CV – Professor Kai Cheng

SUMMARY:

Professor Cheng was appointed as Chair Professor in Manufacturing Systems and Head of Advanced Manufacturing & Enterprise Engineering Department at Brunel University London in May 2006. His academic experience in precision engineering manufacture has been accumulated through working extensively with the UK and Europe industry and benefited from working in different institutions and international context.

Professor Cheng was awarded BEng (Hons) 1st class in 1983 and MSc Distinction in 1988, both at Harbin Institute of Technology. During the period of August 1983 - July 1990, he was employed as an assistant lecturer and then a lecturer at Harbin Institute of Technology. In July 1990 to Sep. 1995, he worked with Professor Brian Rowe on his PhD and postdoc-fellowship at Liverpool John Moores University. He held a senior lectureship at Glasgow Caledonian University from Oct.1995 to Nov. 1999, was appointed as a reader at Leeds Metropolitan University in Dec.1999 and promoted as a professor in March 2001 at the same University. He became a Charted Engineer in 2000 and a Fellow of the IMechE and IET in 2006 and 2004 respectively.

Professor Cheng has been working on manufacturing science and engineering throughout his career. His main contributions have been in invention and development of ultraprecision machines, ultraprecision machining science and innovative diamond cutting tools as enabling ultraprecision technologies particularly for high-tech industries and high level of technological systems in the current and future society. His team at Brunel has been working extensively with UK industries in ultraprecision and micro/nano manufacturing especially via dozens of EPSRC/Innovate UK projects and EU FP6/FP7/Horizontal 2020 programs over last two decades. Their scientific and societal impacts are well evidenced and received by the manufacturing community and collaborative companies, over 50 British companies directly benefited by enhancing their engineering capabilities and global competitiveness.

Professor Cheng's current research interests focus on ultraprecision and micro/nano manufacturing, design of high precision machines, ultraprecision machining systems, smart cutting tools, and digital/e-manufacturing. He has been leading the Micro/Nano Manufacturing Theme at Brunel University London with 15 academics and 50 PhD students, working on research projects funded by the EPSRC, NATEP Program, RAEng, Royal Society, Innovate UK, EU FP6/FP7/Horizon 2020, and the industry. He was the PI for 35 UK and EU projects, secured over 30 million Euros research grants, received the ASME BOSS Award in 2016 and several other distinct international awards/honoured recognitions for his scientific contributions and impacts. He authored 280 publications, invented 12 patents, and successfully supervised over 60 PhD students. His H-index is 52, one of the highest in ultraprecision manufacturing science and technology.

Professor Cheng has been championing the academic/scholar activities in precision manufacturing science and engineering. He is the European editor for the International Journal of Advanced Manufacturing Technology and an editorial board member at other five leading international journals in the field. Since 2016, he was invited to give over 20 keynote speeches at international conferences organised by ASME, IEEE, IMechE, and IET.

PERSONAL INFORMATION:

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EDUCATION AND DEGREES:

BEng (Hons) in Mechanical Engineering, 1st Class, Harbin Institute of Technology, July 1983.
MSc in Precision Manufacturing, Distinction, Harbin Institute of Technology, July 1988.
PhD in Precision Manufacturing, Liverpool John Moores University, January 1994.

WORKING EXPERIENCES:

8/1983 – 7/1988, Assistant Lecturer, Department of Mechanical Engineering, Harbin Institute of Technology.
8/1988 – 7/1990, Lecturer, Department of Mechanical Engineering, Harbin Institute of Technology.
1/1994 – 9/1995, Post-doctoral Fellow, School of Engineering at Liverpool John Moores University.
10/1995 – 11/1999, Senior Lecturer, Department of Engineering at Glasgow Caledonian University.
12/1999 – 2/2001, Reader, School of Engineering at Leeds Metropolitan University.
3/2001 – 4/2006, Professor, School of Engineering at Leeds Metropolitan University.
5/2006 – 7/2014, Chair Professor and Head of Department, Advanced Manufacturing & Enterprise Engineering (AMEE) Department, Brunel University.
8/2014 – to date, Chair Professor and Theme Leader for Ultraprecision and Micro/Nano Manufacturing Theme at Brunel University of London.

JOURNAL EDITORIAL AND PROFESSIONAL INSTITUTIONS/COMMITTEES WORK:

Journal Editorial Boards:

(1) European Editor, International Journal of Advanced Manufacturing Technology (ISSN: 0628-3768).
(2) Editor-in-Chief and Member of the Editorial Board, Machines (ISSN: 2075-1702).
(3) Member of the Editorial Board, International Journal of Extreme Manufacturing, IOP Science (ISSN: 2631-7990).
(4) Member of the Editorial Board, Nanomanufacturing and Metrology, Springer (ISSN: 2520-8128).
(5) Member of the Editorial Board, Journal of Multiscale Modelling (ISSN: 1756-9737).

Professional Committees:

(1) Member of the EPSRC Peer Review College (2003-present).
(2) Member of the UK COMEH (Consortium of Manufacturing Engineering Heads) Committee (2001-present).
(3) Member of the UK Manufacturing Professors Forum (2002-present).
(4) Member of the IMechE Academic Standards Committee/Panel (2010-present).
(5) Member of the Innovate UK Smart Awards review panel (2008-present).

Fellowship of Professional Institutions:

Fellow of the IMechE (No. 80016440)
Fellow of the IET (No. 36447653)

INTERNATIONAL AND NATIONAL HONOURS:

ASME BOSS Award, 2016.

RESEARCH INTERESTS AND SUPERVISION:

Current Research Interests:

(1) Design of high precision machines
(2) Ultraprecision machining systems
(3) Micro cutting mechanics and physics
(4) Multiscale multiphysics modelling and analysis
(5) Smart cutting tools and smart machining
(6) Sustainable manufacturing systems

Research and PhD Supervision:

(1) Current supervision of 5 PhD students (as the 1st supervisor)
(2) Current supervision of 1 postdoctoral research fellow

TEACHING AND LEARNING:

Teaching Modules (2014 - to date):

(1) MSc modules: Design Experience; Ultraprecision and Micro Manufacturing; Manufacturing Systems and Economics, Project Management.
(2) BEng modules: Design Methodology; Advanced Manufacturing Technology; Machines Design.

PhD Examination:

Having examined over 60 PhDs at a number of UK/EU universities including Cambridge, Oxford, Warwick, Manchester, Nottingham, Cranfield, Birmingham, Delft, Uppsala, Tampere, and Aalto, etc.

ACADEMIC LEADERSHIP AND MANAGEMENT DUTIES:

- Theme leader for Micro-Nano Manufacturing Theme at Brunel University of London
- Member of the Brunel Research Institutes Board
- Member of the College/University Promotions Panel

PUBLICATIONS LIST (2001 - to date):

***Books*:**

(1) *Advances in Manufacturing Technology XVI* (Editors: K. Cheng and D. Webb), Professional Engineering Publishing, London, September 2002.
(2) *Advances in e-Engineering & Digital Enterprise Technology I* (Editors: K. Cheng, D. Webb, and R. Marsh), Professional Engineering Publishing, London, September 2004.
(3) K. Cheng, Y. Yao and L. Zhou, *e-Engineering & Digital Enterprise Technology*, TTP Trans Tech Publications, Switzerland, September 2007.
(4) K. Cheng (Editor), *Machining Dynamics: Theory, Applications and Practices*, Springer, London, November 2008.
(5) K. Cheng and D. Huo (Editors), *Micro Cutting: Fundamentals and Applications*, John Wiley & Sons, Chichester, October 2013.
(6) K. Cheng and T. Akins, *The Science and Engineering of Cutting: The Mechanics and Processes of Separating, Scratching, and Puncturing Metals, Biomaterials and Non-metals*, 2nd Edition, Elsevier, 2024 (in process).

***Book Chapters*:**

(1) K. Cheng, Chapter 4: Microgrinding and abrasive micromachining, *Micromachining of Engineering Materials* (Editor: J.A. McGeough), Marcel Dekker Publisher, New York, 2002, 85-123.
(2) K. Cheng and X.C. Luo, Chapter 11: Nanometric machining: theory, methods and implementation, *Microfabrication and Nano-manufacturing* (Editor: M.J. Jackson), Taylor & Francis Group, New York, 2006, 311-337.

Journal Special Issues (Acting as the Guest Editor):

(1) Special issue (Cheng & Webb) on 'Digital Manufacturing and Enterprise Technologies', International Journal of Advanced Manufacturing Technology, 30(9), 2006.
(2) Special issue (Cheng & Shore) on 'Design of Ultraprecision and Micro Machine Tools and the Key Enabling Technologies', International Journal of Machine Tools and Manufacture, 50(4), 2010.
(3) Special issue (Cheng & Srai) on 'Sustainable Manufacturing and the Key Enabling Technologies', Proceedings of the IMechE – Part B: Journal of Engineering Manufacture, 226(10), 2012.
(4) Special issue (Cheng) on 'Multiscale multiphysics modelling and analysis for precision engineering', Journal of Multiscale Modelling, 7(1), 2016.
(5) Special Issue (Jackson, Cheng & Chen) on 'Grinding Technology – Commemorating the Scientific Contributions by Professor Stephen Malkin', Transactions of the ASME: Journal of Manufacturing Science and Engineering, 139, 2017.
(6) Special issue (Huo & Cheng) on 'Vibration Assisted Machining' at the Proceedings of the IMechE – Part C: Journal of Mechanical Engineering Science, 233(12), 2019.
(7) Special issue (Ivanov & Cheng) on 'Non-traditional and hybrid processes for micro and nano manufacturing', International Journal of Advanced Manufacturing Technology, 105, 2019.
(8) Special issue (Cheng, Zou, Jackson, Yuan & Gamstedt) on 'From engineering science to precision engineering and ultraprecision production: fundamentals, methodologies, and application case studies', Nanotechnology and Precision Engineering, 4, 2021
(9) Special issue on 'Advances in air bearings design and analysis for the 21st Century' at the Proceedings of the IMechE – Part J: Journal of Engineering Tribology, 237, 2023 (in press).

Journal Papers:

(1) K. Cheng, P.Y. Pan and D.K. Harrison, Web-based design and manufacturing support systems: implementation perspectives, *International Journal of Computer Integrated Manufacturing*, 14(1), 2001, 14-27.
(2) K. Cheng, M.L. Yang, G.E. Taylor and A. Dow, Petri net as a tool with application in modelling an Internet based virtual manufacturing enterprise, *International Journal of Agile Manufacturing*, 4(2), 2002, 100-109.
(3) P.Y. Pan, K. Cheng and D.K. Harrison, Development of an Internet-based intelligent design support system for rolling element bearings, *International Journal of Systems Science*, 33(6), 2002, 403-419.
(4) K. Cheng, X. Liu, D. Webb and X. Luo, Prediction of cutting force distribution and its influence on dimensional accuracy in peripheral milling, *International Journal of Machine Tools and Manufacture*, 42, 2002, 791-800.
(5) X. Liu, K. Cheng, D. Webb and X. Luo, Improved dynamic cutting force model in peripheral milling - part 1: theoretical model and simulations, *International Journal of Advanced Manufacturing Technology*, 20(6), 2002, 631-638.
(6) J. Jiang, K. Cheng and D.K. Harrison, An integrated concurrent engineering approach to the design and manufacture of complex components, *International Journal of Advanced Manufacturing Technology*, 20(5), 2002, 319-325.

(7) X. Liu and K. Cheng, 3D extension of Bresenham's algorithm and its application in straight-line interpolation, *Proceedings of the IMechE, Part B: Journal of Engineering Manufacture*, 216, 2002, 459-463.

(8) J. Toussaint and K. Cheng, Implementation of design agility and manufacturing responsiveness on the web: two case studies, *Integrated Manufacturing Systems*, 13(5), 2002, 328-339.

(9) R.J. Bateman and K. Cheng, Devolved Manufacturing: theoretical perspectives, *Concurrent Engineering: Research and Applications*, 10(4), 2002, 291-297.

(10) X. Luo, K. Cheng, X. Guo and R. Holt, An investigation on the mechanics of nanometric cutting and the development of its test-bed, *International Journal of Production Research*, 41(7), 2003, 1149-1165.

(11) X. Luo, K. Cheng and R. Holt, Modelling and simulation on the tool wear in nanometric cutting, *Wear*, 255(7), 2003, 1427-1432.

(12) X.K. Luo, K. Cheng and X.C. Luo, A simulated investigation on machining instability and non-linear aspects in CNC turning processes, *International Journal for Manufacturing Science and Production*, 5(1), 2003, 45-50.

(13) J. Jiang, D.K. Harrison and K. Cheng, Computer aided design and manufacture of scroll compressors, *Journal of Materials Processing Technology*, 138, 2003, 145-151.

(14) P.Y. Pan, K. Cheng and D.K. Harrison, A web-based agile system for rolling bearing design, *Integrated Manufacturing Systems*, 14(6), 2003, 518-529.

(15) K. Cheng and Y. Popov, Internet enabled modelling of extended manufacturing enterprises using the process-based techniques, *International Journal of Advanced Manufacturing Technology*, 23(1), 2004, 148-153.

(16) C. Gao, K. Cheng and D. Webb, Investigation on the sampling size optimisation in gear tooth surface measurement using a Co-ordinate Measuring Machine, *International Journal of Advanced Manufacturing Technology*, 24(7), 2004, 599-606.

(17) X. Liu, K. Cheng, D. Webb and X. Luo, Improved dynamic cutting force model in peripheral milling - part 2: experimental verification and prediction, *International Journal of Advanced Manufacturing Technology*, 24(11), 2004, 794-805.

(18) X.C. Luo, K. Cheng, and R. Ward, The effects of machining process variables and tooling characterisation on the surface generation: modelling, simulation and application promise, *International Journal of Advanced Manufacturing Technology*, 25, 2005, 1089-1097.

(19) X.K. Luo, K. Cheng, X.C. Luo and X. W. Liu, A simulated investigation on the machining instability and dynamic surface generation, *International Journal of Advanced Manufacturing Technology*, 26, 2005, 457-465.

(20) X.W. Liu, K. Cheng, A.P. Longstaff, M.H. Widiyarto and D. Ford, Improved Dynamic Cutting Force Models in Ball-End Milling Part I: Theoretical Modelling and Experimental Calibration, *International Journal of Advanced Manufacturing Technology*, 26, 2005, 457-465.

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(22) W.J. Zong, D. Li and K. Cheng, The material removal mechanism in mechanical lapping of diamond cutting tools, *International Journal of Machine Tools and Manufacture*, 45(7), 2005, 783-788.

(23) B.H. Lu, R.J. Bateman and K. Cheng, RFID enabled manufacturing: fundamentals, methodology and application perspectives, *International Journal of Agile Systems and Management*, 1(1), 2006, 73-92.

(24) X.W. Liu and K. Cheng, Modelling the machining dynamics of peripheral milling, *International Journal of Machine Tools and Manufacture*, 45(11), 2005, 1301-1320.

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(28) J. Toussaint and K. Cheng, Web-based CBR (case-based reasoning) as a tool with the application to tooling selection**,** *International Journal of Advanced Manufacturing Technology*, 29(1), 2006, 24-34.

(29) R.J. Bateman and K. Cheng, Rapid manufacturing as a tool for agile manufacturing: applications and implementation perspectives, *International Journal of Agile Manufacturing*, 9(1), 2006, 39-52.

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(35) D. Huo and K. Cheng, A dynamics-driven approach to precision machines design for micro-manufacturing and its implementation perspectives. *Proceedings of the IMechE, Part B: Journal of Engineering Manufacture*, 222(1), 2008, 1-13.

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(56) H. Ding, R. Shidi, K. Cheng and S-J. Chen, Investigation of the size effect on burr formation in two-dimensional vibration-assisted micro end milling, *Proceedings of the IMechE, Part B: Journal of Engineering Manufacture*, 225, 2011, 2032-2039.

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(58) K. Harun and K. Cheng, An integrated modelling method for assessment of manufacturing quality systems applied to aerospace manufacturing supply chains, *Journal of Intelligent Manufacturing*, 23(4), 2012, 1365-1378.

(59) X.Z. Sun, R.J. Bateman, K. Cheng and S. Ghani, Design and analysis of an internally-cooled smart cutting tool for dry cutting, *Proceedings of the IMechE, Part B: Journal of Engineering Manufacture*, 226, 2012, 585-591.

(60) T. Wu and K. Cheng, An investigation on the cutting performance of nano-crystalline diamond coatings on a micro end mill, *Proceedings of the IMechE, Part B: Journal of Engineering Manufacture*, 226(8), 2012, 1421–1424.

(61) T. Wu, K. Cheng and R. Rakowski, Investigation on tooling geometrical effects of micro tools and the associated micro milling performance, *Proceedings of the IMechE, Part B: Journal of Engineering Manufacture*, 226(9), 2012, 1442–1453.

(62) J.H. Yan, C.H. Feng and K. Cheng, Sustainability-oriented product modular design using kernel-based fuzzy c-means clustering and genetic algorithm, *Proceedings of the IMechE, Part B: Journal of Engineering Manufacture*, 226(10), 2012, 1635–1647.

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(66) T. Wu and K. Cheng, Micro milling performance assessment of diamond-like carbon coatings on a micro end mill, *Proceedings of the IMechE, Part J: Journal of Engineering Tribology*, 227(9), 2013, 1038–1046.

(67) Y. Wan and K. Cheng, An experiment-based investigation on surface corrosion resistance behaviours of aluminium alloy 7050-T7451 after end milling, *Proceedings of the IMechE, Part J: Journal of Engineering Tribology*, 227, 2013, 1297-1305.

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- Enjoying music, field walking, cycling, and reading.

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