

EMAD Y. TANBOUR, Ph.D.

CURRICULUM VITAE

Professor and Chair of Mechanical Engineering
College of Engineering & Technology, School of Engineering, Eastern Michigan University
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SUMMARY

EMAD Dr. Emad Tanbour has more than 39 years combined experience in Mechanical Engineering Design in both academia and industry. His USA industry experience spans over 18 years in the areas of product development, mechanical and structural design, energy efficient appliances and sustainability, thermal systems design and engineering management. He is an expert researcher in industry and had been leading industry- academia funded research since 1997. Dr. Tanbour is an innovator with over 17 US pending and issued patents all of which resulted in products sold in North America. Most of his innovations are in the field of sustainable design of domestic and commercial appliances. Dr. Tanbour has advanced knowledge of computer aided engineering, CFD and computational mechanics. He is an expert user and trainer of computer aided design using solid modeling. He has conducted research in the areas of heat transfer, thermal-fluids, and energy systems and led many years of research and development projects in the interdisciplinary areas of Mechanical Engineering. He received his bachelor's degree in Mechanical Engineering and ranked third over his cohort and received full scholarship to pursue graduate studies towards his Ph.D. in Mechanical Engineering from the University of Iowa. During his studies at Iowa, Dr. Tanbour led the thermal design of all control circuits for NASA Cassini spacecraft that was launched to Saturn. Dr. Tanbour is the recipient of Arch T. Colwell Award from Society of Automotive Engineers and had served for five years as ABET industry consultant. He also received EMBA training courses at the University of Iowa.

Dr. Tanbour is the named inventor or co-inventor on many US patents all in the field of mechanical design of products and consumer products. Dr. Tanbour is an expert in mechanical design of products related to appliances and electromechanical systems. He has in-depth expertise in industry in the field of product design and development including office systems, hearth products, wire and harness connectors for office systems, energy systems design and development, solar energy integration with appliance systems. He also a named inventor jointly with Dr. Dado, the founder and owner of Eta Max, an award winning and successful company that supplies and installs solar PV systems for residential and commercial application in Jordan.

In August 2016, Dr. Tanbour Joined Eastern Michigan University, School of Engineering As professor and coordinator of the Mechanical Engineering program. Dr. Tanbour also assumed coordinator position for Mechanical Engineering Technology upon joining EMU until fall 2017 when he assumed coordinator position for the Graduate Program in Engineering Management. Dr. Tanbour is teaching undergraduate junior and senior courses in Mechanical Engineering and has taught dynamics for Mechanical Engineering Technology. He also teaches graduate courses in Engineering Management. Dr. Tanbour currently serves as program coordinator for both Mechanical Engineering and Master of Engineering Management Program. Dr. Tanbour teaches the thermal fluid lab for the undergraduate mechanical engineering program in the USA and in the joint college in China (Joint College of engineering between BGU-China and Eastern Michigan University). While teaching the thermal fluid lab, Dr. Tanbour developed a set of experimental engineering program that includes, heat transfer, fluid flow, and refrigeration and air-conditioning systems. Students learn hand on experience of conducting experiments in heat conduction, convection, fluid flow, fluid

statics, refrigeration cycles, refrigeration system evaporators, condensers and compressors among other thermal fluid experiments. Upon joining Eastern Michigan, Dr. Tanbour successfully designed and build a state of the art Virtual Reality (VR) lab. The VR lab consists of four-wall fully immersive active stereoscopic system that is 14ft by 14 ft floor plan. The VR lab successfully received funding from Ford Motor Company Fund. Dr. Tanbour is actively conducting research and teaching using the VR lab and is supervising doctoral and undergraduate students conducting research and development in the VR field. The VR lab is also utilized as a design review and visualization facility for senior capstone design students in the School of Engineering.

Dr. Tanbour also teaches thermodynamics for the mechanical engineering program at Eastern Michigan University as well as at the Joint College of Engineering in china. During his tenure, Dr. Tanbour developed mechanical engineering curriculum in thermodynamics where refrigeration cycles, power cycles and heat pumps are taught in his courses. Dr. Tanbour also was instrumental in developing the heating, refrigeration and thermal fluids lab for the Joint College with BGU China. In his leadership of the joint mechanical engineering program with BGU China, Dr. Tanbour established the curriculum and specified all the components of the thermal fluids lab including heat transfer experiments, refrigeration unit test stands, heat pump test stands, fluid flow experiments and other mechanical engineering labs. In Jan 2014, Dr. Tanbour joined Central Michigan University (CMU) as a visiting scholar and served as tenure track assistant professor of Mechanical Engineering Technology in the School of Engineering and Technology (SET) since July 2014. During his first year at Central Michigan University, Dr. Tanbour taught engineering mechanics courses for both Engineering and Engineering Technology majors, Thermodynamic for ME major, Applied Fluid Mechanics, Machine Design and Capstone Projects for Senior Engineering Technology cohort. He also served on the SET Graduate Committee where he led the process to develop the Assessment Plan for the new Master of Science in Engineering (voted as best assessment plan in the history of CMU-currently used as a benchmark for new programs at CMU). Dr. Tanbour built a state of the art Virtual Reality laboratory at CMU, which employed several undergraduate, and two graduate students from SET. He contributed to MET Assessment Committee and was serving as MET Program Coordinator. During the spring of 2015 and 2016, Dr. Tanbour taught the Senior Capstone Industrial Design course for all BSET graduating seniors where he managed to attract several externally sponsored design projects and supervised four internally sponsored ones. Details of some of these Projects are added at the end of this CV. Dr. Tanbour is active in research and has published and presented engineering conference papers, and many journal papers.

In 2009, Dr. Emad Tanbour joined Prince Mohammad Bin Fahd University (PMU) faculty of Mechanical Engineering. He has led the university's strategic plans to achieve total quality assurance. He also led the university's compliance system with ABET (USA), NCAAA (National) and SACS (USA) accreditation. Dr. Tanbour served in several leadership capacities at the university including his membership of the University Council reporting to the Board of Trustees. He was also a member of the Senior Management Group of PMU and has served as a member of the University Deans' Council. He served also as a member of the University IT Council. All such councils were chaired by PMU Rector. He was a member of the College of Engineering Council and served as Senior Advisor to the Rector on Accreditation and was promoted to Dean of Quality and Accreditation reporting directly to the Rector. As Dean of Quality and Accreditation, Dr. Tanbour managed PMU's readiness works to successfully receive NCAAA national accreditation in 2013 (Equivalent to US regional university accreditation such as HLC). During five years at PMU, Dr. Tanbour taught many Mechanical and General Engineering courses more notably, the capstone graduation design projects. Dr. Tanbour brings to his classroom real-life industry experience

especially in product design and development and interdisciplinary Mechanical Engineering. He was an instrumental member in the College of Engineering curriculum development committee for master's degrees in Mechanical Engineering and Energy Systems and has served for three years as member of the College Curriculum and Accreditation standing committee.

During 2005 to 2009, Dr. Tanbour managed product development engineering for Whirlpool and AO Smith-USA water heaters (a division of 45 engineers and technicians). He led the development of several energy efficient residential water heaters. He led the efforts to establish A O Smith Engineering Department in Nanjing china to design and produce water heaters to the Chinese market under A O smith brand and quality. While working with A O Smith-China, Dr. Tanbour led the design and sourcing of all the components of heat pump water heaters. He established suppliers for condensers, evaporators, rotary compressors and other heat pump/refrigeration system components and systems. Dr. Tanbour also visited plants that manufactured evaporators, condensers, rotary compressors and other heat pump/refrigeration system components and managed design aspects and engineering drawings and manufacturing drawings and assembly activities to produce the heat pump components. Dr. Tanbour also has industry experience in designing compact heat pump/refrigeration systems that are mounted on the storage tank-type water heaters. He was successful in developing the world first ultra- low NOX water heater and the production of many DOE-rated Energy Star power-vented water heaters. His experience included utilization of CFD and state of the art CAD deployment through the industry. He also established industry-largest development & reliability labs for residential water heaters at Whirlpool-AO Smith. While at Whirlpool, Dr. Tanbour maintained industry-academia collaboration with Clemson University, Virginia Tech and University of Tennessee, Knoxville. His engineering department in industry-hosted internship program with these three universities and was home for doctoral and graduate student engineering fellows from Clemson and University of Toledo. During 1997 to 2005, Dr. Tanbour worked as R&D senior manager at HNI Corporate Technical Center, the second largest manufacturer of office furniture and hearth systems in North America. He led R&D projects utilizing computational mechanics and founded the Hearth Lab at the corporate center. His 8 years at HNI included numerous industry-academia funded research projects and strong collaboration relationship with the University Of Iowa College Of Engineering and the Center for Computer Aided Design. During the same period, Dr. Tanbour was active in service in the State of Iowa where he served as Co-Chair to Advanced Technical Training at the Iowa Department of Economic Development and several industry-academia service capacities. During his service as Co-Chair of Advanced Tech Training in Iowa, Dr. Tanbour spearheaded the acquisition of a the first laser sintered 3D printing facility that was shared by three major industries in the state of Iowa-John Deere, Alcoa, and HNI (then Hon Industries). Dr. Tanbour continued to utilize 3D printing and additive manufacturing technologies in his industry experience as well as in academia. Dr. Tanbour is also key faculty affiliate of Additive Manufacturing Labs at Eastern Michigan University which are first in kind in terms of capabilities with the region of Eastern Michigan and Northern Ohio.

During 1993 to 1997, Dr. Tanbour was leading Gail Industry's high pressure pumps manufacturing where he successfully developed hydrostatic testing piston pumps and mud pumps for oil and gas operations in California and Texas.

Dr. Tanbour has proven teaching and research record. He served as adjunct assistant professor at the University of Iowa (2000 to 2005) teaching undergraduate and graduate Mechanical Engineering curriculum and as full time faculty (2009 to Present). He was principal investigator in several HNI - U of Iowa funded research projects. He managed to secure \$300,000 seed funding of the Virtual Reality lab jointly at HNI/Allsteel and U of Iowa. This seed funding attracted over \$18 million in research grants over the past 19 years to the Center for Computer Aided Design at Iowa where he is still an affiliate research scholar. His record of service and research is evident in the list of publications in

Thermo- Fluids and interdisciplinary Mechanical Engineering. Dr. Tanbour is still active in consulting projects for manufacturers in USA in the area of Mechanical Engineering design.

EDUCATION

Ph.D. in Mechanical Engineering

The University of Iowa, Iowa City, IA (1997)

M.Sc. in Mechanical Engineering

Jordan University of Science and Technology (1990)

B.Sc. in Mechanical Engineering

Jordan University of Science and Technology (1987)

EMBA, Executive MBA Program Training (courses only, no degree)

The University of Iowa, Iowa City, IA (2004-2005)

Courses completed: Managerial Economics, Managerial Accounting, Organizational Behavior, Data and Decision (Managerial Data, Decision and Statistical Analysis), Marketing Management, Human Resource Management and International Economic Environment of the Firm (Managerial Macroeconomics).

PROFESSIONAL EMPLOYMENT (MAJOR POSITIONS)

ACADEMIC APPOINTMENTS

Eastern Michigan University:

School of Engineering, College of Engineering & Technology

August 31, 2016 - Present:

- Full Professor of Mechanical Engineering
- Associate Professor (tenured and promoted July 2019), and Chair of Mechanical Engineering, School of Engineering and served as Acting Director of the School of Engineering.
- School of Engineering ABET Coordinator (Summer 2018-present)
- Supervisor and Founder of EMU Virtual Reality lab and affiliate faculty of the EMU Additive Manufacturing Labs.

Central Michigan University:

School of Engineering and Technology, College of Science and Technology.

Jan 2014 – August 15, 2016:

- Visiting Professor of Mechanical Engineering (Jan to Jun 2014)
- Tenure Track Assistant Professor of Mechanical Engineering Technology (July 2014-August 2016)
- Coordinator for MET Program
- Coordinator for the Master in Engineering Management Program.

Prince Mohammad Bin Fahd University (Al-Khubar, Saudi Arabia)

Aug 2009- Dec 2013 Dean of Quality and Accreditation and Professor of Mechanical Engineering

The University of Iowa, Iowa City, Iowa 52241, USA

2005-present Affiliate Research Scholar Center for Computer Aided Design

2000-2005 Adjunct Professor of Mechanical Engineering

1992-1997 Teaching/Research, College of Engineering, Department of Mechanical and Industrial Engineering

National College, Amman Jordan (Technical Community College)

1990-1992 Lecturer, Mechanical Engineering

Jordan University of Science & Technology, Irbid, Jordan

1987-1990 Teaching/Research Assistant. Taught and assisted in teaching undergraduate Mechanical Engineering classes including manufacturing processes, fluid mechanics lab, heat transfer lab, instrumentation lab, Engineering and Mechanical Engineering Drawing.

INDUSTRIAL/MANUFACTURING APPOINTMENTS

2019-Present: Expert Witness Experience:

- 1- A. O. Smith vs Bradford White: Patent infringement case: Result: Winning the case of my client and favorable judgement. Was deposed and testified in court.
- 2- SPG vs Evapco: IPR Case in the US Patent Office. Was deposed and outcome was winning the US Patent validation of my client's patent
- 3- Confidential Case: served as tech expert for a supplier of electric power shut-off connector device used in appliances. Case resulted in mediation process in favor of my client.
- 4- Marine Air Conditioning Units. A case currently concluded with a favorable determination to my client at the US-ITC involving compact self-contained marine air conditioning products. Was deposed and testified in ITC court.
- 5- A commercial icemaker. I served as the tech expert in the case representing the complainants. The case was concluded with a favorable determination to my client at the US-ITC involving ice making plate heat exchanger. Was deposed and testified in ITC court.
- 6- Intirion vs. College Products, a combination microwave-refrigerator case. This is an ongoing case. I was deposed twice in this case, once during validity and once in prep for further stages in the case.
- 7- A. O. Smith vs Rheem Manufacturing. I served as technical expert for this case serving A. O. Smith. The case is related to infringement of a patent that belongs to A. O. Smith related to fire-tube heat exchanger type water heater. This case is still in discovery stage.

- 8- Served as Tech Expert on ERICSSON INC. Petitioner v. PROCOMM INTERNATIONAL PTE. LTD. Patent Owner, Title: SYSTEMS AND METHODS FOR VENTURI FAN-ASSISTED COOLING. I represent Ericsson and I only filed a declaration for a petition for IPR so far. This case is going very slow and have not done any work on this case for over 2 year2.
- 9- Served as Tech Expert in Kason vs. RSG. An ongoing litigation.
- 10- Serving as Tech Expert in the case of Whirlpool vs. Samsung - Dishwasher case.

- 1993-1997 Director of Engineering
Gail Industries, Cedar Rapids, Iowa, USA
Manufacturer of high pressure pumps for hydraulic testing of pipelines
- 1997-2005 Senior R&D Manager
S. M. Howe Tech Center, HNI Corporation, Muscatine, Iowa, USA
Manufacturer of office system.
Experience in office product design and mechanical design of data cables and power supplies cables and harness connectors design for cubical work places and office workstations.
- 2005- 8/2009 Manager, Product Development Engineering
A.O. Smith Corporation, Water Product Company, Johnson City, Tennessee, USA
Second Largest Manufacturer of Residential and Commercial water Heaters and Heat Pump Water Heaters in North America with brands like Whirlpool and Sears Water Heaters.
Experience in product design of appliances, electrical power supply and adapters and housing for electronics, wire harness connectors and systems.

TEACHING EXPERIENCE

Eastern Michigan University

- EM 509 Engineering Project Management
- EM 649 Manufacturing Process Planning
- EM 520 Engineering Value and Economic Analysis
- EM 670: Design for Manufacture and Assembly
- ME 312: Dynamics
- ME 316: Thermodynamics
- ME 317: Fluid Mechanics
- ME 313: Mechanics of Materials
- ME 330: Machine Design
- ME 492: Senior Capstone I
- ME 493: Senior Capstone II
- MET 312: Applied Dynamics Principles

Central Michigan University

- IET 454 Machine Design
- IET 279 Applied Statics
- EGR 251 Engineering Statics

- IET 499 Industrial Projects Capstone
- EGR 356 Thermodynamics I
- IET 352 Applied Fluid Mechanics
- IET 501 Industrial Management (Graduate online)
- IET 524 Technology and the Environment (Graduate online)
- IET 680 Sustainability and Green Technology (Graduate online)

Prince Mohammad Bin Fahd University

- Fluid Mechanics
- Engineering Economy
- Power Generation
- Computer Aided Design (ME Senior year course)
- Mechanical Engineering Design I (Kinematics and dynamics of machinery)
- Mechanical Engineering Design II (Automatic control)
- Mechanical Engineering Design III (Machine Design)
- Assessment III (Mechanical Engineering Capstone Design Project)

The University of Iowa

Adjunct Faculty (2000-2005)

- Intermediate Thermodynamics (Graduate course)
- Dynamics
- Principles of Design 1 (Optimization)

Graduate Teaching Assistant (1992-1997)

- Thermodynamics 1
- Heat Transfer
- Fluid Mechanics
- Fluid Mechanics Lab
- Experimental Engineering

National College, Technical Community College

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| • Air-Conditioning Engineering | • Heat Transfer |
| • Refrigeration Technology | • Strength of Materials |
| • Service of HRA System | • Engineering Drawing |
| • Fluid Mechanics and Hydraulic Machinery | • Calculus for Engineers |
| • Engineering Mechanics, Statics and Dynamics | • Mechanical Engineering Drawing |

PUBLICATIONS

1. Kasim A. Korkmaz and Emad Y.H. Tanbour, Augmented Reality Technology for Highway, Presented by co-author Kasim Korkmaz at ICVARS 2018 held during February 24-26, 2018, in Brisbane, Australia, Paper ID : RS0018
2. Barry, Oumar Rafiou, Tanbour, Emadeddin Y., Vaja, Nitish Kumar, and Tanbour; Hesham, Asymmetric Aeolian vibration damper, USA Patent Office, Patent No.: US 9,948,081 B1, Date of Patent: Apr. 17, 2018. <http://www.freepatentsonline.com/9948081.html>
3. Emadeddin Y. Tanbour, Moh'd-Eslam Dahdolan, Mahmoud R. AlOmari, Oumar R. Barry, Characterization of Aerogel Based Thermal Insulation Blankets, Economics, and Applications for Domestic Water Heaters, Journal of Thermal Engineering, 4-5-July, 2018.

4. M. Bukhari, Oumar Barry and Emadeddin Tanbour, On the vibration analysis of power lines with moving dampers, Journal of Vibration and Control, Published July 4, 2017.
<http://journals.sagepub.com/doi/abs/10.1177/1077546317719194>
5. M. C. Greenfield, Emad Y. Tanbour, 2017, Gap Analysis of a Newly Developed Electrical Engineering Program using NCEES FE Exam, International Journal Of Engineering Research & Technology (IJERT) Volume 06, Issue 01 (January 2017).
6. Oumar Barry and Emadeddin Tanbour, Resonant Frequencies of Perforated Plates with Rectangular Slots, Journal of Mechanical Engineering Science, UK Institute of Mechanical Engineers, December 13, 2016, manuscript ID is JMES-16-0518.R1.
<http://journals.sagepub.com/doi/10.1177/0954406216683974>
7. Nitish Kumar Vaja, Oumar Barry, Emadeddin Y. Tanbour, On the Dynamic Modeling and Analysis of an Asymmetric Stockbridge Damper, Proceedings of the Sixth International Conference on Structural Engineering, Mechanics and Computation, Cape Town, South Africa, 5-7 September 2016. <https://www.crcpress.com/Insights-and-Innovations-in-Structural-Engineering-Mechanics-and-Computation/Zingoni/p/book/9781138029279>
8. M. Freund, E. Joubaneh, O. Barry and E. Tanbour, Study Of Vibration Of Electric Power Steering Systems Using A Continuous System Model. International Mechanical Engineering Congress and Exhibition, ASME IMECE 2017, November 3-9, 2017, Tampa, Florida, USA. <https://mail.google.com/mail/u/0/#search/barry1o%40cmich.edu/WhctKHTKgrdpWgzdWsfKGjggNldcqHgBhkZbdgLSQFwSPGnLRBfRDIJvQxMKDSMFMPZpKQ?projector=1&messagePartId=0.2>
9. N.K. Vaja, O.R. Barry, E.Y. Tanbour, On the Dynamic Modeling and Analysis of an Asymmetric Stockbridge Damper, Presented at SEMC 2016: The 6th International Conference on Structural Engineering, Mechanics and Computation, September 5-7, 2016, Cape Town, South Africa.
10. Emadeddin Y. Tanbour and Oumar R. Barry, Free Vibration of flame Arrestors: Theoretical and Numerical Analysis, submitted to AMSE Journal of Vibrations and Acoustics, September 2015
11. Emad Tanbour and Suleiman Ashur, Gap Analysis of Engineering Course Learning Outcomes using NCEES FE Exam, accepted for publication and presentations ASME 2015 International Mechanical Engineering Congress and Exposition, Huston, Texas Nov.13-19, 2015
12. Emadeddin Y. Tanbour, Molu Olumolade and Oumar R. Barry, Newly Introduced Capstone Design Course for Mechanical Engineering Technology – Lessons Learned From Two Cohorts and Two Types of Projects, presented at the 123rd ASEE Annual Conference & Exposition. June 26 - 29, 2016 New Orleans, LA
13. E. Y. Tanbour, Design Optimization and Frequency Analysis of Blast Resistant Doors for 30

G-Force Rating, Canadian Journal on Mechanical Sciences & Engineering, vol. 2, No. 7, November 2011, pp. 157 - 162

14. M. F. Alzoubi, E. Y. Tanbour and R. Al-Waked, Compression and Hysteresis Curves of Nonlinear Polyurethane Foams under Different Densities, Strain Rates and Different Environmental Conditions. Accepted for publication and will appear in: Proceedings of IMECE11 2011 ASME International Mechanical Engineering Congress & Exposition November 11-17, 2011, Denver, Colorado, USA
15. E. Y. Tanbour, "Institutional Effectiveness, The Point Of View Of Southern Association Of Colleges And Schools (SACS)," Presented in the conference of the Vice Rectors for Quality in Saudi Universities, King Saud University, February 27-28, 2011
16. Emad Y. Tanbour, Rafat Al-Waked and Mohamed F. Alzoubi, Experimental Study of a Waste Heat Recovery System for Supplemental Heater, *proceedings of 3rd International Conference on Energy and Sustainability*, 11 - 13 April 2011, Alicante, Spain
17. Ramin K. Rahmani, Anahita Ayasoufi, Emad Y. Tanbour and Hosein Molavi, "Enhancement of Temperature Blending in Convective Heat Transfer by Motionless Inserts With Variable Segment Length" *Journal of Thermal Science and Engineering Applications*, September 2010, Vol. 2
18. Ramin K. Rahmani, Emad Y. Tanbour, Anahita Ayasoufi and Hosein Molavi, "Enhancement of Convective Heat Transfer in Internal Compressible Flows by Stationary Inserts" *Journal of Thermal Science and Engineering Applications* MARCH 2010, Vol. 2
19. Emad Y. Tanbour, Ramin K. Rahmani and Anahita Ayasoufi (2009), "Large-Eddy Simulation of Turbulent Flow Through Small Gage Gas Appliance Orifice," *Proceedings of IMECE 2009, 2009 ASME International Mechanical Engineering and Exposition*, November 13-19, 2009, Lake Buena Vista, Florida, USA
20. Emad Y. Tanbour and Ramin K. Rahmani, (2009), "Enhancement of Temperature Blending in Convective Heat Transfer by Motionless Inserts with Variable Segment Length," *Proceedings of IMECE 2009, 2009 ASME International Mechanical Engineering and Exposition*, November 13-19, 2009, Lake Buena Vista, Florida, USA
21. Emad Y. Tanbour and Ramin K. Rahmani, (2009), "A Numerical Study of The Thermal Performance of Two Stationary Insert Design in Internal Compressible Flow," *Proceedings of 2009 ASME Summer Heat Transfer Conference, HT2009*, July 19-23, 2009, San Francisco, Ca, USA
22. Emad Y. Tanbour and Ramin K. Rahmani, (2008), "Enhancement Of Natural Convection Heat Transfer Rate In Internal Compressible Flows By Inserting Stationary Inserts," *Proceedings of 2008 ASME Summer Heat Transfer Conference, HT2008*, August 10-14, 2008, Jacksonville, Florida USA
23. Emad Y. Tanbour and Ramin K. Rahmani, (2008), "Experimental Study Of Convective Heat Transfer In A Vertical Pipe With Stationary Inserts," *Proceedings of 2008 ASME Summer Heat Transfer Conference, HT2008*, August 10-14, 2008, Jacksonville, Florida USA

24. K. Abdel-Malek, J. Yang, R. Brand, M. Vannier, and E. Tanbour. Towards understanding the workspace of human limbs. *International Journal of Ergonomics*, Oct 22, 2004; 47(13): pp. 1386-1405
25. Butler, P. B., Tanbour, E., Rahman, S., and Smith, T. F., "Virtual International Design Teams," Proceedings of 2002 ASEE Midwest Section Meeting, Madison, WI, September 2002
26. Abdel-Malek, K., Yang, J., Brand, R., and Tanbour, E., (2002), "Towards Understanding the Workspace of The Upper Extremities," 2001 SAE Transactions, *Journal of Passenger Cars: Mechanical Systems*, Vol. 110, Section 6, pages 2198-2206.
27. Mi, Z., Kim, J., and Abdel-Malek, K., Nebel, K., Tanbour, E., "Optimization Based Posture Prediction," Seventh International Symposium on the 3-D Analysis of Human Movement, Newcastle, United Kingdom, July 10 - 12 2002
28. Abdel-Malek, K., Yang, J., Brand, R., and Tanbour, E., "Towards Understanding the Workspace of the Upper Extremities," *Proceedings of SAE Digital Human Modeling for Design and Engineering*, 2001-01-2095, June 26-28, Arlington, VA, USA. [2001 Arch T. Colwell Merit Best Paper Award]
29. Abdel-Malek, K., Yu, W., Tanbour, E., Jaber, M., (2001), "Posture Prediction versus Inverse Kinematics," *Proceedings of the ASME 27th Design Automation Conference*, 2001 ASME Design Engineering Technical Conferences, Pittsburgh, Pennsylvania, U.S.A. September 9-12, 2001
30. K. Abdel-Malek, Y. Wei and E. Tanbour, "Inverse Kinematics using Cost Functions," IASTED International Conference, Robotics and Manufacturing (RM 2001), Cancun, Mexico, May 2001
31. Tanbour, E. Y., and Ahmarow, M. E., "Design and Optimization of Fire-tube Boilers for Large Dairy Processing Plants," Caroline Dairy Company, Amman, Jordan, Final Report, ME Department, Yarmouk University, Irbid Jordan, 1987.
32. Tanbour, E. Y. and Ahmarow, M. E., "Design Calculations for Cooling Systems of Industrial Gas Turbines," ME final Report, Yarmouk University, Irbid, Jordan, 1987.
33. Tanbour, E. Y., "Pressure Distribution on Rotating Cylinders in Cross Flows," ME final Report, Graduation Project, ME department, Jordan University of Science and Technology, Irbid, Jordan, 1987.
34. Tanbour, E. Y., "Design and manufacturing of new pressure measurement mechanism on rotating bodies in cross flows," Final Report, ME Department, Jordan University of Science and Technologies, Irbid, Jordan, 1988.
35. Tanbour, E. Y., "Wind Energy in Jordan," Department of Energy, Jordan, and Jordan University of Science and Technology, Irbid, Jordan, 1989. Project was funded by United Nations
36. Tanbour, E. Y., "Heat Transfer to Gas-Solid Suspension Flows in Vertical Pipes," M.S. Thesis, Jordan University of Science and Technologies, Irbid, Jordan, 1990.
37. Tanbour, E. Y., "Modeling non-isothermal multiphase-multicomponent flow and transport in porous media using the two phase mixture approach," Ph.D. Thesis, The University of Iowa,

Iowa City, Iowa, USA, 1997.

38. Tanbour, E. Y., “Modeling spillage from an open door gas fired fire place using ANSYS Flotran module,” Final Report - HNI Corporation, Muscatine, Iowa, USA, 2001
39. Tanbour, E. Y., “CFD and Heat Transfer Simulation of flow in co-axial elbows with internal baffles. Application to venting of zero-clearance fireplace chimney pipes.” Hearth and Home Inc., Lakeville, MN, USA, 2000
40. Tanbour, E. Y., Ryan B. and Smith, T., “*Development of a Waste Heat Recovery Heat Exchanger for Supplemental Heaters*,” Technical Report ME-01-002, Department of Mechanical Engineering, The University of Iowa, Iowa City, Iowa, 52242, USA, Feb. 2001
41. Tanbour, E. Y., Hu, J. and Smith T., “*Waste Heat Recovery Heat Exchanger for Supplemental Heaters*,” Technical Report ME-01-006, Department of Mechanical Engineering, The University of Iowa, Iowa City, Iowa, 52242, USA, July 2001
42. Tanbour, E. Y., Yu, X. and Smith, T., “*Literature Review of Flexible and Adaptive HVAC Distribution Systems for Office Buildings*,” Technical Report ME-01-005, Department of Mechanical Engineering, The University of Iowa, Iowa City, Iowa, 52242, USA, July 2001
43. Tanbour, E. Y., “Prince M. Bin Fahd University, Strategic Plan for National Commission for Academic Accreditation and Assessment”. August 2009
44. Tanbour, E. Y., “Prince M. Bin Fahd University, College of Engineering Strategic Plan for ABET Accreditation”. August, 2009 to February 2011
45. Tanbour, E. Y., “Prince M. Bin Fahd University, College of Engineering Academic Catalog, Revision”. August, 2009 continuing
46. Tanbour, E. Y., “Prince M. Bin Fahd University, Strategic Plan for (Sothern Association of Colleges and Schools) SACS Accreditation”. August, 2009 continuing.
47. Tanbour, E. Y. (Joint author with Professor Jamal Nayfeh, Dean of College of Engineering),” Master of Science in Mechanical Engineering, Program Specifications, Courses Specification and Syllabi in compliance with National Commission for Academic Accreditation and Assessment (NCAAA). Prince M. Bin Fahd University, December 2011.
48. Tanbour, E. Y. (Joint author with Professor Jamal Nayfeh, Dean of College of Engineering),” Master of Science in Energy Systems Engineering, Program Specifications, Courses Specification and Syllabi in compliance with NCAAA. Prince M. Bin Fahd University, December 2011.
49. Tanbour, E. Y. (contributing author with Professor Jamal Nayfeh, Dean of College of Engineering),” Master of Science in Electrical Engineering, Program Specifications, Courses Specification and Syllabi in compliance with NCAAA. Prince M. Bin Fahd University, December 2011.

USA AND INTERNATIONAL PATENTS

Total 11+ issued and pending patents and a total of 17+ prior arts and patents:

No.	US Patent Ref. Number	Patent Title
1	US 2019/0145507 A1	Slider-Crank Mechanism For Eliminating Side Forces
2	D607094	Air Intake For A Water Heater
3	US20090308332	Water Heater With Forced Draft Air Inlet
4	US20100065203	Sealable Water Heater Manifold Doors
5	D614680	Sight Glass And Frame
6	US20100101510	Water Heaters With Sealed Door Assembly
7	US20100154724	Water Heater Burner Tube And Door Assembly
8	8490580	Water Heaters With Sealed Door Assembly
9	US20100101508	Water Heaters With Sealed Door Assembly
10	US20130284118	Water Heaters With Sealed Door Assembly
11	US20100101509	Water Heaters With Sealed Door Assemblies
12	US20100101507	Water Heaters With Fuel Line And Door Assembly
13	8596226	Water Heater Burner Tube And Door Assembly
14	US20090084328	Water Heaters With Combustion Air Inlet
15	US20040011348	Apparatus And Method For Cooling A Surface Of A Fireplace
16	6848441	Apparatus And Method For Cooling A Surface Of A Fireplace
17	9,948,081	Asymmetric Aeolian Vibration Damper

COMPUTING AND CAD SKILLS

CAD: Advanced in: SolidWorks (2005-present), PRO/ENGINEER (CREO 1995-2005), PolyWorks (2016-Present). Working experience in AutoCAD, Inventor, Bentley and Revit.

SIMULATION: Advanced in: SolidWorks Simulation (SimulationWorks), Lab View (Core 1 and Core 2 certified, National Instruments® 2011), Unity 3D and Middle VR

FEA: **ANSYS (1996-present)**, SimulationWorks (2005-present), Cosmos Works (2005-2009), PRO/MECHANICA (1997-2005)

CFD: ANSYS-FLOTTRAN (1997) and ANSYS (Fluent) (2003-present)

PROGRAMMING: FORTRAN Programming 1984-present

MICROSOFT: Microsoft Office (Word, Excel, Power Point, Outlook and Visio), Microsoft Project (1997-present)

MANAGEMENT: Product Data Management (PDM), PDM Works, Enterprise Software, production mainframe software, strategic planning and implementation.

MANAGERIAL FINANCE:

Advanced practical experience in financial analysis for project management and departmental budgeting and planning. Completed Advanced Financial Analysis Executive MBA course work with Professor

John Spitzer, Senior Analyst-Board of Governors, Federal Reserve, at the University Of Iowa-Tippie School of Business.

LEARNING (LMS): Blackboard®, SMART Notebook for SMART interactive whiteboard, Banner (Academic ERP system)

Panopto® for online course development and delivery

Wiley Plus® by Wiley, McGraw-Hill Connect® and Pearson Mastering Engineering ®

CANVAS: 2016-present: self-trained-Using Canvas on all my online and in-class courses

OTHERS: Certified Training on FARO® Arm Laser Scanner (2016), 3DSTUDIO MAX, Maya and LaTeX® (introductory)

PROFESSIONAL ACTIVITIES AND CERTIFICATIONS

LICENSES AND OTHER TRAINING

- Engineer-in-Training State of Iowa, 1998
- Certificate of Completion: Failure Mode and Effect Analysis
- Apples and Oranges (Corporate Finance Training)

ACTIVE MEMBERSHIP

- Member of the founding body at Aramco Combustion Institute - Chapter, 2010-present
- Professional Member of the American Society of Metals (ASM), 2004-present.
- Member of Combustion Institute, 1998-present.
- Member of the American Society of Mechanical Engineers (ASME) 1992-present.
- Member of Jordan Society of Engineers, Mechanical Engineering, 1987-present.
- Member of the Pioneers' Committee, American Institute of Sustainable Science and Technology, UI Oakdale Research Campus, Iowa City, Iowa, 1999-present
- Member of the Advisory Board of the Digital Human Lab-Center for Computer Aided Design (CCAD), The University of Iowa, Iowa City, Iowa, 2000-present

CERTIFICATION

- OSHA Certified Safety Manager, 2001-present.
- First Aid Certified, American Red Cross 1999-present.
- CPR Certified, American Red Cross 1999-present.

HONORS & AWARDS

- *Arch T. Colwell Merit Award*, Society of Automotive Engineers (SAE) USA:

Author of best paper voted among over 3000 papers in the field of dynamics and ergonomics in the proceedings of SAE.

- **Ph.D. Scholarship Award**, Jordan University of Science and Technology, 1992-1997.
- **Teaching/Research assistantship**, 1990-1997 through M.Sc. and Ph.D. programs.
(This was concurrent with my Ph.D. Scholarship Award from Jordan University of Science and Technology)

SERVICE ACTIVITIES

Eastern Michigan University, Mt. Pleasant, Michigan, USA

- Serving as Program Coordinator for Mechanical Engineering Technology, starting the fall of 2016 until Fall 2018
- Serving as Program Coordinator for Mechanical Engineering, starting the fall of 2017
- Serving as Program Coordinator for Master of Engineering Management, starting the fall of 2017
- Representing CET at the University Budget Council, Eastern Michigan University-Faculty Senate, 2-years Appointment (2016-2018) - Still serving as alternate member.
- Serving member of the SET Strategic Planning committee, 2016-2018 cycle
- Serving member SET Finance Committee, 2016-2018 cycle
- Serving member School of Engineering Personnel Committee (2018-present)
- Serving member College of Engineering and Technology Assessment Committee (2018-present)
- Serving member of Faculty Council, College of Engineering and Technology (2018-present)
- ABET coordinator for SE (Summer 2018-present)
- Chaired faculty search committee for Mechanical Engineering resulted in hiring Dr. Andrew Mansfield
- Served as member of search committee for Information Assurance

Central Michigan University, Mt. Pleasant, Michigan, USA

Served as Program Coordinator for MET starting the fall of 2015 - Summer 2016

Served as Member of the MET Assessment Committee

Served in the School of Engineering and Technology Graduate Committee September 2014 until present. In charge of developing the assessment plan for the MSE program. Presented the assessment plan to the CMU Assessment Council

Assisted SET in the preparation for ABET accreditation visit for the Mechanical Engineering Technology Program.

Conducted semester-long weekly training session on SolidWorks for Graduating Cohort of

MET students (Spring 2014 and Spring 2016)

Conducted semester-long weekly training session on SolidWorks for MET and ME Sophomore students (Fall 2014)

Conducted Weekly training session on SolidWorks for CMU-Art Department Faculty and Students (Fall 2014)

Served in search committee resulted in hiring Dr. Oumar Barry and Dr. Ernur Karadogan for the MET program.

Prince M. Bin Fahd University, KSA

- 1) Department of Mechanical Engineering
 - Member of Curriculum Review Committee, 2009-2013
 - Member, Assessment Committee, 2009-2013.
- 2) College of Engineering
 - Member of College of Engineering Council, 2009-2013
- 3) University
 - Member of University Council, 2010-2013.
 - Member of Senior Management Board, 2009-2013.
 - Member of several University-wide committees in Quality, Accreditation, Internationalization and Research, 2009-2013
 - Director of Quality Center and Institutional Relations, 2010
 - Member of Rector's advisory committee, 2010-2013

Department of Economic Development, State of Iowa, USA

- Co-Chair, Advanced Technology Board, 1999-2001

University of Iowa: Center for Computer Aided Design, Iowa City, Iowa, USA

- Member of the Advisory Board, 2001-present

ABET, Accreditation Board of Engineering and Technology, USA

- Industry Consultant, 2000-2005-Worked closely with Dr. George Peterson, ABET Emeritus President. Continuing to work with Dr. Peterson during his international accreditation activities.

Conferences and Processional Meetings

- Chair of "Practical Combustion" session of the Combustion Institute, George Washington University, Washington DC 1998
- Session Chair, Engineering Criteria 2000 workshop of ABET

EC2000, Accreditation Board of Engineering and Technology, Newton, Iowa, Sept. 23-24, 2000 – This workshop was funded by Maytag Corporation.

- Keynote Speaker, Davinci Conference, Iowa Department of Economic Development, Des Moines, Iowa Feb 2001

Habitat for Humanity

- Volunteer Home Builder, Muscatine, Iowa 1998.

TALKS, SEMINARS AND PRESENTATIONS:

1. **Emad Tanbour**, The Faculty Forum Seminar on Sunday “Computer Aided Engineering,” Sunday, December 20, 2009, Learning Resource Center Room, Prince M. Bin Fahd University, Al-Khobar, KSA
2. **Emad Tanbour**, Al-Zamil Company: Design of Quick-Connect floor-to-wall partition system for Saudi Aramco, 2011
3. **Emad Tanbour**, Design of Penstock and Sluice Gates Using SolidWorks and SolidWorks Simulation®, Presentation to Al-Kuhaimi Metal Industries, Special Projects Division, Second Industrial City, Dammam, KSA, Feb 5, 2011
4. **Emad Tanbour**, “Overview of Prince M. Bin Fahd University and an Update on Accreditation Projects,” A Short lecture presented to the Annual Meeting of Vice Rectors for Quality and Development in Saudi Universities, King Saud University, Riyadh, KSA, Feb, 27, 2011
5. **Emad Tanbour**, Eight introductory workshops on “Requirements of National Commission for Academic Accreditation and Assessment,” presented to Faculty of All departments at Prince M. Bin Fahd University during Spring 2010 and Fall, 2010/2011
6. Represented Prince M. Bin Fahd University (PMU) during the Summer Annual Conference of Accreditation Board of Engineering and Technology (ABET) during the Month of July 2011 in Washington DC, USA
7. Attended 20-hours Workshop on Business Planning at Saudi Aramco During the Month of October 2011
8. Represented PMU in the pre-applicant workshop for Southern Association of Colleges and Schools (SACS), held in Decatur, Georgia, USA, April 2010

HIGHLIGHTS OF DESIGN AND MANUFACTURING EXPERIENCE

Energy Systems Experience

- Over 19 years of experience managing cross-functional teams of product development engineering, serving residential energy efficient fireplaces, stoves, water heaters (Gas fired, wood fired and Electric).
- Development of new generation of FVIR (flammable vapor ignition resistant) Water Heaters.

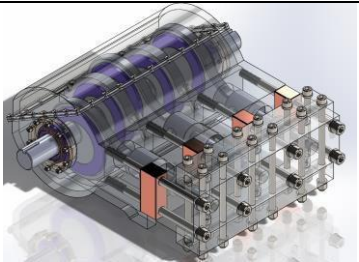
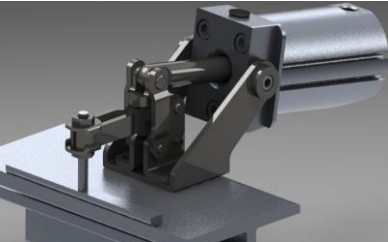
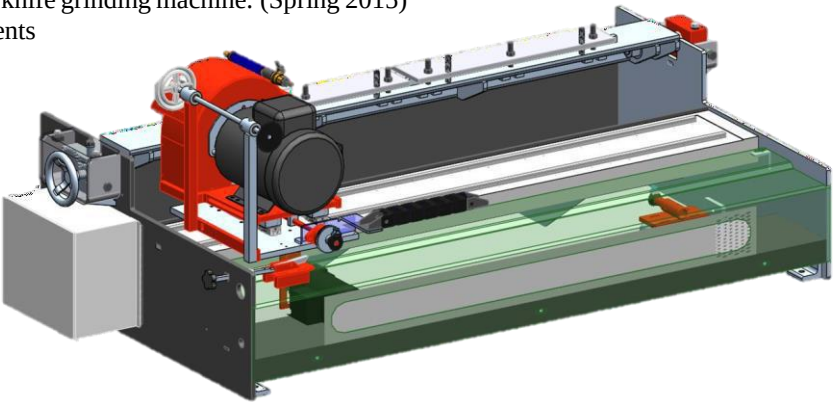
- Experience in developing and manufacturing of Power-Vented residential water heaters and methods of improved combustion.
- Managed and implemented the production of the world first Ultra Low NOX residential water heater compliant to California, USA emission requirements.
- Managed and designed a high efficiency Combustion Water Heater.US DOE designated Energy Star ® water heater.
- Developed a patented combustion air diverting system for power vented residential water heaters. System is in production and successfully achieved cost effectiveness and performance improvement goals. System was recently qualified for the Department of Energy program of Energy Star designation for meeting high energy factor required for water heating equipment.
- Managed and implemented into production the Energy-Smart Gas® water heater. An intelligent gas water heater that utilizes control algorithms enabling water heaters to adapt to household hot water consumption pattern. This product is in production and is sold under Whirlpool Brand throughout North America.
- Designed and implemented into production a new manifold door and burner assemblies for sealed combustion flammable vapor resistant water heaters.
- Thermal Analyst, NASA Cassini Space Mission to Saturn, Physics Department, The Univ. of Iowa, Iowa City, Iowa (1993-1996)

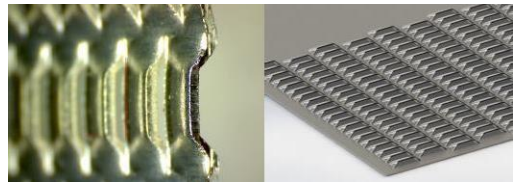
Interdisciplinary Mechanical Engineering Experience:

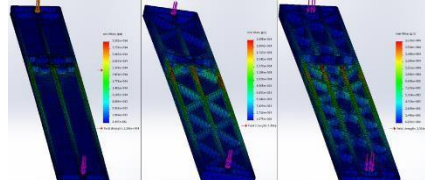
- Seating design, seating mechanism design, seating structural optimization, seating comfort and ergonomics applications in seating. Major seating projects: Allsteel #19 Chair ® (award winning signature product) and Allsteel Sum® Chair (award winning ergonomic signature office product).
- Storage systems design and sheet-metal applications in office storage systems. Alternative materials for office furniture.
- Office system design and development. Major projects: Allsteel Concensys®, Terrace 2.6, Reach and HON Initiate systems. Projects included design and development of wire harness connectors and power supply wire management systems for office furniture and cubicle systems.
- Finite Element Analysis of seating, storage and office systems.
- Acoustics testing and optimization of office systems.
- Material development and inventiveness for green buildings of the future. A major project to utilize sustainable and renewable natural fiber to develop paneling alternative materials for construction applications. This panel system is in production since 2005.

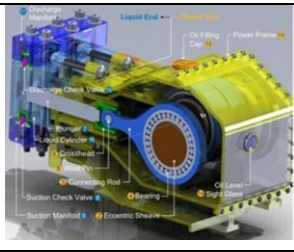
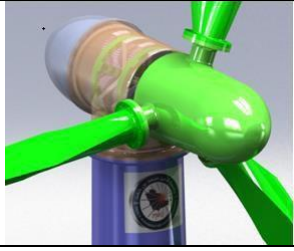
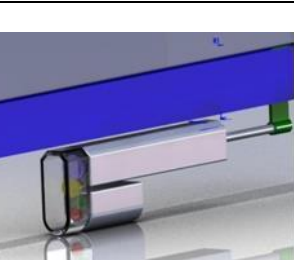
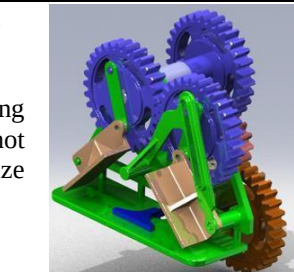
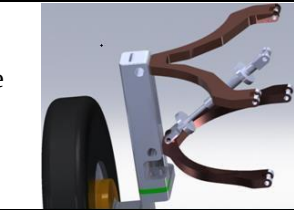
SELECTED SENIOR CAPSTONE PROJECTS SUPERVISED

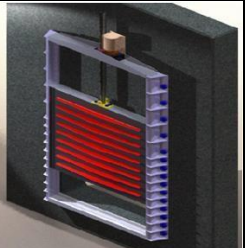
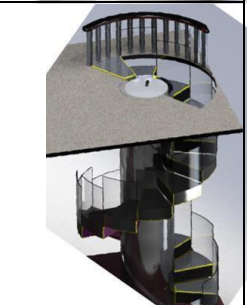
I have utilized my solid industrial background in senior design courses. The following are samples of students' designs:

Project title	Presentation
1. CMU- Morbark Corporation, Winn, MI, Design of Robotic Welding Fixture for Morbark Boxer Ride-on earth movement machines. Spring 2016	
2. CMU- Gail Industries, Cedar Rapids, Iowa, Design and rapid prototyping of bearing-size-driven triplex plunger pump, Spring 2016	
3. CMU- Vantage Plastics, Standish, MI, Design and testing of toggle mechanism clamping system for rotary thermoforming process, Spring 2016	
4. CMU- SAE Baja and SAE Formula team (co- advised with Oumar Barry), Spring 2016	
5. CMU - Redesign of Morbark knife grinding machine. (Spring 2015) Senior MET and IET senior students	
6. CMU - Reverse Engineering of Flame Traps used in flammable vapor resistant water heaters – Sponsored by A. O. Smith – Milwaukee, WI (Spring 2015) 5- MET and IET senior students	

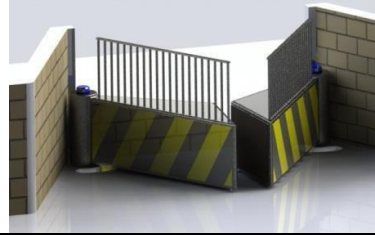


<p>7. CMU - Converting machined steel office furniture components into die cast aluminum design and simulation of failure. Sponsored by Valley Design – Iowa (In progress)</p>	<p>2 MET senior students</p>	
<p>8. CMU Baja Project: Redesign and building of new suspension system (Spring 2015 – In progress)</p>	<p>5 MET and IET senior students</p>	
<p>9. CMU Formula One Car: Redesign and manufacturing of the differential system for Formula One car. (Spring 2015 – In progress)</p>	<p>5- MET and IET senior students</p>	

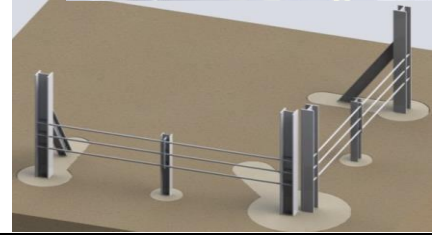
<p>10. Design of High Pressure Triplex Pump, Spring 2010</p> <p>Objective: Students to design a triplex plunger pump to be used for high pressure washing in a country where fresh water is not abundant. The team to come up with a crank shaft design concept that does not need forging which is not widely available in the country.</p>	
<p>11. Design of a 30 KW Wind Turbine, Spring 2010</p> <p>Objective: Students to design a 30 kW wind turbine to generate electricity in rural farms of eastern province of the country utilizing the Shemal wind corridor of continuous 7 m/s wind across the half-moon bay area of the country.</p>	
<p>12. Single Passenger Solar Car, Spring 2010</p> <p>Objective: Students to design a single passenger solar car frame that can reach 25 km/hr. speed.</p>	
<p>13. Design of Highway Sand Scoop, Fall 2010</p> <p>Objective: Students to design implement that can be hooked to power-take-off drive of an off-road vehicle to scoop drifted sand from highways in the Gulf countries</p>	
<p>14. Design of Rain/Dust storm-sensitive window, Fall 2010</p> <p>Objective: Students to design a mechanism driven by linear actuator and sensors to automatically shut windows upon rain or sand storms.</p>	
<p>15. Design of Aluminum Can Crushing Mechanism for recycling beverage cans, Fall 2010</p> <p>Objective: Students to design a compaction mechanism that is capable of crushing aluminum beverage cans for purposes of recycling in a country where recycling is not widely utilized. Design animation was utilized to optimize and synchronize compaction and ejection mechanisms.</p>	
<p>16. Design of Solar Car II, Spring 2011</p> <p>Objective: This is a continuation to Spring 2010 solar car project. Students to enhance suspension system of the solar car frame and to design a light weight body.</p>	

<p>17. Design of a 4m² Penstock-Dam Door, Spring 2011</p> <p>Objective: Students to utilize fluid statics along with mechanical engineering design knowledge to design a remotely operated penstock dam-door (sluicgate). This project was aimed at using such gates to control flash flooding and prevent catastrophic cases repeated at the second largest city in the country (Jeddah)</p>	
<p>18. Design of a New Concept Wheelchair, Spring 2011</p> <p>Objective: Students to design a new concept wheelchair where ratchet-driven wheels are replacing traditional wheel operated chairs. The project was led by one of senior students whose father is handicapped and received excellent sponsorship from a local manufacturer who is conducting feasibility studies on the design outcome.</p>	
<p>19. Design of a Date-Picking elevator, Spring 2011</p> <p>Objective: Students to design an elevator to be used to harvest and serve palm trees in Al-Hasa oasis region (12 million palm trees). The aim is to expedite harvesting and improve safe handling of dates done manually most of the time. The elevator to be easy to operate using hydraulic actuators and maneuvered via farm tractors.</p>	
<p>20. Design of a Spiral Escalator, Spring 2011</p> <p>Objective: Students to design and virtually prototype a spiral escalator system to be used in application where space is limited.</p>	
<p>21. Design of a Low Cost Hospital Bed, fall 2012: Students to design a low cost hospital be to be used in the field hospitals serving in disaster areas.</p>	
<p>22. Design of a truck-mounted Date Harvesting Implement, fall 2012: Students to design implement that can be mounted on a flatbed truck to be used to harvest dates from palm trees.</p>	

23. Design of a road blocker, fall 2012: Students design a road blocker used to prevent unauthorized vehicles from entering high security areas.



24. Design of a Crash Resistant Fence, Fall 2012: Students designed a crash resistant fence according to US Department of State requirements to prevent crashing of hostile vehicles intruding into industrial, petrochemical and defense installations.



25. Characterization of drive belt tensioner for Ford Company. Team of four senior Mechanical engineering students.



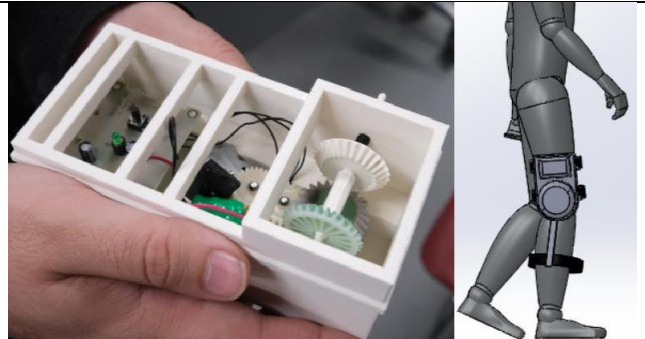
26. Design and build of a lifting walker. Team of four Mechanical Engineering Seniors.



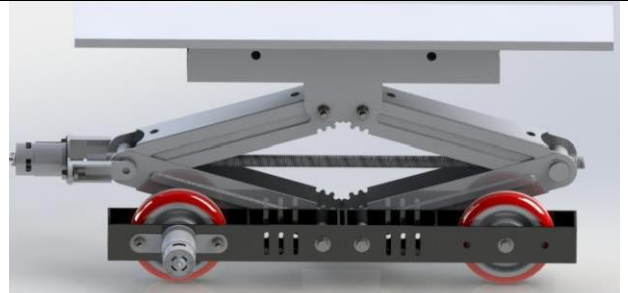
27. Design and build of a drone mounted gutter cleaner. Team of three senior Mechanical Engineering students.



28. Design and build of a wearable charging system.



29. Design and build of Under-Vehicle Parallel Parking System (UVPPI). Team of 4-Senior ME students.



30. Design and build of a surf-wave generator mounted on a surf boat.



ASSESSMENT & QUALITY IN HIGHER EDUCATION (HIGHLIGHTS):

- Currently serving as member of the Graduate Committee of the School of Engineering and Technology, Central Michigan University. I was in charge of developing the Assessment plan for the newly developed Master of Science in Engineering planned to start fall 2015.
- Currently serving in the MET Assessment Committee which is focused on improving program level and course level assessment for the MET program as well as prepare for the readiness to ABET ETAC Commission accreditation
- Served for 5 Years in the State of Iowa, USA as industry consultant to ABET (Accreditation board of Engineering and Technology). Chaired training sessions on ABET criteria in the State of Iowa.
- Designed and implemented ABET readiness program for the college of engineering (Mechanical, civil and electrical engineering)
- Strong experience in outcome-based assessment, curriculum development and course/program specification to comply with accreditation standards.
- 14+ Years' experience leading strategic implementation of ABET, NCAAA and SACS compliance at Prince M. Bin Fahd University (PMU) (NCAAA is National Commission for Academic Accreditation & Assessment). Trained university-wide faculty and staff on NCAAA protocol. Developed strategic plans to comply with NCAAA and is leading the process to Quality and Accreditation at PMU

DETAILED INDUSTRIAL EXPERIENCE

1. (1988-1989) **Technical Support Engineer**, Dar-Al-Riyadh Engineering, Dhahran. Conducted field-training sessions for customers on instrumentations and gas detection equipment. Held weekly seminars at customer locations on gas detection technology, maintenance and operation of various gas detection instruments. Collaborated with manufacturers of equipment to enhance, develop and troubleshoot gas detection equipment.
2. (1993-1997) **Director of Engineering**, Gail Industries, Cedar Rapids, Iowa, USA. Managed the engineering department of Gail Industries, a major manufacturer of light weight, energy efficient high-pressure triplex pumps. Implemented CAD introduction and applied CAM to three new generation high-pressure light weight pumps. Top-down designed and managed the launch of Model 10000 and Model 20000 high-pressure triplex pumps for oil drilling applications. Designed a new-concept injection pump for the use in process applications. Designed and managed the manufacturing of 500hp mud pumps (Gail model 80) for the use in oil-well service applications and oil drilling industry in Bakersfield, California. Model 80 is a light weight and high efficiency family of mud pumps designed for helicopter delivered pumps for offshore oil drilling applications.
3. (1997-2005) **Senior Project Manager (R&D)**, HNI Technologies, Stanley M. Howe Technical Center. Muscatine, Iowa, USA. Managing research and development projects for six company divisions (Allsteel[®], Hon Company[®], Gunlocke[®], Maxon[®], Quadra Fire[®], Heat-N-Glo[®] and Heatilator[®])
4. (2005-2009): **Manager, Product Development Engineering**, A. O. Smith Corporation, Johnson City, Tennessee, USA. A. O. Smith is the second largest manufacturer of residential and commercial high efficiency energy star[®] water heaters in North America with global operations in USA, Mexico, Canada, Europe and China. I was managing the product development engineering department for residential water heater division. My department group is responsible for designing new water heaters and improvement/development projects for existing water heating technologies. The department is responsible for providing design and engineering leadership to 4.5 million residential water heating products produced annually across the globe. The group employs the state of the art experimental lab and cutting edge computational fluid dynamics and computational mechanics techniques. Computer Aided Design and CAM is fully deployed for all product platforms. Company produces energy star[®] water heaters for industry under the brand names of Whirlpool[®], A. O. Smith[®], State[®] and American Water Heaters[®] and other brands. A. O. Smith is a mid-cap blue chip company with annual revenue of over \$2.3 Billion

CAREER EXPERTISE AND SKILLS

<i>Technical</i>	<i>Industrial, Business & Management</i>
<ul style="list-style-type: none"> • Design and Product Development • Failure Mode and Effect Analysis (FMEA) • Engineering Change Request/Notice (ECN/ECR) • Sheet Metal Forming and Production Processes • Additive Manufacturing • Laser sintered 3D Printing • Manufacturing Engineering • Finite Element Analysis: Structural and Thermal/Fluids applications. • Computational Fluid Dynamics • Virtual Reality Engineering Applications • Digital Human Modeling • Alternative materials/sustainability • Engineering Education • Computer Aided Design/Consumer Products • Engineering mechanics and materials • Industrial Applications of Thermo-fluids • Data and Decision (Statistical Analysis) 	<ul style="list-style-type: none"> • Design and Manuf. Of Mud Pumps • Project Management • Managerial Financial Analysis • R&D Project Management • Strategic planning, Institution Building • New product end user research • Engineering-Marketing interfacing • Presentation/public speaking • Competitive strategies/cost effectiveness • Product launch and introduction • Business negotiation skills • Coaching/Mentoring and training • Organizational Behavior • Engineering/Business supervision • Managing product development cross-functional teams • GD&T ASME Y14.5-2009 revision

MAJOR CONSULTING EXPERIENCE:

1. Energy and sustainability assessment of thermoforming machines, Vantage Plastics, Standish, MI, Summer 2016
2. Design of Vibration Testing Platform for ISTA standards shipping testing, Vantage Plastics, Standish, MI, summer 2016
3. Design of heat transfer enhancement baffle system for EF models of high efficiency triple pass water heaters, Bradford White Corporation, Middleville, MI, summer 2016
4. Delivered short course (two-weekend days) in strategic planning for Oman Department of Dams (held in LA, CA, 2015)
5. (1993-1996) Thermal analyst, Cassini Spacecraft, NASA's Mission to Saturn, Jet Propulsion Lab and The University of Iowa Physics and Astronomy Department. Applied my Ph.D. thesis research code to simulate cooling of electronic components of Cassini Spacecraft. Won JPL's Award of outstanding thermal analysis application to electronic packaging. Cassini was launched in 1998. This is a three-year consulting work conducting electronic packaging (cooling) of components under vacuum conditions for space applications. Theoretical and experimental approaches were utilized. This work spanned over three years during my Ph.D. study at the University of Iowa. While working as a consulting graduate engineer at the physics department. The work was funded by NASA to develop electronic controls for the CASSINI probe that was launched to Saturn in the

late 1998. My responsibilities were in the area of thermal management of electronic controls under vacuum. I engineered experimental heat transfer (conduction and radiation) under vacuum conditions. I also utilized FORTRAN numerical code to simulate heat dissipation in electronic controls of CASSINI spacecraft.

6. 1994 Swirling Mixer Design, MiT-M Corporation, Peosta, IA, USA. This was a design and development of a swirling pre-mixer for oil-fired portable boilers that are used on pressure washing equipment. Flame stabilization mechanisms were optimized to provide customer needs.
7. 1998 Combustion Aerodynamics Design of Water Boilers for High Pressure Washers, MiT-M Corporation, Peosta, IA, USA. This was another design consultation for another MiT-M pressure washing system.
8. Several consulting services for Gail Industries (former employer) since 1997 in the areas of high-pressure triplex water pumps.
9. Structural analysis and failure diagnosis of aluminum extrusions for use in high-end office tables. The Gunlocke Company, New York , May-August 2005
10. CAD design of sheet metal and plastic components and assemblies of residential water heaters, using Solid Works®Design and failure analysis of sluice gates for flood control applications, Kuhaimi Metal Industries, KSA, 2009-present.
11. Design of Channel type sluice gates for Dammam Port Authority and Water Treatment Plants, , Kuhaimi Metal Industries, Dammam, KSA 2009-present
12. Design, failure and frequency analysis of explosion-proof doors for petrochemical, defense and security applications, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA 2010-present
13. Design and Implementation of Parametric CAD assemblies for Hollow-Metal doors and Specialty Doors, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA August 2011-in progress. Most Notable design achievements are: Design of fire exit doors for Al-Haramain Railroad Line between Medina and Mecca, design of fire-rated doors for Riyadh Metro, design of swing gates for Aramco-Bgaig Water Treatment Plant, design of explosion-proof doors for petrochemical plants in Jubail, and design of crash resistance barriers for residential compounds.

INDUSTRY-ACADEMIA COLLABORATIVE ACHIEVEMENTS

1. Co-chair of Advanced Technology Board, Department of Economic Development, State of Iowa, USA. The board mission is to deploy mechanisms and establish clusters of collaboration within the State of Iowa manufacturers to enable advanced technologies utilization. Board leadership constitutes of representatives from major Iowa industry and research and development institutions. The outcome of the Board efforts was translated into many successful establishments of rapid prototyping clusters utilizing first in kind Laser-sintered 3D printing facilities within the state. These clusters were operated by major Iowa industry players but were made available to all regional manufacturers. Board has also succeeded in leading regular advanced manufacturing training programs with the state that targeted industry leadership to deploy state of the art manufacturing and process

techniques. The outcome of these programs was translated into collaborative efforts between major industry players to disseminate the know-how of Rapid Continuous Improvement (RCI) process. RCI is a version of the TOYOTA production system tailored for small to medium manufacturers that is solely based on Lean Manufacturing principles. The Board provided leadership and strategic planning services to industry clusters and established metrics to measure the progress of each initiative within the state.

2. Leading the research and development efforts at HNI Corporation in the areas related to Virtual Reality (VR) Simulation and Ergonomic Design of Consumer Products/Office Furniture. VR Projects were collaborated with the Digital Human Modeling Lab at the University of Iowa (2001-2005)
3. Collaborative research in the area of energy optimization of hearth systems (fireplaces and stoves) was conducted with Iowa Energy Center, Ankeny, Iowa (1999-2000)
4. Lead Engineer, Program for Enhanced Design Experience (PEDE), a collaboration program between HNI Corporation and The University of Iowa College of Engineering Senior Design Projects. (1998-2002)
5. Leading research projects at HNI Corporation related to personal climate control in office spaces and systems. Lead engineer from HNI Corporation in the Virtual International Design (VID) program collaborated between HNI Corporation, The University of Iowa and IUSTI – France (1999-2001)
6. Several lead engineer role in University-Industry initiatives and undergraduate senior design projects (1997-2005)
7. Project Manager of Allsteel Virtual Reality Facility (2001-2003). Allsteel, a division of HNI Corporation, Collaborated with The University of Iowa Center for Computer Aided Design to build the industry first virtual reality facility. The facility is used for visualization applications for product development and for marketing purposes.
8. Delivered a 40 hrs. Intermediate SolidWorks® training program for 15 engineers in Industrial City 1 – Dammam, KSA, March 2012
9. Delivered a 32 hrs. Advanced SolidWorks® training program for 15 engineers in Industrial City 1 – Dammam, KSA, April 2012
10. During spring 2015 Supervising three industry-sponsored Capstone Design Projects for undergraduate students in Mechanical Engineering Technology.
 - a. Redesign of a knife grinding machine for Morbark (Michigan)
 - b. Converting machined steel office furniture components into lower cost die cast aluminum design in compliance with BIFMA standards
 - c. Reverse Engineering and frequency analysis of flame traps used in Flammable

Vapor Ignition Resistant gas-fired water heaters.

11. Virtual Reality Design and Optimization of the Ambulance Patient Compartment. A Ford Motor Company sponsored project in collaboration with Huron Valley ambulance organization - Ann Arbor Michigan, July 2017 – August 31, 2018 (\$50,000 equipment funding)
12. Developed collaborative research relationship with EMU School of Nursing. Currently (2020) pursuing funding to develop EMU 1st Virtual Patient Room for School of Nursing teaching and research application. Proposal was jointly submitted with College of Nursing faculty Dr. Meriam Caboral-Stevens.

RECENT AND PAST R&D PROJECTS AND RESEARCH INTERESTS (1997-present)

1. Free Vibration of Flame Arrestors: A theoretical and numerical study of perforated plate flame arrestors used in domestic appliance to enable flammable vapor ignition resistance (FVIR). This research resulted in one journal publication in Sept 2015 and one more journal publication where the square pattern of perforation is examined. An indirect goal of this research is to enhance interdisciplinary Mechanical Engineering collaborative research between thermal fluids and Engineering Mechanics within the SET faculty.
2. Integrating Unity 3D game development software with Middle VR virtual reality content development software in a multiwall VR environment. This is an on-going effort in the VR lab at SET and currently employs three undergraduate students who are conducting system integration under the supervision of Dr. Emad Tanbour.
3. Enhancement of Machine Design teaching for MET seniors using project-based learning. This effort started in the spring of 2014 and continues to be utilized in teaching IET 454, the machine design course for MET seniors. The research is planned to be published in the upcoming ASEE 123rd annual conference in New Orleans, LA, USA, in 2016
4. Mechanism Designs for Seating Products: This project was conducted during my past industry experience at HNI Technical Center. The research was aimed at developing highly featured alternative chair mechanisms made of die-cast aluminum alloy. Finite element analysis and CAD using Pro-Engineer was used to develop the optimal chair mechanism. Mechanism provided features to allow ergonomic adjustment of the office chair for height, back tilt, seat tilt and slide and an innovative mechanism to adjust lumbar support in the back. The mechanism is based on user-weight activation principle developed at HNI and utilized in family of high-end office chairs.
5. Large-scale deformation modeling of irregular shaped cast aluminum parts. ANSYS® commercial finite element analysis software was utilized to predict failure and optimize components of office and storage mechanisms and platforms.
6. Computational modeling of fluid flow and heat transfer in 3D complex passages and applications

to fireplace venting. FLOTTRAN module of ANSYS software was used to predict flow and heat transfer in co-axial vent pipe and vent connections of stoves and fireplaces. Experimental measurements were used to validate modeling. This project developed a baffled co-axial vent elbow for direct-vented fireplaces that meets building standards for zero-clearance construction requirements.

7. Waste heat recovery from supplemental heating system. This project was sponsored in part by the Iowa Energy Center, Energy Research Station in Ankeny, Iowa.
8. Design, prototyping and testing of cross-flow compact heat exchangers for waste heat recovery from gas-fired fireplaces. This research developed a finned-tube heat exchanger that recovers waste heat from residential heating devices such as gas fired fireplaces and stoves. The recovery heat exchanger reduces flue temperature and allows the utilization of PVC/CPVC as venting pipe material.
9. Heat transfer and fluid flow in co-axial fireplace chimney pipes. Experimental work that was conducted in the HNI heart lab in Muscatine, Iowa. The work was aimed at characterizing flow and heat transfer in co-axial vent pipes for direct vent fireplaces and stoves. This experimental testing utilized the state-of-art data acquisition software and hardware to develop minimum and maximum vent lengths. Wind effect on direct-vented stoves was also studied and venting guidelines were established and used for agency certification and product literature development.
10. Optimal design of insulated flue pipes for fireplaces and stoves. Ceramic fiber blanket material was utilized to provide insulation for vent pipes.
11. The use of recycled engineered plastic to replace aluminum components for office systems applications. Connectors traditionally used for office cubical walls were replaced by plastic components that were extruded from recycled materials. The project aimed at cost reduction that achieved \$4 million annual savings during my industrial experience at HNI in Iowa.
12. Design and manufacturing of integrated mobile data acquisition systems for industrial hearth systems testing and applications. Data acquisition kiosks that houses hardware to enable large number of data logging channels and equipped with PC were manufactured for HNI hearth divisions Heatilator® and Heat-N-Glo®. These kiosks were used in agency certification labs and production lines to test fireplaces and stoves in real installation simulations.
13. Numerous FEA studies and applications to optimize the design of various industrial mechanical components. During my work at HNI (1997-2005) I led numerous finite element analyses of components used in office systems and hearth products. These simulations treated stress analysis due to mechanical loading and thermal effects. This represented a day-to-day design support activity and hundreds of FEA cases were completed annually.
14. CFD and heat transfer field applications for office environment
15. Virtual Reality (VR) Simulation and applications to ergonomic design of office furniture. This

project was in collaboration with the University of Iowa Center for computer Aided Design (CCAD). The technology of virtual reality was utilized for product development visualization as well as for marketing purposes. The outcome of this project was a joint effort that built two VR facilities, one at HNI and one at CCAD. Each VR facility provided a 3-wall environment that enabled immersive VR experience. Work included developing stereoscopic CAD models of office equipment that was VR enabled and animated in these VR facilities. The HNI facility is still used to date as a product development and visualization tool and a powerful marketing demonstration tool for showing future products to major customers. Photo-realistic and high fidelity renderings enabled the company to show future products to customers before going into production. The University of Iowa facility was used as a seed to attract funding for VR research. This seed attracted a multimillion (\$17million) grant that was awarded to CCAD over 5 years. The VR facility at the CCAD now houses the world first 6-wall PC-based VR environment.

16. Digital Human Modeling for ergonomic studies. This effort was in collaboration with the University of Iowa and HNI Technical Center. Digital human modeling was utilized to optimize workplace ergonomics and VR technology was used to visualize designs.
17. Thermal and acoustical simulation of comfort in office spaces. Thermal comfort experimental studies were conducted on HNI cubical workplaces. The testing was conducted by engineering interns from the University of Iowa College of engineering inside the university offices. Acoustical testing of noise propagation inside cubical office systems was conducted inside the labs of HNI Technical Center.
18. Finite Element Analysis of hydrostatically pressurized water heater tanks. This work is aimed at simulation of pressurization of water heater tanks to meet ANSI requirements on one hand and to optimize vessel wall thickness achieving cost reduction on the other hand.
19. Fatigue analysis of pulsation loaded water heater tanks. This work utilized Solidworks® COSMOS® FEA module to conduct fatigue analysis of water heater tanks. Water heater tanks experience pressure spikes due to water hammering and the use of other household devices that generate sudden pressure waves. This study provided in-depth analysis and characterization of the behavior of water heater tanks under cyclic loading. The outcome was implemented to predict reliability and to establish life expectancy of water heaters for warrantee purposes.
20. CAD design of sheet metal and plastic components and assemblies of residential water heaters, using Solid Works®
21. Design and failure analysis of sluice gates for flood control applications, Kuhaimi Metal Industries, KSA, 2009-present.
22. Design of Channel type sluice gates for Dammam Port Authority and Water Treatment Plants, , Kuhaimi Metal Industries, Dammam, KSA 2009-present
23. Design, failure and frequency analysis of explosion-proof doors for petrochemical, defense and security applications, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA 2010-present

24. Design and FEA analysis of Crash Rated Fence (CRF) for Saudi Aramco, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA 2011-present
25. Design and FEA analysis of Road Blockers, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA 2011-present

REFERENCES

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