C. Jain, "Development of Correlations for Predicting the Slurry Erosion of Ductile materials", J. Tribology, Tans. ASME, Vol. 133, 2011, pp 031603-1-11.
33. S.S. Patnaik, H.K. Verma and B.K. Gandhi, "New Technology for Discharge Measurement at Small Hydro Stations", Hydropower & Dams, Issue 5, 2011, pp 103-108.
34. S. Kumar, S.K. Mohapatra and B. K. Gandhi, "Effect of Addition of Fly Ash and Drag Reducing on the Rheological Properties of Bottom Ash", International Journal of Mechanical and Materials Engineering (IJMME), Vol. 8 (1), , 2013, pp. 1-8.
35. S. Kumar, S.K. Mohapatra and B. K. Gandhi, "Investigation on Centrifugal Slurry Pump Performance with Variation of Operating Speed", International Journal of Mechanical and Materials Engineering (IJMME), Vol. 8 (1), 2013, pp. 40-47
36. Chirag Trivedi, B. K. Gandhi and Cervantes J. Michel, "Effect of Transients on Francis Turbine Runner Life: A Review", J. Hydraulic Research, Vol. 51(2), 2013, 121–132.
37. Md Shaukat Ali, Andallib Tariq, B. K. Gandhi, "Flow and Heat Transfer Investigation behind Trapezoidal Rib using PIV and LCT Measurements", Experiments in Fluids, 2013, 54:1520.
38. Chirag Trivedi, Michel Cervantes, B. K. Gandhi and Ole Dahlhaug, "Experimental and Numerical Investigations of a High Head Francis Turbine at Several Operating Points" ASME J of Fluids Engineering, Vol. 135, 2013, pp. 02-1 to 02-17.
39. S. Kumar, B. K. Gandhi and S.K. Mohapatra, "Performance Characteristics of Centrifugal Slurry Pump with Multi-Sized Particulate Bottom and Fly Ash Mixtures", Particulate Science and Technology, Volume 32(5), 2014, pages 466-476, DOI:10.1080/02726351.2014.894163.
40. Chirag Trivedi, Michel Cervantes, B. K. Gandhi and Ole Dahlhaug, "Pressure Measurements on a High Head Francis Turbine during Load Acceptance and Rejection", J. Hydraulic Research, 52(2) 2014, DOI:10.1080/00221686.2013.854846.
41. Chirag Trivedi, Michel Cervantes, B. K. Gandhi and Ole Dahlhaug, "Experimental Investigations of Transient Pressure Variations in a High Head Model Francis Turbine during Start-up and Shutdown" J. Hydrodynamics, Volume 26 (2), 2014, pp. 277-290, DOI: 10.1016/S1001-6058(14)60031-7.
42. Rohit Kumar Sahu and B. K. Gandhi, "Numerical simulation of heat transfer enhancement due to a gap in an inclined continuous rib arrangement in a solar air heater duct", International Journal of Advanced Mechanical Engineering, Vol 6 (4), 2014, pp. 687-693.
43. Chirag Trivedi, Michel Cervantes, B. K. Gandhi and Ole Dahlhaug, "Transient Pressure Measurements on a High Head Model Francis Turbine During Emergency Shutdown, Total Load Rejection, and Runaway", ASME J of Fluids Engineering, December 2014, Vol. 136 (12), 121107-1-18.
44. C P Paul, B K Gandhi, P Bhargava, D K Dwivedi and L M Kukreja, "Cobalt Free Laser

- Cladding on AISI type 316L Stainless Steel for Improved Cavitation and Slurry Erosion Wear Behavior”, *Journal of Materials Engineering and Performance*, *Journal of Materials Engineering and Performance*, Vol. 23 (12), 2014, pp. 4463-4471, DOI: 10.1007/s11665-014-1244-9.
45. K. M. Singh, B. K. Gandhi and V. K. Goel, “Aerodynamic Design of High Speed Diesel Trains for Indian Railways”, *Indian Railway Technical Bulletin*, Vol. LXXII, Nov. 2014, pp. 9-18.
  46. Chirag Trivedi, Michel Cervantes, Ole Dahlhaug and B. K. Gandhi, “Experimental Investigation of a High Head Francis Turbine during Spin-No-Load Operation”, *ASME J of Fluids Engineering*, Vol. 137 (6), 2015, pp. 061106-1-10.
  47. Chirag Trivedi, B. K. Gandhi, Michel Cervantes and Ole Dahlhaug, “Experimental investigations on a model Francis turbine during shutdown at synchronous speed”, *Renewable Energy*, Vol. 83, pp 828-836, 2015, DOI:10.1016/j.renene.2015.05.026.
  48. B. S. More, M. K. Chauhan, S. Dutta and B. K. Gandhi, “Investigation of Flow Interference between Two Inline Square Cylinders with One Oscillating Cylinder at Intermediate Reynolds Number”, *Experimental Thermal and Fluid Science*, Vol. 68, pp. 339-358, 2015.
  49. S. Kumar, B. K. Gandhi and S.K. Mohapatra, “Leaching characteristics of Bottom Ash from Thermal Power Plant” Accepted in *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*.
  50. Manish Kumar Chauhan, Sushanta Dutta, B. K. Gandhi and Bhupendra Singh More, “Experimental Investigation of Flow over a Transversely Oscillating Square Cylinder at Intermediate Reynolds Number”, Accepted for publication in *ASME Journal of Fluids Engineering*.
  51. N. Agrawal, S. Dutta and B.K. Gandhi, “Experimental investigation of flow field behind triangular prisms at intermediate Reynolds number with different apex angles”, *Experimental Thermal and Fluid Science*, Vol. 72, 2016, pp. 97-111, DOI: 10.1016/j.expthermflusci.2015.10.032

## **(B) Conferences (65)**

1. B. K. Gandhi and Subir Kar, "Theoretical Estimation of Shut-off Head of Centrifugal Pumps and Fans", Proc. 18<sup>th</sup> National Conf. on Fluid Mechanics & Fluid Power, Indore, 1991, pp. E94-100.
2. M. D. Agrawal, B. K. Gandhi and D. P. S. Chauhan, "Energy Conservation in Agricultural Pumping Systems", Proc. All India Seminar on Pumping Systems-Selection Maintenance & Management, Univ. of Roorkee, Roorkee, 1992, pp. 13-16.
3. B. K. Gandhi and Subir Kar, "Volute Head Loss in a Radial Flow Centrifugal Pump", Proc. 19<sup>th</sup> National Conference on Fluid Mechanics & Fluid Power, Bombay, 1992, pp. F10:1-4.
4. B. K. Gandhi, D. P. S. Chauhan and V.K. Sukhwani "Effect of Vane Passage Blockage on the Performance of Centrifugal Pump", Proc. 20<sup>th</sup> Nat. Conf. on Fluid Mech. & Fluid Power, Palghat, 1993, pp. C11:1-5.
5. M. D. Agrawal, B. K. Gandhi and Ashok Jain, "Heat Dissipation in Hydrodynamic Fluid Coupling", Proc. 20<sup>th</sup> National Conf. on Fluid Mech. & Fluid Power, Palghat, 1993, pp. C12:1-4.
6. D. P. S. Chauhan and B. K. Gandhi, "Effect of Volute Tongue Geometry on the Performance and Noise Behaviour of Centrifugal Pump", Proc. 20<sup>th</sup> National Conf. on Fluid Mechanics & Fluid Power, Palghat, 1993, pp. C13:1-4.
7. D. P. S. Chauhan, B. K. Gandhi and T. N. Rai, "Fault Diagnosis using Spectrum Monitoring of Centrifugal Pump", Proc. 1<sup>st</sup> National Conf. on Fluid Machinery, Bombay, 1994, p. A6:1-5.
8. B. K. Gandhi and D. P. S. Chauhan, "Diagnosis of Air Leakage through Suction in Centrifugal Pump", Proc. First National Conference on Fluid Machinery, Bombay, 1994, pp. A7:1-8.
9. B. K. Gandhi, D.P.S. Chauhan and R. K. Jain, "Computer Aided Performance Evaluation of Horizontal Centrifugal Pump", Proc. All India Seminar on Centrifugal Pumps and Pumping Systems, SGSITS, Indore, March 1995, pp. 128-135.
10. B. K. Gandhi, S. N. Singh and V. Seshadri, "Estimation of Head Ratio of Centrifugal Slurry Pumps at Shut-off Conditions", Proc. 23<sup>rd</sup> National Conference on Fluid Mechanics & Fluid Power, Bhopal, 1996, pp. 275-283.
11. B. K. Gandhi, S. N. Singh and V. Seshadri, "Development of a Test Facility for the Study of Cutting Wear in Solid-liquid Flows", Proc. 24<sup>th</sup> National Conference on Fluid Mechanics & Fluid Power, Calcutta, 1997, C:41-45.
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64. B. K. Gandhi, "Role of hydro power plant in changing energy generation scenario", Recent Developments in Non-conventional Energy Systems" Presented in DIT University, Dehradun, 22-23 December, 2014.
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**(C) Books / Proceedings Edited (01)**

1. "Proceedings of 18<sup>th</sup> National Conference of Fluid Mechanics and Fluid Power", SGSITS Indore, December 1991 (Co-editors: Prof. M. D. Agrawal and Prof. D. Singh).

**(D) Communicated (08)**

1. Rahul Goyal, Chirag Trivedi, B. K. Gandhi, Michel Cervantes and Ole Dahlhaug, "Pressure measurements at part load operating condition of a high head model Francis turbine", Revised manuscript submitted to Sadhana.
2. S. Kumar, B. K. Gandhi and S.K. Mohapatra, "Effect of addition of fly ash on the Rheological properties of bottom ash slurry at varying temperature" Communicated to Particulate Science and Technology.
3. S. Kumar, B. K. Gandhi and S.K. Mohapatra, "Evolution of solid-liquid two-phase flow in centrifugal slurry pump using CFD" Communicated to Journal of Scientific and Industrial Research.

4. S. Kumar, B. K. Gandhi and S.K. Mohapatra, "Influence of fly ash on flow characteristics of bottom ash multisized particulate slurry suspension at high concentration" Communicated to Asia-Pacific Journal of Chemical Engineering.
5. B.K. Gandhi, H.K. Verma and Bobby Abraham, "Mathematical Modeling and Simulation of Flow-Velocity Profile for Rectangular Open Channels", Revised manuscript submitted to ISH Journal of Hydraulic Research.
6. Rahul Tarodiya and B. K Gandhi, "Hydraulic Performance and Erosive Wear of Centrifugal Slurry Pumps - A review", Communicated to Powder Technology.
7. Md. Shaukat Ali, A. Tariq and B. K. Gandhi, "Role of Chamfering angles and Flow through Slit on Heat Transfer Augmentation behind a Surface Mounted Rib", submitted to the ASME Journal of Fluids Engineering.
8. Rahul Goyal, Chirag Trivedi, B. K. Gandhi and Michel Cervantes, "Numerical simulation and validation of a high head Francis turbine at part load operating condition", Communicated to Journal of Hydrodynamics.
9. Chirag Trivedi, Michel Cervantes., B. K. Gandhi and Ole Dahlhaug, "Experimental and Numerical Investigations on a Francis Turbine during Runaway Operating Conditions", Communicated to ASME J. Fluids Eng.

#### **Patents/ Technology Transfer**

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- Slurry Pot Test Rig For Evaluating Erosion Wear, Patent Application No. 2000/DEL/2004, The Patent Office Journal, dated 28-07-2006, India, p. 13908.
- Design of Centrifugal Impeller for OCB system of Indian Railways, Patent application filed at IPR Cell, IIT Roorkee.

#### **Organisation of National / International Conferences / workshops**

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- Joint Organizing Secretary, for 18th National Conference of Fluid Mechanics and Fluid Power, SGSITS, Indore, December, 1991.
- Co-coordinator, Workshop on Laboratory Manual Writing for Fluid Mechanics Laboratory, February 1993.
- Joint Organizing Secretary, Second International (& 29th National) Conference on Fluid Mechanics and Fluid Power, December 2002.
- Convener, International Workshop on Recent Trends in Flow Visualization, IIT Roorkee, December 2009.
- Reviewer and Member, Organizing committee 1st International and 22nd National AIMTDR conference, Dec.21–23, 2007, IIT Roorkee
- Member, Advisory Committee, National Conference on Fluid Mechanics and Fluid Power, 29-31 August, 2013.
- Reviewer and Member, Organizing committee, 1st International and 16th National Conference on Machines and Mechanisms, Dec. 18-20, 2013, IIT Roorkee.
- Member, Organizing Committee, National Conference on Fire Research and Engineering: FiRE 2014, March 1-2, 2014, IIT Roorkee.



**Review/Research/Design/Feasibility Reports:**

Sr. No.	Title	No. of Pages	Name of Agency	Year	Co-author, if any
1	Quality Manual on Testing Procedures in Fluid Mechanics Laboratory at SGSITS Indore	29	National Board for Accreditation of Laboratories	2000	Dr. Sanjeev Bharani

**Sponsored Research Projects (8+2)**

Sr. No.	Title	Capacity	Sponsoring agency	Amount (in INR)	Duration
1	Study on Parametric Dependence of Erosion Wear for Flow of Solid-Liquid Mixture	PI	AICTE, MHRD, Govt. of India	1.6 lacs	1999-01
2	Slurry Erosion Properties of Laser Cladding	PI	BRNS (DST), Govt of India	9.60 lacs	2002-05
3	Modernization of Mechanical Engineering Laboratories	CI	BRNS (DST), Govt of India	9.00 lacs	2004-06
4	Cost Effective Transportation of Bulk Solids through Slurry Pipeline	PI	MHRD, Govt of India	14.0 lacs	2005-07
5	Development of Non-cobalt base Cavitation Resistant Surfaces by Laser Cladding Process	PI	BRNS (DST), Govt of India	14.6 lacs	2006-08
6	Flow Field Investigation of an Axial Flow Pump under near Stall and Stall Conditions	PI	DAAD-DST (PPP)	4.55 lacs	2007-10
7	Investigation on Vortex Generator Induced Heat Transfer Enhancement Using Liquid Crystal Thermography	CI	IITR	9.80 lacs	2008-10
8	Investigations on Ash Disposal System of a Thermal Power Plant for Transportation of Bottom Ash Slurry at Higher Concentrations	PI	DST-FAU	19.03 lacs	2009-12
9	Setting up of Small Hydro Turbine R&D Laboratory at AHEC	CI	MNRE, India	150.00 lacs	2010-14
10	Manipulation of Flow Field over a Square Prism for Vortex Load Reduction using Feedback Control	CI	DST	36.60 lacs	2011-14

**Consultancy Projects (117+5)**

Sr. No.	Title	Capacity	Sponsoring agency	Amount (in INR)	Duration
1	Performance Assessment Certification for Self Priming Pumps	PI	Kirloskar Brothers Ltd., Dewas, (MP)	10,000	1999
2	Assessment of Raw Material Required for Manufacturing Submersible Pump Sets	PI	Shakti Pumps India Ltd., Prithampur (MP)	15,000	1999

3	BIS Testing of Various Pumps and Valves	Team (PI / CI)	Bureau of Indian Standards	2,000,000	1987-2001
4	Automatic Quadrilateral Grid Generation in 2-D	PI	University of Ulsan, Korea	95,698	Apr. 2004- Apr. 2005
5	Performance Testing of Madhavwaram SHP Station in Hyderabad	CI	K.M. Power Ltd., Hyderabad	551,000	Apr. 2004 Dec. 2004
6	Performance Testing of Babbanpur SHP Station in Punjab	CI	Kotla Hydropower Ltd., Noida, UP	330,600	Apr. 2004 -Mar. 2005
7	Performance Testing of Manal SHP Station in Himachal Pradesh	CI	Himalayan Crest Power Ltd. New Delhi	551,000	May 2005 - Sep. 2005
8	Performance Testing of Ching SHP Station in Himachal Pradesh	CI	Hateshwari Om Power Enterprises Pvt. Ltd, Ahmedabad	330,600	June 2005 - Sep. 2005
9	Performance Testing of Aleo Manali SHP Station in Himachal Pradesh	CI	Aleo Manali Hydro Power Ltd. Noida	551,000	Nov. 2005 -Dec. 2005
10	Performance Testing of TB Dam SHP Station in Karnataka	CI	NCL Energy Ltd., Hyderabad	991,800	Nov. 2005 -Dec. 2005
11	Design of Conveyance System from UG Canal to Raw Water Reservoir System of Thermal Power House	CI	Reliance energy, Gaziabad	220,400	Mar. 2006 -Aug. 2006
12	Investigations on Flow induced stresses in the centrifugal fan used for transformer oil cooling	PI	Northern Railway, Ghaziabad	220,400	Nov. 2005 -Aug 2006
13	Performance Testing of Mandagere SHP Station in Karnataka	CI	Bhoruka Power Corporation Ltd.	551,000	Jan. 2006 - Feb. 2006
14	Performance Testing of Chunchi Dodi SHP Station in Karnataka	CI	Sai Spurthi Power Ltd.	991,800	Jan. 2006 - Feb. 2006
15	Performance Testing of Sugur SHP Station in Karnataka	CI	SLS Power Industries Ltd., Karnataka	551,000	Apr. 2005 -Apr. 2006
16	Performance Testing of Someshwara SHP Station in Karnataka	CI	Pioneer Genco Ltd. Hyderabad	991,800	Nov. 2005 -May 2006
17	Performance Testing of Sahyadri SHP Station in Karnataka	CI	Sahyadri Power Co. Pvt. Ltd. Shimoga	220,400	Oct. 2005 - Jun 2006
18	Performance Testing of Chakbai SHP Station in Punjab	CI	Aqua Power Ltd., Noida, UP	551,000	Feb. 2005 - Feb. 2007
19	Performance Testing of Killa SHP Station in Punjab	CI	Kotla Hydro Power Ltd., Noida	561,200	July 2006 - Feb. 2007
20	Performance Testing of Lohgarh SHP Station in Punjab	CI	Aqua Power Ltd., Noida, UP	561,200	July 2006 - Mar. 2007
21	Performance Testing of Sahoke SHP Station in Punjab	CI	Kotla Hydro Power Ltd., Noida	336,720	Dec. 2006 -Apr. 2007
22	Performance Testing of Rani Avanti Bai Sagar in Madhya Pradesh	CI	VA Tech Escher Wyss Flovel Ltd., Faridabad	1,010,160	Feb. 2007 - May 2007
23	Performance Testing of Khauli SHP Station in Himachal Pradesh	CI	VA Tech Escher Wyss Flovel Ltd., Faridabad	1,010,160	Apr. 2007 - Sep. 2007
24	Performance Testing of Marhi SHP Station in Himachal Pradesh	CI	Sai Engineering Foundation, Shimla	561,800	Jul. 2007 - Oct. 2007
25	Measurement of Head and Discharge at different locations of Bassi Power Station in HP	CI	Himachal Pradesh State Electricity Board, Palampur	1,346,880	May 2007 -Nov. 2007
26	Performance Testing of Kadamane SHP Station in Karnataka	CI	Paschim Hydro Energy, Hyderabad	1,011,240	Sep. 2007 - Nov. 2007
27	Performance Testing of Lower Meenmutty SHP Station in Karnataka	CI	Kerala State Electricity Board, Thiruvananthapuram	1,010,160	Jan. 2007 - Jan. 2008
28	Performance Testing of Chayadevi SHP Station in Karnataka	CI	Bhoruka Power Corporation, Bangalore	1,011,240	Sep. 2007 - Jan. 2008
29	Performance Testing of Neria SHP	CI	Bhoruka Power	1,010,160	Mar. 2007

	Station in Karnataka		Corporation, Bangalore		- Jan. 2008
30	Performance Testing of Ranganathaswamy SHP Station in Karnataka	CI	Pioneer Power Corporation Ltd.	1,011,240	Sep. 2007 - Feb. 2008
31	Analysis of Sump model for Recirculating Cooling water system for MA-DMF plant	PI	Simon India, New Delhi	337,080	Oct. 2007- Mar. 2008
32	Performance Testing of MGHE Tailrace SHP Station in Karnataka	CI	Ambuthirtha Power Pvt. Ltd., Bangalore	1,011,240	Feb. 2008 - Aug. 2008
33	Performance Testing of Sarbari SHP Station in Himachal Pradesh	CI	DSL Hydrowatt Limited, Mumbai	561,800	Jan. 2008 - Sep. 2008
34	Performance Testing of Upper Awa SHP Station in Himachal Pradesh	CI	Astha Projects Limited, Hyderabad	561,800	May 2008 - Sep. 2008
35	Performance Testing of Patikari SHP Station in Himachal Pradesh	CI	Patikari Power Private Ltd., Shimla	1,011,240	Mar. 2008 - Oct. 2008
36	Performance Testing of Brahmnganga SHP Station in Himachal Pradesh	CI	Harisons Hydel Construction Co. Pvt. Ltd., Kullu	561,800	June 2008 - Oct. 2008
37	Performance Testing of Hemagiri SHP Station in Karnataka	CI	Trishul Power Pvt. Ltd., Bandihole	561,800	Mar. 2006 - Jan. 2009
38	Performance Testing of Sikasar SHP Station in Chhattisgarh	CI	Chhattisgarh State Electrical Board, Raipur	1,011,240	Jan. 2008 - Dec. 2008
39	Performance Testing of Akkihebal SHP Station in Karnataka	CI	Cauvery Hydro Energy Ltd, bangalore	561,800	June 2008 - Jan. 2009
40	Performance Testing of Sidhana SHP Station in Punjab	CI	Aqua Power Pvt. Ltd. Chandigarh	561,800	Aug. 2008 - Feb. 2009
41	Performance Testing of Sattigala SHP Station in Karnataka	CI	Bhoruka Power Corporation, Bangalore	1,011,240	Dec. 2008 - Feb. 2009
42	Study of Aerodynamic behavior of Passenger Trains and Development of Aerodynamic Profiles of Coaches and Locomotive to Reduce Wind Resistance	CI	Ministry of Railways, Govt. of India	1,746,918	2008-2009
43	Performance Testing of Babehalli SHP Station in Punjab	CI	Gill Power Generation Company Pvt. Ltd., Gurudaspur	561,800	Jan. 2009 – Jun. 2009
44	Capacity Assessment of ITC Haridwar and Manpura Units	PI	ITC Ltd, Kolkatta	275,750	2009-2010
45	To design and deliver Technical capacity Building Programs	PI	Uttarakhand Rural Water Supply & Environmental Sanitation Project, PMU – Dehradun	6,648,000	2009-2011
46	Performance Testing of Lower Baijnath SHP Station in Himachal Pradesh	CI	Changer Vidyut Kranti Pvt. Ltd., Palampur	441,300	Mar. 2010 –Jun. 2010
47	Performance Testing of Baragran SHP Station in Punjab	CI	KKK Hydro Power Ltd., Faridabad	441,200	Feb. 2010 - June 2010
48	Performance Testing of Taraila-II SHP Station in Himachal Pradesh	CI	Cimaron Construction Pvt. Ltd., Hyderabad	561,800	Feb. 2010 - July 2010
49	Performance Testing of Upper Taraila SHP Station in Himachal Pradesh	CI	A.T. Hydro Pvt. Ltd., Hyderabad	661,800	Feb. 2010 - Aug. 2010
50	Performance Testing of Soham Mannapitlu SHP Station in Karnataka	CI	Soham Mannapitlu Power Pvt. Ltd., Bnglr	1,103,000	Aug. 2010 -Nov. 2010
51	Performance Testing of Ullunkal SHP Station in Kerala	CI	Energy Development Company Ltd., Faridabad	1,103,000	Aug. 2009 -Dec. 2010

52	Performance Testing of Mrujaara SHP Station in Karnataka	CI	Mrujaara Power Plant, Shimoga	441,200	July 2010 - Dec. 2010
53	Performance Testing of Kenchengudem SHP	CI	Pusala Power Project Pvt. Ltd., Hyderabad	1,103,000	Jan. 2010 - Feb. 2011
54	Performance Testing of Terkiana SHP Station in Punjab	CI	Atlantic Power Pvt. Ltd., Chandigarh	441,200	May 2010 -Mar. 2011
55	Performance Testing of Gholian SHP Station in Punjab	CI	Abohar Power Generation Pvt. Ltd, Noida	441,200	Sep. 2010 - Mar. 2011
56	Performance Testing of Akhara SHP Station in Punjab	CI	Abohar Power Generation Pvt. Ltd., Noida	441,200	Sep. 2010 - Mar. 2011
57	Performance Testing of Channuwala SHP Station in Punjab	CI	Abohar Power Generation Pvt. Ltd., Noida	441,200	Sep. 2010 - May 2011
58	Performance Testing of Khanpur SHP Station in Punjab	CI	Abohar Power Generation Pvt. Ltd., Noida	441,200	Sep. 2010 - May 2011
59	Performance Testing of GGSSTP SHP Station in Punjab	CI	Punjab State Power Corporation, Patiala	441,200	Mar. 2010 -Jun. 2011
60	Performance Testing of Sudhar SHP Station in Punjab	CI	Abohar Power Generation Pvt. Ltd., Noida	441,200	Sep. 2010 -Jun. 2011
61	Performance Testing of Korba SHP Station in Chhattisgarh	CI	Chhattisgarh State Electricity Board, Raipur	441,200	Nov. 2009 - Jul. 2011
62	Performance Testing of Kadamane-II SHP Station in Karnataka	CI	Nagarjuna Hydro Energy Pvt. Ltd., Hyderabad	1,103,000	Feb. 2011 - Nov. 2011
63	Performance Testing of Deoghar SHP Station in Maharashtra	CI	Gadre Marine Export Ltd., Ratnagiri	441,200	Oct. 2010 - Dec. 2011
64	Study on Erosion Wear using Slurry Pot Tester	PI	Voith Hydro Holding GmbH Co., Germany	1,003,000	Sept.2011-Aug. 2014
65	Performance Testing of Manjanadka SHP Station in Karnataka	CI	Bhoruka Power Corporation Ltd., Bangalore	1,103,000	Apr. 2011 - Feb. 2012
66	Performance Testing of Nandigama-III SHP Station in Andhra Pradesh	CI	Kallam Spinning Mills Ltd., Guntur	441,200	Dec. 2011 - Feb. 2012
67	Performance Testing of Yettinahole SHP Station in Karnataka	CI	Mysore Mercantile Co. Ltd., Bangalore	661,800	May 2011 - Feb. 2012
68	Performance Testing of Perla SHP Station in Karnataka	CI	AMR Power Pvt. Ltd., Hyderabad	1,103,000	May 2011 -Mar. 2012
69	Performance Testing of Dadupur SHP Station in Haryana	CI	Bhourka Power Corporation Ltd., Bangalore	1,103,000	Mar. 2012 -June 2012
70	Performance Testing of Darna SHP Station in Maharashtra	CI	DLI Power (India) Pvt. Ltd., Mumbai	661,800	Sep. 2011 - June 2012
71	Performance Testing of Rakchad SHP in Himachal Pradesh	CI	Regent Energy Ltd, New Delhi	661,800	Oct. 2011 - June 2012
72	Performance Testing of Rukti-II SHP Station in Himachal Pradesh	CI	Door Sanchar Hydro Power Pvt. Ltd., Gurgaon	674,160	May 2012 -Aug. 2012
73	Performance Testing of Kumbhi SHP Station in Maharashtra	CI	Sh. T. K. Warana Sahakari Navshakti Nirman Sanstha Ltd, Warannanagar	681,000	Dec. 2011 -Aug. 2012
74	Performance Testing of Chitri SHP, Maharashtra	CI	Sh. T. K. Warana Sahakari Navshakti Nirman Sanstha Ltd,	441,200	Dec. 2011 - Sep. 2012

Warannanagar						
75	Performance Testing of Radhanagari SHP Station in Maharashtra	CI	R.M. Mohite Industries Ltd., Maharashtra	1,103,000	Dec. 2011 - Sep. 2012	
76	Performance Testing of Aniyur SHP Station in Karnataka	CI	Prasanna Power Ltd., Bangalore	1,103,000	Sep. 2011 - Oct. 2012	
77	Efficiency Test on Periyar Vaigai-II SHP Station in Tamil Nadu	CI	Kirloskar Brothers Ltd., Pune	674,160	Dec. 2012 - Jan. 2013	
78	Performance Testing of Mussapur SHP Station in Haryana	CI	Puri Oil Mills Ltd., New Delhi	441,200	Mar. 2012 - Mar. 2013	
79	Unit Efficiency Test on Bassi Hydro-Electrical Project in HP	CI	Andritz Hydro Pvt.e Ltd.	1,685,400	Jan. 2013 - Mar. 2013	
80	Performance Testing of Kasari SHP Station in Maharashtra	CI	Vishwaj Energy Pvt. Ltd., Pune	661,800	Mar. 2011 - Apr. 2013	
81	Performance Testing of Kadavi SHP Station in Maharashtra	CI	Sh. T. K. Warana Sahakari Navshakti Nirman Sanstha Ltd, Warannanagar	449,440	Sep. 2012 - Jun. 2013	
82	Performance Testing of Khukhni SHP Station in Haryana	CI	Puri Oil Mills Ltd., New Delhi	449,440	Sep. 2012 - Aug. 2013	
83	Renovation, Modernization and Uprating of Kuttiadi HEP	CI	Kerala State Electricity Board	2,030,345	Apr. 2012 - Oct. 2013	
84	RLA studies and DPR for R & M of Koshi SHP Station	CI	Bihar State Electricity Board, Patna	1,763,200	2006-2007	
85	Analysis of GI pipes of different places of Uttarakhand	PI	Uttarakhand Lal Nigam	2,213,000	Apr. 2012- Mar. 2013	
86	Analysis of GI Pipes of Different Places of Uttarakhand	PI	Project Management Unit, Deharadun	183,147	2013-14	
87	Performance Testing of Pench RBC SHP (2x700 kW) at Parseoni, District Nagpur, Maharastra	CI	Director, SMS Vidhyut Pvt. Ltd, Nagpur	449,440	Dec. 2012 - Dec. 2013	
88	Efficiency Testing of the generating unit of Bassi Hydropower Station (4x16.5 MW) in Mandi District, HP	CI	M/s Andriz Hydro Pvt. Ltd., Palwal	1,685,400	Dec. 2012 - Dec. 2013	
89	Turbine Flow Measurement for PG test at Periyar Veghai-II (2x1.25 MW) Hydel Project Tamilnadu	CI	M/s Kirloskar Brothers Ltd., Pune	674,160	Dec. 2012 - Dec. 2013	
90	Performance Testing of Kadavi Hydroelectric Project (1.5 MW) in District Kolhapur, Maharashtra	CI	M/s Shree Tatyasaheb Kore Warana Sahakari Navashakti Nirman Sansthan Ltd., Wrananagar	449,440	Sep. 2012 - Dec. 2013	
91	Performance Testing of Mussapur (2x700 kW) SHP in Haryana	CI	M/s Puri Oil Mills Ltd., New Delhi	441,200	Feb. 2012 - Dec. 2013	
92	Performance Testing of Kesari SHP (1x2.5 MW) at Village Dhoom-Balkwadi District Satara in Maharashtra	CI	M/s Vishwaj Energy Pvt. Ltd., Pune	661,800	Mar. 2011 - Dec. 2013	
93	Performance Testing of Khukhni Hydro Electric Project (2x700 kW) in Haryana	CI	M/s Puri Oil Mills Ltd., New Delhi	449,440	Sep. 2012 - Dec. 2013	
94	Performance Testing of Dhom SHP (4 MW) at Village Dhom-Balkawadi District Satara in Maharashtra	CI	M/s Vishwaj Energy Pvt. Ltd., Pune	661,800	Mar. 2011 - Dec. 2013	
95	CFD analysis of Intake arrangement of veer NLBC Hydroelectric Project	PI	Mahati Hydro Power Projects Pvt. Ltd., Pune	1,123,600	Oct. 2013- May 2014	
96	Performance testing of Brindavan SHP Station, Near Mysore, Karnataka	CI	Atria Brindavan Project Ltd., Bangalore	11,03,000	Mar. 2012- May 2014	
97	Performance Testing of Brandavan	CI	Atria Brindavan	6,74,160	Sept. 2012	

	Tailrace SHP in Distt. Mandya, Karnataka		Project Ltd., Bangalore		- May 2014
98	Measurement of Head Loss at Ganguwal and Kotla Power House of BBMB	CI	BBMB PW Ganguwal, Punjab	2,24,720	Feb. 2014 - July 2014
99	Performance Testing of Ghanvi-I SHP near Rampur Bushr, District – Shimla (HP)	CI	Andritz Hydro Pvt. Ltd., Palwal (Haryana)	11,23,600	April 2014 – July 2014
100	Field Efficiency Testing of Machine No. -2 at Mohammadpur SHP, Uttarakhand	CI	GoGoal Hydro Power Pvt. Ltd., Haridwar	11,23,600	April 2013 –Sept. 2014
101	Performance Testing of Phatakwardi SHP in Distt. Kolhapur, Maharashtra	CI	DM Corporation Pvt. Ltd., Maharashtra	11,23,600	Aug.2012- Nov. 2014
102	Performance Testing of Somavathi Mini Hydel Scheme SHP near Samse Village, Mudigere Taluk, Chikmangalore Distt., Karnataka	CI	SRM Power Pvt. Ltd., Bangalore	11,23,600	July 2013- Nov. 2014
103	PG Test at Periyar Vaigai-I Hydel Project Theni District in Tamil Nadu	CI	Kirloskar Brothers Ltd., Pune	6,74,160	Sept.2013- Jan. 2015
104	PG Test at Periyar Vaigai-III Hydel Project Theni District in Tamil Nadu	CI	Kirloskar Brothers Ltd., Pune	6,74,160	Sept. 2013-Jan. 2015
105	Performance Testing of Gonal SHP – III on Devapur Nala at Gonal Village, Shorapur Taluk, Yadgir District (Karnataka)	CI	South West Hydro Power Pvt. Ltd., Hyderabad	6,74,160	Dec.2013 - Jan. 2015
106	Performance Testing of Rayabasavanna Canal MHP at Tungabhadra Dam, Distt. Bellary (Karnataka)	CI	Khandaleru Power Company Ltd., Hyderabad	4,49,440	Dec.2013- Jan. 2015
107	Performance Testing of Agrahara-I Scheme Near Kardigudda and Ramdurga, District – Raichur Karnataka	CI	Sarovara Energy Pvt. Ltd., Bangalore	4,49,440	Oct.2013 - Feb. 2015
108	Performance Testing of Agrahara-II Scheme Near Kardigudda and Ramdurga, District – Raichur Karnataka	CI	Sarovara Energy Pvt. Ltd., Bangalore	4,49,440	Oct. 2013 - Feb. 2015
109	Performance Testing of 1x4.8 MW Veer NLBC Hydro Electric Project Veer Village, Taluka-Purandar, District Pine, Maharashtra	CI	M/s Mahati Hydro Power Projects Pvt. Ltd., Pune	674,160	Aug. 2012 -Dec. 2015
110	Performance Testing of Phatakwardi SHP (2x4 MW) in District Kolhapur, Maharashtra	CI	M/s DM Corporation Pvt. Ltd. Kolhapur, Maharashtra	1,123,600	Aug. 2012 -Dec. 2015
111	Performance Testing of Harangi Stage-II (1x6 MW) Hydro Electric Project, District Kodagu, Karnataka	CI	M/s Energy Development Company Co., Faridabad	1,123,600	Jul. 2013 - Dec. 2015
112	Performance Testing of 2x2.25 MW Charmadi SHP at Belthangadi Taluk in Karnataka	CI	M/s Trinethra Energy Conventions Ltd., Bangalore	661,800	Sep. 2009 - Dec. 2014
113	Performance Testing of Sonna SHP (3x3.5 MW) at Devanagaon, Bijapur District, Karnataka	CI	M/s Jasper Energy Pvt. Ltd., Hyderabad	1,123,600	Jun. 2012 - March. 2015
114	Performance Testing of Beaskund (9 MW) SHP at Village Palchan District Kullu, Himachal Pradesh	CI	M/s Kapil Mohan & Asscoait Hydro Power Pvt. Ltd., Chandigarh	1,103,000	Mar. 2012 -Dec. 2014
115	Performance Testing of Bhilangana-	CI	M/s Abohar Power	1,123,600	Apr. 2012

	III (3x8 MW) Hydro Electric Project in Uttarakhand		Generation Pvt. Ltd., Noida		-Dec. 2014
116	Performance Testing of Brindavan (2x6 MW) SHP Station, Near Mysore, Karnataka	CI	M/s Atria Brindavan Power Ltd., Bangalore	1,103,000	Mar. 2012 -Dec. 2014
117	Performance Testing of Brandavan Tailrace Scheme (2x2 MW) in Karnataka	CI	M/s Atria Brindavan Power Ltd., Bangalore	674,160	Sep. 2012 - Dec. 2014
118	Performance Testing of 2x2 MW Horizontal Pelton Turbine at Panvi, Himachal Pradesh	CI	M/s Kirloskar Brothers Ltd., Pune	674,160	Jul. 2013 - Dec. 2015
119	Performance Testing of Motighat SHP (2x2.5 MW) at Munsyari, Pithoragarh, Uttarakhand	CI	M/s Himalaya Hydro Pvt. Ltd., Hyderabad	661,800	Feb. 2012 - Dec. 2014
120	Performance Testing of Tangling HEP (2x2.5 MW) in District Kinnour, Himachal Pradesh	CI	M/s Sai Engineering Foundation, New Shimla (HP)	674,160	Mar. 2013 -Dec. 2015
121	Performance Testing of Chakshi Hydro Electric Project (1x2 MW) in Himachal Pradesh	CI	M/s Puri Oil Mills Ltd., New Delhi	449,440	Sep. 2012 - Dec. 2015
122	Performance Testing of Balij Ka Nallan SHP (2x1.75 MW), Chamba District, Himachal Pradesh	CI	M/s Batot Hydro Power Ltd., Mumbai	674,160	Aug. 2013 -Dec. 2015

### Short Term Courses Organised (29)

Sr. No.	Name of activity	Course	Sponsoring agency	Duration	Coordinator
1	Training Course	Best Practices in Agricultural Pump-sets and Rural Demand Supply Management	PFL Ltd., New Delhi	Nov.28–Dec. 2, 2005	B K Gandhi
2	Refresher course	Orientation Programme for Finishing School Participating Institute	MHRD, Govt. of India	Apr. 24 – 25, 2008	Vinod Kumar B K Gandhi
3	Training course	Finishing School Programme	MHRD, Govt. of India	May 26 – Jul. 18, 2008	Vinod Kumar B K Gandhi
4	Short term course	Computational Fluid Dynamics	AICTE, QIP center, IIT Roorkee	Jun. 11-22, 2008	B.K. Gandhi K. M. Singh
5	Training course	Finishing School Programme	MHRD, Govt. of India	May 28 – Jul. 16, 2009	Vinod Kumar B K Gandhi
6	Training Course	Feasibility, Design & DPR preparation	Swajal,Uttarakhand	Jan. 8-12, 2008	Deepak Khare B.K. Gandhi
7	Training Course	Feasibility, Design & DPR preparation	Swajal,Uttarakhand	Feb. 4-8, 2008	Deepak Khare B.K. Gandhi
8	Training Course	Feasibility, Design & DPR preparation	Swajal,Uttarakhand	Mar. 16-20, 2008	Deepak Khare B.K. Gandhi
9	Short term course	Computational Fluid Dynamics	QIP center, IIT Roorkee	Jun. 28- Jul. 2, 2010	B.K. Gandhi K. M. Singh
10	Training Course	Feasibility, Design & DPR preparation	Swajal,Uttarakhand	Nov. 16-20, 2009	B.K. Gandhi Deepak Khare
11	Training Course	Feasibility, Design & DPR preparation	Swajal,Uttarakhand	Nov. 23-27, 2009	B.K. Gandhi Deepak Khare
12	Training Course	Feasibility, Design & DPR preparation	Dept of Drinking Water, Swajal,Uttarakhand	Dec. 7-11, 2009	B.K. Gandhi Deepak Khare
13	Training Course	Feasibility, Design & DPR preparation	Dept of Drinking Water, Swajal,Uttarakhand	Dec. 14-18, 2009	B.K. Gandhi Deepak Khare

14	Training Course	Feasibility, Design & DPR preparation	Dept of Drinking Water, Swajal,Uttarakhand	Jan. 5-9, 2010	B.K. Gandhi Deepak Khare
15	Training Course	Feasibility, Design & DPR preparation	Dept of Drinking Water, Swajal,Uttarakhand	Jan. 12-16, 2010	B.K. Gandhi Deepak Khare
16	Training Course	Feasibility, Design & DPR preparation	Dept of Drinking Water, Swajal,Uttarakhand	Jan. 5-9, 2010	B.K. Gandhi Deepak Khare
17	Training course	Computational Fluid Dynamics	IEI (I) Local centre Roorkee	Aug. 20-22, 2010	B.K. Gandhi K. M. Singh
18	Short term course	Computational Fluid Dynamics	QIP center, IIT Roorkee	Jun. 28- Jul. 2, 2010	B.K. Gandhi K. M. Singh
19	Training Course	Construction Supervision and Operation & Maint.	Dept of Drinking Water, Swajal,Uttarakhand	Sep.13-17, 2010	B.K. Gandhi Deepak Khare
20	Training Course	Construction Supervision and Operation & Maint.	Dept of Drinking Water, Swajal,Uttarakhand	Oct.11-15, 2010	B.K. Gandhi Deepak Khare
21	Training Course	Construction Supervision and Operation & Maint.	Dept of Drinking Water, Swajal,Uttarakhand	Jan. 10-14, 2011	B.K. Gandhi Deepak Khare
22	Training Course	Construction Supervision and Operation & Maint.	Dept of Drinking Water, Swajal,Uttarakhand	Jan. 17-21, 2011	B.K. Gandhi Deepak Khare
23	Training Course	Construction Supervision and Operation & Maint.	Dept of Drinking Water, Swajal,Uttarakhand	Jan. 24-28, 2011	B.K. Gandhi Deepak Khare
24	Training Course	Construction Supervision and Operation & Maint.	Dept of Drinking Water, Swajal,Uttarakhand	Jan.31- Feb. 4, 2011	B.K. Gandhi Deepak Khare
25	Training Course	Construction Supervision and Operation & Maintenance	Dept of Drinking Water, Swajal,Uttarakhand	Feb. 14-18 , 2011	B.K. Gandhi Deepak Khare
26	Training Course	Feasibility, Design & DPR preparation	Dept of Drinking Water, Swajal,Uttarakhand	Feb.28 -Mar. 4, 2011	B.K. Gandhi Deepak Khare
27	Training Course	Catchment Area Conservation and Management Aspects	Dept of Drinking Water, Swajal,Uttarakhand	Sep. 3-5, 2011	Deepak Khare B.K. Gandhi
28	Training Course	Catchment Area Conservation and Management Aspects	Dept of Drinking Water, Swajal,Uttarakhand	Sep. 1-3, 2011	Deepak Khare B.K. Gandhi
29	Short term course	Modern measurement techniques in fluid and thermal engineering	QIP center, IIT Roorkee	Jul. 07 –11, 2011	B K Gandhi S. Dutta

### **Significant Contributions during the Last Five Years**

I am working in the area of experimental fluid mechanics and also using tools of computational fluid dynamics (CFD). The facility of on-site performance testing has been developed for small hydro power plants and so far efficiency of around 120 plants has been evaluated. I travelled extensively all over the country to gear-up for efficient utilization of hydro-power for better generation. A frequent problem of grid failure and its effect on hydro-turbine has been studied, first time, to strengthen the design. Complete flow passages of Francis turbine and pumps, namely centrifugal and axial flow, have been numerically simulated. The transient operating condition of the turbines is being investigated using CFD and particle image velocimetry (PIV) system. A hydro-turbine laboratory is being developed.

A flow visualization laboratory equipped with PIV system is established for flow diagnostics. We are currently studying the techniques of active and passive flow controls in a small wind tunnel using PIV and hot wire anemometer. PIV system has also been used to investigate the effect on the flow field due to artificial surface roughness and rib turbulators.



The shape of Indian railway loco and train has been optimised and is suggested to Indian railway for saving in power and energy consumption. A centrifugal impeller of oil cooling blower system of traction motor has also been designed and developed which is being used by Indian railway in place of the expensive imported one. This has resulted in less failure in the field and reduced the imports.

A pot tester has been designed and developed to simulate slurry erosion in the laboratory. It was submitted for patent and an international consultancy project on the pot tester is received from M/s Voith Hydro, Germany. A close loop pilot plant for slurry transportation system is also installed. A facility for evaluating cavitation wear has also developed.

I am often teaching fluid mechanics and fluid machines to UG students, and advanced fluid mechanics and hydrodynamic machines to PG students. A new course on fluid power systems has been developed and implemented for UG students to impart them the knowledge of hydraulic and pneumatic control systems being used for automation. Also a new PG program on energy systems and management has also been designed and developed.