

Curriculum Vitae of Dr. N. K. JAIN

Full Name: Neelesh Kumar Jain
Date of Birth: 17th November, 1973
Nationality: Indian (Passport Number: Z1718426)
Marital Status: Married (Wife: Dr. Rajul Goel, Ph. D. Botany)
Kids: One daughter (Namya Jain born on 24th May 2005) and
One Son (Aarjav Jain born in 6th April 2011)

Education:

Degree	Year	Institute	Discipline (Specialization)
Ph. D.	2003	IIT Kanpur	Mechanical Engineering (Manufacturing)
M. Tech.	1995	IIT Kanpur	Mechanical Engineering (Manufacturing)
B. E.	1993	SGSITS Indore	Mechanical Engineering

Areas of Specialization and Interest:

- ❖ Advanced Machining Processes
- ❖ Hybrid Machining Processes
- ❖ Micro-machining and Nano-finishing Processes
- ❖ Manufacturing Process Selection and Process Parameters Optimization
- ❖ CAPP, CAD/CAM, Integrated Manufacturing Systems
- ❖ Application of Soft Computing Techniques to Manufacturing Processes
- ❖ Product Data Management (PDM) and Internet Based Manufacturing

Work Experience:

Organization/Institute	Designation	Duration
IIT Indore	Associate Professor	29 th Jan. 2010 onwards
IIT Roorkee	Assistant Professor	6 th Feb 2007 to 28 th Jan. 2010
School of Mechanical and Aerospace Engineering, Oklahoma State University, Stillwater (USA)	Visiting Assistant Professor	3 rd July 2008 to 27 th Dec. 2008
IIT Roorkee	Assistant Professor (on-contract)	17 th June 2004 to 5 th Feb 2007
South Asia International Institute, Hyderabad	Assistant Professor	22 nd June 2003 to 31 st May 2004
NSIT (Formerly DIT) New Delhi	Lecturer	29 th July 2002 to 19 th June 2003
IIT Kanpur	Senior Project Associate	17 th Dec 95 to 17 th March 96 1 st May to 31 st Oct 96
Tata Electric Company, Mumbai	PGET	1 st to 10 th Aug. 95
IIT Kanpur	Project Research Associate	1 st Apr 95 to 11 th June 95

Awards and Honors:

- Inclusion in **Marquis's Who's Who** for the year 2010.
- **BOYSCAST Fellowship (2007-08)** in Engineering Sciences by Department of Science and Technology (DST), Government of India to visit **Oklahoma State University, Stillwater (USA)** for duration of SIX months for doing advanced training/research in area of micro-machining/nanotechnology/manufacturing process simulation under the mentorship of **Prof. Ranga Komanduri**.
- **Second Best Paper award** at 17th AIMTDR Conference held at NIT (REC) Warangal during January 1997.
- **National Merit Scholarship** during Oct. 1989 to July 1993 on the basis of Higher Secondary Examination 1989 conducted by B.S.E. Bhopal.
- **National Scholarship Merit Certificate** on the basis of High School Examination 1987 conducted by B.S.E. Bhopal.
- **MHRD Ph. D. Scholarship** during January 1997 to July 2002.
- **MHRD scholarship** during July 1993 to January 1995 on basis of GATE 1993

Administrative Responsibilities:

At IIT Indore

- **Dean, Academic Affairs** (6th Oct. 2010 onwards)
- **Member**, Board of Governors (**BOG**) of IIT Indore (April 2010-July 2012)
- **Member**, Academic Council, IIT Indore (July 2011 onwards)
- Coordinator, IIT Indore Virtual Classroom (March 2010 onwards)
- **Acting Director** (15 & 16th Nov., 13-15 Dec. 2010, 27-29 Dec. 2010)
- Convener, UGAPEC (March 2010 to March 2011) & PGAPEC (May 2010 to March 2011)
- Member, Institute Library Committee (May 2010 - June 2012)

At IIT Roorkee

- Course coordinator, MI-102: Manufacturing Techniques for the year 2007-08.
- Staff Advisor, Photography section of Hobbies Club, IIT Roorkee since March 2009 to Jan. 2010.
- Member DUGC, MIED (2006-07) at IIT Roorkee
- OC, Work Science Laboratory July 2005 to Jan. 2010.
- Member, PG Program Academic Structure Review Committee of MIED (Oct 2004-April 2006) at IIT Roorkee
- Member, B. Tech. Project Evaluation Committee of MIED for year 2005-06.
- Member, MIED Website Maintenance and Update Committee.

Contact Information:

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Theses Supervision:

Degree	Completed+ Under Progress	Total
Ph. D. Thesis	2 + 3	05
M. Tech. Theses	10	10
B. Tech. Projects	6	06

Ph.D. Theses Supervision				
SN	Student Name	Thesis Theme/Title	Status	Other Thesis Supervisor
1	Kapil Gupta	<i>SOME INVESTIGATIONS ON MANUFACTURING OF Miniature Gears by Wire Electro-Discharge Machining (WEDM)</i>	On-going since July 2011	None
2	Shaikh Javed Habib	<i>Experimental Investigations and Process Performance Optimization of Bevel Gear Finishing by ECH and PECH</i>	On-going since July 2010	None
3	Suyog Jhavar	<i>Investigations on Die Mold Repair using Advanced Manufacturing Processes</i>	On going since July 2010	Dr. C.P. Paul (RRCAT, Indore)
3	Pragya Shandilya	<i>Studies on Wire Electro Discharge Cutting (WEDC) of Al-based Metal Matrix Composites (MMC)</i>	Awarded in March 2012	Prof. P. K. Jain (IIT Roorkee)
4	Abhay Kumar Dubey	<i>Development of the Setup and Performance Optimization of Electro Chemical Honing Process</i>	Awarded in Oct 2006	Retd. Prof. H. S. Shan (IIT Roorkee)

M. Tech. Theses Supervision				
SN	Student Name	Thesis Title	Status	Co-Guide (if Any)
1	Harpreet Singh	<i>"Investigations on Pulse-Electrochemical Honing (PECH) of External Gears"</i>	Completed (July 2010)	Prof. P. K. Jain
2	D. Srinath	<i>"Enhancement of Electrode Life in Resistance Spot Welding of Zn-Coated Steel Sheets"</i>	Completed (July 2010)	Dr. D. K. Dwivedi
3	Abhishek Das	<i>"Surface Modification of Aluminum by EDM Using Ti/Cu Green Compact Electrode"</i>	Completed (July 2009)	Prof. Pradeep Kumar Prof. Alexander Wanner Prof. Volker Schulze (Karlsruhe Institute of Technology)
4	Abhimanue Potpelwar	<i>"Investigation of Electrolytic Jet Drilling (EJD) Process"</i>	Completed (July 2009)	Prof. N. K. Mehta
5	Joy Prakash Misra	<i>"Precision Finishing of Helical Gears by Electro Chemical Honing (ECH) Process"</i>	Completed (July 2009)	Dr. A. K. Sharma
6	L. Ramlal Naik	<i>"Investigations on Precision Finishing of Gears by Electro Chemical Honing"</i>	Completed (July 2008)	Dr. A. K. Sharma
7	Sandeep Srivastava	<i>"Investigation on Densification of Weld Joints using Compaction Techniques"</i>	Completed (July 2008)	Dr. D. K. Dwivedi
8	Kailash S. Kuhite	<i>"Modeling of Surface Roughness of Electro Discharge Machined Components"</i>	Completed (July 2008)	Dr. D. K. Dwivedi
9	Deepark Kumar Nagar	<i>"Decision Support System for Selection of Casting Processes"</i>	Completed (July 2007)	Prof. Pradeep Kumar
10	T. Venkat Siva Reddy	<i>"Experimental Investigation on Stir-Casting of Al-Si Alloys"</i>	Completed (July 2006)	Dr. D. K. Dwivedi
11	Devender Ninaniya	<i>"Process Parameters Optimization and Experimental Verification of Ultrasonic"</i>	Completed (July 2006)	No

		<i>Machining (USM) Process”</i>		
12	V. V. Rao	<i>“Decision Support System for Selection of Rapid Prototyping Processes”</i>	Completed (July 2006)	No

B. Tech. Projects				
<i>SN</i>	<i>Title</i>	<i>Students Name</i>	<i>Co-Guide</i>	<i>Status</i>
1	<i>Modeling of Supply Chain for Disaster Management</i>	Mukund Murari Singh Durgendra N. Singh	---	<i>Completed (2007-08)</i>
2	<i>Design and Development of Tribo-Fatigue Testing Machine</i>	Shanshank Rai Goel Vaishav Sah Tarjan Singh	Dr. D. K. Dwivedi	<i>Completed (2007-08)</i>
3	<i>Development of Touch Pad Controlled AGV</i>	Kaustubh Chilwarwar Kamaljeet Singh	Dr. D. K. Dwivedi	<i>Completed (2007-08)</i>
4	<i>Software development for Dynamic Trains Scheduling</i>	Abhinav Anand, Keshav Sirohi, Rakesh Prakash	---	<i>Completed (2006-07)</i>
5	<i>Computer Aided Plant Layout</i>	Siddharth Jain Tushar Parashar Sher Ali	---	<i>Completed (2006-07)</i>
6	<i>Computer Aided Materials Selection System (at NSIT New Delhi)</i>	Amit Kumar Charan Jeet Singh, Pradeep Verma	---	<i>Completed (2002-03)</i>

Research Publications:

	Published (Accepted)	Communicated	Total
Chapters in Books and Encyclopedia	03	00	03
In Refereed International Journals	18	07	25
In Proceedings of International + National Conferences	18	01	19
Total	39	08	47

[A] Chapters in Book/Encyclopedia

1. Shandilya, Pragya; Jain, P. K. & **Jain, N. K.** (2011). *Wire Electric Discharge Machining of Metal Matrix Composite Materials*, **Chapter 30 in DAAAM International Scientific Book 2011**, pp. 383-400, B. Katalinic (Ed.), Published by *DAAAM International*, ISBN 978-3-901509-84-1, ISSN 1726-9687, Vienna, Austria DOI: 10.2507/daaam.scibook.2011.30
2. **Neelesh K. Jain** and Vijay K. Jain (2001), "Computer Aided Process Planning in Agile Manufacturing Environment" *Chapter 27 in Agile Manufacturing: 21st Century Competitive Strategy*, Editor: A. Gunasekaran, *Elsevier Science Publications*, pp. 515-534.
3. **Neelesh K. Jain** and Vijay K. Jain, (1999) "Computer Aided Process Planning (CAPP) Approach for Advanced Machining Processes" **Industrial Engineering Application and Practice: Users' Encyclopedia** (on CD-ROM), Editor: A. Mital.

[B] Papers in Refereed Journals

[B.1] Published Papers

1. J. P. Misra, P. K. Jain, **N. K. Jain** and H. Singh (2012), "Effects of Electrolyte Composition and Temperature on Precision Finishing of Spur Gears by Pulse Electrochemical Honing (PECH)" **Int. J. Precision Technology**, 3(1), 37-50. (DOI: 10.1504/12.45987)
2. Pragya Shandilya, P. K. Jain and **N. K. Jain** (2012) "Neural Network based Modeling in Wire Electric Discharge Machining of SiCp/6061 Aluminium Metal Matrix Composite", *Advanced Materials Research*, Vol. 383-390, 6679-6683. (doi:10.4028/www.scientific.net/AMR.383-390.6679)
3. Pragya Shandilya, P. K. Jain, and **N. K. Jain** (2012) *Prediction of Surface Roughness During Wire Electrical Discharge Machining of SiCp/6061 Al MMC*, **Int. J. of Industrial and Systems Engineering** (in Press).
4. Pragya Shandilya, P. K. Jain, and **N. K. Jain**, (2011), *Modelling and Analysis of Average Cutting Speed in WEDM of SiCp/6062 Al Metal Matrix Composite*, **Manufacturing Technology Today**, 10 (4), April 2011, 18-26.
5. Pragya Shandilya, P. K. Jain, **N. K. Jain** (2011), *Modeling and analysis of surface roughness in WEDC of SiCp/6061 Al MMC through response surface methodology*, **Int. J. of Engineering Science and Technology**, 3(1) (Jan. 2011), 531-535.
(http://www.ijest.info/issue.php?file=vol03issue01)
6. Pragya Shandilya, **N. K. Jain**, and P.K. Jain (2011), "Experimental Studies on Wire Electric Discharge Cutting of SiCp/6061 Aluminium Metal Matrix Composites", **Key Engineering Materials**, 450 (2011), 173-176. (Publisher: *Trans Tech Publications*, Switzerland)
(DOI:10.4028/www.scientific.net/KEM.450.173)
7. J. P. Misra, **N. K. Jain**, P. K. Jain (2010), "Investigations on Precision Finishing of Helical Gears by Electro Chemical Honing (ECH) Process", *Proc. of IMechE, Part B: J. of Engineering Manufacture*, 224

- (12), Dec 2010, 1817-1830. (Publisher: *Professional Engineering Publishing*, UK). (DOI: 10.1243/09544054JEM1836)
8. **N. K. Jain**, L. Ramlal Naik, A. K. Dubey, and H. S. Shan (2009), “*State of Art Review of Electrochemical Honing of Internal Cylinders and Gears*” *Proc. IMechE, Part B: J. of Engineering Manufacture*, 223(6), 665-681. (June 2009). (Publisher: *Professional Engineering Publishing*, UK). (DOI: 10.1243/09544054JEM1381)
 9. A. K. Dubey, H. S. Shan, and **N. K. Jain** (2009) “*Precision Micro-Finishing By Electro-Chemical Honing*” *Int. J. of Manufacturing Technology and Management*, 17(4), 364-372 (March 2009). (Publisher: *Inderscience*, UK). (DOI: 10.1504/IJMTM.2009.023953)
 10. T. V. S. Reddy, D. K. Dwivedi, and **N. K. Jain** (2009), “*Adhesive Wear of Stir Cast Hypereutectic Al-Si-Mg Alloy Under Reciprocating Sliding Conditions*” *Int. J. of WEAR*, 266(1-2), 1-5, (Jan. 2009). (Publisher: *Elsevier*, UK) (DOI: 10.1016/j.wear.2008.05.003).
 11. T. V. S. Reddy, D. K. Dwivedi, and **N. K. Jain** (2009), “*Effect of Stir Casting on the Microstructure and Adhesive Wear Characteristics of Cast Al-Si-Cu Alloy*” *Proc. IMechE, Part B: J. Engineering Manufacture*, 223(1), 83 – 87. (Jan. 2009) (Publishers: *Professional Engineering Publishing*, UK). (DOI: 10.1243/09544054JEM1196)
 12. A. K. Dubey, H. S. Shan and **N. K. Jain** (2008), “*Analysis of Surface Roughness and Out-of-Roundness in Electro-Chemical Honing of Internal Cylinders*” *Int. J. of Advanced Manufacturing Technology*, 38(5-6), 491-500. (Aug. 2008), (Publisher: *Springer London*) (DOI: 10.1007/s00170-007-1180-z)
 13. **N. K. Jain**, V. K. Jain, and S. Jha (2007), “*Parametric Optimization of Advanced Fine Finishing Processes*”, *Int. J. of Advanced Manufacturing Technology*, 34(11-12), 1191-1213 (Nov. 2007). (Publisher: *Springer London*) (DOI: 10.1007/s00170-006-0682-4)
 14. **N. K. Jain**, and V. K. Jain, (2007) “*Optimization of Electro-Chemical Machining Process Parameters Using Genetic Algorithms*” *Machining Science and Technology*, 11(2), 235-258. (June 2007) (Publisher: *Taylor and Francis*, UK) (DOI: 10.1080/10910340701350108)
 15. **N. K. Jain**, V. K. Jain, and K. Deb (2007), “*Optimization of Process Parameters of Mechanical Type Advanced Machining Processes Using Genetic Algorithms*” *Int. J. of Machine Tools and Manufacture*, 47(6), 900-919 (May 2007). (Publisher: *Elsevier*, UK) (DOI: 10.1016/j.ijmachtools.2006.08.001)
 16. **Neelesh K. Jain** and Vijay K. Jain (2003) “*Process Selection Methodology for Advanced Machining Processes*”, *J. of Advanced Manufacturing Systems*, 2(1), 5-45 (June 2003). (Publisher: *World Scientific*) (DOI:10.1142/S0219686703000204)
 17. **Neelesh K. Jain** and Vijay K. Jain (2003) “*An Integrated and Automated Process Planning System for Advanced Machining Environment*”, *Int. J. of Industrial Engineering*, 10(2), 98-106 (June 2003). (Publisher: *IJIE Press*, USA) (DOI:)
 18. **Neelesh K. Jain** and Vijay K. Jain, (2001) “*Modeling of Material Removal in Mechanical Type of Advanced Machining Processes: a State-of-Art Review*”, *International Journal of Machine Tools and Manufacture*, 41(11), 1573-1635 (Sep 2001). (Publisher: *Elsevier*, UK). (DOI: 10.1016/S0890-6955(01)00010-4)

[B.2] Communicated Papers

19. Shandilya Pragya, Jain P. K. and Jain N. K. (2012) "Surface characterization during wire electric discharge cutting of SiCp/6061 Al Metal Matrix Composite", *International Journal of Microstructure and Materials Properties*. (Communicated)
20. Shandilya Pragya, Jain P. K. and Jain N. K. (2012) "On Wire Breakage and Microstructure in WEDC of SiCp/6061 Aluminum Metal Matrix Composites", *International Journal of Advanced Manufacturing Technology* [IJAMT]. (Communicated)
21. Shandilya Pragya, Jain P. K. and Jain N. K. "Neural network based modeling for average cutting speed in wire-electric discharge machining of SiCp/6061 Al MMC", *International Journal of Mechatronics and Manufacturing Systems* [IJMMS]. (Communicated)
22. Shandilya Pragya, Jain P. K. and Jain N. K. (2012) "RSM and ANN modeling approaches for predicting MRR during WEDM of SiCp/6061 Al MMC", *Sadhana - Academy Proceedings in Engineering Sciences*. (Communicated)
23. Abhishek Das, and N K Jain (2011), "Investigations on Tool Wear and Material Deposition Aspects in TiC Coating on Aluminum by Electro Discharge Coating (EDC) Process" *Int. J. of Mfg. Technology and Management* (communicated in May 2011).
24. Abhishek Das, **N. K. Jain**, A. Wanner, V. Schulze, "Study of Characteristics of TiC Coating on Al-Cu Alloy by Electro Discharge Coating (EDC) Process" online submitted to *J. of Materials Processing Technology* (Publishers: Elsevier, UK),.
25. Abhimanue Potpelwar, **N. K. Jain**, N.K. Mehta, "Investigations on process productivity and hole quality characteristics of micro to small holes drilled in Incoloy 800 by electrolytic jet drilling" Online submitted to *Int. J. of Machine Tools and Manufacture* (Publishers: Elsevier, UK), .

[C] Papers in the Conference Proceedings

1. Shandilya, Pragya, Jain, P. K. and Jain, N. K. (2011) "Surface Integrity Aspects After Wire Electric Discharge Machining of SiCp/6061 Al Metal Matrix Composites". ***International Conference on Advanced Materials and Manufacturing Processes (ICAMP)***, IIT Kharagpur, 9-11 December, 2011, Kharagpur, India.
2. Pragya Shandilya, P. K. Jain, and N. K. Jain (2011), "Effect of machining parameters on MRR during wire electric discharge cutting of SiCp/6061 Al MMC", **22nd DAAAM International World Symposium, 23-26th November 2011, Vienna, Austria.**
3. Shandilya Pragya, Jain P. K. and Jain N. K. (2011) "Artificial neural network kerf model in Wire Electric Discharge Machining of SiCp/6061 Al MMC". ***ASME International Mechanical Engineering Congress and Exposition***, 11-17 November, Colorado, USA. (Accepted)
4. Shandilya, Pragya, Jain, P. K. and Jain, N. K. (2011) "Neural network based modeling in wire electric discharge machining of SiCp/6061 Aluminum metal matrix composite". ***Proc. of International Conference on Manufacturing Science and Technology (ICMST)***, 16-18 September, 2011, Singapore.
5. Shandilya, Pragya, Jain, P. K. and Jain, N. K. (2011) "Selection of optimum parameters in wire electric discharge cutting (WEDC) of SiCp/6061 Al MMC". ***Proc. of 5th International Conference on Advances in Mechanical Engineering (ICAME)***, SVNIT, 6-8 June, 2011, Surat, India, 666-670.
6. Shandilya, Pragya, Jain, N. K. and Jain, P. K. (2010) "On Wire Breakage and Microstructure in WEDC of SiCp/6061 Aluminum Metal Matrix Composites". ***Proc. of 3rd International and 24th All India Manufacturing Technology Design and Research Conference (AIMTDR) - 2010***, Andhra University, 13-15 December, 2010, Visakhapatnam, India, 1089-1094.
7. Shandilya, Pragya, Jain, P. K. and Jain, N. K. (2010) "Study on average cutting speed in WEDM of SiCp/6061 Al MMC based on RSM". ***Proc. of 4th International Conference on Advances in Mechanical Engineering (ICAME)***, SVNIT, 23-25 September, 2010, Surat, India, 394-398.
8. Pragya Shandilya, N. K. Jain, and P. K. Jain (2010), "Experimental Studies on Wire Electric Discharge Cutting of SiCp/6061 Aluminum Metal Matrix Composites", ***Proc. of 3rd International Conference on Advanced Design and Manufacturing (ADM2010)***, 8-10 September 2010, Nottingham Trent University, Nottingham (UK).
9. Abhishek Das, N.K. Jain, A. Wanner, and V. Schulze (2010), "Effect of Coating Time and Electrode Polarity in Electro Discharge Coating of Al using TiC/Cu Green Compact Tool", ***Proc. of 3rd International and 24th AIMTDR Conference***, 13-15 Dec. 2010, Andhra University, Visakhapatnam, India, pp 527-530.
10. J. P. Misra, H. Singh, N. K. Jain, P. K. Jain (2010), "Effect of Electrolyte Composition and Temperature on Finishing of Spur Gears by Pulse Electrochemical Honing (PECH)", ***Proc. of 3rd International and 24th AIMTDR Conference***, 13-15 Dec. 2010, Andhra University, Visakhapatnam, India, pp 903-908.
11. J. P. Misra, N. K. Jain, and A. K. Sharma (2009), "Effect of finishing time and electrolyte on precision finishing of helical gears by Electrochemical honing (ECH) process", ***Proc. of 6th International Conference on Precision, Meso, Micro and Nano Technology (COPEN 6)***, 11-12 Dec. 2009, PSG College of Technology, Coimbatore, India, pp F24-29.
12. J. P. Misra, A. K. Sharma, and N. K. Jain (2009), "Setup For Electrochemical Honing of Helical Gears" ***Proc. of National conference on Emerging Trends in Manufacturing Engineering (ETME)***, 20-21 March 2009, G. H. Patel College of Engineering and Technology, Vallabh Vidyanagar, India, 5 pages.
13. J. P. Misra, A. K. Sharma, and N. K. Jain (2009), "Design of Experiments for Electrochemical Honing of Helical Gears" ***Proc. of the International Conference on Emerging Research and***

Advances in Mechanical Engineering (ERA 2009), 19-21 March 2009, Velammal Engineering College, Channai, pp 874-878.

14. L. Ramlal Naik, **N. K. Jain** and A. K. Sharma (2008), "*Investigation on Precision Finishing of Spur Gears by Electrochemical Honing*" Proc. of **2nd International and 23rd AIMTDR Conference**, 15-17 Dec. 2008, IIT Madras, India, pp 509-514. (Ed. M.S. Shunmugam and N. Rameshbabu).
15. A. K. Dubey, H. S. Shan and **N. K. Jain**, (2006) "*Analysis of Surface Roughness and Out-of-Roundness in Electro-Chemical Honing Process*" Proc. of **1st International and 22nd AIMTDR Conference**, 21-23 Dec. 2006, IIT Roorkee, India, pp 887-892.
16. **N. K. Jain** and V. V. Rao, (2006) "*Process Selection Methodology for Rapid Prototyping (RP) Processes*", Proc. of **1st International and 22nd AIMTDR Conference**, 21-23 Dec. 2006, IIT Roorkee, India, pp 815-821.
17. A. K. Dubey, H. S. Shan, and **N. K. Jain** (2006) "*Precision Micro-Finishing By Electro-Chemical Honing*" Proc. of **International Conference on Manufacturing Science and Technology (ICOMAST)**, 28-30 August, 2006, Maleka, Malaysia, pp 173-176.
18. Amitabha Mukerjee and **Neelesh K. Jain** (1997), "*A Featureless Approach to Process Planning*" Proc. of **International Conference on Robotics and Automation [ICRA' 97]**, New Mexico (USA) April 1997, pp 2747-2752.
19. Amitabha Mukerjee and **Neelesh K. Jain** (1997), "*Featureless Process Planning*" Proc. of **17th AIMTDR Conference**, REC Warangal, Jan. 1997[Ed.: R.L. Murthy, G. Srihari, and C.S.P. Rao], pp. 125-130.

This Paper Won the 2nd Best Paper Award

Details of Sponsored/Consultancy Projects Handled:

Sponsoring Agency	Title	Amount	Duration	Co-PI (if any)
CSIR, New Delhi	Experimental Investigations and Performance Optimization of High-Precision Finishing of Gears by Electro Chemical Honing (ECH) Process	Rs. 18.76 Lacs	May, 2009 to April, 2012	Prof. P. K. Jain
Dean, SRIC IIT Roorkee	Investigation on Precision Finishing of External Gears by Electrochemical Honing (ECH) Process	Rs. 4.5 Lacs	March, 2008 to January, 2010	No
DST, Govt. of India	Influence of Process Parameters in Electro Chemical Spark Machining	Rs. 7.75 Lacs	2002-2004	Self PI: S. K. Chak (NSIT, New Delhi)

Courses Taught:

1. At IIT Indore (Jan. 2010 onwards)

1. ME 451/ME 751: Advanced Machining Processes (Autumn 2010, 2011, 2012)
2. ME 305: Machining Science and Metrology (Autumn 2011)
3. ME 208: Theory of Manufacturing Processes (Spring 2011)
4. ME258: Manufacturing Process Lab (Spring 2011, Spring 2012)
5. ME 207: Materials Science (Autumn 2010)
6. ME 152: Workshop Practice (Spring 2010)

2. At IIT ROORKEE (June 2004 Onwards)

(1A) PG and Pre-Ph. D. Courses

1. MI-572: Advanced Manufacturing Processes (Spring 2006, 2007, 2008)
2. MI-577: Industrial Automation (Spring 2005, 2006, 2009)
3. MI-584: Advanced Manufacturing Processes (Spring 2005)

(1B) UG Courses

1. MI-449: Facilities Planning (Autumn 2004, 2005, 2006)
2. MI-443: Maintenance Management (Autumn 2004)
3. MI-331: Manufacturing Science (Autumn 2005, 2006, 2007)
4. MI-335: Machining Science and Metrology (Autumn 2009)
5. MI-334: Quality Control (Spring 2007, 2008)
6. MI-102: Manufacturing Techniques (Autumn 2007, Spring 2009, Autumn 2009)

3. At SAII HYDERABAD (June 2003 to May 2004)

1. ESC-101: Engineering Thermodynamics (Spring 2004)
2. ETL-101: Engineering Graphics (Autumn 2003)

4. At NSIT NEW DELHI (July 2002 to June 2003)

1. MA-405: CAM and Robotics-II (Autumn 2002)
2. MA-402 Modern Methods of Manufacturing (Autumn 2002)
3. MA-313: Applied Plasticity (Spring 2003)
4. MA-311: CAM & Robotics-I (Spring 2003)

Details of Lab Development:

At IIT Indore

1. Central Workshop
2. Machining Science Lab
3. Metrology Lab
4. Manufacturing Process Lab
5. Gear Research Lab
6. Advanced Manufacturing Processes Lab
7. Virtual Classroom under National Knowledge Network (NKN)

International Academic Responsibilities:

- Reviewer, **Journal of Materials Processing Technology** (Elsevier, London)
- Reviewer, **International Journal of Machine Tools and Manufacture** (Elsevier, London)
- Reviewer, **Proc. IMechE, Part B: Journal of Engineering Manufacture** (Professional Engineering Publishing, UK)
- Reviewer, **International Journal of Advanced Mfg Technology** (Springer-Verlag, London)
- Reviewer, **International Journal of Mfg Technology and Management** (Inderscience)
- Reviewer, **International Journal of Materials and Product Technology** (Inderscience)
- Reviewer and Member of Local Organizing Committee of 1st International and 22nd AIMTDR Conference (21-23 Dec. 2006)

Invited Lectures Delivered:

1. On “*Electrochemical honing of Internal Cylinders and external gears*” DST sponsored 3rd SERC school at IIT KANPUR during 20-25th July 2009.
2. FOUR expert lectures on the topics of *Electro Discharge machining (EDM)*, *Wire-EDM*, *Electro Chemical Machining (ECM)*, and *Electro Chemical Grinding (ECG)* in the short-term course on “Non-Conventional Machining” held at Delhradun Institute of Technology, Dehrdun during 2-6th March, 2009.
3. FIVE Lectures on the topics of *CIM*, *Automation*, *CAM*, and *CAPP* in a Short-Term Training Program on ACAD/CAM for Polytechnic Teachers of Uttarakhand during 11th to 15th March 2008 organized at STEP IIT Roorkee.
4. On “Manufacture Process Selection” in AICTE-Sponsored Short-Term Course on “*Product Design and Development*” on 12th July 2007 held at IIT ROORKEE during 9-13 July, 2007.
5. On “*Electrochemical Honing (ECH) Process*” in AICTE-BARC sponsored Short-Term Course on “*Micromachining*” on 21st June 2007 held at IIT KANPUR during 18-23 June 2007.
6. On “*Automated Manufacturing Process Selection for Advanced Machining Processes and Rapid Prototyping Processes*” at S.G.S.I.T.S. INDORE, on 29th Jan, 2007.
7. On “*Rapid Prototyping Technology*” in QIP-sponsored Short-Term Course on “*Advanced Processing of Composite Materials*” on 26th July 2006 held at IIT ROORKEE during 24-28th July, 2006.
8. On “*Plant Layout*” on 1st Feb. 2005 in the Analytical Skills Development Program for ACC Management Trainees conducted at Continuing Education Center of IIT ROORKEE during Jan-Feb. 2005.
9. On “*Advanced Machining Process Selection*” on 20th March 2004 at Sreenidhi Institute of Science and Technology (SNIST), HYDERABAD.
10. On “*Computer Aided Process Selection and Parametric Optimization of Advanced Machining Processes*” in the Contact Program for Young Scientists sponsored by DST, Government of India New Delhi and held at IIT KANPUR during July 2001.

Conferences/Workshops/ Short-term Courses Attended:

1. **3rd International Conference on Advanced Design and Manufacturing (ADM2010)**, 8-10 September 2010, Nottingham Trent University, Nottingham (UK).
2. Workshop on “Emerging Global Job Competencies” held at I.I.T. ROORKEE, 25-26 March 2007.
3. 22nd AIMTDR and 1st International Conference held at I.I.T. ROORKEE, 21-23 Dec. 2006
4. 19th AIMTDR Conference held at I.I.T. MADRAS, 14-16 Dec. 2000.
5. Workshop on “**Internet Based Manufacturing Management**” held at Indira Gandhi National Open University (IGNOU) New Delhi on Nov. 17, 2000.
6. One week Short-term course on “**Neural Networks and their Engineering Applications**” held at I.I.T. KANPUR during June 2000.
7. One week Short-term course on “**Fuzzy Logic and its Engineering Applications**” held at I.I.T. KANPUR during May 1999.
8. 6th SERC school on “**Advanced Manufacturing Technology**” held at I.I.T. KANPUR during March 1999, Sponsored by *Dept. of Science and Technology (DST)*, Govt. of India.

Software Skills:

Programming Languages: C, C++, Fortran

Operating Systems: MS Windows XP/2000/98/95, MS-DOS, UNIX, LINUX

Windows Programming: MS Visual C++ with API

Methodologies: Structured and Object-oriented programming

Application Software: AutoCAD, Turbo C, MsOrigin, Surfer, GnuPlot, etc.

Documentation: MS Office, LaTeX

Theses/Projects:

BOYSCAST Fellowship Project: “Electrochemical Polishing (ECP) of Copper Discs ”

Supervisor: Prof. Ranga Komanduri

Regents Professor, Mechanical and Aerospace Engineering

College of Engineering, Architecture, and Technology

218, Engineering North

Oklahoma State University, Stillwater, OK-74075 (USA)

- **Short abstract:** In this work I made a significant contribution in planning, achieving, and analyzing the mirror-like finish (with a surface roughness values in the range of 10-50 nm) on 4 inch diameter copper wafers by the ECP process for microelectronics and optical applications. Literature survey involved study of about 25 research publications and 15 Patents on the ECP of copper. The literature on ECP of copper has so far not reported mirror polishing of as large area as 4” dia. I designed a new wafer holding system and made several changes in the ECP system (particularly electrolyte recirculation system) through which this achievement was made possible. I conducted 18 sets of experiments with each set of experiments lasting 3-4 hours. The experiments were planned systematically to study the effect of main process variables which include applied DC voltage, polishing time, electrolyte flow rate, and composition of electrolyte (i.e concentration of ortho-phosphoric acid and copper sulphate pentahydrate) on the quality of polishing. I observed the ECP process very carefully and made various modification in the ECP setup to solve the various polishing quality related problems particularly evolution of the gases during the process. While studying and analyzing the polished surface I also gained valuable hands-on experience on *optical microscope, environmental scanning electron microscope (ESEM), and atomic force microscope (AFM)*.

Ph. D. Thesis: "*Automated Process Selection and Parametric Optimization of Advanced Machining Processes (AMPs)*"

Thesis Supervisor: Prof. V. K. Jain (Professor, ME, IIT Kanpur)

Short Abstract:

This project was sponsored by the *Department of Science and Technology (DST), Government of India*. An integrated and automated process planning system named as **APSPPOAMPS** (standing for Automated Process Selection and Parametric Optimization of AMPS) was envisaged and developed in this research work.

The requirements like ultra precision machining of complex shapes, machining at micro and nano levels, surface integrity aspects etc., have contributed towards the development of Advanced Machining Processes (AMPs). Effective, efficient and economic utilization of the capabilities of AMPs necessitates careful selection of a suitable process and subsequent parametric optimization. Selection of an appropriate AMP depends to a large extent on the knowledge and experience regarding the AMPs, nature of a particular application and availability of the required data. Since, experience and expertise transferring from person to person is of time consuming, an interactive computer program can aid an engineer in making decision regarding *process selection* and manufacturability.

Development of an automated system for process selection: A system like AMPSPPOAMPS forms the core of an integrated and automated or computer aided process planning (CAPP) system for advanced machining environment. The conceptual details, solution methodology and decision logic of APOPOAMPS were implemented in the form of interactive, user-friendly and pull-down menus driven software. This software was developed using *Windows Programming* via Application Programming Interface (API) in C/C++ programming language. The developed automated system comprises the following modules, which accomplish the various tasks through different menus of the developed system: i) Input module (to gather the required information like physical and mechanical properties of work materials, shape generation requirements, operational requirements etc. by interactive way) ii) Manufacturing process selection module (for deciding the basic nature of manufacturing process according to the requirements) iii) AMP selection and ranking module [The tasks of the process selection and ranking is carried out at five levels, in which at first level, non applicable AMPs are eliminated according to the nature of work material and according to the shape or feature generation requirements certain AMPs are eliminated at second level, third level uses **FUZZY SETS** to frame the suitability index, and at forth and fifth levels, suitability index is framed according to the economic and environmental aspects respectively]. Based on these indices, user can select an appropriate process for parametric optimization.

Parametric optimization by evolutionary computation: *Nine* optimization models for six mechanical type AMPs and electro-chemical machining (ECM) process were formulated, after conducting a comprehensive and exhaustive survey of the models of material removal and surface generation in these AMPs and critically examining each model. For the **optimization of multi-variable non-linearly constrained non-linear objective functions**, as encountered in formulated optimization models, *real-coded genetic algorithms (GA)* employing *tournament reproduction*, *simulated binary crossover (SBX)*, and *polynomial mutation* were used for parametric optimization of AMPs. The functioning and validity of the developed system was tested on a number of real-life test examples.

- **M. Tech. Thesis:** *"Visibility Check Based Operation Planning for Axi-symmetric Components"*

Thesis Supervisor: Prof. Amitabha Mukerjee (Professor, CSE, IIT Kanpur)

Abstract: This project was sponsored by *Tata Iron and Steel Company (TISCO) Jamshedpur (India)*. It involved developing an operation planning software for axi-symmetric components in computer aided manufacturing (CAM) environment minimizing reliance of features in the process planning. The developed system was named as *CARGAC* (acronym for Computer Aided Route-card Generation for Axi-symmetric Components). *CARGAC* uses DXF file (a neutral file format) of the CAD model of the product as input. It uses visibility status of a surface for determining whether a surface can be machined from a given direction and subsequently uses the results of the visibility status for identifying and sequencing the machining operations. Advantages of visibility based approach are greater flexibility and less dependence on subjective aspects in process planning. A set of heuristics was developed for sequencing the machining operations for axi-symmetric components. *CARGAC* graphically simulates the results of input pre-processing and visibility check, while, results of machining operations identification and sequencing are written in a route card format. Entire source code for the system was written in *Turbo C* programming language and was implemented on IBM compatible PC-XT/AT.

- **B.E. Project:** *"Process Planning and Part Programming for the Manufacture of Typical Component on NC and CNC Machines"*

Project Guide: Prof. N. K. Nagar (Deptt. of Industrial Engg. S.G.S.I.T.S. Indore)

Abstract: This work involved manual process planning, CNC code generation, and graphical simulation of manufacturing of some typical component (ie CNC tool holder) for a retrofitted NC machine and for Denford CNC Milling and Turning Centers with Fanuc controllers.

Minor Projects (During M. Tech. and Ph. D.)

Title: *"Generation of Non Uniform Rational B-Splines (NURBS) based Curves and Surfaces"*

Abstract: This work was done as term project in an elective course in the M. Tech. program entitled as Computer Aided Engineering Design (CAED). It was implemented in ANSI C programming language and using STARBASE graphics on HP-UNIX Work Stations. It involved generation of NURBS curves and surfaces using input information about number of vertices and their homogeneous coordinates in the control polygon and order of the curve. The outputs of program include generated NURBS curve, surface of revolution of the generated curve, extruded surface of the generated curve, and NURBS surface.

Title: *"Feature Recognition, Machining Operations Sequencing, CNC Code Generation and Simulation for Axi-symmetric Components"*

Abstract: This was the term project of another M. Tech. elective course entitled as Computer Integrated Manufacturing Systems (CIMS). It was implemented in ANSI C programming language and using STARBASE graphics on HP-UNIX Work Stations. It involved development of an interactive system for feature recognition, sequencing of machining operations, and CNC code generation for simple axi-symmetric components. The developed system has four modules namely input module, feature recognition module, machining operations sequencing module, and output module. It uses a neutral file format (ie DXF file) of the CAD model of the component as input. While, outputs were CNC code and graphical simulation of the sequential removal of machining volumes.

Title: *"Non-Linearly Constrained Optimization of Process Parameters of Electro-Chemical Machining Process using Genetic Algorithms (GA)"*

Abstract: This work was the term project in a Ph. D. elective course entitled as Optimization Methods in Engineering Design. It was implemented in *Fortran-77* programming language in the UNIX environment. A multi-variable non-linearly constrained optimization model for ECM process previously solved using goal programming was solved using binary coded simple genetic algorithms. It showed an improvement of 150% over the goal programming solution for the value of the objective function achieved.

Title: *"Computer Aided Generation of Orthographic and Isometric Projections"*

Abstract: This work was done as a computer assignment in a Ph. D. elective course entitled as Programming and Numerical Analysis. It was implemented in *Fortran-77* programming language in the UNIX environment using STARBASE graphics. It involved drawing orthographic and isometric projections of a given object using the concepts of geometric translation, rotation, and reflection. The object is specified by geometric coordinates of its entities.

References:

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