

Curriculum Vitae (updated Aug 2025)

Kai Tang 汤凯

Professor and Head
Smart Manufacturing Thrust
Hong Kong University of Science and Technology (GZ)
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Education

PhD (Computer Engineering), University of Michigan, 1990
MSc (Computer, Information, and Control Engineering), University of Michigan, 1986
BEng (Mechanical Engineering), Nanjing Institute of Technology, China, 1982

Academic Employment

- 2022 – present: Full Professor and Head of Smart Manufacturing Thrust
Hong Kong University of Science and Technology (GZ)
- 2011 – 6/2024: Full Professor of Mechanical Engineering
2006 – 2011: Associate Professor of Mechanical Engineering
2001 – 2006: Assistant Professor of Mechanical Engineering
(all in Hong Kong University of Science and Technology)
- 1982 – 1984: Lecturer, Nanjing Institute of Technology, China

Academic Services

Director of Materials, Design, and Manufacturing Facility of HKUST, 2019 – 2022

Industrial Employment

Chief Engineer, Allvox Inc., Michigan, USA, 2001
Senior Software Specialist, Applicon Inc., Michigan, USA, 1991-2001
Senior Engineer, Optimal CAE Inc., Michigan, USA, 1987-1990

Honors and Awards

- China Education Ministry's Overseas Study Scholarship, 1984 – 1986
- 2015 Best Paper Award of Journal of Computational Design and Engineering (the Gaheon award)
- On the Stanford Top 2% List of Scientists (2022, 2023, 2024)
- 中国国家长江讲席教授, 2023

Professional Activities and Recognitions

- 广州市现代高端装备产业链产业顾问, since 2024.2
- Editorial member of International Journal of CAD/CAM, 2002 – 2011
- Editorial member of Journal of Computational Design and Engineering, since 2011
- Editorial member of Journal of Computer-Aided Design, since 2011
- Editorial member of International Journal of Materials and Manufacturing Processes, since 2021
- Conference Chair of 2005 CAD/Graphics
- Conference Chair of 2015 International Workshop on Computational NC Machining
- Honored Conference Chair of 2023 International Workshop on Computational NC Manufacturing

- Guest Editor of the special issue of “Computational NC Machining” (2019) in International Journal of Advanced Manufacturing Technology
- Guest Editor of the special issue of “Advances in Multi-axis Machining” (2021) in Journal of Manufacturing and Materials Processing
- Guest Editor of the special issue of “Multi-axis Additive Manufacturing” (2023) in Journal of Computer-Aided Design
- Member of organization committees of various major international conferences such as Solid and Physical Modeling, Geometric Modeling and Processing, Computer Graphics International, Pacific Graphics, CAD/Graphics

Collaboration as guest professor

Northwest Polytechnical University, China

Nanjing University of Astronautics and Aeronautics, China

Huazhong University of Science and Technology, China

Research Interests

Five-axis machining of complex freeform surfaces

Process planning of machining complex parts for optimal time and/or energy efficiency

Five-axis additive manufacturing of complex geometries – hardware and software

Hybrid multi-axis manufacturing of complicated parts

Measurement techniques and algorithms

Geometric modeling and processing

AI and machine learning in manufacturing

Robotic manufacturing

Developable surfaces and their application in industries

Graduated RPG Students

29 PhD students and 10 MPhil students

Current RPG Students

8 PhD students

Courses Taught

MECH1901 Automotive Engineering and Technology

MECH1906 Mechanical Engineering for Modern Life

MECH3030 Mechanisms of machinery

MECH3510 Computer-Aided Design and Manufacturing

MECH4740 Numerical Methods for Engineers

MECH5520 Theories and Algorithms of CAD/CAM

MESF5380 Advanced Numerical Methods

MESF5520 CAD/CAM

MECH691o Geometric Modeling

MECH691w Geometric Optimization

SMMG5600 Fundamentals of CAD/CAM (at HKUST(GZ))

SMMG6000I Advanced Numerical Methods

Major Research Grants as PI (at HKUST and HKUST(GZ))

Active:

- “连续纤维增材制造轨迹规划的研发”, **PI**, 阿奈索 – HKUST(GZ) 技术开发项目, Project # R00335, **RMB 1,200,000**, 9/2025.9 – 8/2029.
- “面向金属增材混合制造的复杂腔体零件工艺规划”, **PI**, 中国自然科学基金面上项目, 项目号 52375518, **RMB 500,000**, 1/2024 – 12/2027。
- “Process planning of collision-free multi-pass flank milling of complicated parts based on quasi-developable stripification”, RGC-GRF/16211222, **PI**, **HK\$1,098,559**, 9/2022 – 8/2025.

- “复杂零件混合加工工艺的研发”, **PI**, 固高 – HKUST (GZ) 技术开发项目, Project # R00040, **RMB 750,000**, 9/2023 – 8/2026.

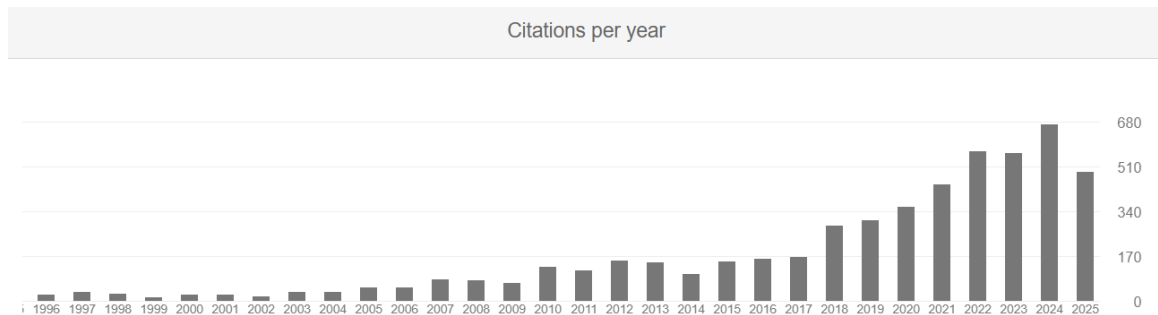
Completed:

- “金属多轴增减材复合加工中心软硬件平台的研发/多轴增减材复合加工工艺规划/仿真系统的研究与开发”, 2020 年度佛山-科大专项合作研发项目, **PI**, **RMB7,500,000**, 6/2021 – 6/2024.
- “Curved layer-based process planning for five-axis volume printing of freeform parts”, RGC-GRF/16200819, **HK\$700,000**, 1/9/2019 – 31/8/2022.
- “An intelligent CAM system for automotive wheel hub manufacturing”, PRP/041/19FX, **HK\$1,000,000**, 1/2020 – 8/2021.
- “Offline programming for robotic manufacturing”, ITS/141/18FX, **HK\$3,590,000**, 30/11/2018 – 30/11/2021.
- “Automatic five-axis sweep scanning path planning system for efficient inspection of freeform surfaces”, RGC-GRF/16205617, **HK\$443,950**, 01/09/2017 – 31/08/2020.
- “Artificial intelligent orthodontic system”, **PI**, ITS/411/17FX, **HK\$506,000**, 1/7/2018 – 30/8/2020.
- “Time-optimal five-axis machining system based on machine-dependent potential field”, RGC-GRF/16209714, **HK\$500,000**, 01/09/2014 – 31/08/2017.
- “Optimized toolpaths for 5-axis finishing operation of freeform surface parts”, ITS/138/13FX, **HK\$2,000,000**, 1/22014 – 31/12016.
- “Efficient 5-axis CNC adaptive machining and measurement of hollow blisk blades”, ITF GHP/057/12, **HK\$5,500,000**, 01/06/2013 - 31/09/2015.
- “A comprehensive study of global collision avoidance for setup optimization and tool path generation in five-axis machining”, RGC-GRF/619212, **HK\$500,000**, 01/09/2012 - 31/08/2015.
- “Five-axis tool path generation from the perspective of minimizing the dynamic loading on the machine’s rotary axes and local gouging”, RGC-GRF/620409, **HK\$733,000**, 01/09/2009 - 31/08/2011.
- “A New MRG Algorithm for 3D Shape Matching”, RGC07/08EG.620307, **HK\$382,000**, 01/09/2007 - 31/08/2009.
- “A unified tool path planning algorithm for five-axis sculptured surface machining based on variational energy minimization”, RGC05/06.EG.620105, **HK\$360,000**, 01/09/2005 - 31/08/2007.
- “Next generation online multimedia collaboration system”, ITF WebEx Project UIM103, **HK\$14,000,000**, 01/12/2004 - 30/11/2006.
- “Design of a reliable interlocking system for the landing gates of material hoists”, HK OSHC Research Grant CM/4R/2004-01, **HK\$290,000**, 01/07/2004 - 30/06/2005.
- “Optimal loop connection in laminated object manufacturing”, HKUSTDAG01/02.EG.10, **HK\$100,000**, 15/12/2001 - 14/12/2002.

Total amount: HK\$51M

Journal Publications

(Last five years; for the full list, see http://mektang.people.ust.hk/public_files/publications.html; “^” indicates own students or post-docs)



(Google Scholar H index = 44, citations 5500+, as of Aug. 2025)

- P167 Wenze Zhang[^], Yichen Wang[^]..., and **Kai Tang***, “DED Bead Geometry and Profile Prediction with Multimodal Spatio-temporal Neural Networks”, *Additive Manufacturing*, accepted, Sept. 2025, 104952.
- P166 Xiangyu Li, ..., and **Kai Tang***, “A three-dimensional tracking algorithm for efficient construction of the feasible space of tool axis for a conical toroidal-end cutter in five-axis machining”, *Computer-Aided Design*, Vol. 189, Dec. 2025, 103941.
- P165 Tak Yu Lau[^] and **Kai Tang***, “Sparse Support Path Generation for Multi-axis Curved Layer Fused Filament Fabrication”, *Graphical Models*, Vol. 140, Aug. 2025, 101280.
- P164 Shuzhi Xu, Jikai Liu, Dong He[^], **Kai Tang**, Kentaro Yaji, “Self-support structure topology optimization for multi-axis additive manufacturing incorporated with curved layer slicing”, *Journal of Computer Methods in Applied Mechanics and Engineering*, Vol 438, Part B, April 2025, 117841.
- P163 N. Wang, Y. Li, C. Liu, Z. Zhao, D. He[^], and **Kai Tang**, “Parameter optimization of ultrasonic impact for deformation control based on Dual Information Neural Network”, *Journal of Manufacturing Processes*, Vol 137, Pages 113-124, March 2025.
- P162 Yuzhu Ding[^], Zhaoyu Li[^], Dong He[^], **Kai Tang***, Pengcheng Hu, “Geodesic distance field-based five-axis continuous sweep scanning method for the multi-entrance inwall surface”, *IEEE Transactions on Automation Science and Engineering*, accepted, Jan. 2025.
- P161 Yuanzhi Chen[^], Dong He[^], ..., and **Kai Tang***, “Five-axis hybrid manufacturing with DED and milling for complex multi-branched metallic parts”, *International Journal of Computer-Integrated Manufacturing*, accepted, Jan. 2025.
- P160 Danjie Bi[^], Molong Duan, and **Kai Tang***, “Freeform trajectory generation for fiber reinforced polymer composites additive manufacturing with variable-deposition-width”, *Journal of Composites Part A*, Oct. 2024.
- P159 Dong HE[^] and **Kai Tang***, “Iso-force rough machining of freeform deep cavities based on volumetric fields”, *Journal of Manufacturing Processes*, Vol. 131, Dec. 2024, pp. 1970-1986.
- P158 Dong HE[^] and **Kai Tang***, “Feedrate-preserved motion planning for five-axis directed energy deposition of freeform metal parts”, *Journal of Additive Manufacturing*, Volume 89, 5 June 2024, 104302.
- P157 Joseph Jayakody, Tak Yu Lau[^], and **Kai Tang***, “Topological awareness towards collision-free multi-axis curved layer additive manufacturing”, *Journal of Additive Manufacturing*, Volume 88, 25 May 2024, 104247.
- P156 Jiancheng Hao[^] and **Kai Tang***, “Efficient cutting path planning for a non-spherical tool based on an iso-scallop height distance field”, *Chinese Journal of Aeronautics*, accepted, Nov. 2023.
- P155 Zhaoyu Li[^] and **Kai Tang***, “Efficient five-axis scanning-inspection path planning for complex freeform surfaces”, *Journal of Robotics and Computer-Integrated Manufacturing*, Vol. 86, Apr. 2024.
- P154 Xiangyu Li[^], Junxue Ren, and **Kai Tang***, “Efficient machining of a complex blisk channel using a disc cutter”, *Chinese Journal of Aeronautics*, Vol. 37(1), 2024.
- P153 Tak Yu Lau[^] and **Kai Tang***, “Partition-based print sequence planning and adaptive slicing for scalar field-based multi-axis additive manufacturing”, *Journal of Computer-Aided Design*, Vol. 163, 2023.
- P152 Danjie Bi[^], Molong Duan, Tak Yu Lau[^], Fubao Xie, and **Kai Tang***, “Strength-enhanced volume decomposition for multi-directional additive manufacturing”, *Journal of Additive Manufacturing*, Vol. 69, May 2023, 103529.
- P151 Zhao ZHANG, Feng JIANG, Ming LUO, Baohai WU, Dinghua ZHANG, and **Kai Tang**, “Geometric error measuring, modeling, and compensation for CNC machine tools: A review”, *Chinese Journal of Aeronautics*, accepted, Mar. 2023.

- P150 Dong He[^] and **Kai Tang***, “Collision-conscious multi-pass flank milling of complicated parts based on stripification”, *Journal of Computer-Aided Design*, Vol. 157, Apr. 2023.
- P149 Joseph Jayakody[^] and **Kai Tang***, “Convexity and Surface Quality Enhanced Curved Slicing for Support-Free Multi-Axis Fabrication”, *Journal of Manufacturing and Materials Processing*, 2023, 7(1), 9.
- P148 Xiaoke Deng[^] and **Kai Tang***, “A new visual-guided and partition-based multi-setup 3D printing system Journal of Manufacturing Systems”, *Journal of Manufacturing Systems*, Vol. 67, pages 35-56, April 2023
- P147 Jiancheng Hao[^] and **Kai Tang***, “Partition-based five-axis tool path generation for freeform surface machining using a non-spherical tool”, *Journal of Computational Design and Engineering*, accepted, Vol. 9(5), Pages 1585–1601, October 2022.
- P146 H. Guo, Y. Li, C. Liu, Y. Ni, and **Kai Tang**, “A Deformation Force Monitoring Method for Aero-Engine Casing Machining Based on Deep Autoregressive Network and Kalman Filter”, *Journal of Applied Sciences*, 12(14), 7014, July 2022.
- P145 Xinxin Lu, Yuansheng Zhou, Dong He[^], Fangyan Zheng, **Kai Tang**, and Jinyuan Tang, “A novel two-variable optimization algorithm of TCA for the design of face gear drives”, *Journal of Mechanism and Machine Theory*, Vol. 175, Sept. 2022.
- P144 Yamin Li[^], Dong He[^], Shangqin Yuan, **Kai Tang***, and Jihong Zhou, "Vector field-based curved layer slicing and path planning for multi-axis printing", *Journal of Robotics and Computer-Integrated Manufacturing*, Vol. 77, Oct. 2022.
- P143 Zhaoyu Li[^], Pengcheng Hu, and **Kai Tang***, "Five-axis trochoidal sweep scan path planning for free-form surface inspection", *IEEE Transactions on Automation Science and Engineering*, accepted, Feb. 2022.
- P142 Fubao Xie[^] and **Kai Tang***, “Volume Decomposition for Multi-axis Support-free and Gouging-free Printing based on Ellipsoidal Slicing”, *Computer-Aided Design*, Vol. 143, Feb. 2022.
- P141 Shenghui Wang, Yuansheng Zhou, Jinyuan Tang, and **Kai Tang**, "Digital tooth contact analysis of face gear drives with an accurate measurement model of face gear tooth surface inspected by CMMs", *Journal of Mechanism and Machines Theory*, Vol. 167, Jan. 2022.
- P140 Zhaoyu Li[^] and **Kai Tang***, "Kinematics-based five-axis trochoidal milling process planning for deep and curved slots", *ASME Journal of Manufacturing Science and Engineering*, Vol. 144 (2), Feb. 2022.
- P139 G.Urbikain Pelayo, D.Olvera-Trejo, M. Luo, **K. Tang**, L.N. López de Lacalle, A.Elías-Zuñig, “A model-based sustainable productivity concept for the best decision-making in rough milling operations”, *Journal of Measurement*, Vol. 186, Dec. 2021.
- P138 Danjie Bi[^], Fubao Xie[^], and **Kai Tang***, "Generation of Efficient Iso-planar Printing Path for Multi-axis FDM Printing", *Journal of Manufacturing and Materials Processing*, 5(2), 59, 2021.
- P137 Zhaoyu Li[^], Qianhang Yan[^], and **Kai Tang***, "Multi-pass adaptive tool path generation for flank milling of thin-walled workpieces based on the deflection constraints", Vol 68, Part A, *Journal of Manufacturing Processes*, pp. 690-705, Aug. 2021.
- P136 Dong He[^] and **Kai Tang***, "Quasi-developable and signed multi-strip approximation of a surface mesh for efficient flank milling", *Computer-Aided Design*, Vol. 140 (special issue of 2021 Solid and Physical Modeling Conference), Nov. 2021.
- P135 Xiangyu Li[^], Junxue Ren, and **Kai Tang***, "Collaborative optimization of conical cutter sequence for efficient multi-axis machining of deep curved cavities", *Journal of Manufacturing Processes*, accepted, March 2021.
- P134 Yamin Li[^] and **Kai Tang***, "Multi-axis support-free printing of freeform parts with lattice infill structures", *Journal of Computer-Aided Design*, Vol. 133, April 2021.

- P133 Zhaoyu Li[^] and **Kai Tang***, "Partition-based five-axis tool path generation for freeform surface machining using a non-spherical tool", *Journal of Manufacturing Systems*, Vol. 58, Part A, pp. 248-262, Jan. 2021.
- P132 Zhaoyu Li[^] and **Kai Tang***, "A variable-depth multi-layer five-axis trochoidal milling method for machining deep freeform 3D slots", *Journal of Robotics and Computer-Integrated Manufacturing*, Vol. 68, April 2021.
- P131 Yao-an Lu and **Kai Tang***, "Collision-free and smooth joint motion planning for six-axis industrial robots by redundancy optimization", *Journal of Robotics and Computer-Integrated Manufacturing*, Vol. 68, April 2021.
- P130 Dong He[^] and **Kai Tang***, "Geodesic distance field-based process planning for five-axis machining of complicated parts", *ASME Journal of Manufacturing Science and Engineering*, Vol. 143(6), June 2021.
- P129 Zhongxi Zhang, Ming Luo, **Kai Tang**, and Dinghua Zhang, "A new in-process method for reducing the residual stresses induced deformation of thin-walled parts", *Journal of Manufacturing Processes*, Vol. 59, pp. 316-325, Nov. 2020.
- P128 Fubao Xie[^] and **Kai Tang***, "A potential field based multi-axis printing path generation algorithm", *International Journal of Computer Integrated Manufacturing*, Vol. 33 (12), pp. 1277-1299, 2020.
- P127 X. Wang[^] and **Kai Tang***, "A skeleton-based process planning framework for support-free 3+2-axis printing of multi-branch freeform parts", *Journal of Advanced Manufacturing Technology*, Vol. 110, Aug. 2020.
- P126 X. Hao, Y. Li, C. Liu, and **Kai Tang**, "An allowance allocation method based on dynamic approximation via online inspection data for deformation control of structured parts", *Chinese Journal of Aeronautics*, Vol. 33(12), pp. 3495-3508, Dec. 2020.
- P125 Jingting Xu, Longkun Xu, Zhen Geng, Yuwen Sun, and **Kai Tang**, "3D surface topography simulation and experiments for ball-end CNC milling considering dynamic feedrate", *CIRP Journal of Manufacturing Science and Technology*, Vol. 31, pp. 210-223, Nov. 2020.
- P124 Jiarui Wang[^], Lulin Quan[^], and **Kai Tang***, "A prediction method based on the voxel model and the finite cell method for cutting force-induced deformation in the five-axis milling process", *Journal of Computer Methods in Applied Mechanics and Engineering*, Vol. 367, Aug. 2020.
- P123 Lufeng Chen[^], Pengcheng Hu[^], Rong Zhang[^], Zhaoyu Li[^], and **Kai Tang***, "A spiral-based inspection path generation algorithm for efficient five-axis sweep scanning of freeform surfaces", *Journal of Computer-Aided Design*, Vol. 124, Jul. 2020.
- P122 Fubao Xie[^] and **Kai Tang***, "Path smoothing and feed rate planning for robotic curved layer additive manufacturing", *Journal of Robotics and Computer-Integrated Manufacturing*, Vol. 65, Oct. 2020.
- P121 Yamin Li[^] and **Kai Tang***, "A new voxel model-based process-planning method for five-axis machining of complicated parts", *ASME Journal of Computing and Information Science in Engineering*, Vol. 20 (4), Aug. 2020.
- P120 X. Hao, Y. Li, Y. Cheng, C. Liu, K. Xu[^], **Kai Tang**, "A time-varying geometric modeling method for parts with deformation during machining process", *Journal of Manufacturing Systems*, Vol. 55, pp. 15-29, Apr. 2020.
- P119 Zhaoyu Li[^], Lufeng Chen[^], Ke Xu[^], and **Kai Tang***, "Five-axis trochoidal flank milling of deep 3D cavities", *Journal of Computer-Aided Design*, Vol. 119, Feb. 2020.
- P118 Li Chen[^] and **Kai Tang***, "Manufacturability and process planning for additive and subtractive hybrid manufacturing of quasi-rotational parts with columnar features", *Journal of Computer-Aided Design*, Vol. 118, Jan. 2020.

P117 Yamin Li[^], Long Zeng, and **Kai Tang***, "Orientation-point relation based inspection path planning method for 5-axis OMI system", *Journal of Robotics and Computer Integrated Manufacturing*, Vol. 61, Feb. 2020.