

David C. Che

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EDUCATION

Ph.D. Mechanical Engineering, University of Michigan, Ann Arbor, Michigan

M.S. Mechanical Engineering, Ohio State University, Columbus, Ohio

B.S.E. Precision Mechanical Engineering, Harbin Institute of Technology, Harbin, P. R. China

PROFESSIONAL EXPERIENCE

7/21 – present **Professor & Engineering Program Director, Indiana Wesleyan University, Marion, IN**

- Responsible for developing and teaching mechanical and general engineering courses in a new BSE program
- Assist in marketing of the program, recruitment of students, acquisition of lab equipment, setting up labs
- Lead in curriculum design, assessment, continuous improvement, and other accreditation activities related to the program
- Serve as academic advisor/mentor to engineering students
- Engage the local community and area industry to seek out student project/internship/job/scholarship opportunities
- Recruit and mentor/supervise engineering faculty and staff
- Assist in engineering building renovations
- Serve as co-PI for a \$1.5 million equipment grant from Don Wood Foundation

8/19 – 5/21 **Professor & Chair of the Engineering Department, Vogel School of Engineering, Bryan College, Dayton, TN**

- Responsible for developing and teaching mechanical and general engineering courses in a new BSE program
- Participate in recruitment of students, acquisition of lab equipment, set up of labs
- Lead in curriculum development and ABET accreditation activities
- Serve as academic advisor to student clubs (ASME and SAE)
- Participate in committees and online learning taskforce
- Engage the community and seek out student project/internship opportunities
- Lead students in service-learning activities on and off campus.

8/16 – 6/19 **Professor of Engineering, Mount Vernon Nazarene University, Mt. Vernon, OH**

- Responsible for developing and teaching mechanical and general engineering courses in a new engineering program
- Lead in recruitment and advising of students, acquisition of lab equipment, set up of labs
- Lead in curriculum development and ABET accreditation activities (served as Department Chair between 8/17-6/19)
- Serve as academic advisor to student clubs (SAE Baja)

8/15 – 5/16 Associate Professor of Engineering, Anderson University, Anderson, IN

- Responsible for developing and teaching mechanical and general engineering courses in a new engineering program
- Participate in recruitment of students, acquisition of lab equipment, set up of labs
- Participate in curriculum development and ABET accreditation activities

7/08 – 5/15 Associate Professor of Engineering & Director of the Pinkerton Center for Technology Development, Department of Engineering & Computer Science, Geneva College, Beaver Falls, PA (tenured on 5/9/2014)

- Responsible for teaching mechanical and general engineering courses in an ABET-accredited BSE program
- Responsible for supervising senior design projects
- Maintain contacts with local industry, government and innovation incubators, facilitate faculty research projects and student project/internship opportunities
- Serve as academic advisor for students in mechanical engineering concentration of the BSE program
- Serve on faculty senate and various committees
- Serve as faculty advisor to student clubs such as GodLed and SAE Baja

1/05 – 6/08 General Manager, Asia Operations, Stafast Products, Inc., Painesville, Ohio & Shenzhen/Dongguan, China

- Develop direct China manufacturing sources for industrial fasteners and automation machinery components, evaluating them on the basis of price, quality, service support, availability, reliability, etc.
- Evaluate capability of suppliers in a wide range of manufacturing disciplines such as sheet metal stamping, forging, machining, die casting, welding, plating (coating) and assembly
- Direct business activities in import and export, sales and marketing, purchasing, logistics, quality control, facility management, government relations, etc.
- Responsible for interpretation of engineering drawings sent from the US and communicate detailed technical specifications and requirements to Chinese manufacturers
- Responsible for integration of an automation machine with components sourced from multiple vendors from both China and North America
- Coordinate the establishment of a manufacturing facility in China

3/97 – 1/05 Sr. Project/Research Engineer, General Motors Corporation, Warren, Michigan

1/04-1/05 Dimensional Management, General Motors North American Product Development, Warren, Michigan

- Create and coordinate Geometric Dimensioning & Tolerancing (GD&T) drawings for interior trim parts (instrument panel & console) with build strategies
- Create measurement points for interior trim parts
- Support Functional Evaluation (FE) process & launch team
- Create and maintain Dimensional Technical Specification (DTS) stack studies

2/03-1/04 Vehicle Performance Integration, General Motors North American Product Development, Pontiac, Michigan

- Support analysis efforts to provide assessment and guidance in addressing effects of tire inflation pressure change on vehicle ride and handling performance
- Create front and rear suspensions and full vehicle analysis models for heavy-duty pickup and sports utility vehicles using MotionView & ADAMS
- Collect data on vehicles affected
- Run Vehicle Handling Facility (VHF) and Static Design Factors (SDF) tests on these vehicles and correlate to hardware test results
- Conduct quasi-static and dynamic tests on a full vehicle model complete with mass and inertia data
- Run On-center, Control Response tests on selected vehicles and make recommendations on design changes
- Perform trailering analysis to validate the suggested changes

6/99-1/03 Competitive Operations Engineering, General Motors North American Vehicle Operations & Manufacturing, Warren, Michigan

Support Industrial Engineering (IE) new tool development and training

- Validate a GM developed analytical tool to balance throughput across areas of a plant and link with other key program drivers such as product work content, floor space, station cost, etc. for bodyshop
- Validate an analytical tool that sets plant throughput targets and optimally allocates buffers for the above program
- Create a complete plant model, with detailed Body, Paint, and General Assembly systems supported by mainline zones and subsystem models down to the station level
- Derive plant area square footage usage information from plant layouts using AutoCAD
- Develop business case

Develop and pilot best practice procedures for as-built plant layout creation

- Coordinate and lead best practice development of using laser scanning for field check and 3D layout generation process
- Work with customers such as Industrial Engineers (IE), Manufacturing Engineers (SME), General Assembly (GA), Bodyshop, Worldwide Facility Group (WFG), etc. to define requirements (SOR)
- Document common best practice process including technology recommendation

Evaluate and assess feasibility of a math-based tool for Paint Engineering

- Research critical electro-coating process elements which require predictive models
- Assess past modeling attempts at GM and outside sources
- Evaluate resource and timing requirements
- Propose potential technical modeling approaches

Support implementation of math-based tools for Dimensional Engineering

- Support Unigraphics (UG) Vector Creation Tools (VCT) training plan development and implementation

- Support math-based manufacturing strategies development for dimensional engineering with Information System & Services
- Participate in and contributed to functional focus team meetings, such as Mfg. CAE & Dimensional Integration Focus Team, CMM Users' Group, etc.

3/97-5/99 Manufacturing Systems Research Lab, General Motors Global Research & Development Center, Warren, Michigan

- Conduct digital body panel assembly analysis for functional evaluation in support of GMT800 program
- Evaluate dimensional measurement systems for surface data collection
- Conduct case studies to diagnose root causes for door denting problems at the Lake Orion Assembly Plant
- Conduct Design of Experiment (DOE) analysis to isolate problem areas

12/95 - 2/97 **Postdoctoral Research Fellow/Research Investigator**, Sam Wu Manufacturing Research Center, University of Michigan, Ann Arbor, Michigan

National Institute of Standards and Technologies, Advanced Technology Program-Dimensional Variation Reduction for Automotive Body Assembly, the “2mm Program”

- Consult for Chrysler Twinsburg Stamping Plant on continuous improvement of process quality
- Conduct case studies to control minivan door stamping and subassembly processes on manufacturing shop floor
- Analyze process capability based on both CMM and hard checking fixture data following standard statistical process control (SPC) procedures
- Create routines to correlate dimensional variation data from CMM to Perceptron Optical CMM stations

National Institute of Standards and Technologies, Advanced Technology Program-Agile and Precision Sheet Metal Stamping, the “Near Zero Stamping Program”

- Investigate new algorithms for temperature compensation of industrial robots for sheet metal inspection purposes
- Support proposal and report writing, project planning and coordination of a cross-functional team of industrial engineers and researchers
- Monthly and quarterly report team’s output to Auto Body Consortium
- Develop measurement strategy and specifications for dimensional inspection of sheet metal stamping parts
- Evaluate, test and recommend existing and new technologies to achieve faster, more flexible and higher precision stampings

6/95 - 11/95 **Project Engineer/Training Specialist**, Perceptron, Inc, Plymouth, Michigan

- Install in-process optical gauging systems at Chrysler Windsor Assembly Plant and Paslin Body Shop
- Train skill-trades operation and programming of the system at Chrysler Jefferson North Assembly Plant, Chrysler National Training Center and GM Lake Orion Assembly Plant

- Train plant personnel root cause analysis of assembly problems at various plants

9/93-12/94 **Teaching Assistant, Department of Industrial and Operations Engineering & Department of Mechanical Engineering and Applied Mechanics, University of Michigan, Ann Arbor, Michigan**

- Assist in teaching a senior/graduate level course “Time Series Analysis, Modeling and Forecasting (ME/IOE 563)” for two semesters
 - Performed teaching duties such as grading of homework, holding office hours, preparing exams and grading exams, preparing and conducting computer lab sessions, and lecturing review sessions, supervised term projects for 40 students
- Assist in teaching a undergraduate course “Mechanical Science Laboratory (ME 396)” for one semester
 - Assisted with course material writing and helped facilitate lab sessions for the above course that encompasses measurements of fundamental quantities and systems analysis as related to solid mechanics, strength of materials, dynamics and controls

1/92 - 5/95 **Research Assistant, NSF Industry/University Cooperative Research Center (NSF I/UCRC) for Dimensional Measurement and Control in Manufacturing, University of Michigan, Ann Arbor, Michigan**

NIST ATP (National Institute of Standards and Technologies, Advanced Technology Program) - Dimensional Variation Reduction for Automotive Body Assembly – the “2mm Program”

- Develop a laser gaging system to reduce die prototyping and tryout time
- Integrate the system to a CNC machining center and developed online calibration techniques
- Develop robust geometric algorithms for identification of non-ideal features on sheet metal stampings such as misaligned, damaged or obscured holes and slots, and protruded or drawn holes and slots
- Develop a new camera-to-object calibration program for 100% automobile body-in-white dimensional inspection with a Perceptron optical CMM
- Develop a generic analytical solution to variation analysis of coordinate transformations
- Review technical papers for ASME journals and conference proceedings in areas of expertise

9/90-12/91 **Research Associate, Coordinate Measurement Research Lab, NSF Engineering Research Center for Net-shape Manufacturing, Ohio State University, Columbus, Ohio**

- Participate in the development of a triangulation-based optical CMM inspection system for automated non-contact dimensional inspection

- Develop a reverse engineering scheme that includes a surface scanning module, system calibration module and error compensation module for digitization/inspection of soft or delicate parts
- Research manufacturing online measurement technologies and sensing techniques

PUBLICATIONS

- David C. Che, "Teaching Biblical Environmentalism in a Christian Engineering Program," Proceedings of the 2022 Christian Engineering Conference, St. Paul, MN, June 29-July 1, 2022
- David C. Che, "The Development of a Hands-on Impact Testing Lab/Mini-Project in the Context of Machine Component Design," Proceedings of the 2022 ASEE-Illinois/Indiana Section Conference, April 9, 2022, Anderson, Indiana
- David C. Che, "Creating a Contextualized Learning Environment for a Computational Methods Course," Proceedings of the 2021 ASEE-Southeast Regional Conference (virtual), March 8-11, 2021
- David C. Che, "A Christ-centered Dominion Mandate – Reflections on Integration of Faith and Engineering," Proceedings of the 2019 Christian Engineering Conference, Sioux Center, Iowa, July 11-13, 2019
- David C. Che, Steve Feazel, "Engagement in Practice – CAD Education via Service-Learning," Proceedings of the 2019 ASEE Annual Conference, Tampa, Florida, June 16-19, 2019
- David C. Che, "Engagement in Practice – CAE Education via Service-Learning," Proceedings of the 2018 ASEE Annual Conference, Salt Lake City, UT
- David C. Che, "The Development of a Hybrid Course on Ethics, Service Engineering, Society and Technology," poster presentation, Workshop on *Engaged Scholarship for Ethics and Responsible Innovation in STEM Fields*, North Carolina State University (NCSU) – Genetic Engineering and Society Center, March 14-15, 2018, Raleigh, NC
- David C. Che, "Engineering through the Eyes of Faith," 2017 Christian Engineering Conference, Cedarville, OH, June, 2017
- David C. Che, "The Development of a Truly Hands-on Torsional Strength of Materials Lab," Proceedings of the 2017 ASEE Annual Conference, Columbus, OH
- David C. Che, "Incorporating Excel Data Solver in Teaching Undergraduate Engineering Curriculum," ASEE North-Central Region Annual Conference, Mt. Pleasant, MI, March 18-19, 2016
- David C. Che, "An Attempt to Strengthen ‘Outcome k’ in a Mechanical Vibrations Course," ASEE Gulf-Southwest Region Annual Conference, San Antonio, TX, March 25-27, 2015
- David Smith, William Fiedler, David C. Che, "Gyroscopic Effect Analysis of a Battle Bot – A Service-Learning Project," ASEE North Central Regional Conference, Auburn Hills, MI, April 4-5, 2014
- David C. Che, "Common Grace and Engineering," 2013 Christian Engineering Conference, Atlanta, GA, June 26-28, 2013
- David C. Che, "Use of Automotive Related Examples in Teaching Undergraduate Engineering Curriculum", ASEE North Central Regional Conference, Columbus, OH, April 5-6, 2013
- David C. Che, Dave Clark, David Shaw, James Gidley, "Lessons Learned from Starting an SAE Baja Program in a Small Liberal Arts College", ASEE Annual Conference, San Antonio, TX, June 9-13, 2012

- David Che, David Clark, Tom Magnone, “Manufacturing Engineering Curriculum Renewal in a General BSE Program”, Proceedings of the 2011 Midwest Section Conference of the American Society for Engineering Education
- David C. Che, “Laser scanning: a key enabler for 3D virtual factory layout modeling and a method improvement to as-built plant field checking”, *General Motors Corp. Internal Report*, August, 2001
- C. Che, Jun Ni, “A ball-target-based extrinsic calibration technique for high-accuracy 3-D metrology using off-the-shelf laser-stripe sensors,” *Precision Engineering*, 2000, Vol.24 (3), pp. 210-219
- C. Che, Jun Ni, “A generic coordinate transformation uncertainty assessment approach and its application in machine vision metrology,” *International Journal of Machine Tools & Manufacture*, 1998, Vol. 38, pp. 1241-1256
- C. Che, Diane Gibbons, “Multi-variate analysis using Design of Experiment techniques for identifying automotive door denting problems”, *General Motors Corp. Internal Report*, 1997
- C. Che, Jun Ni, “Modeling and calibration of a structured-light optical CMM via skewed frame representation,” *ASME Journal of Manufacturing Science and Engineering*, 1996, Vol. 118(4), pp. 595-603
- C. Che, Jun Ni, “Modeling and calibration of a structured-light optical CMM for dimensional measurement of sheet metal parts and dies,” *Proceedings of the 1995ASME Winter Annual Meeting*, San Francisco, CA
- C. Che, “Scanning compound surfaces with no existing CAD model by using laser probe of a coordinate measuring machine”, *Proceedings of the SPIE Annual Opto-Midwest Conference*, March 1992, Chicago, *Optical Design and Processing Technologies and Applications*, Vol. 1779, pp. 56-67

COMMUNITY AND PROFESSIONAL SERVICES

2018/2019	Vice Chair , ASME Central Ohio Section
2017/2018	Director of the Board , Knox-Lab, Knox County, OH
2013/2014	Governing Board Member , Society of Automotive Engineers (SAE) Pittsburgh Section
1998/2000	Director of the Board , Detroit Chinese Engineers Association
1998/1999	Director of the Board , Chinese Association of Greater Detroit
1997/1998	Founding President , Alumni Club of Harbin Institute of Technology in the Great Lakes Region
1993	Volunteer Partner , Focus: HOPE, Detroit

PROFESSIONAL AFFILIATIONS

- American Society of Mechanical Engineers (ASME)
- Society of Automotive Engineers (SAE)
- American Society of Engineering Education (ASEE)
- Christian Engineering Society (CES)

COURSES TAUGHT

Geneva College

- EGR 100 Engineering: Calling and Vocation
- EGR 211 Solid Mechanics
- EGR 214 Dynamics
- EGR 322 Manufacturing Engineering
- EGR 423 Quality Engineering
- EGR 481 & EGR 482 Senior Design Projects (I and II)
- MEE 321 Mechanics of Deformable Bodies
- MEE 403 Machine Component Design
- MEE 405 Finite Element Analysis
- MEE 410 Mechanical Vibrations

Anderson University

- ENGR 2020 Engineering Materials and Processes
- ENGR 2080 Service through Engineering and Technology
- ENGR 2120 Mechanics of Materials
- ENGR 3110 Kinematics and Robotics
- ENGR 3140 Strength of Materials Laboratory
- ENGR 3150 Structural Dynamics Laboratory
- ENGR 3170 Manufacturing and Finance

Mount Vernon Nazarene University

- EGR-1003 Logic and Computational Engineering
- EGR-2033 Digital Systems
- EGR-2043 Statics
- EGR-2053 Dynamics
- EGR-2073 Thermodynamics
- EGR-2083 Engineering Materials and Processes
- EGR-3014 Mechanics of Materials
- EGR-3023 Machine Synthesis
- EGR-3073 Computer Aided Engineering
- EGR-3093 Machine Component Design
- EGR-4012 & EGR-4022 Senior Design Projects (I and II)

Bryan College

- EGR-223 Engineering Mechanics – Statics
- EGR-221 Computational Methods
- EGR-222 Circuits and Instrumentation
- EGR-224 Mechanics of Materials
- EGR-226 Engineering Mechanics – Dynamics
- EGR-321 Design of Experiments
- EGCI-323 Structural Analysis
- EGME-323 Manufacturing Engineering
- CT-209 Missional Engineering
- CT-210 Biblical Environmentalism
- EGME-424 Machine Component Design
- EGR-122 Service Engineering

Indiana Wesleyan University

- MAT-101 Introductory Algebra
- MAT-253 Calculus I
- EGR-105 Engineering Shop Experience - 3D Printing
- EGR-121 Introduction to Engineering
- EGR-142 Computer Aided Design
- EGR-211 Solid Mechanics
- EGR-214 Dynamics