

JIAN CAO

Professor, Department of Mechanical Engineering
Associate Vice President for Research
Northwestern University
2145 Sheridan Road
Evanston, IL 60208
cao.mech.northwestern.edu/
Tel: (847) 467-1032
Fax: (847) 491-3915
Email: jcao@northwestern.edu



Prof. Cao's major research interests include innovative manufacturing processes and systems, particularly in the area of deformation-based processes and laser processes. Her work has made fundamental contributions to the understanding of wrinkling in sheet forming and the effects of material microstructure and material architecture on forming behavior of metals and woven composites. Her research has integrated analytical and numerical simulation methods, control and sensors, design methodologies to advance manufacturing processes. Her research group has designed unique manufacturing equipment for microforming and flexible rapid forming. Current research on flexible dieless forming, micro-forming, laser processes for ablation and additive has direct impacts on energy-efficient manufacturing, surface engineering and rapid prototyping. She has published nearly 300 technical articles, including 140 journal articles, over 10 book chapters, and 10 patents. She has given over 120 invited talks.

Prof. Cao's research contributions have been recognized by honors and awards given by her peers in the field of manufacturing, applied mechanics and control, including STLE Best Paper Award, ASME literature award – Blackall Machine Tool and Gage award; ASME/AMD Young Investigator Award; and NSF CAREER award. Prof. Cao is the founding Technical Editor of the *ASME Journal of Micro- and Nano-manufacturing*. She is a Fellow of the *International Academy for Production Engineering (CIRP)*, *Society of Manufacturing Engineers (SME)*, and *American Society of Mechanical Engineers (ASME)*. In 2012, she was selected to be the panelist representing the field of manufacturing in the World Technology Evaluation (WTEC) study on Societal Convergence for Human Progress: Beyond Convergence of Nano-Bio-Info-Cognitive Technologies, sponsored by NSF, NIH, NASA, EPA, DoD, and DoA; and the WTEC study on Systems Engineering for Clean and Renewable Energy Manufacturing sponsored by NSF. Her research partners have included both large corporations and small-medium corporations.

Prof. Cao has been active at the national and international stages. She served as the Program Director of Materials Processing and Manufacturing (MPM) program at NSF from 2003 to 2005. During that short two-year period, under her leadership, the WTEC Study on Micro-manufacturing was conducted and co-sponsored by four government agencies and more than ten NSF programs. She co-initiated the joint-funding between NSF and DOE for her MPM program. Through collaborating with other programs, she was able to increase the funding of her program by over 20%. She is one of the main driving forces behind the well-received NSF workshops on CAREER development. Prof. Cao served as President of North American Manufacturing Research Institute of SME and Chair of ASME Manufacturing Engineering Division. She has chaired multiple ASME committees, including M. Eugene Merchant Medal Committee and Committee of Administration and Finance. She was awarded the ASME Dedicated Service Award. She is the Vice-Chair of the Scientific and Technical Committee on Forming of *CIRP*.

PROFESSIONAL EXPERIENCES

Professor,	Mechanical Engineering, Northwestern Univ.	Sept. 2008 – present
Associate Vice President for Research,	Northwestern University	Oct. 2012 – present
Director,	Northwestern Initiative for Manufacturing Science and Innovation (NIMSI)	April 2015 - present
Founder	Scimplicity LLC	Nov. 2011 – present
Co-Director,	NSF Summer Institute on Nanomechanics, Nanomaterials, and Micro/Nanomanufacturing	Oct. 2007 – Sept. 2013
Director,	Graduate Studies, Mechanical Engineering	Sept. 2007 – Sept. 2012
Professor,	Civil and Environmental Eng., Northwestern	May 2010 – present
Associate Professor,	Mechanical Engineering, Northwestern Univ.	Sept. 2002 – Aug. 2008
Interim Asso. Chair,	Mechanical Engineering, Northwestern Univ.	Sept. 2006 - Aug. 2007
Program Director,	National Science Foundation	Sept. 2003 – Sept. 2005
Assistant Professor,	Mechanical Engineering, Northwestern Univ.	Sept. 1995 - Aug. 2002
	(Industrial training at General Motors Corp.	Sept. 1995 - June 1996)
Postdoctoral Fellow,	Mechanical Engineering, M.I.T.	Feb. 1995 - July 1995

EDUCATION

- Ph.D. Mechanical Engineering, *Massachusetts Institute of Technology*, 1995
Thesis: Design and Control of Forming Parameters for Sheet Metal Forming Using Finite Element Analysis
Thesis Advisor: Professor Mary C. Boyce
- M.S. Mechanical Engineering, *Massachusetts Institute of Technology*, 1992
Thesis: Drawbead as a Control Element of Material Flow during Sheet Metal Forming
Thesis Advisor: Professor Mary C. Boyce
- B.S. Materials Science and Engineering & Automatic Control, *Shanghai JiaoTong Univ.*, 1989

HONORS AND AWARDS

- Fellow, The International Academy for Production Engineering (CIRP), 2014
- STLE Best Paper Award, 2014, among all the papers published in 2013 by STLE's associated journals in the field of surface engineering, Society of Tribologists and Lubrication Engineers, 2014 – "Surface Texturing of Drill Bits for Adhesion Reduction and Tool Life Enhancement".
- ISFA Best Application Paper Award at the ISFA 2014 – "Design and evaluation of an embedded pressure sensor for microrolling process monitoring", Awaji-Island, Hyogo, Japan
- Distinguished Service Award, ASME Manufacturing Engineering Division, 2013.
- ASME Blackall Machine Tool and Gage Award, 2012 – Best Journal Paper Award "An Investigation on Deformation-based Micro Surface Texturing".
- ASME Dedicated Service Award, 2011
- Fellow, Society of Manufacturing Engineers, 2010
- Distinguished Service Award, ASME Manufacturing Engineering Division, 2009.

Best Poster Award, ASME Manufacturing Science and Engineering Conference, 2008, "Deformation Machining: A New Hybrid Process", Woody, B., Smith, K.S., Cao, J., Ziegert, J., Belytschko, T., Foecke, T. and Li, M
Fellow, *American Society of Mechanical Engineers*, 2007
Young Investigator Award, *American Society of Mechanical Engineers/Applied Mechanics*, 2006
Outstanding Young Investigator Award, *Japan-US Flexible Automation*, 2002
Outstanding Young Manufacturing Engineer Award, *Society of Manufacturing Engineers*, 2002
Ralph R. Teetor Educational Award, *SAE International*, 1999
CAREER Award, *National Science Foundation*, 1997-2001
ALCOA Foundation award, 1997
General Electric Chair Professor, endowed Assistant Professor Chair, Northwestern University, 1996-1997

Editorships

Technical Editor, *ASME Journal of Micro- and Nano-Manufacturing*, January 2012 – January 2017
Editor, *International Journal of Precision Engineering and Manufacturing*, Jan. 2011 – Dec. 2011
Associate Editor, *ASME Journal of Manufacturing Science and Engineering*, April 2003 – 2009.
Associate Editor, *ASME Journal of Applied Mechanics*, October 2005 – October 2011.
Scientific Committee, *International Journal of Materials Forming*, Springer, October 2007 – present.
Member, International Editorial Advisory Board of *Chinese Journal of Mechanical Engineering-English Edition*, distributed by ASME, October 2001 – present.

REFEREED JOURNAL ARTICLES

1. Smith, J. Cao, J. and Liu, W. K. (2016) "Computational Challenges and Future Research Directions in Additive Manufacturing," *IACM Expression*, 38, 2-5.
2. Zeng, Q., Ehmann, K.F. and Cao, J. (2016) "Design of General Kinematotropic Mechanisms", *Robotics and Computer-Integrated Manufacturing*, Vol. 38, pp.67-81, <http://dx.doi.org/10.1016/j.rcim.2015.10.005>.
3. Saxena, I., Liu, J., Ehmann, K., Cao, J., "Periodic Surface Pattern Fabrication via Biprism Interference Micro-machining", *Journal of Surface Topography*, Oct. 27, 2015, 045006, doi:10.1088/2051-672X/3/4/045006.
4. Martinez-Prieto, N., Abecassis, M., Xu, J., Guo, P., Cao, J., Ehmann, K., (2015) "Feasibility of Fiber-deposition Control by Secondary Electric Fields in Near-Field Electrospinning." *ASME Journal of Micro and Nano Manufacturing*, Vol. 3(4), 041005, Sept. 22, 2015, doi: 10.1115/1.4031491.

5. Smith, J., Liu, W.K. and Cao, J. (2015) "A General Anisotropic Yield Criterion for Pressure-dependent Materials", to appear *Int. J. Plasticity*, 10.1016/j.ijplas.2015.08.009.
6. Zhang, Z., Ren, H., Xu, R., Moser, N., Smith, J., Ndip-Agbor, E., Malhotra, R., Xia, Z.C., Ehmann, K.F. and Cao, J. (2015) "A Mixed Double-Sided Incremental Forming Toolpath Strategy for Improved Geometric Accuracy", *ASME Journal of Manufacturing Science and Engineering*, Vol.137(5), 051007 (7 pages), doi: 10.1115/1.4031092.
7. Yao, Y., Wang, X., Cao, J. and Ulmer, M. (2015) "Stress manipulated coating for fabricating light weight X-ray telescope mirrors", *accepted for publication, Optics Express*.
8. Ng, M.K., Li, L.Y., Fan, Z.Y., Gao, R.X., Smith, E.S. III, Ehmann, K.F. and Cao, J. (2015) "Joining sheet metals by electrically-assisted roll bonding", *Annuals of CIRP*, Vol. 65(1), pp. 273-276, doi:10.1016/j.cirp.2015.04.131.
9. Li, Z.F., Ding, W., Cao, J., Ye, L.Y. and Chen, J. (2015) "In Situ TEM Observation on Martensitic Transformation during Tensile Deformation of SUS304 Metastable Austenitic Stainless Steel", *Acta Metall. Sin. (Engl. Lett.)*, Vol. 28(3), pp.302-306, DOI:10.1007/s40195-014-0197-1.
10. Tekkaya, A.E., Allwood, J.M., Bariani, P.F., Bruschi, S., Cao, J., Gramlich S., Groche P., Hirt, G., Ishikawa, T., Merklein, M., Misiolek, W., Pietrzyk, M., Shivpuri, R. and Yanagimoto, J. (2015) "Metal Forming Beyond Shaping: Predicting and Setting Product Properties", to appear *Annuals of CIRP*, Vol. 64(2).
11. Xu, D., Ng, M.K., Fan, R., Zhou, R., Wang, H.-P., Chen, J. and Cao, J. (2015) "Enhancement of Adhesion Strength by Micro-rolling-based Surface Texturing", *Int. J. Advanced Manufacturing Technology*, Vol. 78 (9-12), pp 1427-1435, doi:10.1007/s00170-014-6736-0.
12. Moser, N., Ndip-agbor, E., Ren, H., Zhang, Z., Ehmann, K., & Cao, J. (2015). Challenges and Process Strategies Concerning Multi-Pass Double Sided Incremental Forming. *Key Engineering Materials*, 651-653, 1122–1127. doi:10.4028/www.scientific.net/KEM.651-653.1127.
13. Ndip-Agbor, E.E., Smith, J., Ren H., Jiang, Z., Moser, N., Chen, W. Xia, Z.C. and Cao, J. (2015) "Optimization of Relative Tool Position in Accumulative Double Sided Incremental Forming using Finite Element Analysis and Model Bias Correction", *Int. J. Material Forming*, DOI:10.1007/s12289-014-1209-4.
14. Zou, X., Fan, Z., Gao, R.X., Ng, M.K. and Cao, J. (2015) "An Integrative Approach to Spatial Mapping of Pressure Distribution in Microrolling", *CIRP J. Manufacturing Science and Technology*, doi:10.1016/j.cirpj.2014.12.002.
15. Saxena, I., Ehmann, K. and Cao, J. (2015) "High Throughput Microfabrication using Laser Induced Plasma in Saline Aqueous Medium", *J. Materials Processing Technology*, Vol. 217, March, pp. 77–87, doi:10.1016/j.jmatprotec.2014.10.018.
16. Fan, Z., Zou, X., Gao, R.X., Ng, M.K., Cao, J. and Smith, E.F. (2015) "Embedded Capacitive Pressure Sensing for Electrically Assisted Microrolling", *IEEE/ASME Transactions on Mechatronics, Focused Section on Mechatronics for Intelligent Manufacturing*, Vol. 20, No. 3, pp.1005-1014. DOI: 10.1109/TMECH.2014.2365512.

17. Aktürk, D.Z., Liu, P., Cao, J., Wang, Q.J., Xia, Z.C., Talwar, R., Grzina, D., and Merklein, M. (2015) "Friction Anisotropy of Aluminum 6111-T4 Sheet with Flat and Laser-Textured D2 Tooling", *Tribology International*, Vol. 81, pp. 333-340, DOI: 10.1016/j.triboint.2014.09.001.
18. Cao, T.T., Lu, B., Xu, D.K., Zhang, H., Chen, J., Long, H. and Cao, J. (2015) "An efficient method for thickness prediction in multi-pass incremental sheet forming", *Int. J. Advanced Manufacturing Technology*, Vol. 77(1-4), pp. 469-483., DOI 10.1007/s00170-014-6489-9.
19. Lu, B., Fang, Y., Xu, D.K., Chen, J., Ai, S., Long, H., Ou, H. and Cao, J. (2015) "Investigation of material deformation mechanism in double side incremental sheet forming", *Int. J. Machine Tools and Manufacture*, Vol.93, pp.37-48, doi:10.1016/j.ijmactools.2015.03.007.
20. Saxena, I., Wolff, S. and Cao, J. (2015) "Unidirectional magnetic field assisted Laser Induced Plasma Micro-Machining", *Manufacturing Letters*, Vol. 3, pp.1-4.
21. Zeng, Q., Ehmann, K.F. and Cao, J. (2014) "Tri-pyramid Robot: Design and kinematic analysis of a 3-DOF translational parallel manipulator", *Robotics and Computer-Integrated Manufacturing*, Vol. 30(6), pp. 648-657, doi:10.1016/j.rcim.2014.06.002.
22. Saxena, I, Ehmann, K. and Cao, J. (2014) "Laser-induced plasma in aqueous media: numerical simulation and experimental validation of spatial and temporal profiles", *Applied Optics*, Vol. 53(35), pp. 8283-8294, dx.doi.org/10.1364/AO.53.008283.
23. Wang, X., Knapp, P., Vaynman, S., Graham, M.E., Cao, J., Ulmer, M.P. (2014) 'Experimental study and analytical model of deformation of magnetostrictive films as applied to mirrors for X-ray space telescopes", *Applied Optics*, Vol. 53(27), pp.6256-6267, dx.doi.org/10.1364/AO.53.006256.
24. Zeng, Q., Ehmann, K.F. and Cao, J. (2014) "Tri-pyramid Robot: Stiffness Modeling of a 3-DOF Translational Parallel Manipulator", *Robotica*, DOI: 10.1017/S0263574714001520.
25. Lu, B., Fang, Y., Xu, D.K., Chen, Ou, H., Moser, N.H. and Cao, J. (2014) "Mechanism investigation of friction-related effects in single point incremental forming using a developed oblique roller-ball tool", *Int. J. Machine Tools and Manufacture*, Vol. 85, pp.14-29, DOI: 10.1016/j.ijmactools.2014.04.007.
26. Bruschi, S., Altan, T., Banabic, D., Bariani, P.F., Brosius, A., Cao, J., Ghiotti, J., Khraisheh, M., Merklein, M. and Tekkaya, E. (2014) "Testing and Modelling of Material Behavior and Formability in Sheet Metal Forming Processes", *Annals of CIRP*, Vol.63/2, pp.727-749. Dx.doi.org/10.10106/j.cirp.2014.05.005.
27. Guo, P., Lu, Y., Ehmann, K.F. and Cao, J. (2014) "Generation of hierarchical micro-structures for anisotropic wetting by elliptical vibration cutting", *Annals of CIRP*, Vol.63/1, pp.553-556, http://dx.doi.org/10.1016/j.cirp.2014.03.048.
28. Ng, M-K, Fan, Z., Gao, R.X., Smith, E.F., Cao (2014) "Characterization of electrically-assisted micro-rolling for surface texturing using embedded sensor", *Annals of CIRP*, Vol.63/1, pp. 269-272, http://dx.doi.org/10.1016/j.cirp.2014.03.021.

29. Xu, R., Shi, X.T., Xu, D.K, Malhotra, R. and Cao, J. (2014) "A preliminary study on the fatigue behavior of sheet metal parts formed with accumulative-double-sided incremental forming", *Manufacturing Letters*, <http://dx.doi.org/10.1016/j.mfglet.2013.10.009>.
30. Cui, Y., Yuan, W. and Cao, J. (2013) "The effect of surface texturing on microalgal cell attachment to solid carriers", *International Journal of Agricultural and Biological Engineering*, Vol. 6(4), pp. 44 – 54, DOI: 10.3965/j.ijabe.20130604.006.
31. Magargee, J., Fan, R. and Cao, J. (2013) "Analysis and Observations of Current Density Sensitivity and Thermally Activated Mechanical Behavior in Electrically-Assisted Deformation", *ASME J. Manufacturing Science and Engineering*, Vol. 135, 061022 (8 pages), DOI: 10.1115/1.4025882.
32. Ling, T.D., Liu, P., Xiong, S., Grzina, D., Cao, J., Wang, Q. J., Xia, Z. C. and Talwar, R. (2013) "Surface Texturing of Drill Bits for Adhesion Reduction and Tool Life Enhancement", *Tribology Letter*, Vol. 52, pp.113-122, DOI 10.1007/s11249-013-0198-7.
33. Beltran, M., Malhotra, R., Nelson, A.J., Bhattacharya, A., Reddy, N.V., and Cao, J. (2013). "Experimental study of failure modes and scaling effects in micro-incremental forming", *ASME Journal of Micro- and Nano-manufacturing*, Sept, Vol. 1, 031005-1, doi:10.1115/1.4025098
34. Xu, D.K; Wu, W.C., Malhotra, R., Chen, J., Lu, B. and Cao, J. (2013) "Mechanism Investigation for the Influence of Tool Rotation and Laser Surface Texturing (LST) on Formability in Single Point Incremental Forming", *International Journal of Machine Tools and Manufacture*, Vol. 73, pp. 37-46, 10.1016/j.ijmachtools.2013.06.007.
35. Smith, J. L., Malhotra, R., Liu, W.K. and Cao, J. (2013) "Deformation Mechanics in Single Point and Accumulative Double-Sided Incremental Forming", *International Journal of Advanced Manufacturing Technology*, Vol. 69 (5-8), pp 1185-1201, DOI 10.1007/s00170-013-5053-3.
36. Magargee, J., Morestin, F., and Cao, J. (2013) "Characterization of Flow Stress for Commercially Pure Titanium Subjected to Electrically-Assisted Deformation", *ASME Journal of Engineering Materials and Technologies*, Vol.135(4), doi:10.1115/1.4024394.
37. Fan, R., Magargee, J., Hu, P. and Cao, J. (2013) "Influence of Grain Size and Grain Boundaries on the Thermal and Mechanical Behavior of 70/30 Brass under Electrically-Assisted Deformation", *Materials Science & Engineering A*, Vol.574(1), pp.218-225, 10.1016/j.msea.2013.02.066.
38. Mitsuishi, M., Cao, J., Bártolo, P., Friedrich, D., Shih, A., Rajurkar, K., Sugita, N. and Harada, K. (2013) "Biomanufacturing", *Annals of CIRP*, Vol.62/2, pp.585-606, <http://dx.doi.org/10.1016/j.cirp.2013.05.001>.
39. Malhotra, R., Saxena, I., Ehmann, K.F. and Cao, J. (2013) "Laser-induced Plasma Micro-machining (LIPMM) for Enhanced Productivity and Flexibility in Laser-based Micro-machining Processes", *Annals of CIRP*, Vol.62/1, 10.1016/j.cirp.2013.03.036.
40. Lu, B., Chen, J., Ou, H. and Cao, J. (2013) "Feature-Based Tool Path Generation Approach for Incremental Sheet Forming Process", *Journal of Materials Processing Technology*, Vol. 213(7), pp. 1221-1233, <http://dx.doi.org/10.1016/j.jmatprotec.2013.01.023>.

41. Xiao, Y.Z., Chen, J., Zhu, X.H. and Cao, J. (2013) "Modified Maximum Mechanical Dissipation Principle for Rate-Independent Metal Plasticity", *ASME Journal of Applied Mechanics*, Vol. 80(6), 061020 (9 pages), doi:10.1115/1.4023685.
42. Wang, Z.J, Jin, X.Q., Liu, S.B., Keer, L.M., Cao, J. and Wang, Q. (2013) "A New Fast Method for Solving Contact Plasticity and Its Application in Analyzing Elasto-plastic Partial Slip", *Mechanics of Materials*, 60 (2013) 18–35, <http://dx.doi.org/10.1016/j.mechmat.2013.01.001>.
43. Xiao, Y., Chen, J. and Cao, J. (2012) "A Generalized Thermodynamic Approach for Modeling Nonlinear Hardening Behaviors", *International Journal of Plasticity*, Vol. 38, pp. 102-122, DOI: 10.1016/j.ijplas.2012.05.004.
44. Agrawal, A., Ziegert, J., Smith, S., Woody, B. and Cao, J. (2012) "Study of Dimensional Repeatability and Fatigue Life for Deformation Machining Bending Mode", *ASME Journal of Manufacturing Science and Engineering*, Vol. 134, 061009, DOI: 10.1115/1.4007716.
45. Xu, D.K., Malhotra, R., Cao, J., Reddy, N.V. and Chen, J. (2012) "Analytical Prediction of Stepped Feature Generation in Multi-pass Single Point Incremental Forming", *Journal of Manufacturing Processes*, Vol.14, 487-494, dx.doi.org/10.1016/j.jmapro.2012.08.003.
46. Xu, D.K., Chen, J., Tang, Y.C., Cao, J. (2012) "Topology Optimization of Die Weight Reduction for High-Strength Sheet Metal Stamping", *International Journal of Mechanical Sciences*, Vol. 59(1), pp. 73–82, <http://dx.doi.org/10.1016/j.ijmecsci.2012.03.006>.
47. Dittrich, M.A., Gutowski, T.G., Cao, J, Roth, J.T., Xia, Z.C., Kiridena, V., Ren, F., Henning, F. (2012) "Exergy Analysis of Incremental Sheet Forming", *Production Engineering Research & Development*, Vol. 6, pp. 69–177. DOI: 10.1007/s11740-012-0375-9.
48. Malhotra, R., Xue, L, Belytschko, T., Cao, J. (2012) "Prediction and Analysis of Fracture in Single Point Incremental Forming using a Damage based Material Model", *Journal of Materials Processing Technology*, Vol. 212, pp. 1573-1590. <http://dx.doi.org/10.1016/j.jmatprotec.2012.02.021>.
49. Malhotra, R., Cao, J., Beltran, M., Xu, D., Magargee, J., Kiridena, V., Xia, Z.C. (2012) "Accumulative-DSIF Strategy for Enhancing Process Capabilities in Incremental Forming", *Annals of CIRP*, Vol.61/1, pp.251-254, DOI: 10.1016/j.cirp.2012.03.093.
50. Fan, Z., Ng, M.K., Gao, R.X., Cao, J. and Smith, E.F. III (2012) "Real-Time Monitoring of Pressure Distribution in Microrolling through Embedded Capacitive Sensing", *Annals of CIRP*, Vol.61/1, 367–370, <http://dx.doi.org/10.1016/j.cirp.2012.03.136>.
51. DeVor, R.E., Kapoor, S.G., Ehmann, K.F. and Cao, J. (2012) "Transforming the Landscape of Manufacturing: Distributed Manufacturing based on Desktop Manufacturing (DM)²", *ASME Journal of Manufacturing Science and Engineering*, Vol. 134(4), 041004, <http://dx.doi.org/10.1115/1.4006095>.
52. Li, H., Dong X., Shen, Y., Zhou, R., Diehl, A., Hagenah, H., Engel, U., Merklein, M., Cao, J. (2012) "Analysis of Microbending of CuZn37 Brass Foils Based on Strain Gradient Hardening Model", *Journal of Materials Processing Technology*, 212, 653–661.
53. Bhattacharya, A., Maneesh, K., Reddy, N.V. and Cao, J. (2011) "Formability and surface finish studies in single point incremental forming", *ASME Journal of Manufacturing Science*

and *Engineering*, Vol. 133(6), 061020, <http://dx.doi.org/10.1115/1.4005458>,
<http://link.aip.org/link/?MAE/133/061020>.

54. Magargee, J., Cao, J., Zhou, R., McHugh, M. and Brink, D. (2011) "Characterization of Tensile and Compressive Behavior of Microscale Sheet Metals Using a Transparent Micro-wedge Device", *ASME Journal of Manufacturing Science and Engineering*, Vol. 133(6), <http://link.aip.org/link/?MAE/133/064501>; DOI: 10.1115/1.4005401
55. Malhotra, R., Cao, J., Ren, F., Kiridena, V., Xia, Z.Cedric. and Reddy, N.V. (2011) "Improvement of geometric accuracy in Incremental Forming by using a Squeezing Toolpath With Two Forming Tools", *ASME Journal of Manufacturing Science and Engineering*, Vol. 133(6), 061019, DOI: 10.1115/1.4005179, <http://link.aip.org/link/?MAE/133/061019>.
56. Zhou, R., Cao, J., Ehmann, K., Xu, C., (2011), "An investigation on deformation-based micro surface texturing", *ASME Journal of Manufacturing Science and Engineering*, Vol. 133(6), <http://link.aip.org/link/?MAE/133/061017>, DOI: 10.1115/1.4005459.
57. Parasiz, S. A., Kinsey, B., Mahayotsanun, N. and Cao, J. (2011) "Effect of Specimen Size and Grain Size on Deformation in Microextrusion", *SME Journal of Manufacturing Processes*, Vol. 13, pp.153-159, dx.doi.org/10.1016/j.jmapro.2011.05.002.
58. Zhou, R., Cao, J., Xu, C. and Ehmann, K. (2011) "An Investigation on Multi-pass Deformation-based Surface Texturing", *Steel Research International*, Vol. 81(9), pp. 171, DOI: 10.1002/srin.201190002.
59. Chung, Y.W., Wang, J. Q., Ajayi, O., Biresaw, G., Cao, J., Hua, D., Lapatovich, W., Liu, W.K., Majumdar, A., Qureshi, F. and Zhu, D. (2011) "Transformative research issues and opportunities in energy efficiency", *Current Opinion in Solid State & Materials Science*, Vol. 15(1), pp.16-19.
60. Zhou, R., Cao, J., Wang, Q. J., Meng, F., Zimowski, K., Xia, C. Z., (2011) "Effect of EDT Surface Texturing on Tribological Behavior of Aluminum Sheet", *Journal of Materials Processing Technology*, Vol. 211(10), pp. 1643-1649, [10.1016/j.jmatprotec.2011.05.004](http://dx.doi.org/10.1016/j.jmatprotec.2011.05.004).
61. Malhotra, R., Bhattacharya, A., Kumar, A., Reddy, N.V. and Cao, J. (2011) "A New Methodology for Multi-Pass Single Point Incremental Forming with Mixed Toolpaths", *Annals of CIRP*, Vol.60/1, pp.323-326, <http://dx.doi.org/10.1016/j.cirp.2011.03.145>
62. Malhotra, R., Reddy, N.V. and Cao, J. (2010) "Automatic Spiral Toolpath Generation for Single Point Incremental Forming", *ASME Journal of Manufacturing and Science Engineering*, Vol. 132(6), 061003, <http://dx.doi.org/10.1115/1.4002544>.
63. Cao, J., Dohda, K., Zhou, R., Makino, T., Futamura, M., (2010) "An Investigation on Bump Formation in Forming of Micro Dimples", *Steel Research International*, 81, No. 9:1160-1165, 81: n/a. doi: 10.1002/srin.201190002.
64. Yang, Mei, Dong, X.H., Zhou, R. and Cao, J. (2010) "Crystal plasticity-based forming limit prediction for FCC materials under non-proportional strain-path", *Materials Science & Engineering A*, Vol. 527, 6607–6613. doi:10.1016/j.msea.2010.06.063

65. Lee, W., Um, M.K., Boisse, P. and Cao, J. (2010) "Numerical study on thermo-stamping of woven fabric composites based on double-dome stretch forming", *International Journal of Material Forming*, Vol. 3(2), 1217-1227. <http://dx.doi.org/10.1007/s12289-009-0668-5>.
66. Sargent, J., Chen, J., Sherwood, J., Cao, J., Boisse, P., Willem, A., Vanclooster, K., Lomov, S.V., Khan, M., Mabrouki, T., Fetfatsidis, K., Jauffrès, D. (2010) "Benchmark study on finite element models for simulating the thermostamping of woven-fabric reinforced composites", *International Journal of Material Forming*, Vol. 3(1), 683-686, DOI 10.1007/s12289-010-0862-5.
67. Meng, F., Zhou, R., Davis, T., Cao, J., Wang, Q., Hua, D., Liu, J., (2010) "Study on Effect of Dimples on Friction of Parallel Surfaces Under Different Sliding Conditions", *Applied Surface Science*, 256, no. 9: 2863-2875, doi:10.1016/j.apsusc.2009.11.041
68. Davis, T. and Cao, J (2010) "Effect of Laser Pulse Overlap on Machined Depth", *Transaction of the North American Manufacturing Research Institution of SME*, Vol. 38, pp. 291-298.
69. Huang, Y., Mahayotsanun, N., Cao, J., Lee, W., Wang, H.P. and Xu, S (2010) "A Framework for Predicting Subtle Surface Distortion in Sheet Metal Flanging", *Transaction of the North American Manufacturing Research Institution of SME*, Vol. 38, 403-410.
70. Zhou, R., Cao, J., Xia, Z.C., Wang, Q. and Alali, I. (2009) "Experimental Analysis of Die Wear in Sheet Metal Forming", *SAE International Journal of Materials and Manufacturing*, Vol.2(1): 465-471.
71. Cao, J., Yuan, W., Pei, Z.J., Davis, T., Cui, Y. and Beltran, M. (2009) "A preliminary study of the effect of surface texture on algae cell attachment for a mechanical-biological energy manufacturing system", *ASME Journal of Manufacturing Science and Engineering*, Vol. 131(6), 064505. <http://dx.doi.org/10.1115/1.4000562>.
72. Cao, J., Zhou, R, Wang, Q., Xia, Z.C., (2009) "Strip-on-cylinder test apparatus for die wear characterization", *Annals of the CIRP*, Vol.58/1, 251-254, <http://dx.doi.org/10.1016/j.cirp.2009.03.098>.
73. Zhang, H., Makino, T., Dohda, K. and Cao, J., (2009) "Production of Small Pin by Micro/Meso-Scale Rotary Forming", *Materials Science Forum*, Vol. 614, pp 105-110.
74. Mahayotsanuna, N., Sahb, S., Cao, J., Peshkin, M., Gao, R. X. and Wang, C.T., (2009) "Tooling-integrated sensing systems for stamping process monitoring", *International Journal of Machine Tools & Manufacture*, Vol. 49, 634-644, DOI: 10.1016/j.ijmachtools.2009.01.009
75. Cao, J., Lee, W. Cheng, H.S., Wang, H. and Chung, K. (2009) "Experimental and Numerical Investigation of Combined Isotropic-kinematic Hardening Behavior", *International Journal of Plasticity*, Vol. 25 (5), pp.942-972, <http://dx.doi.org/10.1016/j.ijplas.2008.04.007>.
76. Cao, J., Akkerman, R., Boisse, P., Chen, J., Cheng, H.S., de Graaf, e.F., Gorczyca, J.L., Hivet, G., Launay, J., Lee, W., Liu, L., Lomov, S.V., de Luycker, E., Morestin, F., Padvoiskis, J., Peng, X.Q., Sherwood, J., Stoilova, T., Tao, X.M., Verpoest, I., Willems, A., Yu, T.X., and Zhu, B., (2008) "Characterization of Mechanical Behavior of Woven Fabrics:

Experimental Methods and Benchmark Results”, *Composite Part A-Applied Science and Manufacturing*, Vol. 39 (6), 2008, 1037-1053. DOI: 10.1016/j.compositesa.2008.02.016.

77. Huang, Y., Cao, J., Smith, S., Woody, B., Ziegert, J. and Li, M.(2008) “Experimental and Numerical Investigation of Forming Limits in Incremental Forming of a Conical Cup”, *Transaction of the North American Manufacturing Research Institution of SME*, Vol. 38, pp.389-396.
78. Boisse, P., Hamila, N., Helenon, F., Hagege, B. and Cao, J. (2008) “Different Approaches for Woven Composite Reinforcement Forming Simulation”, *International Journal of Material Forming*, Vol.1, pp.21 – 29.
79. Chen, W. W., Wang, Q., Wang, F., Keer, L. M., and Cao, J. (2008) "Three-Dimensional Repeated Elasto-Plastic Point Contact, Rolling and Siding," *ASME Journal of Applied Mechanics*, March, Vol.75 (2).
80. Chen, W., W., Liu, Y., Chen, W., Cao, J., Xia, C., and Wang, Q., (2007) "Analysis of Elasto-Plastic Contact with Nominally Flat Surfaces: Average Gap, Contact Area Ratio and Plastic Volume", *Tribology Letters*, Vol. 28 (1), pp. 27-38.
81. Cao, J., Cheng, S.H., Wang, H.P., and Wang, C.T. (2007) “Buckling of Sheet Metals in Contact with Tool Surfaces”, *Annals of the CIRP*, Vol.56/1, pp.253-256.
82. Parasiz, S., Kinsey, B., Krishnan, N., Cao, J. and Li, M. (2007) “Investigation of Deformation Size Effects during Microextrusion”, *ASME Journal Manufacturing Science and Engineering*, Vol. 129, Issue 4, pp. 690-697.
83. Mori, L, Krishnan, N., Cao, J. and Espinosa, H (2007) “Study of the Size Effects and Friction Conditions in Micro-extrusion: Part II—Size Effect in Dynamic Friction for Brass-steel Pairs”, *ASME Journal of Manufacturing Science and Engineering*, Vol. 129, Issue 4, pp. 677-689.
84. Krishnan, N., Cao, J. and Dohda K. (2007) “Study of the Size Effect on Friction Conditions in Micro-extrusion: Part 1 – Micro-Extrusion Experiments and Analysis”, *ASME Journal of Manufacturing Science and Engineering*, Vol. 129, Issue 4, pp. 669-676.
85. Onyancha, R., Kinsey, B.L., Krishnan, N., and Cao, J. (2007) “Development of an Accurate Process Model for Microscale Forward Extrusion”, *Transaction of the North American Manufacturing Research Institution of SME*, Vol. 35, pp. 121-128.
86. Cheng, H.S., Cao, J. and Xia, Z.C. (2007) “An Accelerated Springback Compensation Method”, *International Journal of Mechanical Sciences*, Vol. 49, pp.267-279.
87. Buranathiti, T., Cao, J., Chen, W., Xia, Z.C. (2006) “A Weighted Three-Point-Based Methodology for Variance Estimation”, *Engineering Optimization*, Vol. 38(5), pp. 557 - 576.
88. Buranathiti, T., Cao, J., Baghdasaryan, L, Chen, W., Xia, Z.C. (2006) “Approaches for Model Validation in Simulating Sheet Metal Flanging Processes”, *ASME Journal of Manufacturing Science and Engineering*, Vol. 128, pp. 588-597.
89. Xue, P., Cao, J. and Chen, J. (2005) “Integrated Micro/Macro Mechanical Model of Woven Fabric Composites under Large Deformation”, *Composite Structures*, Vol. 70, pp.69-80.

90. Lu, H., Cheng, H.S., Cao, J. and Liu, W.K. (2005) "Adaptive Enrichment Meshfree Simulation and Experiment on Buckling and Post-buckling Analysis in Sheet Metal Forming," *Computer Methods in Applied Mechanics and Engineering*, Vol. 194, pp.2569 – 2590.
91. Peng, X.Q. and Cao, J. (2005) "A Continuum Mechanics Based Non-orthogonal Constitutive Model for Woven Composites", *Composites: Part A Applied Science and Manufacturing*, Vol. 36(6), pp. 859-874.
92. Xiong, S., Liu, W.K., Cao, J., Li, C.S., Rodrigues, J.M.C. and Martins, P.A.F. (2005) "Simulation of Bulk Metal Forming Processes Using the Reproducing Kernel Particle Method", *Computers & Structures*, Vol. 83, pp. 574 – 587.
93. Cao, J., Krishnan, N., Wang, Z., Lu, H., Liu, W.K., Swanson, A. (2004) "Microforming – Experimental Investigation of the Extrusion Process for Micropins and its Numerical Simulation using RKEM", *ASME Journal of Manufacturing Science and Engineering*, Vol. 126, pp. 642-652.
94. Li, S. and Cao, J. (2004) "A Hybrid Approach for Quantifying the Winding Process and Material Effects on Sheet Coil Deformation", *ASME Journal of Materials Engineering and Technology*, Vol. 126(3), pp.303-313, July.
95. Cheng, H., Cao, J., Yao, H., Liu, S.D., and Kinsey, B.L. (2004) "Wrinkling Behavior of Laminated Steel Sheets", *Journal of Materials Processing Technology*, Vol.151/1-3, pp. 133-140.
96. Chen, W., Baghdasaryan, L, Buranathiti, T., Cao, J., (2004) "Model Validation via Uncertainty Propagation and Data Transformations", *AIAA*, Vol. 42(7), pp.1406-1415.
97. Lu, H., Li, S., Simkins, D.C., Liu, W.K. and Cao, J. (2004) "Reproducing Kernel Element Method, Part III: Generalized Enrichment and Applications", *Computer Methods in Applied Mechanics and Engineering*, Vol. 193, pp.989 – 1011.
98. Liu, W. K., Han, W., Lu, H., Li, S., and Cao, J. (2004) "Reproducing Kernel Element Method, Part I Theoretical Formulation", *Computer Methods in Applied Mechanics and Engineering*, Vol. 193, pp.933 - 951.
99. Kinsey, B., Krishnan, N., and Cao, J. (2004) "A Methodology to Reduce and Quantify Wrinkling in Tailor Welded Blank Forming", *International Journal of Materials and Product Technology*, Vol. 21 (1/2/3), pp. 154 -168.
100. Buranathiti, T., Cao, J. (2004) "An Effective Analytical Model for Springback Prediction in Straight Flanging Processes", *International Journal of Materials & Product Technology*, Vol. 21 (1/2/3), pp.137 – 153.
101. Peng, X.Q., Cao, J., Chen, J., Xue, P., Luisser, D.S. and Liu, L. (2004) "Experimental and numerical analysis on normalization of picture frame tests for composite materials", *Composites Science and Technology*, Vol. 64, pp.11-21.
102. Krishnan, N. and Cao, J. (2003) "Estimation of optimal blank holder force trajectories in segmented binders using an ARMA model", *ASME Journal of Manufacturing Science and Engineering*, Vol. 125(4), pp. 763-771, November.

103. Cao, J., Xue, P., Peng, X.Q. and Krishnan, N (2003) "An approach in modeling the temperature effect in thermo-forming of woven composites", *Composite Structures*, Vol. 61(4), pp.413-420.
104. Kinsey, B.L. and Cao, J (2003) "An analytical model for Tailor Welded Blank forming", *ASME Journal of Manufacturing Science and Engineering*, May, Vol. 125(2), pp.344-351.
105. Viswanathan, V., Kinsey, B.L., and Cao, J., (2003) "Experimental Implementation of Neural Network Springback Control for Sheet Metal Forming", *ASME Journal of Engineering Materials and Technology*, Vol. 125 (2), April, pp.141-147.
106. Xue, P., Peng, X.Q. and Cao, J. (2003) "A Non-orthogonal Constitutive Model for Characterizing Woven Composite", *Composites: Part A*, Vol. 34/2, pp. 183 – 193.
107. Xiong, S., Liu, W.K., Cao, J., Rodrigues J.M.C. and Martins, P.A.F. (2003) "On the Utilisation of the Reproducing Kernel Particle Method for the Numerical Simulation of Plane Strain Rolling", *International Journal of Machine Tools and Manufacture*, Vol. 43(1), pp.89-102.
108. Cao, J., Wang, X., and Mills, F. A. (2002) "Characterization of Sheet Buckling Phenomenon Subjected to Controlled Boundary Constraints", *ASME Journal of Manufacturing Science and Engineering*, August, 2002, Vol. 124, pp.493-501.
109. Peng, X.Q. and Cao, J (2002) "A Dual Homogenization and Finite Element Approach for Material Characterization of Textile Composites ", *Composites Part B*, Vol. 33 (1), pp 45-56.
110. Yao, H. and Cao, J. (2002) "Prediction of Forming Limit Curves Using an Anisotropic Yield Function with Prestrain Induced Backstress", *International Journal of Plasticity*, Vol.18/8, pp.1013-1038.
111. Li, S.P. and Cao, J. (2002) "A Study on the Stress Distribution in Coil Wrapping and its Effect on the Final Coil Deformation", *Transaction of the North American Manufacturing Research Institution of SME*, Vol. 30, pp.95-102.
112. Liu, G., Lin, Z.Q., Cao, J. and Bao, Y.X. (2002) "Eliminating Springback Error in U-shaped Part Forming by Variable Blankholder Force", *Journal of Materials Engineering and Performance*, v 11, n 1, February, 2002, pp. 64-70.
113. Cao, J., Li, Shunping, Xia, Z.C. and Tang, S.C. (2001) "Analysis of an Axisymmetric Deep Drawn Part Forming Using Less Forming Steps", *Journal of Materials Processing Technology*, Vol. 117/1-2, pp. 193-200, November.
114. Chen, J., Lussier, D.S., Cao, J. and Peng, X.Q., (2001) "The Relationship Between Materials Characterization Methods and Material Models for Stamping of Woven Fabric/thermoplastic Composites", *International Journal of Forming Processes*, Vol. 4, Issues 3-4, pp. 269-294.
115. Wang, X. and Cao, J. (2001) "Wrinkling Limit in Tube Bending", *ASME Journal of Engineering Materials and Technology*, Vol.123, pp.430 – 435, October.

116. Song, N., Qian, D., Cao, J., Liu, W., Viswanathan, V. and Li, S.F. (2001) "Effective Models for Prediction of Springback in Flanging", *ASME Journal of Engineering Materials and Technology*, Vol.123, pp.456-461, October.
117. Kinsey, B. and Cao, J. (2001) "Enhancement of Sheet Metal Formability via Local Adaptive Controllers", *Transactions of the North American Manufacturing Research Institution of SME*, Vol. XXIX, pp. 81-88.
118. Wang, X., Cao, J. and Li, M. (2001) "Wrinkling Analysis in Shrink Flanging", *ASME Journal of Manufacturing Science and Engineering*, Vol. 123, pp.426-432, August.
119. Cao, J., Kinsey, B.L., Yao, H., Viswanathan V. and Song, N. (2001) "Next Generation Stamping Dies - Flexibility and Controllability", *Robotics and Computer-Integrated Manufacturing*, Vol.17/1-2, pp.49-56, March.
120. Yao, H and Cao, J. (2001) "Assessment of Corner Failure Depths in the Deep Drawing of 3D Panels Using Simplified 2D Numerical and Analytical Model", *ASME Journal of Manufacturing Science and Engineering*, Vol.123 (2), pp.248-257.
121. Lee, C.H. and Cao, J. (2001) "Shell Formulation of Multi-step Inverse Analysis for the Design of Axisymmetric Deep Drawing Process", *International Journal of Numerical Methods in Engineering*, Vol.50, pp.681-706.
122. Kinsey, B.L., Viswanathan, V., and Cao, J., (2001) "Forming of Aluminum Tailor Welded Blanks", *Journal of Materials & Manufacturing*, Vol. 110, Section 5, pp. 673-679.
123. Cao, J., Yao, H., Karafillis, A. and Boyce, M.C. (2000) "Prediction of Localized Thinning in Sheet Metal Using a General Anisotropic Yield Criterion", *International Journal of Plasticity*, Vol. 16/9, pp.1105-1129, August.
124. Wang, X. and Cao, J., (2000) "On the Prediction of Side-wall Wrinkling in Sheet Metal Forming Processes", *International Journal of Mechanical Science*, Vol. 42/12, pp.2369-2394, July.
125. Kinsey, B. Liu, Z.H. and Cao, J. (2000) "A Novel Forming Technology for Tailor Welded Blanks", *Journal of Materials Processing Technology*, Vol. 99, pp.145-153.
126. Wang, X. and Cao, J. (2000) "An Analytical Model for Predicting Flange Wrinkling in Deep Drawing", *Journal of Manufacturing Processes*, Vol. 2/2, pp.100-107. Also appeared in *Transaction of the North American Manufacturing Research Institution of SME*, Vol.26, 1998, pp.25-30.
127. Cao, J., Kinsey, B. and Solla, S. (2000) "Consistent and Minimal Springback Using a Stepped Binder Force Trajectory and Neural Network Control", *ASME Journal of Engineering Materials and Technology*, Vol.122, pp.113-118, January.
128. Cao, J. and Wang, X. (1999) "An Analytical Model for Plate Wrinkling under Tri-axial Loading and its Application", *International Journal of Mechanical Science*, Vol. 42, No. 3, pp.617-633.

129. Kinsey, B., Liu, Zhihong, and Cao, J. (1999) "New Apparatus and Method for Forming Tailor Welded Blanks", *Journal of Materials & Manufacturing*, Vol. 108, Section 5, pp. 653-660.
130. Yao, H., Kinsey, B. and Cao, J. (1999) "A Simplified 2-D Model for Predicting 3-D Corner Failure in a Square Part", *Journal of Materials & Manufacturing*, Vol. 108, Section 5, pp. 958-966.
131. Yao, H., Kinsey, B. and Cao, J. (1999) "Rapid Design of Corner Restraining Force in Deep Drawn Rectangular Parts", *International Journal of Machine Tools and Manufacture*, Vol. 40, No.1, pp.113-131.
132. Cao, J. (1999) "Prediction of Plastic Wrinkling Using Energy Method", *ASME Journal of Applied Mechanics*, Vol.66, pp.646-652, September.
133. Wang, Xi and Cao, J. (1999) "Stress-based Prediction for the Straight Side-wall Wrinkling in Deep Drawing Processes", *Transaction of the North American Manufacturing Research Institution of SME*, Vol.27, pp.55-60.
134. Ruffini, R. and Cao, J. (1998) "Using Neural Network for Springback Minimization in a Channel Forming Process", *Journal of Materials & Manufacturing*, Vol. 107, Section 5, pp. 65-73.
135. Cao, J. and Boyce, M. (1997) "Wrinkling Behavior of Rectangular Plates under Lateral Constraints", *International Journal of Solids and Structures*. Vol. 34 (2), Section 5, pp.153-176.
136. Cao, J. and Boyce, M. (1997) "A Predictive Tool for Delaying Wrinkling and Tearing Failure in Cup Forming", *ASME Journal of Engineering Materials and Technology*, Vol. 119, October, pp.354-365.
137. Sunseri, M., Cao, J., Karafillis, A.P. and Boyce, M. (1996) "Accommodation of Springback Error in Channel Forming Using Active Binder Force Control: Numerical Simulation and Experiments", *ASME Journal of Engineering Materials and Technology*. Vol.118, July, pp.426-435.
138. Taylor, L., Cao, J., Karafillis, A.P., and Boyce, M.C. (1995) "Numerical Simulations of Sheet Metal Forming", *Journal of Materials Processing Technology*, Vol. 50, pp. 168-179.
139. Jalkh, P., Cao, J., Hardt, D. and Boyce, M. C. (1993) "Optimal Forming of Al 2008-T4 Conical Cups Using Force Trajectory Control", *Journal of Materials & Manufacturing*, Vol.102, Sec. 5, pp.416-427.
140. Cao, J. and Boyce, M. (1993) "Draw Bead Penetration as a Control Element of Material Flow", *Journal of Materials & Manufacturing*, Vol. 102, Sec 5, pp.694-702.

PATENTS

Granted:

1. Cao, J. and Kinsey, B., 'Adaptive Method and Apparatus for Forming Tailor Welded Blank', U.S. Patent No. 5,941,110, August 24, 1999.
2. Cao, J., Lee, J.H. and Peshkin, M., 'Real-time Draw-in Sensors and Methods of Fabrication', U.S. Patent No.6,769,280, August 3, 2004.
3. Cao, J., Swanson, A. and Davis, T. "Microforming Method and Apparatus," US Patent No 8,408,039 B2, April 2, 2013.
4. Smith, K. S., Woody, B., Ziegert, J. and Cao, J. 'Deformation Machining – A Hybrid Process', US Patent No. 8,545,142, Oct. 1, 2013.
5. Roth, J. and Cao, J. "Electrical-assisted Double Side Incremental Forming and Processes Thereof", US Patent No. 8,741,079 B2, June 3, 2014.
6. Cao, J., Zhou, R. and Ehmann, K "Desktop deformation-based micro surface texturing system", US Patent No. 8,905,748 B2, December 9, 2014.
7. Grzina, D. Rajesh, T., Cao, J., Wang, Q., Xia, Z. C., Ling, T.D., Liu, P. "Cutting Tools with Textured Surfaces," US Patent No. 9,144,845, September 29, 2015.
8. Malhotra, R. and Cao, J. "System and Method for Accumulative Double Sided Incremental Forming", US Patent No. 9,168,580, October 27, 2015.
9. Beltran, M., Cao, J. and Roth, J. "Frame Structure & Tool Axis Design for a Double Sided Incremental Forming Center", No. 61/555,951, Nov. 4, 2011 (to be issued).
10. Zeng, Q., Ehmann, K.F. and Cao, J. "Tri-pyramid Robot: a novel 3-DOF translational parallel manipulator", NU2013-068, April 12, 2013, 14/259,815, April 23, 2014 (to be issued).

Pending:

11. Pallav, K., Han, P., Ehmann, K. F., Park, J-K., Ro, S-K., and Cao, J "Surgical Scalpel Blade with Multiple Micro-cutting Edges and Surface Textured Rake Face", provisional patent submitted, Feb. 23, 2011, No. 2011-033.
12. Pallav, K., Han, P., Ehmann, K. F., Park, J-K., Ro, S-K., and Cao, J "Micro-feature based Surface Textured Biopsy Needles", provisional patent submitted, Feb. 23, 2011, No. 2011-032.
13. Pallav, K., Malhotra, R., Saxena, I. Ehmann, K.F. and Cao, J "Laser Induced Plasma Micromachining (LIPMM)", US Patent Application No. 14/681,365, April 8, 2015. Provisional patent application submitted, No. 61/979313 (NU2012-189, January 4, 2013), April 14, 2014.
14. Cao, J., Xu, D.K., Wang, H.P., "Rolling Textures for Adhesion Enhancement", NU2011-145, October 27, 2011.
15. Xia, Z. C., Cao, J., Wang, Q., Rajesh, T., Grzina, D., Ling, T.D., Liu, P. (2012) Forming Tools having Textured Surfaces, Patent application submitted, 13/465587, May 7, 2012.
16. Gao, R.X., Fan, Z. and Cao, J. "Methods and Apparatus for Monitoring Microrolling Processes Using Embedded Sensing", US Patent No. 14/260,680 A1, Sept. 18, 2014.

17. Yao, Y.W., Wang, X., Ulmer, M. and Cao, J. "Stress manipulated coating for figure reshape of light weight optics mirrors", NU2015-054, Patent disclosure submitted, March 30, 2015.

BOOK CHAPTERS

1. Cao, J. and Malhotra, R. (2014) Energy Reduction in Manufacturing via Process Innovation and Surface Modification, in Energy Efficient Manufacturing, Ed. Sutherland, J., *in preparation*.
2. Cao, J. Meador, M., Baba, M.L., Ferreira, P. M., Madou, M., Scacchi, W., Spohrer, R.J., Teague, C., Westmoreland, P., Zhang, X. (2014) Chapter 7: Implications: Societal Collective Outcomes, including Manufacturing, in *Convergence of Knowledge, Technology and Society*, Eds. Roco, M.C.; Bainbridge, W.; Tonn, B.; Whitesides, G., Springer, ISBN 978-3-319-02203-1.
3. Cao, J. and Ehmann, K. (2013) Section editor, Manufacturing Tribology, in *Encyclopedia of Tribology*, Ed. Wang, Q. and Chung, Y.W., Springer, ISBN 978-0-387-92896-8.
4. Cao, J., Chen, J. and Peng, X. (2011) Chapter 13: In-plane shear properties of woven fabric reinforced composites, in "Composite Reinforcements For Optimum Performance" Ed. Boisse, P., Woodhead Publishing Limited, ISBN-13: 978 1 84569 965 9.
5. Peng, X. and Cao, J. (2011) Chapter 8: Continuous models for analyzing the mechanical behavior of reinforcements in composites, in "Composite Reinforcements For Optimum Performance" Ed. Boisse, P., Woodhead Publishing Limited, ISBN-13: 978 1 84569 965 9.
6. Wang, Q., Zhu, D., and Cao, J. (2009) Chapter 26. Tribology and Surface Engineering, Scientific and Technological Bases for Energy Efficiency, in *Intelligent Energy Field Manufacturing and Interdisciplinary Process Innovations*, Ed. Zhang, W., CRC Press.
7. Ehmann, K.F., DeVor, R.E., Kapoor, S.G. and Cao, J. (2008) Chapter: Design and Analysis of Micro/Meso-scale Machine Tools, in *Smart Devices and Machines for Advanced Manufacturing*, Springer-Verlag London.
8. Philippe Boisse, Remko Akkerman, Jian Cao, Julie Chen, Stepan Lomov and Andrew Long, (2007) "Composites Forming" in *Advances in Material Forming (Esaform 10 Years on)*, Springer, ISBN: 978-2-287-72142-7.
9. Cheng, H.S., Cao, J., Mahayotsanun, N. (2007) "Experimental Study on Behavior of Woven Composites in Thermo-stamping under Nonlinear Temperature Trajectories", *Advanced Methods in Material Forming*, ed. Dorel Banabic, Springer, ISBN: 978-3-540-69844-9.
10. Cao, J. (2007), *Preface*, "Micromanufacturing: International Assessment of Research and Development", Springer, ISBN: 1402059485, Ehmann, K. et al.
11. Gorczyca, J., Chen, J. and Cao J. (2007), *Composite Forming Technologies*, Woodhead Publishing Lt., Cambridge, UK., ISBN 1 84569 033 8.
12. Smith, L.M.; Zhang, L.; Wang, C.-T.; Shi, M.F.; Yoon, J.-W.; Stoughton, Th.B.; Cao, J.; Pourboghrat, F. (2005) Numerical Simulation of 3D Sheet Metal Forming Processes, American Institute of Physics, Melville, New York, ISBN: 978-0-7354-0265-2.

13. Cao, J. (2005) *The ASM Handbook (Volume 14) Chapter 16: Bending and Flanging, of Aluminum Sheet*, ASM International, ISBN: 1-892140-03-9.
14. Mahmoud Y. Demeri, Jian Cao and Ravi Venugopal (2005) *The ASM Handbook (Volume 14) Chapter 18: Process and Adaptive Control for Sheet Forming*, ASM International, ISBN:1-892140-03-9.

REFEREED CONFERENCE PUBLICATIONS

1. Wang, X., Yao, Y., Cao, J., Vaynman, S., Graham, M. E., Liu, T., Ulmer, M. P., (2015) "Investigation of magnetically smart films applied to correct the surface profile of light weight X-ray optics in two directions", Proc. SPIE 9603, Optics for EUV, X-Ray, and Gamma-Ray Astronomy VII, 96031O, doi:10.1117/12.2187070
2. Yao, Y., Wang, X., Cao, J., Graham, M. E., Vaynman, S., Grogans, S. E., Cao, Y., and Ulmer, M. P., (2015) "Stress manipulated coating for figure reshape of light weight X-ray telescope mirrors", Proc. SPIE 9603, Optics for EUV, X-Ray, and Gamma-Ray Astronomy VII, 96031J, doi:10.1117/12.2186146
3. Saxena, I., Liu, J., Ehmann, K.F. and Cao, J. "Biprism Interference Micro-Patterning For Periodic Micro-Structure Generation", International Conference on MicroManufacturing, Milan, Italy, March 2015.
4. Giovannini, G., Han, P., Ehmann, F.E. and Cao, J. "Tissue cutting with bio-inspired biopsy punches with serrated edges accompanied by vibrational motions," International Conference on MicroManufacturing, Milan, Italy, March 2015.
5. Xu, J., Abecassis, M., Zhang, Z., Guo, P., Cao, J. and Ehmann, J. "Accuracy Improvement of Nano-fiber Deposition by Near-Field Electro Spinning," International Workshop on Micro-Factory, Hawaii, 2014.
6. Fan, Z., Zou, X., Gao, R., Ng, M.K., Cao, J. and Smith, E.F., "Design and evaluation of an embedded pressure sensor for microrolling process monitoring", *Proceedings of 2014 International Symposium on Flexible Automation*, Awaji-Island, Hyogo, Japan, July, 2014.
7. Ndip-Agbor, E.E., Smith, J., Ren, R., Xu, J., Jiang, Z., Chen, W. and Cao, J. "Optimization of CAD-based Toolpath Generation in Accumulative-DSIF", *Proceedings of ISFA2014 2014 International Symposium on Flexible Automation*, Japan, 2014.
8. Ulmer, M. P., Wang, X., Peter, K., Cao, J., Cao, Y., Karian, T., Grogans, S., Graham, M. E., Vaynman, S. and Yao, Y., "Comparisons of the deflections of magnetically smart films on alloy of NiCo and glass substrates", *Proceedings of SPIE - The International Society for Optical Engineering*. 2014;9208, SPIE conference in San Diego, California.
9. Smith, J., Malhotra R., Liu, W.K., and Cao, J. "Application of a shear-modified GTN model to incremental sheet forming", NUMISHEET 2014: The 9th International Conference and Workshop on Numerical Simulation of 3D Sheet Metal Forming Processes: Part A

Benchmark Problems and Results and Part B General Papers, volume 1567, pages 824-827. AIP Publishing, 2014.

10. Ndip-Agbor, E.E., Smith, J., Xu, R., Malhotra, R. and Cao, J. "Effect of relative tool position on the geometric accuracy of accumulative DSIF", NUMISHEET 2014: The 9th International Conference and Workshop on Numerical Simulation of 3D Sheet Metal Forming Processes: Part A Benchmark Problems and Results and Part B General Papers, volume 1567, pages 828-831. AIP Publishing, 2014.
11. Saxena, I., Ehmann, K., Cao, J. "Productivity Enhancement in Laser Induced Plasma Micro-Machining by Altering Salinity of the Dielectric Media", Proceedings of the International Conference on Micro-Manufacturing 2014, Paper No. 93
12. Ng, M.K., Saxena, I., Ehmann, K.F. and Cao, J., "Improving surface hydrophobic performance by micro-rolling based-texturing", *Proceedings of the 9th International Conference on Micro-Manufacturing*, Singapore, March, 2014.
13. Xu, R., Ren, H., Zhang, Z., Malhotra, R. and Cao, J, "A mixed toolpath strategy for improved geometric accuracy and higher throughput in double-sided incremental forming", MSEC 2014-4127, Proc. ASME 2014 International Manufacturing Science and Engineering Conference, June 9-13, 2014, Detroit, MI, USA.
14. Ng, M.K., Magargee, J., Ehmann, K.F. and Cao, J. (2013) "Microrolling-based Surface Texturing", Conference on Multi-Material Micro Manufacture, San Sebastián, Spain, Oct. 8-10, 2013.
15. Fan, R., Ng, M.K., Xu, D., Hu, P. and Cao, J. (2013) "Experimental and Numerical Study of Electrically-Assisted Micro-Rolling", The 11th International Conference on Numerical Methods in Industrial Forming Processes, Shenyang, China, July 6-10, 2013.
16. Velasquez, T., Han, P., Cao, J. and Ehmann, K. (2013) "Feasibility of laser surface texturing for friction reduction in surgical blades", MSEC2013-1193, 2013 ASME International Manufacturing Science and Engineering Conference, Madison, WI, June 10-14, 2013.
17. Magargee, J., Morestin, F. and Cao, J. (2013) "Characterization of flow stress for commercially pure titanium subjected to electrically-assisted deformation", MSEC2013-1069, 2013 ASME International Manufacturing Science and Engineering Conference, Madison, WI, June 10-14, 2013.
18. Malhotra, R., Saxena, I., Ehmann, K. and Cao, J. (2013) "Line-based laser induced plasma micro-machining (L-LIPMM)", MSEC2013-1153, 2013 ASME International Manufacturing Science and Engineering Conference, Madison, WI, June 10-14, 2013.
19. Fan, Z.Y., Zou, X.Y., Gao, R. X and Cao, J. (2013) "Pressure Reconstruction for Microrolling Process Monitoring", 46th CIRP Conference on Manufacturing Systems 2013, Procedia CIRP 7, pp. 258-263, Setubal, Portugal, May 29-31, 2013.
20. Ng, M.K., Magargee, J., Fan, R., Gao R.X. and Cao, J. (2013) "Surface texturing in titanium alloy by electrically-assisted micro-rolling", Proceedings of the 8th International Conference on Micromanufacturing, Victoria, Canada, March 25-28, 2013.

21. Magargee, J. Morestin, F., Cao, J. and Jones, J.S. (2013) "Micro-scale Mechanical Testing of Non-woven Carbon Nanotube Sheets and Yarns", Proceedings of the 8th International Conference on Micromanufacturing, Victoria, Canada, March 25-28, 2013
22. Xu, D., Malhotra, R., Cao, J, Reddy, N.V., Chen, J. (2012) "Analytical Prediction of Stepped Feature Generation in Multi-Pass Single Point Incremental Forming", 40th NAMRC, June 4-8, 2012, Nortre Dame, IN, U.S.A.
23. Ulmer, M. P., Wang, X., Cao, J., Graham, M. E., and Vaynman, S. (2013) "Update to an application using magnetic smart materials to modify the shape of a x-ray telescope mirror", Proc. SPIE 8861, Optics for EUV, X-Ray, and Gamma-Ray Astronomy VI, 88611R (September 26, 2013); doi:10.1117/12.2024217.
24. Wang, X., Cao, J., Ulmer, M. P., Graham, M. E., Vaynman, S., Savoie, J. and Bellavia, B. (2012) "Comparing theory with experimental data in studying the deformation of magnetically smart films deposited on nickel and glass substrates", Proc. SPIE 8503, Adaptive X-Ray Optics II, 85030D (October 15, 2012); doi:10.1117/12.929350.
25. Ulmer, M.P., Wang, X., Cao, J., Savoie, J., Bellavia, B., Graham, M.E., Vaynman, S. (2012) "Progress report on using magneto-strictive sputtered thin films to modify the shape of a X-ray telescope mirror", Proc. SPIE 8503, Adaptive X-Ray Optics II, 85030C, October 15, 2012; doi:10.1117/12.928454.
26. Wang, X., Ulmer, M.P., Graham, M.E., Vaynman, S., Savoie, J., Hoffmann, L. and Cao, J. (2012) "Deflection for a Magnetostrictive Thin Film Bimorph in a Magnetic Field", 40th NAMRC, June 4-8, 2012, Nortre Dame, IN, U.S.A.
27. Han, P., Kim, J., Ehmann, K. and Cao, J. (2012) "Laser surface texturing of medical needles for friction control", 1st PROMED Conference, Brescia, Italy, May 2-4, 2012.
28. Ng, M.K., Fan, R., Zhou, R., Smith, E, Gao, R. and Cao, J. (2012) "Micro surface-texturing by electrically assisted micro-rolling", Proceedings of the 7th International Conference on Micromanufacturing, Evanston, IL, pp. 259-266.
29. Malhotra, R., Xue, L., Cao, J., Belytschko, T., Smith, K. Scott., Ziegert, J. (2011) "Prediction and Analysis of Fracture in Single Point Incremental Forming using a Damage based Material Model", accepted to Proceeding of the North American Manufacturing Research Conference of SME, Vol. 39, June 13-17, 2011, Oregon State University, Corvallis, Oregon, USA.
30. Malhotra, R., Cao, J., Ren, F., Kiridena, V., Xia, Z.Cedric. (2011) "Improvement of geometric accuracy in Incremental Forming by using a Squeezing Toolpath With Two Forming Tools", accepted to 2011 International Manufacturing Science and Engineering Conference, June 13-17, 2011, Oregon State University, Corvallis, Oregon, USA.
31. Zhou, R., Cao, J, Ehmann, K., Xu, C., (2011), "An investigation on deformation-based micro surface texturing", ASME/SME/JSME Manufacturing Research Conference, Corvallis, OR, June 2011.
32. Ulmer, M.P., Grahama, M.E., Vaynmana, S., Cao, J. and Takacs, P.Z. (2011) "Plan for using magnetically smart materials to shape X-ray optics", SPIE, V. 1, Prague.

33. Zhou, R., Cao, J., Ehmann, K., Chuang, Y., Lee, A., Wu, C., Huang, K, (2011) "A novel desktop deformation based micro surface texturing system", *6th International Conference on Micromanufacturing*, Tokyo, Japan, March 2011.
34. Ulmer, M.P., Grahama, M.E., Vaynmana, S., Cao, J. and Takacs, P.Z. (2010) "Magnetic smart material application to adaptive X-ray optics", *SPIE*, 7803 - 8 V. 1.
35. Malhotra, R., Huang, Y., Xue, L., Cao, J., Belytschko, T. (2010) "An Investigation on the Accuracy of Numerical Simulations for Single Point Incremental Forming with Continuum Elements." , *Proceedings of the 10th International Conference on Numerical Methods in Industrial Forming Processes*, June 13-17, 2010, Pohang, Korea, AIP Conference Proceedings, 1252, pp/221-227.
36. Malhotra, R., , Xue, L., Cao, J. (2010) "Fracture Based Formability Prediction in Incremental Forming", *Proceedings of the ASME 2010 International Manufacturing Science and Engineering Conference*, October 12-15, 2010, Erie, PA, USA.
37. Mahayotsanun, N., Cheng, T.J., Chuang, Y., Tu, K.Y., Lee, H.C., Ehmann, K., and Cao, J. (2010) "Effects of Grain Size and Strain Rate in Micro-Extrusion", *Proceedings of the 2010 International Conference of Micromanufacturing*, Madison, WI, April 2010.
38. Mahayotsanuna, N., Lee, H.C., Cheng, T.J., Chuang, Y., Tu, K.Y., Beltran, M., Ehmann, K and Cao, J (2010) "Development of the micro-exstrusion machine to study the grain size and strain rate effects in the micro-extrusion process", *International Symposium on Flexible Automation*, Tokyo, Japan, July 2010.
39. Mahayotsanuna, N., Lee, H.C., Cheng, T.J., Chuang, Y., Tu, K.Y., Ehmann, K and Cao, J. (2009) "Development of the high-speed micro-extrusion machine to investigate strain rate and size effects", *4M/ICOMM 2009*, Karlsruhe, Germany.
40. Wang, Yongjun, Wu, Weichao, Huang, Ying, Reddy, N.V. and Cao, J. (2009) "Experimental and Numerical Analysis of Double Sided Incremental Forming", *Proceedings of the 2009 International Manufacturing Science and Engineering Conference, MSEC2009*, October 5-8, 2009, West Lafayette, IN, USA.
41. Meng, F., Zhou, R., Davis, T., Wang, Q., Cao, J., Hua, D., and Liu, J. (2009) "Numerical Study of Effect of Initial Clearance Between Lubricated Laser-Textured Parallel Surfaces on Friction", *Society of Tribologists and Lubrication Engineers Annual Meeting*, May 17-21, 2009, Lake Buena Vista, FL.
42. Zhou, R., Cao, J., Xia, Z. C. , Wang, Q. and Alali, I., (2009) "Experimental Analysis of Die Wear in Sheet Metal Forming", [*Society of Automotive Engineers World Congress*](#), April 20-23, 2009, Detroit, MI.
43. Wang, Y., Huang, Y., Cao, J. and Reddy, N.V. (2008) "Experimental Study on a New Method of Double Side Incremental Forming", *Proceedings of the 2008 International Manufacturing Science and Engineering Conference, MSEC2008*, October 7-10, 2008, Evanston, Illinois, USA.

44. Huang, Y., Cao, J., Smith, S., Woody, B., Ziegert, J. and Li, M. (2008) "Studies of Size Effect on the Formability of a Domed Part in Incremental Forming", Proceedings of the 2008 International Manufacturing Science and Engineering Conference, MSEC2008, October 7-10, 2008, Evanston, Illinois, USA.
45. Malhotra, R., Reddy, N.V. and Cao, J. (2008) "A Generic Tool Path Generation Methodology for Incremental Forming", Proceedings of the 2008 International Manufacturing Science and Engineering Conference, MSEC2008, October 7-10, 2008, Evanston, Illinois, USA.
46. Davis, T., Zhou, R., Pallav, K., Beltran, M., Cao, J., Ehmann, K., Wang, Q. J., Xia, Z. C., Talwar, R. and Lederich, R. (2008) "Experimental friction study of micro-scale laser-textured surfaces," International Workshop on Microfactories 2008, Oct. 5-7, 2008, Evanston, IL.
47. Cao, J., Huang, Y., Reddy, N.V., Malhotra, R. and Wang, Y. (2008) "Incremental Sheet Metal Forming: Advances and Challenges", International Conference on Technology of Plasticity, Gyeongju, Korea, pp. 1967-1982, ISBN: 978-89-5708-152-5.
48. Beltran, M., Huang, Y., Zhou, R. and Cao, J. (2008) "Microchannel Fabrication using Micro-Incremental Forming in Thin Stainless Steel Sheet", 3rd *International Conference on Micromanufacturing*, September, 2008, Pittsburgh, PA.
49. Cao, J., Lee, W., Cheng, H.S., Wang, H.P. and Chung, K. (2008) "Experimental and Numerical Investigation of Combined Isotropic-kinematic Hardening Behavior", in *Mechanics and Mechanisms of Finite Plastic Deformation*, edited by A.S. Khan and B. Farrokh, Proceedings of PLASTICITY '08: The 14th International Symposium on Plasticity and its Current Applications in Kailua-Kona, Hawaii, U.S.A., Jan. 3-8, 2008, Neat Press, Fulton, Maryland, 2008, pp.109-111.
50. Lee, W., Cao, J., Badel, P. and Boiss, P. (2008) "Non-orthogonal Constitutive Model for Woven Composites with Considering Tensile Effect on Shear Behavior", in The 11th ESAFORM Conference on Material Forming, Proceedings of ESAFORM 2008 in Lyon, France, Apr. 23-25, 2008, pp.327-330.
51. Lee, W., Padvoiskis, J., Cao, J., de Luycker, E., Boisse, P., Morestin, F., Chen, J. and Sherwood, J. (2008) "Bias-extension of woven composite fabrics", in The 11th ESAFORM Conference on Material Forming, Proceedings of ESAFORM 2008 in Lyon, France, pp.331-334.
52. Wang, H-P., Xu, S., Cao, J., Chen, W. and Cheng, H.S. (2008) "A Study on a Surface Distortion Predictor for Sheet Metals: validation in Yoshida Buckling Problems", in 2008 NUMISHEET.
53. Parasiz, S.A., Kinsey, B., Krishnan, N. and Cao, J. (2007) "Characterization and Investigation of Deformation during Microextrusion using X-ray Texture Analysis", *ASME International Manufacturing Science and Engineering Conference*, Atlanta, Georgia.
54. Huang, Y., Wang, Y.J., Cao, J. and Li, M. (2007) "Prediction of Forming limit in Single Point Incremental Forming with the Ductile Fracture Criterion," *ASME International Manufacturing Science and Engineering Conference*, Atlanta, Georgia.

55. Davis, T., Cao, J., Chen, W., Wang, Q., Xia, C., Talwar, R. and Lederich, R. (2007) "Effect of Micro Manufacturing Processes on Surface Behavior," *ASME International Manufacturing Science and Engineering Conference*, Atlanta, Georgia.
56. Mahayotsanu, N, Krishnan, N., Cao, J. and Ehmann, K. (2007) "Study of Strain Rates and Size Effects in the Microextrusion Process: Part I - Development of a Microextrusion Machine," *2nd International Conference on Micromanufacturing*, Clemson, South Carolina.
57. Parasiz, S.A., Kinsey, B., Mahayotsanun, N. and Cao, J. (2007) "Dependence of Deformation on Grain Size and Sample Size in Microextrusion," *2nd International Conference on Micromanufacturing*, Clemson, South Carolina.
58. Mahayotsanu, N, Cao, J., Sah, S., Gao, R., and Wang, C.T., (2007) "Integrated Sensing System for Stamping Monitoring and Control," *IEEE SENSORS 2007*, Atlanta, Georgia.
59. Lee, W., Cao, J., Chen, J. and Sherwood, J.A. (2007) "Numerical Analysis on Double Dome Stretching Tests of Woven Composites", *ESAFORM Conference*, Zaragoza, Spain, ISBN: 978-0-7354-0414-4, pp. 1052-1057.
60. Cheng, H.S., Lee, W., Cao, J., Seniw, M. and Wang, H.P. and Chung, K.S. (2007) "Experimental and Numerical Investigation of Kinematic Hardening Behavior in Sheet Metals", *ESAFORM Conference*, Zaragoza, Spain, ISBN: 978-0-7354-0414-4, pp.337 – 342.
61. Gamache, L., Sherwood, J.A., Chen, J. and Cao, J. (2007) "Characterization of the Fabric/Tool and Fabric/Fabric Friction during the Thermoforming Process", *ESAFORM Conference*, Zaragoza, Spain, ISBN: 978-0-7354-0414-4, pp. 1068-1073.
62. Cheng, H. S., Cao, J. and Wang, H.P. (2006) "Experimental and Numerical Analysis of the Buckling and Post-buckling Phenomena in the Yoshida Test", *ASME International Conference on Manufacturing Science and Engineering*, Ypsilanti, Michigan, 2006.
63. Cao, J., Krishnan, N, Mori, L. and Espinosa H.D. (2006) "Experimental Investigation of the Size Effects Observed in the Extrusion of Micropins", *1st International Conference on Micromanufacturing*, Urbana, Illinois, 2006.
64. Mahayotsanun, N., Cao, J. and Peshkin, M. (2006) "Characterization of a Draw-in Sensor Built on the Principle of Mutual Inductance", *International Symposium on Flexible Automation*, Osaka, Japan.
65. Liu, L, Chen, J., Zhu, B., Yu, T.X., Tao, X.M., and Cao, J. (2006) "The Yarn-to-Yarn Friction of Woven Fabric", *ESAFORM 2006*, Glasgow, U.K.
66. Buranathiti, T., Cao, J., Xia, Z.C. and Chen, W. (2005) "Probabilistic Design in a Sheet Metal Stamping Process under Failure Analysis", *NUMISHEET*, Detroit, MI.
67. Mahayotsanun, N., Cao, J. and Peshkin, M. (2005) "A Draw-In Sensor for Process Control and Optimization", *NUMISHEET*, Detroit, MI.
68. Krishnan, N., Cao, J., Kinsey, B., Parasiz, S.A. and Li, M. (2005) "Investigation of Deformation Characteristics of Micropins Fabricated Using Microextrusion", *IMECE 2005*, Orlando, FL.

69. Krishnan, N., Cao, J. and Dohda, K. (2005) "Microforming: Study of Friction Conditions and the Impact of Low Friction/High Strength Die Coatings on the Extrusion of Micropins", *IMECE 2005*, Orlando, FL.
70. Hang Shawn Cheng, Jian Cao, Numpon Mahayotsanun (2005) "Experimental Study on Woven Composites with Different Temperature Trajectories", *ESAFORM Conference*, April, 2005.
71. Krishnan, N., Cao, J., Ehmann, K. F. and Owusu-Ofori, S. (2004) "Microforming: Study of grain size and friction effects in the extrusion of micropins", *4th International Workshop on Microfactories*, Shanghai, China, October 15-17, 2004.
72. Krishnan, N. and Cao, J. (2004) "Experimental Investigation and Comparison of Variable Blank-holder Force Trajectories Using an ARMA Model", *JUSFA 2004*, July 19-21, Denver, Colorado.
73. Liu, W.K., Cao, J. Lu, H.S. and Krishnan, N. (2004) "A Multi-scale Simulation of Microforming Process Using RKEM", *NUMIFORM 2004*, June 13-17, Columbus, OH.
74. Sahai, A., Schramm, U., Buranathiti, T., Chen, W., Cao, J. and Xia, Z.C. (2004) "Sequential Optimization and Reliability Assessment Method for Metal Forming Processes", *NUMIFORM 2004*, June 13-17, Columbus, OH.
75. Cao, J., Cheng, H.S. and Peng, X.Q. (2004) "Experimental Verification for a Non-orthogonal Constitutive Model for Woven Composites", *ESAFORM Conference*, April, 2004.
76. Cao, J. and Cheng, H.S. (2004) "An Accelerated Method for Springback Compensation", *ESAFORM Conference*, April, 2004.
77. J. Cao, H.S. Cheng, T.X. Yu, B. Zhu, X.M. Tao, S.V. Lomov, Tz. Stoilova, I. Verpoest, P. Boisse, J. Launay, G. Hivet, L. Liu, J. Chen, E.F. de Graaf and R. Akkerman (2004) "A Cooperative Benchmark Effort on Testing of Woven Composites", *ESAFORM Conference*, April, 2004, p.305.
78. Cao, Peng, X.Q., Cao, J., Chen, J. (2003) "Stamping Simulation of Woven Composites Using a Non-orthogonal Constitutive Model", *ESAFORM Conference on Material Forming*, Italy.
79. Cheng, H.S., Lu, H., Cao, J. and Liu, W.K. (2003) "Characterization of Wrinkling: Experiments and Simulations", *ESAFORM Conference on Material Forming*, Italy.
80. Krishnan, N., Cao, J., (2002) "Estimation of Optimal Blank Holder Force Trajectories in Segmented Binders Using an ARMA Model", *Proceedings of the JSME/ASME Conference on Materials and Processing*, Oct 15-18, 2002-Honolulu, Hawaii.
81. Peng, X.Q., Xue, P., Cao, J., Lussier, D. and Chen, J. (2002) "Normalization in the Picture Frame Test of Woven Composites: Length or Area?", *ESAFORM Conference on Material Forming*, Krakow, Poland.
82. Baghdasaryan, L., Chen, W., Buranathiti, T. and Cao, J. (2002) "Model Validation via Uncertainty Propagation using Response Surface Models", *2002 ASME Design Engineering Technical Conferences*, Montreal, Canada.

83. Buranathiti, T. and Cao, J., Baghdasaryan, L., Chen, W., (2002) "An Approach for Model Validation in Simulating Sheet Metal Forming Processes", *International Conference on Frontiers of Design and Manufacturing*, Dalian, China
84. Krishnan, N and Cao, J. (2002) "Real-time Calculation of Optimal Blank-holder Force History in Sheet Metal Forming Using an ARMA Model", *2002 Japan US Symposium on Flexible Automation*, Hiroshima, Japan.
85. Li, S.P. and Cao, J (2001) "Enhancement of Coil Stiffness Using a Cardboard Core", *2001 International Mechanical Engineering Congress and Exposition*, New York, NY.
86. Peng, X.Q. and Cao, J. (2001) "Sensitivity Study on Material Characterization of Textile Composite", *the First M.I.T. Conference on Computational Fluid and Solid Mechanics*, Cambridge, Massachusetts, June 12 - 14, 2001.
87. Kinsey, B.L. and Cao, J. (2001) "Numerical Simulation and Experimental Implementation of Tailor Welded Blank Forming", *Second Global Conference on Processing & Manufacturing of Sheet Metals, 2001 TMS Annual Meeting*, New Orleans, Louisiana, February 11-15,2001.
88. Peng, X.Q., Lussier, D., Cao, J. and Chen, J. (2001) "Material Behavior Characterization of Textile Composite Sheets: Experiments and Simulation", *Second Global Conference on Processing & Manufacturing of Sheet Metals, 2001 TMS Annual Meeting*, New Orleans, Louisiana, February 11-15,2001.
89. Song, N., Qian, D., Cao, J., Liu, W., Viswanathan, V. and Li, S.F. (2000) "Effective Models for Prediction of Springback in Flanging", *Symposium on Advances in Metal Forming*, American Society of Mechanical Engineers, Orlando, Florida.
90. Peng, X.Q. and Cao, J. (2000) "Numerical Determination of Mechanical Elastic Constants of Textile Composites", *15th Annual Technical Conference of the American Society for Composites*, College Station, Texas, Sept. 25-27, 2000.
91. Lee, L.H., Cao, J., Xia, Z.C. and Tang, S.C. (2000) "Reduction of Forming Steps of an Axisymmetric Multi-step Drawing Problem via Numerical Modeling", *2000 Society of Automotive Engineers International Congress & Exposition*, Detroit, MI.
92. Cao, J., Kinsey, B.L., Song, N. and Yao, H. (2000) "Next Generation Stamping Dies - Flexibility and Controllability", *International Conference of Flexible Automation & Intelligent Manufacturing*, College Park, Maryland.
93. Kinsey, B., Song, N., and Cao, J. (1999) "Analysis of Clamping Mechanism for Tailor Welded Blank Forming", *1999 International Body Engineering Conference*, paper No. 99IBECC_26, Detroit, MI.
94. Cao, J., Liu, Zhihong, Liu, W.K. (1999) "Prediction of Springback in Straight Flanging", *Symposium on Advances in Sheet Metal Forming, 1999 ASME IMECE Winter Conference*.
95. Cao, J., Karafillis, A. and Ostrowski, M. "Prediction of Flange Wrinkles in Deep Drawing", *Advanced Methods in Materials Processing Defects*, ed. Predeleanu and P.Gilormini, 1997.
96. Cao, J., Karafillis, A. and Boyce, M. "Prediction of Forming Limit Diagram using KB yield Criterion", *International Symposium on Plasticity and its Current Applications*, 1997.

97. Kinsey, B. and Cao, J. "An Experimental Study to Determine the Feasibility of Implementing Process Control to Reduce Part Variation in a Stamping Plant", 1997 *Society of Automotive Engineers International Congress & Exposition*, Detroit, MI.
98. Cao, J. and Boyce, M., "Design and Control of Forming Parameters Using Finite Element Analysis", *Symposium on Computational Material Modeling*, American Society of Mechanical Engineers, Chicago, IL. 1994, pp.265.
99. Sunseri, M., Karafillis, A., Cao, J. and Boyce, M., "Methods to Obtain the Net Shape in Aluminum Sheet Forming Using Active Binder Force Control", *Symposium on Mechanics of Materials Processing and Manufacturing*, 1994. ASME, Chicago, IL.
100. Cao, J., Bakkestuen, R., Jalkh, P., Boyce, M. and Hardt, D., "Improvement of Forming Height and Stability of Aluminum Parts Using Active Binder Control", *International Deep Drawing Conference*, 1994, Lisboa, Portugal.

NON-REFEREED CONFERENCE PUBLICATIONS

101. Cao, J. Malhotra, R., Beltran, M.J, Reddy, N.V. (2011) "Incremental Forming at Multi-Scales", Proceedings of 2011 NSF Engineering Research and Innovation Conference, Atlanta, Georgia, Jan. 4-7, 2011.
102. Magargee, J., McHugh, M. Cao, J. and Brink, D.D. (2011) "Evaluating the Tensile and Compressive Behavior of Thin Metal Sheets Using a Transparent Micro-Wedge Device", Proceedings of 2011 NSF Engineering Research and Innovation Conference, Atlanta, Georgia, Jan. 4-7, 2011.
103. Cao, J., Dohda, K., Zhou, R., Makino, T. and Futamura, M. (2010) "An Investigation on Bump Formation in Forming of Micro Dimples", Metal Forming 2010, Toyohashi, Japan, September 19-22, 2010, pp.1160-1164.
104. Cao, J and Malhotra, R. (2009) "Incremental Forming at Multi-Scales", Proceedings of 2009 NSF Engineering Research and Innovation Conference, Honolulu, Hawaii, June 22-25, 2009.
105. Cao, J., Peshkin, M., Mahayotsanun, N., Gao, R.X., Sah, S. and Wang, Chuan-tao (2009) "Tooling-Integrated Draw-In and Pressure Sensing for Stamping Process Monitoring", Proceedings of 2009 NSF Engineering Research and Innovation Conference, Honolulu, Hawaii, June 22-25, 2009.
106. Smith, S., Woody, B., Cao, J., Belytschko, T., Malhotra, R., Huang, Y., Ziegert, J., Gnäupel-Herold, T. and Foecke, T. (2009) "Deformation Machining – A New Hybrid Process", Proceedings of 2009 NSF Engineering Research and Innovation Conference, Honolulu, Hawaii, June 22-25, 2009.
107. Huang, Y., Beltran, M. and Cao, J. (2008) "Experimental and Numerical Investigation of Forming Limits in Single Point Incremental Forming of a V-Shape Groove", Proceedings of the 8th International Conference on Frontiers of Design and Manufacturing, September 23~26, 2008, Tianjin, China.

108. Cao, J., Lee, W., Huang, Y., Wang, H-P (2008) "Numerical and experimental Analysis of Subtle Surface Distortion in Sheet Metal Forming", in The 8th World Congress on Computational Mechanics/The 5th European Congress on Computational Methods in Applied Sciences and Engineering, edited by B.A. Schrefler and U. Perego, Proceedings of WCCM8 and ECCOMAS2008, in Venice, Italy, Jun. 30-Jul. 4, International Center for Numerical Methods in Engineering (CIMNE), Barcelona, Spain, 2008 pp. 228.
109. Cao, J., Lee, W. and Padvoiskis, J. (2008) "Characterization of Material Deformation Behavior of Woven Composites", in 2008 NSF Engineering Research and Innovation Conference in Knoxville, Tennessee, U.S.A., Jan. 7-10, 2008.
110. Cao, J., Peshkin, M. and Mahayotsanun, N., Gao, R.X., Sah, S. and Wang, C.T. (2008) "Integrated Sensing for Stamping Process Monitoring and Control", in 2008 NSF Engineering Research and Innovation Conference in Knoxville, Tennessee, U.S.A., Jan. 7-10, 2008.
111. Kinsey, B.L., Onyancha, R.M., Parasiz, S.A., Krishnan, N., Cao, J., Ehmann, K., Liu, W.K., Espinosa, H. and Li, M. (2008) "Microforming Processes – Fundamental Studies and Developments", in 2008 NSF Engineering Research and Innovation Conference in Knoxville, Tennessee, U.S.A., Jan. 7-10, 2008.
112. Lee, W. and Cao, J. (2007) "Characterization of Woven Composites Forming from Macro to Micro", International Conference on Intelligent Textiles 2007 in Seoul National University, Seoul, South Korea, Nov. 11-13, 2007.
113. Lee, W. and Cao, J. (2007) "Non-orthogonal constitutive law with considering the tensile effect on the shear modulus", 2007 NSF Grantee Conference on International Research and Education in Engineering in Purdue University, Indiana, U.S.A., Oct.30-Nov.1, 2007.
114. Sherwood, J. A. and Cao, J. (2006) "Collaborative Research: Enhancing the Understanding of the Fundamental Mechanisms of Thermostamping Woven Composites to Develop a Comprehensive Design Tool", *National Science Foundation DMII Grantee Conference*, St. Louis, MO.
115. Cao, J. and Krishnan, N. (2006) "Experimental Study of Friction Behavior in Micropin Extrusion", *International Conference of Frontiers in Design and Manufacturing*, Guangzhou, China.
116. Cao, J. and Krishnan, N. (2005) "Recent Advances in Microforming: Science, Technology and Applications", *TMS*, Pittsburg, PA.
117. Buranathiti, T. and Cao, J. (2005) "Benchmark Simulation Results: Automotive Deck Lid Inner Panel (Benchmark 1)", *NumiSheet 2005*, Detroit, MI.
118. Buranathiti, T. and Cao, J. (2005) "Numisheet 2005 Benchmark Analysis on Forming of an Automotive Deck Lid Inner Panel (Benchmark 1)", *NumiSheet 2005*, Detroit, MI.

119. Buranathiti, T. and Cao, J. (2005) "Benchmark Simulation Results: Automotive Underbody Cross Member (Benchmark 2)", *NumiSheet 2005*, Detroit, MI.
120. Buranathiti, T. and Cao, J. (2005) "Numisheet 2005 Benchmark Analysis on Forming of an Automotive Underbody Cross Member (Benchmark 2)", *NumiSheet 2005*, Detroit, MI.
121. Buranathiti, T. and Cao, J. (2005) "Benchmark Simulation Results: Channel Draw/Cylindrical Cup 2-Stage Test (Benchmark 3)", *NumiSheet 2005*, Detroit, MI.
122. Liu, W.K., Cao, J. Cheng, H.S., Lu, H. (2004) "Founding of New Numerical Tool (RKEM) and Advancement of Experimental Setup", *2004 National Science Foundation DMII Grantee Conference*, January, Dallas, TX.
123. Jian Cao, Wing Kam Liu, Hang Shawn Cheng, Hongsheng Lu (2003) "A Multi-Scale Approach for Predicting Wrinkling and its Experimental Verification ", *2003 National Science Foundation DMII Grantee Conference*, Birmingham, Alabama.
124. Jian Cao, Julie Chen, Samuel Chow, Darin Lussier, Xiongqi Peng, Xue Pu (2003), "Characterization in Stamping of Woven Composites", *2003 National Science Foundation DMIII Grantee Conference*, Birmingham, Alabama.
125. Cao, J. (2002) "Springback Prediction in Straight Flanging", *2002 Plasticity Conference*, Aruba, Netherland.
126. Cao, J. and Wang, X. (2001) "Experimental Study on Sheet Wrinkling Behavior and its Analysis", *2001 National Science Foundation DMII Grantee Conference*, Florida.
127. Cao, J., Kinsey, B.L., and Song, N. (2001) "Experimental Implementation of the Novel Forming Process", *2001 National Science Foundation DMII Grantee Conference*, Florida.
128. Chen, J., Bulusu, A., Cao, J. and Peng, X. (2001) "Intelligent Material and Process Design for Stamping of Structural Composites: Modeling and Comparisons", *2001 National Science Foundation DMII Grantee Conference*, Gainesville, Florida.
129. Cao, J. and Wang, X. (2000) "A Stress Based Wrinkling Criterion", *2000 National Science Foundation DMII Grantee Conference*, Vancouver, Canada.
130. Cao, J., Kinsey, B.L., and Song, N. (2000) "Enhance the Formability of Sheet Metal via Smart Tooling", *2000 National Science Foundation DMII Grantee Conference*, Vancouver, Canada.
131. Chen, J., Bulusu, A., Cao, J. and Peng, X. (2000) "Intelligent Material and Process Design for Stamping of Structural Composites: Fabric Modeling", *2000 National Science Foundation DMII Grantee Conference*, Vancouver, Canada.
132. Peng, X.Q. and Cao, J. (1999) "Material Characterization in Forming Structural Composites", *ME100, Polytechnic University, NY*.
133. Chen J., Sherwood, J, and Cao, J. (1999) "High Volume Manufacturing of Structural Composites", *Tsai Symposium on Composites for the Next Millennium*, July 2-3, 1999, Tours, France.

ADDITIONAL CONFERENCE/WORKSHOP PRESENTATIONS

Referred and non-referred conference papers were presented at the corresponding conferences either by Jian Cao or by her students. In addition to those presentations, the following presentations were made by Jian Cao:

134. Predictive Science Based Design for Advanced Metal Forming, January 25, 2013, STC-F, CIRP January meeting, Paris.
135. Combined Isotropic-kinematic Hardening Behaviour in Sheet Metal Forming Processes & Failure in Incremental Forming, August 24, 2012, General Assembly, Part II.
136. Numerical Simulation of Incremental Forming, 2010, CIRP January meeting, Paris.
137. Effect of Surface Texture on Algae Growth, 2009, CIRP General Assembly Part II, Boston.
138. A New Experimental Apparatus for Measuring the Kinematic Hardening Behavior in Sheet Metals, 2007, CIRP January Meeting.
139. Draw-in Sensor for Real-time Measurement/Control in Sheet Metal Forming, 2006, *North American Deep Drawing Group Research Conference*.
140. CAREER Program Development, 2005, *TMS*.
141. Manufacturing Processes Research on Metals, 2004, *Interagency Meeting on Metal Research*.
142. The US National Science Foundation's Investment in Manufacturing, 2004, *China Natural Science Foundation*.
143. Intelligent Manufacturing and Maintenance System, 2004, *Manufacturing Frontier Conference*.
144. From the Nano Tech Lab to the Manufacturing Industry: The NSF Initiative, 2004, *Indo-US Advanced Manufacturing Forum*.
145. Opportunities and Challenges in Micro-forming, 2004, *Indo-US Advanced Manufacturing Forum*.
146. Current Funded Projects & Future Directions in Manufacturing Processes Research, 2003, *Interagency Meeting on Metal Research*.
147. Life Beyond the Ph.D., 2003, *National Science Foundation Division of Design, Manufacturing and Industrial Innovation Grantee Conference*.
148. Research Opportunities in Green Engineering: Bridging Design and Manufacturing, 2003, *Society of Women Engineers Conference*.
149. Engineering Applications of Newly Proposed Reproducing Kernel Element Method, 2003, *International Congress of Applied Mathematics*.

150. A Multi-Scale Meshfree Approach for Predicting Wrinkling and Experimental Verification, 2003, *US Congress of Computational Mechanics*.
151. Process Control: Hardware and Software, 2002, *North American Deep Drawing Group Research Conference*.
152. Instability Analysis – Wrinkling, 2001, *North American Deep Drawing Group Research Conference*.
153. Wrinkling Prediction in Numerical Simulations, 1999, *US Congress of Computational Mechanics*.
154. Springback in Flanging Operation, 1999, *North American Deep Drawing Group Research Conference*.

INVITED PRESENTATIONS

1. Invited Speaker, Advanced Manufacturing – Current Challenge in Computing Conference, March 29 – 31, 2016, Napa, CA.
2. Invited Speaker, Generis American Manufacturing Summit, February 29 – March 1, 2016, Chicago, Illinois, <http://manufacturing.generisgp.com/summit/speakers>
3. Invited Seminar, Integration of Innovative Manufacturing Processes, Mechanics and Materials Design for Energy-efficient Distributed Manufacturing, December 15, 2015, University of Michigan, Ann Arbor.
4. Keynote, Digital Manufacturing, 12th Conference on Advanced Molding and Materials Processing, November 20, 2015, Nansha, China
5. Keynote, Cope with Uncertainties in Sheet Metal Forming Processes – Classification and Methodologies, 2nd Int. Conf on Uncertainty in Mechanical Engineering, Nov. 19, 2015, Darmstadt, Germany.
6. Keynote, Advances in Modeling of Manufacturing Process, Society of Engineering Science Annual Technical Conference, Oct. 28 – 30, 2015, College Station, TX.
7. Invited Talk, Additive Manufacturing, NAS workshop, Oct. 7-9, 2015, Washington, D.C.
8. Invited Talk, “Digital Manufacturing for Flexibility and Energy Efficiency”, DMDII Summer Institute on Sustainability and Energy, August 10, 2015, Chicago, IL.
9. Invited Talk, “Coupling Manufacturing, Mechanics and Materials Design in Additive Manufacturing”, NSF Workshop on Multiscale/3D Printing Cement, July 16-17, Nashville, TN.
10. Plenary Talk, “Flexible Energy Efficient Sheet Metal Forming”, International Deep Drawing Research Group 2015 Conference, Shanghai, China, June 1, 2015.

11. Invited Panelist, Advanced Manufacturing Workshop, University of Pennsylvania, May 21, 2015.
12. Department Seminar Speaker, Mechanical & Industrial Engineering, University of Iowa, May 7, 2015.
13. Invited Talk, "Opportunities and Challenges in Rapid Flexible Manufacturing", U.S. National Committee for Theoretical and Applied Mechanics, The National Academies, May 1, 2015.
14. Invited Seminar, "Challenges and Opportunities in Linking Materials, Processes and Performance", NIST, April 30, 2015.
15. Invited Speaker, Generis American Manufacturing Summit, March 10-11, 2015, Chicago, Illinois, <http://manufacturing.generisgp.com/summit/speakers>.
16. Panelist, "Reaping the Benefits of Corporate Sponsored Research: A Panel Discussion by McCormick Faculty", Northwestern University, Jan. 22, 2015.
17. Invited Lecturer "Flexible Energy-Efficient Manufacturing", Hong Kong Productivity Council, Oct. 13, 2014.
18. Plenary Talk, "Rapid Manufacturing Processes for Enhancing Energy Efficiency", International Conference on Advanced Aerospace Manufacturing, May 22-23, 2014, Shanghai, China.
19. Invited Department Seminar, Materials Science and Engineering, Carnegie Mellon, April 25, 2014.
20. Curie Lecture, University of Florida, Gainesville, February 18, 2014.
21. Plenary Talk "Microforming", 2013 International Conference on Multi-Material Micro-Manufacture (4M2013), 8-10 October 2013, San Sebastian, Spain.
22. Keynote Talk, "Metal forming proc16th International Conference on Advances in Materials & Processing Technologies (AMPT 2013), Sept. 22 – 26, 2013, Taiwan.
23. Invited Talk "Eletroplasticity – Yes or No", University of Ulsan, May 4, 2013, Ulsan, South Korea
24. Invited Talk "Manufacturing Aspects in Systems Engineering for Clean and Renewable Energy Manufacturing", National Science Foundation, March 14, 2013, Arlington, VA.
25. Invited Talk "Converging Knowledge and Technologies for Societal Benefit - Implications: Societal collective outcomes, including manufacturing", National Science Foundation, December 11, 2012, Arlington, VA.
26. Invited Seminar, "Material Design and Manufacturing", Schlumberger, November 12, 2012, Houston, TX.
27. Keynote Talk "Small Features for Large Saving", ISGMA 2012 International Symposium on Green Manufacturing and Applications, August 25-27, 2012, Jeju, Korea.

28. Invited Talk “Transforming the Landscape of Manufacturing”, WTEC Study on NBIC2, National Science Foundation, June 25, 2012.
29. Invited Seminar “Point-of-Need Manufacturing Processes for Enhancing Energy Efficiency”, University of Texas, Austin, April 10, 2012.
30. Invited Seminar “Point-of-Need Manufacturing Processes for Enhancing Energy Efficiency”, Texas A&M, College Station, Texas, April 11, 2012.
31. Invited Epstein Institute Seminar, “Point-of-Need Manufacturing Processes for Enhancing Energy Efficiency”, Department of Daniel J. Epstein Department of Industrial and System Engineering, University of Southern California, October 25, 2011.
32. Keynote Talk, “Engineering Energy-efficient Surfaces and Forming Processes”, ISGMA 2011 International Symposium on Green Manufacturing and Applications, October 6~7, 2011, Seoul, Korea.
33. Invited Talk, “Recent Findings in Incremental Forming”, Institute of Forming Technology and Lightweight Construction (IUL), Dortmund, Germany, August, 2011.
34. Invited Talk, “Surface Texturing: Theory, Fabrication Methods and Applications”, Institute of Forming Technology and Lightweight Construction (IUL), Dortmund, Germany, August, 2011.
35. Invited Talk, “Manufacturing Processes to Increase Energy Efficiency and Energy Independency”, March 15, 2011, Kansas State University.
36. Invited Talk, “Incremental forming at multi-scales”, Indo-US forum, Aurangabad, India, Dec. 17, 2010.
37. Keynote Talk, “Recent findings in microforming and its applications”, The 10th Asia-Pacific Conference on Engineering Plasticity and Its Applications, Wuhan, China, Nov. 15-17, 2010
38. Keynote Talk, “Micromanufacturing in Biomedical and Energy Applications”, International Forum on MicroManufacturing, Gifu, Japan, Oct. 21-23, 2010.
39. Keynote Talk, “An investigation on bump formation in forming of micro dimples”, Metal Forming 2010, Toyohashi, Japan, September 19-22, 2010.
40. Plenary Talk, “Manufacturing Processes to Increase Energy Efficiency and Energy Independency”, 9th International Conference on Frontiers of Design and Manufacturing, Changsha, China, July 17-20, 2010.
41. Association for Manufacturing Technology, “New Technology Developments in Japan”, 2010 Manufacturing Technology Forum, March 31, 2010, Nashville, TN.
42. NSF US-Egypt Wind Energy Workshop, “Understanding the Life of Power Transmission Elements of Wind Turbine Systems”, March 22-24, 2010, Cairo, Egypt.
43. Silgan, “Sheet Metal Forming Research at AMPL”, February 25, 2010, Wisconsin.

44. Naval Research Laboratory, "Material Formability and Geometry Flexibility in the Deformation Processes," January 28, 2010.
45. India Institute of Technology, Kanpur, "Forming Processes and Surface Texturing in the Era of Energy Research", December 10, 2009.
46. Argonne National Laboratory, Argonne, IL, "Surface Texturing in the Era of Energy Research", November 18, 2009.
47. Shanghai Jiao Tong University, China, "Surface Texturing and Manufacturing Processes to Increase Energy Efficiency", September 14 and September 15, 2009.
48. National Taiwan University, Taiwan, "Surface Texturing and Manufacturing Processes to Increase Energy Efficiency" & "Research at ME of Northwestern University", July 13, 2009.
49. Chung Yuan Christian University, Taiwan, "Surface Texturing and Manufacturing Processes to Increase Energy Efficiency", July 13, 2009.
50. NSF Energy Workshop, "Better efficiency by surface texturing", June 21, 2009.
51. University of Minnesota, Twin City, "Surface Texturing and Manufacturing Processes to Increase Energy Efficiency", April 1, 2009.
52. Society of Manufacturing Engineers Micromanufacturing Conference, "Microforming", March 31, 2009.
53. University of Colorado, Boulder, "Material and Friction Characterization in Forming", February 26, 2009.
54. University of Connecticut, "Material and Friction Characterization in Forming", January 23, 2009.
55. India Institute of Technology, Kanpur, "Metal Forming: Process Innovation and Mechanics", December 15, 2008.
56. Georgia Institute of Technology, "Material and Friction Characterization in Forming", Oct. 24, 2008.
57. Shanghai Jiao Tong University, "Material and Friction Characterization in Forming", Sept. 22, 2008.
58. Seoul National University, Department of Materials Science and Engineering, "Incremental Forming: Advances and Challenges", Sept. 12, 2008.
59. Keynote Presentation, "Incremental Forming: Advances and Challenges", International Conference on Technology of Plasticity, Gyeongju Korea, Sept. 11, 2008.
60. General Electric, "Surface Engineering and its Effect on Friction Control", July 22, 2008.
61. Society of Manufacturing Engineers Micromanufacturing Conference, "Microforming", April 21, 2008.

62. General Motors, "Integrated Sensing System for Stamping Monitoring and Control", April 18, 2008.
63. University of North Carolina, Charlotte, "Mechanics and Control of Deformation Processes", March 18, 2008.
64. University of California, Irvine, "Micromanufacturing and Microfluidics Research at Northwestern", with W.K. Liu, Feb. 28, 2008.
65. California State University, Fullerton, "Introduction of Research at the Department of Mechanical Engineering at Northwestern University", Feb. 27, 2008.
66. 2008 NSF Engineering Research and Innovation Conference in Knoxville, Tennessee, U.S.A. "An American Manufacturing Innovation Initiative", Jan. 10, 2008.
67. 14th International Symposium on Plasticity and its Current Applications in Kailua-Kona, Hawaii, U.S.A, "Experimental and Numerical Investigation of Combined Isotropic-kinematic Hardening Behavior", Jan. 4, 2008.
68. International Symposium on Automotive Sheet Metal Forming, India, Dec. 17, 2007, "Predictability of Numerical Simulations".
69. Keynote, International Conference on Future Trends in Composite Materials and Processing, India, Dec. 14, 2007, "Material Characterization of Woven Composites".
70. Keynote, International Conference on Intelligent Textiles, Seoul, South Korea, Nov. 12, 2007, "Material Characterization of Woven Composites".
71. INSA-Lyon (Institut National des Sciences Appliquées de Lyon), France, Sept. 20, 2007, « Size Effects in Woven Composites and Metals ».
72. Ford Motor Company, Dearborn, Michigan, September 7, 2007, "Enhancing Interface Performance through Surface Texturing".
73. Workshop on Advanced Technologies for New Materials, Taiwan, July 16, 2007, « Develop Computer-Integrated Systems for Composite Sheet Forming Processes From Micro to Macro Scale ».
74. SME Micromanufacturing Conference (short course), March 13, 2007, "Fundamentals and Challenges in Microforming".
75. University of Stuttgart, Institute of Metal Forming, Germany, Oct. 5, 2006, "Mechanics and Control of Sheet Metal Forming Processes in Automotive Applications".
76. General Motors, September 29, 2006, "An Investigation of Surface Distortion in Line Dies".
77. University of Michigan, Ann Arbor, September 28, 2006, "Manufacturing at Multi-scales".
78. Tokyo University of Agriculture and Technology, Japan, July 14, 2006, "Mechanics and Control of Sheet Metal Forming Processes".
79. Nagoya Institute of Technology, Japan, July 7, 2006, "Fundamentals and Challenges in Microforming".

80. Toyota, July 7, 2006, "Characterization of Wrinkling and Draw-in in Sheet Metal Forming".
81. Chung Yuan Christian University, Taiwan, July 5, 2006, "Fundamentals and Challenges in Microforming".
82. Shanghai JiaoTong University, China, June 28, 2006, "Advances in Metal Forming".
83. Boeing Phantom Works, St Louis, Missouri, June 13, 2006, "Manufacturing at Multi-scales".
84. General Motors, Michigan, April 3, 2006, "Prediction of Surface Distortion".
85. Univ. of Massachusetts, Lowell, April 21, 2006, "Career Program Development".
86. The Chinese University of Hong Kong, Hong Kong, January 18, 2006, "Manufacturing at Multi-scales".
87. HuaZhong University of Science and Technology, China, January 16, 2006, "Mechanics and Control of Sheet Metal Forming Processes".
88. Hong Kong University of Science and Technology, January 13 2006, "Material Characterization of Woven Composites".
89. Purdue University, December 15, 2005, "Manufacturing at Multi-scales".
90. M.I.T., November 29, 2005, "Manufacturing at Multi-scales".
91. Unico, Inc., Wisconsin, November 22, 2005, "Real-time Calculation of Optimal Blank Holder Force History in Sheet Metal Forming".
92. IMECE Panel on Biomanufacturing, November 10, 2005, "Micromanufacturing".
93. General Motors, Michigan, October 27, 2005, "Characterization of Draw-in and Wrinkling in Sheet Metal Forming".
94. Shanghai JiaoTong University, China, Oct. 11, 2005, "Innovative Processes for Sustainable Manufacturing".
95. Plenary Talk: M&P 2005, Seattle, WA, June 21, 2005, "Manufacturing at Multi-scales".
96. Drexel University, September 23, 2005, "Manufacturing at Multi-scales".
97. Clemson University, August 30, 2005, "Mechanics and Control of Sheet Metal Forming Processes in Automotive Applications".
98. Georgia Tech Institute of Technology, Oct. 29, 2004, "Microforming: Study of Grain Size and Friction Effects in the Extrusions of Micropins".
99. Purdue University, Oct. 12, 2004, "Current Activities and Future Directions in Manufacturing Processes Research".
100. Hong Kong University of Science and Technology, December 9, 2003, "Fundamentals of Forming at Multiple Scales".
101. Ohio State University, November 13, 2003, "Understanding the Material Processing & Manufacturing Program".
102. National Science Foundation, May 27, 2003, "Sheet Forming and Looking Beyond".

103. New Jersey Institute of Technology, November 13, 2002, "Modeling Tools and Forming Technologies for the Enhancement of Design Attributes".
104. Michigan Technological University, November 1, 2001, "Modeling Tools and Forming Technologies for the Enhancement of Design Attributes".
105. University of Leuven, Belgium, April 23, 2001, "The Relationship between Materials Characterization Methods and Material Models for Stamping of Woven Fabric/Thermoplastic Composites".
106. MSC, Inc., Illinois, December 17, 2000, "Analysis of the Softcoil Problem".
107. Illinois Institute of Technology, November 29, 2000, "Material Characterization in Forming Structure Composites".
108. Rensselaer Polytechnic Institute, September 22, 2000, "Material Characterization in Forming Structure Composites".
109. General Electric, September 21, 2000, "Material Characterization in Forming Structure Composites".
110. University of Nevada, Reno, September 14, 2000, "Material characterization and instability analysis in sheet materials forming".
111. Ford Scientific Research Lab, September 6, 2000, "Material Characterization in Forming Structure Composites".
112. National Steel Inc. , September 8, 2000, "Material Characterization and Instability Analysis in Sheet Materials Forming".
113. Columbia University, July 6, 2000, "A Computer Integrated System for Sheet Forming".
114. Northeastern University, May 12, 2000, "Modeling Tools and Forming Technologies for the Enhancement of Design Attributes".
115. University of Illinois, Chicago, February 17, 2000, "A Computer Integrated System for Sheet Forming".
116. General Motors, January 28, 2000, "Stamping Technologies to Reduce Weight and Lead Time".
117. University of Washington, January 7, 2000, "A Computer Integrated System for Sheet Forming".
118. Northwestern Polytechnical University, December, 1999, "Material Characterization in Forming Structure Composites".
119. Georgia Institute of Technology, September 7, 1999, "A Computer Integrated System for Sheet Forming".
120. University of Maryland, College Park, July 21, 1999, "A Computer Integrated System for Sheet Forming".
121. Women in Engineering, University of Maryland, July 23, 1999.

122. Keynote, 'Plasticity in Manufacturing Processes & Product Performance' at 13th U. S. National Congress of Applied Mechanics, Gainesville, Florida, 21-26 June 1998.
123. University of Massachusetts, Lowell, September 15, 1998, "A Computer Integrated System for Sheet Forming".

PROFESSIONAL ACTIVITIES

Committee Memberships

- External Review Board, NSF Consortium for Innovation in Manufacturing and Materials, Louisiana, Oct. 2015 to September 2020.
- Member, Scientific Committee, Surface Integrity (3rd CIRP CSI), Charlotte, NC, June 8-10, 2016.
- Member, Advisory Committee, Department of Mechanical Engineering, University of California, Berkeley, 2014 – 2017
- External Academic Advisor, Department of Mechanical and Biomedical Engineering, City University of Hong Kong, 2014 – 2017.
- Vice-Chair, STC-Forming, The International Academy for Production Engineering (CIRP), January 2014 – December 2016.
- Member, Chicago Metro Metals Consortium (CMMC) Research and Innovation Subcommittee, 2014 - present
- Member, SME International Director and Member Council Nominating Committee, 2013 - 2014
- Panelist, World Technology Evaluation Study on System Engineering for Renewable Energy, December 2012 – October 2013
- Panelist, World Technology Evaluation Study on Transforming Tools of Emerging and Converging Technologies for Societal Benefit (beyond Nano-Bio-Info-Cognitive Technologies, NBIC2) <http://www.wtec.org/NBIC2/index.html>, June 2012 – June 2013.
- Chair, M. Eugene Merchant Medal Committee of ASME/SME, July 2012 – June 2015.
- Chair, SME/NAMRI Honors Committee, June 2012 – June 2013.
- President, SME/North America Manufacturing Research Institution, June 2011 – June 2012.
- Secretary, STC-Forming, The International Academy for Production Engineering (CIRP), January 2011 – December 2013.
- President-elect, SME/North America Manufacturing Research Institution, May 2010 – May 2011.
- Member, Johnson & Johnson Consumer Companies, Inc. Medal Committee, July 2010 – June 2013.

Chair, Administration and Finance Committee, ASME Technical Communities, July 2009 – June 2012.

Vice Chair, Manufacturing Group, ASME, July 2009 – June 2010.

Member, M. Eugene Merchant Medal Committee of ASME/SME, July 2007 – June 2012.

Secretary, SME/North America Manufacturing Research Institution, May 2009 – May 2010.

Board Member, SME/North America Manufacturing Research Institution, May 2004 – May 2011.

Chair, Conference Planning Committee, ASME/MED & SME/NAMRI & JMSE, 2009 - 2011

Executive Committee, ASME Manufacturing Engineering Division, July 2004– June 2009.

Incoming Member	July 2004 – June 2005
Secretary	July 2005 – June 2006
Program Chair	July 2006 – June 2007
Vice Chair	July 2007 – June 2008
Chair	July 2008 – June 2009

Member, ASME Manufacturing Technology Group Operating Boards, July 2008 – June 2009.

Member, Scientific Committee, ESAFORM (European Scientific Association for material FORMing), April 2006 – present. (2006 was the first year that ESAFORM invited researchers outside of Europe to be on the Scientific Committee)

Member, Scientific Committee, International Conference on Technology of Plasticity, September 2008.

Member, Scientific Committee, NUMIFORM'07, June 2007.

Member, Organization Committee, 2nd International Conference on Micromanufacturing, Clemson, SC, 2007.

Member, Organization Committee, 1st International Conference on Micromanufacturing, Urbana, IL, 2006.

Member, Program Committee, International Conference on Frontiers of Design and Manufacturing, 2006.

Member, Scientific Committee, NAMRC, 2005 – present.

Member, Executive Committee, North American Deep Drawing Research Group, March 2003 – June 2006.

Member, Technical Committee, 8th International Conference on Numerical Methods of Industrial Forming Processes, NUMIFORM'2004, Columbus, Ohio.

Member, Technical Committee, NUMISHEET'2005, Detroit, Michigan.

Member, USA program committee, 2004 Japan-USA Symposium on Flexible Automation, Denver, U.S.A.

Chair, Program Committee of ASME Manufacturing Engineering Division, May 2001 – Nov. 2002

Chair, Committee on Integration of Computational Mechanics and Manufacturing (ICMM), US Association for Computational Mechanics, December 1999 – 2000

Chair, Committee on Materials Processing and Manufacturing, Applied Mechanics Division, ASME, Nov. 2001 – Nov. 2003.

Member, USA program committee, 2002 Japan-USA Symposium on Flexible Automation, Hiroshima, Japan.

Member, International executive committee, the 10th JSME/ASME Materials and Processing Conference, U.S.A., Oct. 15-18, 2002.

Vice-Chair, Committee on Materials Processing and Manufacturing, Applied Mechanics Division, ASME, Nov. 1999 – Nov. 2001.

Scientific Committee Member, WSES International Conference on Mathematics and Computers in Mechanical Engineering, Marathon, Florida Keys, Florida, July 25-29, 1999

Liaison Officer, Manufacturing Engineering Division of ASME, Nov. 1998 – May 2001.

Organizers

Organizer, North America Deep Drawing Research Group Annual Meeting, May 5, 2015, Evanston, Illinois.

Organizer, Workshop on Future Research Needs in Advanced Manufacturing from Industrial Perspective, sponsored by NSF, August 11-13, 2013, Arlington, Virginia.

Program co-Chair, 1st CIRP BioManufacturing Conference, March 2013, Tokyo, Japan.

Conference co-Chair, 2012 International Conference on MicroManufacturing, March 2012, Evanston, IL.

Program co-Chair, 2010 ASME/JSME International Flexible Automation, Tokyo, Japan, 2009 – 2010.

Program co-Chair, ASME Nanoengineering for Medicine and Biology, Feb. 2010.

Conference Chair, ASME International Conference of Manufacturing Science and Engineering & JSME Materials & Processing, Evanston, IL, Oct. 2008.

Conference co-Chair, 6th International Workshop on Microfactories, Evanston, IL, Oct. 2008.

Co-organizer, Mini-symposium on Composites, ESAFORM 2008, Lyon, France, April 2008.

Organizer, Panel on Coping with the CAREER Award, National Science Foundation DMII Grantee Conference, TN, January 2008.

Co-organizer, CAREER Proposal Writing Workshop, sponsored by NSF, March 23-26, 2007.

Co-organizer, Workshop on Advanced High-Strength Steels, co-sponsored by NSF, DoE and ASP, October 22-23, 2006.

Co-organizer, Mini-symposium on Composites, ESAFORM 2007, Spain, April 2007.

Co-organizer, CAREER Proposal Writing Workshop, sponsored by National Science Foundation, April 6, 2006.

Co-organizer, Mini-symposium on Composites, ESAFORM 2006, April 2006.

Co-organizer, CAREER Proposal Writing Workshop, sponsored by National Science Foundation, May 24, 2005.

Co-organizer, Mini-symposium on Composites, ESAFORM 2005, April 2005.

Co-organizer, CAREER Proposal Writing Workshop, sponsored by National Science Foundation, Nov. 13, 2004.

Organizer, Symposium on Computational Methods in Sheet Forming, *Sixth World Congress on Computational Mechanics*, Beijing, China, September 5-10, 2004

Chair, Benchmark Analysis Summary Committee, *NUMISHEET2005*, Detroit, September, 2005.

Organizer, Benchmark Analysis on Composite Sheet Forming, 2002 – present.

Organizer, Symposium on Materials Development and Utilization in Forming, *International Mechanical Engineering Congress and Exposition*, New York, New York, November, 2001.

Organizer, National Science Foundation Workshop on Composite Sheet Forming, Lowell, Massachusetts, September, 2001.

Organizer, CAREER Workshop at *the 2001 National Science Foundation Design and Manufacturing Research Conference*, Tampa, Florida, January, 2001.

Organizer, Symposium on Advances in Metal Forming, *International Mechanical Engineering Congress and Exposition*, Orlando, Florida, November, 2000

Co-Organizer, Session "Affordable Composites Manufacturing: New Advances in Forming, Stamping, and other rapid processing methods", at the *15th Annual Technical Conference of the American Society for Composites (ASC)*, Texas, September, 2000.

Organizer, CAREER Workshop at *the 2000 National Science Foundation Design and Manufacturing Research Conference*, Vancouver, British Columbia, Canada, January, 2000.

Co-Organizer, Session 'Engineering Mechanics in Manufacturing Processes and Material Processing', ASME summer conference, McNu'97, Evanston, Illinois, July 1997.

NU Service

Member, Search Committee for Senior Vice President for Business and Finance, Feb. – June 2014.

Associate Vice President for Research, October 2012 - present

Member, Advisory Council for the Office of Fellowships, September 2013 - present

Member, Tenure and Promotion Committee, McCormick, Northwestern University, Sept. 2011 – August 2013.

Member, The Limited Submissions Advisory Committee, Northwestern University, Sept. 2009 – August 2010.

Member, Faculty Search Committee, Sept. 2009 – Feb. 2010.

Chair, ME Graduate Studies, Mechanical Engineering, Sept. 2007 – Sept. 2012

Member, General Faculty Committee, Northwestern University, Sept. 2008 – August 2011

Member, ME Machine Shop Oversight Committee, Sept. 2008 – August 2009

Member, Faculty Search Committee, Mechanical Engineering, Oct. 2007 – May 2008

Interim Associate Chair, Mechanical Engineering, Sept. 2006 – August 2007

Speaker, NSF Graduate Fellowships Meeting, Oct. 2, 2007

Speaker, Navigating the Professoriate Program: Grantsmanship and Identifying Funding Opportunities, April 5, 2007.

Member, Energy Committee, Mechanical Engineering, Jan. 2006 – June 2006.

Organizer, Mechanics Colloquia Seminar Series, 2001 – Sept. 2003.

Editor, Newsletter of Department of Mechanical Engineering, 1998 – Sept. 2003

Member, Faculty Search Committee, Industrial Engineering, Oct. 2002 – June 2003.

Member, Faculty Search Committee, Mechanical Engineering, Sept. 2001 – Sept. 2002

Member, Committee on Classrooms of the Searle Center for Teaching Excellence, January - June, 2000.

Member, Faculty Search Committee, Mechanical Engineering, August 1999 – January 2000.

Creator, ME Design and Manufacturing Group Web Site, 1998.

Member, College Curriculum Committee, Northwestern University, Fall 1997.

National Science Foundation (NSF) Service

Panelist, the World Technology Evaluation Study on Advanced Manufacturing, www.wtec.org/advmfg, sponsored by NSF.

Initiated the World Technology Evaluation Study on Micro-manufacturing, www.wtec.org/micromfg, Dec. 2003 – September 2005, co-sponsored by NSF, ONR, DOE and NIST.

Co-initiated joint proposal review and co-funding for proposals in the area of predictive polymer processing between NSF/DMII and DOE, 2005.

Co-initiated joint proposal review and co-funding for proposals in the area of coating and deposition between NSF/DMII and NSF/CMS, 2004 – 2005.

Co-initiated joint proposal review and co-funding for proposals in the area of thermo-related processes between NSF/DMII and NSF/CTS, 2004.

Co-sponsored the CAREER proposal writing workshop, November 2004

Co-sponsored the CAREER proposal writing workshop, May 2005.

Co-sponsored the Predictive Modeling workshop, July 2005.

Initiated and sponsored the Biomanufacturing workshop, June 2005.

Member, Engineering workgroup on Cyberinfrastructure, 2005

Other Activities

Member, Advisory Board, New Trier High School Engineering Partnership, 2012 – present

Member, MIT Educational Council, 2012 - present

Judge, Student Oral Presentation and Posters, HBCU-UP conference, Washington, D.C., October 2007.

Professeur invité, L'Institut National Des Sciences Appliquees de Lyon, France, June – Sept. 2007.

Member, Strategic Planning Committee, School District 37, Illinois, 2003.

Activity officer of the Mechanical Engineering Women Graduate Association, MIT, 1994-1995.

Selected participant for the NSF New Century Scholars Workshop, Stanford University, August 2-7, 1998.

COURSES LECTURED

Graduate Courses:

- ME-445: Micromanufacturing
- ME-441: Optimization in Manufacturing Processes
- ME-442: Advanced Metal Forming
- ME-495: Mechanics of Manufacturing Processes

Undergraduate Courses:

- ME-340-2: CAD/CAM
- ME-340-1: Introduction to Manufacturing Processes
- ME-240: Introduction to Mechanical Design & Manufacturing

STUDENTS GRADUATED

Ph.D. Students:

Hong Yao, Mechanical Engineering, June 2000, *Process Design and Failure Analysis of Three Dimensional Sheet Metal Forming Using Simplified Numerical and Analytical Models*, currently Sr. Research Engineer, Mittal Steel USA.

Xi Wang, Mechanical Engineering, December 2000, *Stress-based Wrinkling Criteria and Experimental Verification in Sheet Metal Forming*, currently Senior Software Engineer, Nicksun, Inc.

Brad L. Kinsey, Mechanical Engineering, June 2001, *A Combined Approach to Improve and Assess the Formability of Tailor Welded Blanks*, currently Professor and Chair, University of New Hampshire, Durham. NSF CAREER award recipient.

Xiongqi Peng, Mechanical Engineering, December 2003, *Material Characterization and Stamping Simulation for Woven Composites*, currently Professor, Shanghai JiaoTong University, China.

Thaweeapat Buranathiti, Mechanical Engineering, June 2005, *Design and Optimization under Uncertainty in Sheet Metal Forming Processes Constrained with Failure Analysis*, currently Associate Professor, King Mongkut's University of Technology, Thonburi.

Neil Krishnan, Mechanical Engineering, June 2006, *Microforming: Experimental Investigation of Size Effects in the Extrusion of Micropins*, currently Manager, Advanced Manufacturing Engineering, Sandvik Hyperion.

Shawn H. Cheng, Mechanical Engineering, December 2009, Experimental and Numerical Analysis of Material Deformation Behavior in Sheet Metals and Its Forming Process, currently CEO, HUPU.com, named one of the Nine Promising Young Entrepreneurs in China by Forbes.

Numpon Mahayotsanun, Mechanical Engineering, December 2010, Study of Size and Strain Rate Effects in the Micro-Extrusion Process, currently Lecturer at Khon Kaen University, Thailand.

Tiffany Davis Ling, Mechanical Engineering, December 2011, Mechanics and Control of Laser Surface Texturing and its Applications in Energy Efficiency and Production, currently Lead Senior Process Engineer at Honeywell Aerospace.

Rui Zhou, Mechanical Engineering, December 2011, Process Mechanics and Design of Deformation-based Surface Texturing System, currently Senior Engineer at Apple Inc.

Rajiv Malhotra, Mechanical Engineering, June 2012, Formability and Toolpath Planning in Incremental Forming, currently at Oregon State University as a tenure-track Assistant Professor.

James Magargee, Mechanical Engineering, June 2014, Mechanics of Electrically-Assisted Deformation in Metals, currently at 3M.

Ishan Saxena, Mechanical Engineering, December 2015, Laser Induced Plasma Micro-Patterning, currently at Intel.

M.S. Students:

Brad L. Kinsey, Mechanical Engineering, June 1998, *Process Control in Sheet Metal Forming*, currently Associate Professor, University of New Hampshire, Durham.

Nan Song, Mechanical Engineering, December 2000, *Springback Prediction of Straight Flanging Operation*, currently R&D Software Developer, Bloomberg, L.P.

Vikram Viswanathan, Mechanical Engineering, December 2000, *Experimental Investigation of Forming Limit Curve for Tailor Welded Blanks and Physical Implementation of Neural Network for Springback Control*, currently at Adobe.

Neil Krishnan, Mechanical Engineering, December 2003, *Estimation of optimal blank holder force trajectories in segmented binders using an ARMA model*, currently Manager, Advanced Manufacturing Engineering, Sandvik Hyperion.

Shawn Cheng, Mechanical Engineering, June 2004, *Experimental study on wrinkling characterization and an accelerated method for springback compensation*, currently a Ph.D. student at Northwestern.

Numpon Mahayotsanun, Mechanical Engineering, June 2005, Draw-in sensor for sheet metal forming, continued as a Ph.D. student at Northwestern.

Anthony Swanson, Mechanical Engineering, June 2006, Experimental analysis of die wear in deep drawing with nanometer precision, currently a consultant in Chicago.

Michael Beltran, Mechanical Engineering, December 2010, Investigation of the Incremental Forming Process at a Micro-Scale, currently a lab manager/lecture at Northwestern University, co-founder of Scimplicity LLC.

Tim Rockers, Mechanical Engineering, August 2012, Tension and compression test of a sheet metal.

Tim Velasquez, Mechanical Engineering, January 2013, Feasibility of Laser Surface Texturing for Friction Reduction in Surgical Blades.

Sifang Zhou, Mechanical Engineering, June 2013, Bulk Metallic Glasses for Micro-Rolling, at Mori Seiki.

Rui Xu, Mechanical Engineering, June 2014, Process Accuracy Improvement and Performance Study of Incremental Forming, continuing his Ph.D. study at Stanford.

Jiachen (Jackson) Xu, Mechanical Engineering, June 2014, currently at Apple, A Novel Method of Evaluating the Tensile and Compressive Behavior of Thin Metal Sheet Using a Transparent Device.

Jintao Liu, Mechanical Engineering, June 2015, Laser Surface Processing: Laser Shock Peening and Biprism interference micromachining.

Satyabrata Mohanty, Mechanical Engineering, June 2015, Electrical Micro Manipulation of Jet Trajectory for Water Jet Based Micro-manufacturing.

Lingxuan Su, Mechanical Engineering, Fall 2015.

CURRENT RESEARCH PERSONNEL

Post-doctoral Fellow:

Dr. Qiang Zeng	(2013 – 2017)
Dr. Taekyung (Terry) Lee	(2015 – 2017)

Ph.D. Students:

Miss Xiaoli Wang	(expected 2015)
Miss Man Kwan (Trista) Ng	(expected 2016)
Mr. Jacob L. Smith	(expected 2016)
Mr. Ebot Etchu Ndip-Agbor	(expected 2017)
Miss Sarah Wolff	(expected 2017)
Miss Zixuan (Zoe) Zhang	(expected 2018)
Mr. Newell Moser	(expected 2018)
Mr. Huaqing Ren	(expected 2018)
Mr. David Pritchett	(expected 2018)
Mr. Marco Giovannini	(expected 2018)
Mr. Nicolas Martinez	(expected 2019)
Miss Jennifer Bennett	(expected 2019)
Mr. Weizhao Zhang	(expected 2020)
Mr. Yi Shi	(expected 2020)

M.S. Students:

Miss Xiaoting Shi	(expected 2016)
Ms. Gabriela Fratta	(expected 2020)
Miss Tanvy Limaye	(expected Dec. 2015)

Undergraduate Students:

Miss Yifang Cao	(expected 2016)
Miss Jovanka Lynn Ravix	(expected 2016)

Visiting Scholars > 5

RESEARCH PERSONNEL SUPERVISED

Post-doctoral Fellows:

Dr. Rajiv Malhotra	(2012 - 2013)
Dr. Ying Huang	(2006 – 2009)
Dr. Wonoh Lee	(2006 – 2008)
Dr. Shunping Li	(2000 – 2005)
Dr. Kum Cheol Shin	(2003 – 2004)
Dr. Hongsheng Lu	(2002 – 2004)
Dr. Xue (Patricia) Pu	(2000 – 2002)
Dr. Zhihong Liu	(1998 – 1999)
Dr. Choong Ho Lee	(1998 - 1999)

Visiting Scholars:

Dr. Xifeng Li	2011 - 2012
Prof. Yun Wang	(2008)
Prof. Xudong Kang	(2008)
Prof. Zhong Wang	(2003 – 2004)
Dr. Riccardo Ruffini	(1997)
Mr. Steffen Hägebarth	(2004)
Mr. Anupam Agrawal	(2006)
Prof. Venkat Reddy	(2006 – 2007)
Prof. Yongjun Wang	(2007 – 2008)
Mr. Ning Ma	2009 – 2010
Prof. Chun Xu	2010 – 2011
Mr. Weichao Wu	2009 – 2011
Mr. Deniz Akturk	2012 – 2012
Mr. Dongkai Xu	2010 – 2012
Ms. Fan Rong	2010 – 2013
Prof. Xie Le	2014
Ms. Lanyun Li	2014-2015
Mr. Youqiang Xing	2015-2016
Mr. Wei Wang	2014-2015
Mr. Xinwei Wang	2014-2015
Ms. Beatrice Valoppi	2015
Mr. Antonio Jose Sanchez Egea	2015-2016
Miss Huan Zhang	2014-2016
Mr. Wule Zhu	2015-2016

Undergraduate Students:

Miss Mikenzie Steffens	(graduated 1999)
Mr. Joseph Goode	(graduated 2000)
Mr. Francis Joe Mills	(graduated 2001)
Mr. Alexander J. Ellis	(graduated 2002)
Mr. Peter J. Leonard	(graduated 2002)
Mr. Sasawat Mahabunphachai	(graduated 2002)
Mr. Ibrahim Khalid Sahouh	(graduated 2008)
Miss Kristi Bond	(graduated 2008)
Miss Julia Padvoiskis	(graduated 2008)
Mr. Phillip Ahn	(graduated 2008)
Mr. Ben Schriesheim	(graduated 2008)
Mr. Drew Price	(graduated 2009)

Miss Rachel Cohen	(graduated 2010)
Mr. Krystian Zimowski	(graduated 2010)
Miss Regan Radcliffe	(graduated 2011)
Mr. Kevin Yngve	(graduated 2011)
Mr. Stephen Guerin	(graduated 2011)
Mr. Jeffrey Shih	(graduated 2011)
Miss Morgan McHugh	(graduated 2011)
Mr. Andrew Nelson	(graduated 2011)
Miss Brooke Stanislawski	(graduated 2012)
Miss Eliza Bifano	(graduated 2012)
Mr. Justin Panhans	(graduated 2012)
Miss Sarah Wolff	(graduated 2013)
Mr. Max Abecassis	(graduated 2014)
Mr. Olatunde Olufisayo Okeowo	(graduated 2015)

AWARDS STUDENTS RECEIVED

Brad L. Kinsey, ASME Student Design Manufacturing Competition, 3rd Place, 1998

Xi Wang, Terminal Year Cabell Fellowship, Northwestern University, 2000.

Xiongqi Peng, Terminal Year Cabell Fellowship, Northwestern University, 2003.

Numpon Mahayotsanun, NADDRG Student Presentation Award, 2007

Tiffany Davis, NU Research Implementation Award, 2007

Tiffany Davis, NSF Fellowship, 2007

Michael Beltran, NSF Fellowship Honorable Mention, 2008

Ibrahim Khalid Sahouh, Undergraduate Research and Innovation Award, Mechanical Engineering, Northwestern University, 2008

Huang, Y., Cao, J., Smith, S., Woody, B., Ziegert, J., and Li, M., Finalist, Best Paper Award, "Studies of Size Effect on the Formability of a Domed Part in Incremental Forming", MSEC-72545, Proceedings of the 2008 International Manufacturing Science and Engineering Conference, MSEC2008, October 7-10, 2008, Evanston, Illinois, USA.

Rui Zhou and Ibrahim K. Sahouh, 3rd place, 2008 ASME Student Manufacturing Design Competition, MSEC 2008, October 7-10, 2008, Evanston, Illinois, USA.

Rajiv Malhotra, Predictive Science and Engineering Design (PSED) Fellowship, Northwestern University, 2009.

Tiffany Davis, Presidential Fellowship, Northwestern University, 2010.

Krystian Zimowski, Undergraduate Research and Innovation Award, Mechanical Engineering, Northwestern University, 2010

Rui Zhou, ISEN (The Initiative for Sustainability and Energy at Northwestern) Fellowship, Northwestern University, 2010.

Rui Zhou, Terminal Year Cabell Fellowship, 2010

James Magargee, Predictive Science and Engineering Design (PSED) Fellowship, Northwestern University, 2010 - 2011.

James Magargee and Morgan McHugh, 3rd place, 2010 ASME Student Manufacturing Design Competition, MSEC 2010, October, 2010, Erie, PA, USA.

Rajiv Malhotra, 2012 Best Poster Award, North America Deep Drawing Research Group, May, 2012, Oakland, MI.

Luke Francis Hemenetz and Tim Rockers, 2nd place, 2012 ASME Student Manufacturing Design Competition, MSEC 2012, June 2012, Notre Dame, USA.

James Magargee, Predictive Science and Engineering Design (PSED) Fellowship, Northwestern University, 2010 - 2011.

Jacob L. Smith, Predictive Science and Engineering Design (PSED) Fellowship, Northwestern University, 2012 - 2013.

Trista (Man Kwan) Ng, Honorable Mention, Martin Fellowship, Northwestern University, 2013.

Trista (Man Kwan) Ng, Predictive Science and Engineering Design (PSED) Fellowship, Northwestern University, 2013 - 2014.

Jacob L. Smith, National Defense Science and Engineering Fellowship, US Department of Defense, 2013 – 2016.

James Magargee, ME Department Graduate Leadership and Service Award, 2013.

Newell Moser, National Science Foundation Graduate Fellowship, 2014 – 2017.

Jacob L. Smith, Martin Fellowship, Mechanical Engineering, Northwestern, 2014.

Zixuan Zhang, Predictive Science and Engineering Design (PSED) Fellowship, Northwestern University, 2014-2015.

Sarah Wolff, Predictive Science and Engineering Design (PSED) Fellowship, Northwestern University, 2014-2015.

Xiaoli Wang, Cabell Fellowship, McCormick, Northwestern University, 2015.

Ebot Etchu Ndip-Agbor, Martin Fellowship, Mechanical Engineering, Northwestern University, 2015.

Jennifer Bennett, Predictive Science and Engineering Design (PSED) Fellowship, Northwestern University, 2014-2015.

SPONSORED PROJECTS

A total of \$18.2 million research grant funding have been received by Cao and her collaborators at Northwestern, among which Cao's funding totals \$9.0 million. Current projects are highlighted in light purple.

No.	Project title	Sponsor	Role	Period
65	Electrically-Assisted Tubing Processes for Enhancing Manufacturability of Oxide Dispersion Strengthened Structural Materials for Nuclear Reactor Applications	DOE	PI	09/15 – 08/18
64	Electric Field Guided Micro Additive Manufacturing Process	NSF	Co-PI	07/15 – 06/18
63	Understanding the effect of continuous electrical current on assisting material deformation and its resulting microstructure	NSF	PI	04/15 – 03/16
62**	Integrated Computation Materials Engineering (ICME) Development of Carbon Fiber Composites for Lightweight Vehicles (subcontract from Ford)	DOE	PI	10/14- 09/18
61**	MRI: Instrument Development: Additive Rapid Prototyping Instrument (ARPI)	NSF	Co-PI	7/14 – 6/16
60*	Development of Roadmap and Consortium for Innovation in Sheet Metal Forming	NIST	PI	6/14 – 5/16
59**	Hybrid Tri-pyramid Robot: A Novel Type of Double-Sided Incremental Forming Machine	NSF	PI	5/14 – 11/15
58**	3D Near Field e-Writing with Submicron Resolution	NSF	PI	6/14 – 5/16
57*	Manufacturing Processes Enhancement	Hu-Friedy	PI	1/14 – 12/15
56**	Development and Validation of Physics-Based Additive Manufacturing Models For Process Control and Quality Assurance	NIST	PI	10/13 – 3/16
55*	Process Modeling and Enhancements of Laser-Induced Plasma Micro-Machining (LIP-MM)	NSF	Co-PI	9/13 – 8/15
54	Workshop on Future Research Needs in Advanced Manufacturing from Industrial Perspective; Arlington, Virginia; 11-13 August 2013	NSF	PI	3/13 – 2/14
53*	Rapid Freeform Sheet Metal Forming:	DOE	PI	7/13 – 12/16

	Technology Development and System Verification (subcontracted from Ford)			
52*	Curved Waterjet-Guided Laser Micro-Manufacturing	NSF	Co-PI	9/12-8/16
51**	EAGER: Cloud-Computing and High-Speed Internet Enabled Manufacturing	NSF	PI	9/11-8/13
50**	Improving the performance of X-ray optics with magnetostrictive films	NASA	co-PI	3/11 – 3/16
49	GOALI/Collaborative Research: Electrically-Enhanced Precision MicroRolling	NSF	PI	4/11 – 3/16
48*	Multi-Physics Based Micro Texturing (MP-M2) Technologies for Biomedical Products	KIMM	Co-PI	11/10 – 10/15
47	Study on Shaping Titanium Electrode	GE	PI	11/10-06/11
46	Friction Characterization of EDT sheets	Ford	PI	06/10- 09/10
45**	Engineering Bacteria-Proof Textured Steel Alloys for Medical Applications	Baxter	PI	09/10-08/11
44	A Hybrid Forming System: Electrical-Assisted Double Side Incremental Forming (EADSIF) Process for Enhanced Formability and Geometrical Flexibility	DOE	PI	07/10 – 01/12
43	Conference: The 2010 International Symposium on Flexible Automation; Tokyo; Japan; July 12 - 14, 2010	NSF	PI	03/10 – 06/11
42**	MRI: Development of a State-of-the-Art Laser Micro-machining and Surface Engineering System	NSF	Co-PI	9/09 – 8/11
41**	PFI: Laser-based Manufacturing and Materials Processing	NSF	co-PI	9/09 – 8/11
40	Variation Control in Micro-stamping	NSF	PI	9/09 – 8/13
39	Incremental Forming at Multi-scales – RET supplement	NSF	PI	9/08 -8/13
38	Exploratory Study on Shaping Titanium Electrode	GE	PI	4/09 – 6/09
37	Continuous Micro Roll Forming to Enable Energy Efficiency Devices	NU/ISEN	PI	5/09 – 9/ 09
36*	Collaborative Research: Deformation Machining - A New Hybrid Process – REU supplement	NSF	Co-PI	04/08 – 03/10

35	An Investigation of Surface Distortion of Line Dies - supplement	GM	PI	11/06-10/08
34*	GOALI/Collaborative Research: Integrated Sensing System for Stamping Monitoring and Control – supplement	NSF	PI	9/06 – 8/08
33**	A Bayesian Treatment of Uncertainty in Simulation-Based Methods for Enhancing Process and Product Robustness	NSF	Co-PI	06/08 – 06/12
32*	Collaborative Research: Deformation Machining - A New Hybrid Process	NSF	Co-PI	04/08 – 03/10
31	Incremental Forming at Multi-scales	NSF	PI	9/07-8/13
30**	NSF Summer Institute on Nano-Mechanics, Nano-Materials and Micro/Nano-Manufacturing	NSF	Co-PI	10/07-9/13
29*	Center for Multi-scale Virtual Design and Manufacturing	DOE/ ORNL	Co-PI	5/07-5/09
28**	CI-TEAM Implementation Project: Collaborative Research-A National Engineering Dissection Cyber-Collaboratory	NSF	Co-PI	1/07 – 12/08
27	An Investigation of Surface Distortion of Line Dies	GM	PI	11/06-03/08
26*	Enhancing Interface Performance Through Surface Texturing	Boeing & Ford	PI	10/06 – 7/11
25*	GOALI/Collaborative Research: Integrated Sensing System for Stamping Monitoring and Control	NSF	PI	9/06 – 8/08
24**	Building a State-of-the-Art Laser-Based Surface-Texturing Instrument	NSF	Co-PI	9/06 – 8/08
23	SGER/GOALI/Collaborative Research: Deformation Machining - A New Hybrid Process	NSF	PI	5/06-4/08
22	Tool wear of high strength stamping die	Ford	PI	9/05 – 8/08
21	A Post-Process Tool for Detecting Surface Distortion in Stamping	GM	PI	11/05 – 10/06
20	Enhancing the understanding of the Fundamental Mechanisms of Thermostamping Woven Composites to Develop a Comprehensive Design Tool	NSF	PI	6/03 – 5/08
19	IREE Supplement to Collaborative Research: Enhancing the Understanding of the Fundamental	NSF	PI	8/05-5/08

	Mechanisms of Thermostamping Woven Composites to Develop a Comprehensive Design Tool			
18	REU Supplement to Collaborative Research: Enhancing the Understanding of the Fundamental Mechanisms of Thermostamping Woven Composites to Develop a Comprehensive Design Tool	NSF	PI	4/04 – 5/08
17	Forming of Can Lid	REXAM	PI	9/02 – 6/03
16	Material Variability and Stamping Robustness	FORD	PI	03/02- 02/05
15*	A Multi-Scale Approach for Predicting Wrinkling and its Experimental Validation	NSF	PI	09/01-08/04
14	Workshop on composite sheet forming	NSF	PI	05/01-11/01
13	An approach for model validation in simulating sheet metal forming processes	NSF	PI	09/00 - 2/02
12*	Intelligent material and process design for stamping of structural composites	NSF	Co-PI	04/99 - 03/02
11	CAREER: Tooling design and failure analysis in sheet metal forming	NSF	PI	07/97-06/02
10	A stress-based wrinkling criterion and its experimental verification	NSF	PI	09/97-08/01
9	Composite sheet forming	FORD	PI	
8	CAREER matching fund	FORD	PI	
7	A study on soft coil issue	MSC	PI	2001
6**	Design algorithm for optimizing stamping steps of axisymmetric parts	FORD	PI	2000
5	A simplified 2D model for predicting corner failure	GM	PI	07/97-01/99
4	Wrinkling prediction	GE	PI	3/97 - 12/98
3*	Springback Prediction	FORD	Co-PI	03/98-03/99
2	A study in sheet metal forming	ALCOA	PI	1997
1	A die design algorithm for stamping	NSF	PI	06/96-09/97
	TOTAL			
	Cao's TOTAL			

* Two PIs on this project.

** Multiple PIs on this project.

PARTICIPATING RESEARCH CENTERS

No.	Project title	Sponsor	Role	Period	Cao's Amount
1	NIST CoE: ChiMaD (\$25M)	NIST	seed	1/15 – 12/17	One graduate student
2	Digital Manufacturing and Design Innovation Institute, Chicago (\$70M + cost share)	DoD	NU-PI	3/14 – 2/19	Two graduate students – awards pending