

David Edward Fly, P.E.

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SUMMARY

David is a professional engineer specializing in manufacturing processes. He is currently teaching *Mechanics of Materials*, *Electricity/Electronics Fundamentals*, and *System Simulation*. An apprentice journeyman before college, his strengths are the practical applications of engineering as used for structures, manufacturing processes, machinery, and operations. His current interests are 3D printing, hybrid composites, finite element analysis, design, applied statistics, and intellectual property. He has owned and operated an engineering company, designed machines and fixtures, worked with Chinese engineers, and commercialized patented technology.

ACADEMIC EXPERIENCE

University of Wisconsin – Stout – *Associate Professor, Tenured* 2015 - Present

- Planned and developed new course, MFGE-440-Manufacturing System Simulation
- Invited by Boeing to present this work at AeroDef conference.
- Designed and built a hybrid composite towbar for SAE Baja race car.

University of Wisconsin – Stout – *Assistant Professor, Tenured* 1997 - 2015

- Promoted and developed 3D printing technology
- Data acquisition instrumentation on pendulum type impact tester.
- Visits, tours, and projects with scores of small manufacturing companies.
- Director of the Stout Technology Incubator for two years.
- Learned, tested, and implemented Solidworks modeling software, Cosmos finite elements software, Denso and ABB industrial robotics, and Cognex machine vision cameras.
- Wrote \$265,401 in grants from UW-Stout, UW-System, WI-DOC, and the USDA
- Contracted and taught a custom statistics workshop for S&S Cycle in Viola Wisconsin, focusing on overview of statistics, statistical process control, t-tests, regression analysis, and X-bar and R-charts.

PROFESSIONAL EXPERIENCE

Runva Mechanical and Electrical – *Engineer, Consultant* 2007 – 2008

Designed, built, and tested a 4 ton winch testing machine.

Alliance Machinery and Engineering - *Owner* 2003 – 2005

- Consulting engineering for machinery design, analysis, and product development
- Companies and projects:

- Burns Best, wood fired outdoor furnaces.
- Liquid Waste Technologies, river dredging equipment.
- Intellishare Environmental, reclamation equipment
- Conagra Foods, chocolate pudding equipment
- Hi-Fold Doors, airplane hangar doors.
- Modular and lightweight welding and coordinate measuring machine fixtures.

The Troxel Company - *Senior Manufacturing Engineer - Metals* 1995 – 1997

- Researched tubing industry for long term strategic plans for capital equipment.
- Wrote equipment status report and suggested purchases for board of directors.
- Quoted welding work and did preliminary designs of welding fixtures.
- Design, built, and tested automated leak testing equipment for a specific press.
- Troubleshoot tooling and maintained fabrication equipment.

Amadas Industries - *Production Engineer* 1994 - 1995

- Designed, modified, built, and tested specialized equipment used in manufacturing such as: gang drill, rotating welding table, fixtures for machining and welding, coil pivoting platform.
- Worked as part of a technical writing team complete machine operation manuals.
- Acted as a liaison between 3 product managers in engineering and manufacturing.

Advanced Manufacturing Technology Center - *Teaching Assistant* 1992 - 1994

- Prepared and conducted lecture/lab demonstrations on metrology, factorial experimental design, punching, statistical process control, machining, fatigue, robotics, and CNC programming.
- Wrote and graded assignments, lab exercises, and tests.
- Conducted research on CO2 laser heat treating of low carbon steel to examine the effect on fatigue life from residual stresses at the surface.

Department of Agricultural Engineering - *Research Assistant* 1990 - 1992

- Selected and assembled image processing board, multiplexer, and optics for three digital cameras.
- Wrote image processing algorithms in C language.
- Designed and built a prototype frame and light table.
- Developed personal computer based vision system to measure pine seedlings.

Newport News Shipbuilding and Drydock - *Outside Machinist* 1980 - 1984

- All assignments were on US Navy Submarines.

- Participated in machine shop training program for six months (including NC milling machine).
- Changed propeller, removed and re-installed main propulsion turbine rotor, machined steam generator foundations, and mounted main pressure vessel for the nuclear reactor.
- Overhauled impulse cylinder, bored torpedo tubes, installed retractable masts for radar, sonar, snorkel, and periscopes.

PROFESSIONAL MEMBERSHIPS

Society of Manufacturing Engineers

Advised the Student Chapter at UW-Stout – 1998 to 2000

Certified as a Manufacturing Engineer – 1996 to 2002

American Society of Mechanical Engineers

Member since 1994

Attended ASME meetings or plant tours in St. Paul.

American Society of Engineering Educators

Member from 2010 to 2013

CLASSES TAUGHT

Undergraduate Courses Taught

MECH-293-Statics and Dynamics

MFGE-415-Machine Vision and Robotics

MFGE-707-Field Project Formulation

MFGE-106-Impacts of Engineering Design

MFGE-325-Computer Aided Manufacturing

MFGE-405-Industrial Robotics

POWER-260-Introduction to Fluid Power

ELEC-205-Electricity/Electronics Fundamentals

MECH-294 -Mechanics of Materials

MFGE-441 -Design of Jigs and Fixtures

MFGE-410-Capstone 2

MFGE-407-Flexible Manufacturing Systems

MFGE-391-Fluid Mechanics

MFGE-102-Manufacturing & Materials

MFGE-440-Manufacturing System Simulation

Graduate Students Advised

2014 Anita Gradowski, Analysis of Measurement Systems for Parts Made by Fused Deposition Modeling.

2011 Mike Hemmila, Utilization of a Vision System to Inspect Thermo Set Cores

2010 Amanda Normand, A Study of the Venturi Effect and the Venturi Exhaust Primer

2010 Ryan Geissler, Assessing Improvements to Technical Instruction Manuals

2009 Christian Gausman, Implementing Lean Manufacturing and Design for Mfg.

2008 Rebecca Anderson, Design and Justification of an Automated Palletizing Line

2007 Doug Reinhardt, Training of Diesel Technicians

Workshops Taught to Industry

2014 End of Arm Tools for Industrial Robotics. Stratasys Incorporated Eden Prairie MN.

2009 Review of Statistics with Applications in Your Business. S&S Cycle. Viroqua WI.

PATENTS

- 2015 U.S. Patent Pending – Hybrid Composites with 3D Printed Forms
- 2014 U.S. Patent Application Number 14/347926 – Layered 3D Printing with Lower Viscosity Fluid Fill
- 2010 U.S. Patent 7,770,870 Tow Ball Winch Mount
- 2009 Canadian Patent 2504029 Alignment pin and fastener with bi-directional clamping.
- 2006 U.S. Patent 6,997,658 Alignment pin and fastener with bi-directional clamping.
- 2000 U.S. Patent 6,019,359 Lightweight welding table.

PUBLICATIONS

- 2014 3D Printing Thin Skinned Composites to Achieve the Strength-to-Weight Ratio of Aluminum. Solid Freeform Symposium. Austin Texas.
- 2014 Measurement Systems Comparison on Various Feature Sizes of FDM Parts. Solid Freeform Symposium. Austin Texas.
- 2013 Measuring..... American Society of Engineering Educators.
- 2005 Dash Knob Inspection Project ASEE North Midwest Conference. Brookings South Dakota. October 14, 2005.
- 1996 Low Power Laser Heat Treatment to Improve Fatigue Life of Low Carbon Steel Journal of Laser Applications vol.8 no.2 1996 (primary author)
- 1994 PC-Based Multiple Camera Machine Vision System for Pine Seedling Measurements Applied Engineering in Agriculture (ASAE) vol. 10 no. 6 1994 (primary author)

PRESENTATIONS

- 2014 3D Printing Thin Skinned Composites to Achieve the Strength-to-Weight Ratio of Aluminum. Solid Freeform Symposium. Austin Texas.
- 2014 Measurement Systems Comparison on Various Feature Sizes of FDM Parts. Solid Freeform Symposium. Austin Texas.

- 2013 3D Printed Internal Structure: Influence on Tensile Strength. ASEE North Midwest Section Conference. Fargo North Dakota
- 2013 Measuring..... American Society of Engineering Educators.
- 2009 Master Machinist Exam for candidates applying to Chicago Metropolitan Water District. Chicago Illinois.
- 2008 Statistics Workshops to Engineering Department at S&S Cycle, Viroqua Wisconsin.
- 2002 Developing Successful Academic Partnerships. Wisconsin Business Incubation Association Annual Meeting. Madison Wisconsin.
- 2002 Administration of Incubators. Economic Development Administration Chicago Regional Office Annual Conference. Chicago Illinois.
- 1995 Poster session on Laser Heat Treatment to Improve Fatigue Life. International Congress on the Applications of Lasers and Electro-Optics (ICALEO). San Diego California.

GRANTS AND SCHOLARSHIPS:

- 2015 **Principal Investigator** \$2,000 Conference Presentation at AeroDef-2016 (pending award decision)
- 2015 **Principal Investigator** \$127,870 Hybrid Composites from 3D Printed Internal Forms: Validation of the Finite Element Analysis (not awarded)
- 2014 **Principal Investigator** \$5,000 Faculty Senate Research Fellowship (not awarded).
- 2013 **Principal Investigator** \$8,000 Faculty Research Initiative Grant. University of Wisconsin-Stout.
- 2009 **Principal Investigator** \$776,000 Machine Vision Measurement of Micro-Endmill Deflection. National Science Foundation (not awarded)
- 2005 \$56,612 from Wisconsin Department of Commerce. Stout Technology Accelerator in Oaklawn Harmony Center.
- 2003 **Principal Investigator** \$64,100 from Wisconsin Department of Commerce. Incubator Expansion Project.
- 2003 **Principal Investigator** \$74,100 from U.S. Dept. of Agriculture, Rural Business Enterprise Grant. Incubator Expansion Project.
- 2001 **Principal Investigator** \$10,000 from Wisconsin Department of Commerce. Community Based Economic Development Grant for an Incubator Expansion

Feasibility Study.

- 2000 **Principal Investigator** \$1,982 from University of Wisconsin Stout. Increasing Knowledge of Industrial Hydraulic Circuits.
- 2000 **Principal Investigator** \$10,000 from 3M Corporation. Non-Tenured Faculty Professional Development.
- 1999 \$945 from University of Wisconsin Stout. Attend Fabtech International.
- 1999 **Principal Investigator** \$3000 from Wisconsin Department of Commerce. Rural Economic Development Grant to assist in patenting the new welding table.
- 1998 **Principal Investigator** \$43,392 from University of Wisconsin System. “Develop Production Processes and Equipment for a New Welding Platen”.
- 1997 \$1,657 from University of Wisconsin Stout to attend a workshop on Microcomputer Electronics for Automation.

CONFRENCES AND WORKSHOPS

- 2015 How to Communicate with Tact and Professionalism. Fred Pryor. Minneapolis, Minnesota
- 2014 Non-Destructive Testing of Composites. RCON NDT. Menomonie, Wisconsin.
- 2014 Solidworks Simulation. Brooklyn Park Minnesota. April 2.
- 2013 Roberts Rules of Order. American Society of Mechanical Engineers. Webinar from Portland Oregon.
- 2013 Solid Freeform Fabrication. Austin Texas.
- 2007 Robot Safety. Robotics Industries Association
- 2011 SMC Corporation of America, Vacuum Technology. Chicago. Illinois. May, 17.
- 2010 Elluminate Webconferencing Training. University of Wisconsin-Stout.
- 2009 Digimat Technology Days (materials software). Detroit Michigan
- 2004 Solidworks training classes at Symmetry Solutions Inc. Brooklyn Park MN.
- 2002 Bolt and Fastener Design. American Society of Mechanical Engineers. University of Wisconsin, Milwaukee.
- 2001 Governor’s Summit on Venture Capital. Madison Wisconsin.
- 2000 Hydraulic Circuit Design. Eaton Vickers Training Center, Detroit Michigan.

1998 Finance and Accounting for Nonfinancial Managers. Fred Prior Seminars, Eau Claire WI.

EDUCATION

<u>Ph.D. Candidate, Industrial and Systems Engineering, Auburn University</u>	2015
Dissertation (in progress): Additive Manufactured Hybrid Composites as a Lightweight Material.	
	1994
<u>ME. Manufacturing Systems Engineering, Auburn University</u>	
Thesis: Laser Heat Treatment of Low Carbon Steel to Examine the Effect on Fatigue Life from Residual Compressive Stresses at the Surface.	
	1992
<u>MS. Agricultural Engineering, Auburn University</u>	
Thesis: Machine Vision System to Measure Pine Seedlings.	
	1989
<u>BS. Agricultural Engineering, VA Polytechnic Institute & State University</u>	
	1984
<u>Journeyman of Machinery Installation, Virginia Apprenticeship Council</u>	

SERVICE

Service Outside of University of Wisconsin

2015 Technical review for Nazarbayev University through Oak Ridge Associated Universities. Prototype Development of an Industrial Manipulator Based Intelligent Assist System for Cooperative Assembly Tasks

2015 Technical review for Additive Manufacturing Journal. Quantitative analysis of surface profile in fused deposition modeling.

2014 Technical review for Nazarbayev University through Oak Ridge Associated Universities. Industrial Manipulator Based Intelligent Assist System for Cooperative Assembly Tasks

Red Cross Blood Donor

Service to Students

2015 Advisor -Society of Automotive Engineers, Student Chapter at UW-Stout

2015 Advisor - Intervarsity Christian Fellowship, Student Chapter at UW-Stout

2014 Reviewed - Lewis E. Brigman and Jake Pedretti - Barium Titanate and Barium Titanate/Aluminum Oxide Ceramics for Capacitors and Transducers

2011 Independent Study in Materials Engineering, Buğra M. Aç an from Ankara

Turkey

- 2011 River Falls Charter School, River Falls WI.
- 2010 First Lego League Robotics Competition at UW Stout
- 2009 First Lego League Robotics Competition, regional and state
- 2009 Advisor – Stout Trigger Guards
- 2005 Taught Solidworks one on one to Capstone students (after sabbatical)
- 2001 TEAMS Competition for High Schools (Event Coordinator)
- 1998-2000 Adviser to the Student Chapter of Society of Manufacturing Engineers
- 1998-2001 STEPS Camp
- Supervised and trained student lab assistants in our robot lab.

Service on Committees

- 2011 Chancellor's Task Force on Customized Instruction.
- Faculty Senate.
- Curriculum and Instruction Committee.
- Program Review Committee.
- Advisory Board for Engineering Technology.
- Program Advisory Board for Manufacturing Engineering.
- Served on several search and screen committees.
- Advisory Board for Stout Online
- ABET Accreditation Committee
- Personnel Committee, Chair
- Recruiting Committee
- Executive Committee

Service in Administration

- 2015 \$72,000 Gift in Kind, 26 seats of Simio software
- 2009 to 2012 Program Director for Master of Science in Manufacturing Engineering
- 2011 \$5000 Gift in Kind of Machine Vision Camera from Imperx
- 2010 M.S. Manufacturing Engineering Program Revision and Self Study Report

2008 \$16,930 Machine Vision Lenses from PPT Vision
2007 \$20,000 Gift in Kind of Robot from Phillips Plastics
2001 - 2003 Director of Small Business Incubator

Service in Laboratories

2015 Started the use of UW Stout fatigue tester to ASTM standards
2015 Designed, built, and tested new methods for demonstration of tensile testing.
2014 Designed, built, and calibrated instruments for a pendulum type impact tester
2013 Formed basic composites demonstrations.
2010 Equipment Loan Agreement with Atometric Inc. in Rockford Illinois.
2010 Specified, purchased, and installed new control system, frame, and enclosure for Denso robot.
2009 Equipment donation from Phillips Corporation, Denso Robot.
1998 Specified, purchased, and installed ABB robot.
Mentored the robot installation and training for academic staff and lab assistants.

PERSONAL INTERESTS

Outdoor Recreation

- Canoeing, hiking, and camping
- Landscaping
- Karate
- House remodeling
- Hunting and fishing

Family and Community Service

- Hobby farm, cookouts, bonfires.
- Bike rides, canoeing, and camping with my kids
- Special Olympics Wisconsin fundraising
- Service projects and Range Supervisor at our local public rifle range
- Red Cross Blood Donor