



EMAD TANBOUR, Ph.D.
CURRICULUM VITAE

Permanent Address

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SUMMARY

Dr. Emad Tanbour has more than 23 years combined experience in Mechanical Engineering in both academia and industry. His industry experience spans over 18 years in the areas of product development, 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 13 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.

In 2009, Dr. Emad Tanbour joined Prince M. B. Fahd University (PMU) faculty of Mechanical. He has led the university strategic plans to achieve total quality assurance. He also led the university compliance system with ABET (USA), NCAAA (National) and SACS (USA) accreditation. Dr. Tanbour serves in several leadership capacities at the university including his membership of the University Council reporting to the Board of Trustees. He is also a member of the Senior Management Group of PMU and has been a member of the University Deans' Council since Sept 2011. He serves also as a member of the University IT Council. All such councils are chaired by PMU Rector. He is a member of the College of Engineering Council and serves as Senior Advisor to the Rector on Accreditation and recently was assigned to PMU Accreditation Committee chaired by the Rector. During the last three years, 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 instrumental member in the college of engineering curriculum development committee for master's degrees in Mechanical Engineering and Energy Systems and has served for the past 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 water heaters. He led the development of several energy efficient residential 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.

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 1993 to 1997, Dr. Tanbour was leading Gail Industry 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 excellent 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) at Prince M. B. Fahd University. 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 8 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 KSA 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).

PERSONAL - US Citizen

- Married with four children

PROFESSIONAL EMPLOYMENT (MAJOR POSITIONS)

ACADEMIC APPOINTMENTS

Prince M. Bin Fahd University

2009-present Assistant Professor of Mechanical Engineering
Department 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

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

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 systems and hearth products

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 in North America with brands like Whirlpool and Sears Water Heaters

TEACHING EXPERIENCE

Prince M. 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
- Principle 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

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

PUBLICATIONS

1. **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
2. 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
3. **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
4. **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

5. 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
6. 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
7. **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*
8. **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*
9. **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*
10. **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*
11. **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*
12. 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
13. 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*
14. 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.
15. 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*
16. 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]

17. 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
18. 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
19. **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.
20. **Tanbour, E. Y.** and Ahmarow, M. E., "Design Calculations for Cooling Systems of Industrial Gas Turbines," ME final Report, Yarmouk University, Irbid, Jordan, 1987.
21. **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.
22. **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.
23. **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
24. **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.
25. **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.
26. **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
27. **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
28. **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
29. **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
30. **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
31. **Tanbour, E. Y.**, "Prince M. Bin Fahd University, Strategic Plan for National Commission for Academic Accreditation and Assessment". August 2009

32. **Tanbour, E. Y.**, “Prince M. Bin Fahd University, College of Engineering Strategic Plan for ABET Accreditation”. August, 2009 to February 2011
33. **Tanbour, E. Y.**, “Prince M. Bin Fahd University, College of Engineering Academic Catalog, Revision”. August, 2009 continuing
34. **Tanbour, E. Y.**, “Prince M. Bin Fahd University, Strategic Plan for (Sothern Association of Colleges and Schools) SACS Accreditation”. August, 2009 continuing.
35. **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.
36. **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.
37. **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 13 issued and pending patents: US20100065203, US20090308332, US20100101507, US20100154724, US20100101509, US20100101510, US20100101508, US20090084328, US20040011348, D607094, D614680, 6848441, WO/2004/042281A1

COMPUTING AND CAD SKILLS

- CAD:** SolidWorks (2005-present), PRO/ENGINEER
- SIMULATION:** SolidWorks Simulation (SimulationWorks), Lab View (Core 1 and Core 2 certified, National Instruments® 2011)
- FEA:** ANSYS (1996-present), Cosmos Works (2005-2009), PRO/MECHANICA (1997-2005)
- CFD:** ANSYS-FLOTTRAN (1997)
- PROGRAMMING:** FORTRAN Programming 1984-present
- MICROSOFT:** Microsoft Office (Word, Excel, Power Point, Outlook and Visio), Microsoft Project
- MANAGEMENT:** Product Data Management (PDM), PDMWorks, Enterprise Software, production mainframe software, strategic planning and implementation
- LEARNING (LMS):** Blackboard®, SMART Notebook for SMART interactive whiteboard, Banner (Academic ERP system)
- OTHERS:** 3DSTUDIO MAX, Maya (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

Prince M. Bin Fahd University, KSA

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

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

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

Habitat for Humanity

- Volunteer Home Builder, Muscatine, Iowa 1998.

RECENT 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 11 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 patent-pending 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.
- 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.

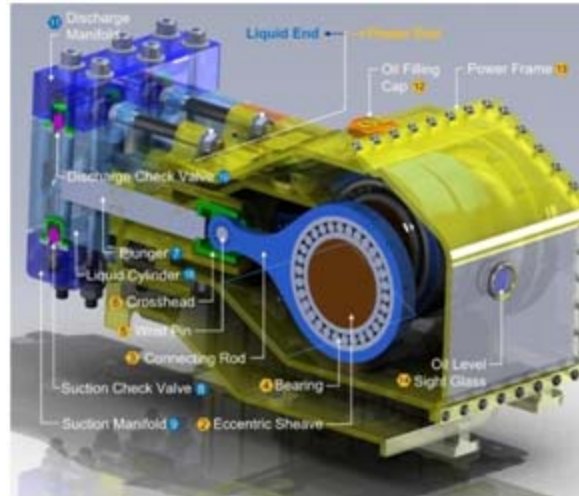
SELECTED SENIOR CAPSTONE PROJECTS SUPERVISED

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

Project title	Presentation
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1. **Design of High Pressure Triplex Pump, Spring 2010**

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.



2. **Design of a 30 KW Wind Turbine, Spring 2010**

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..



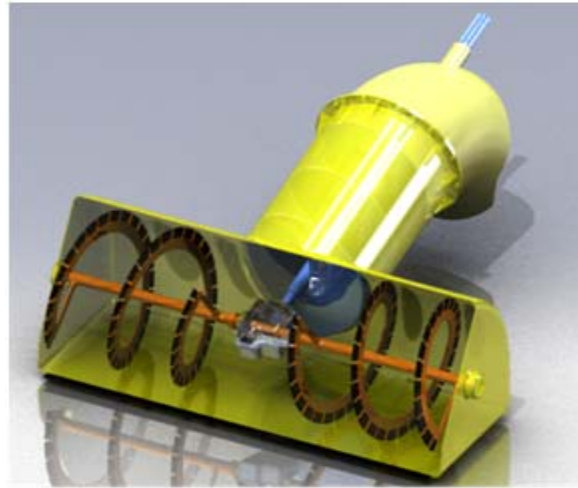
3. **Single Passenger Solar Car, Spring 2010**

Objective: Students to design a single passenger solar car frame that can reach 25 km/hr speed.



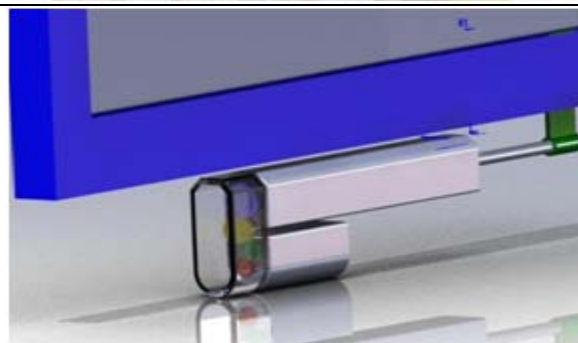
4. **Design of Highway Sand Scoop, Fall 2010**

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



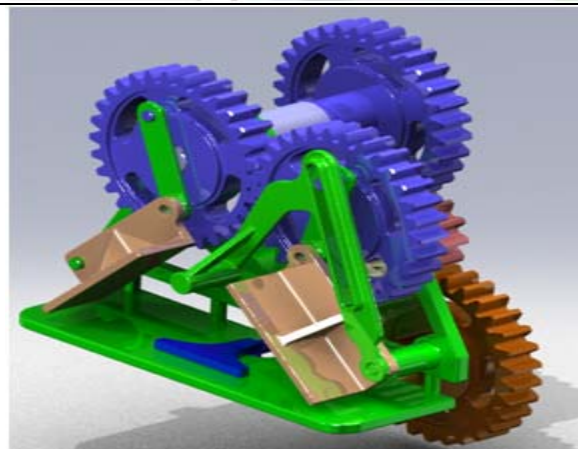
5. **Design of Rain/Dust storm-sensitive window, Fall 2010**

Objective: Students to design a mechanism driven by linear actuator and sensors to automatically shut windows upon rain or sand storms.



6. **Design of Aluminum Can Crushing Mechanism for recycling beverage cans, Fall 2010**

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.



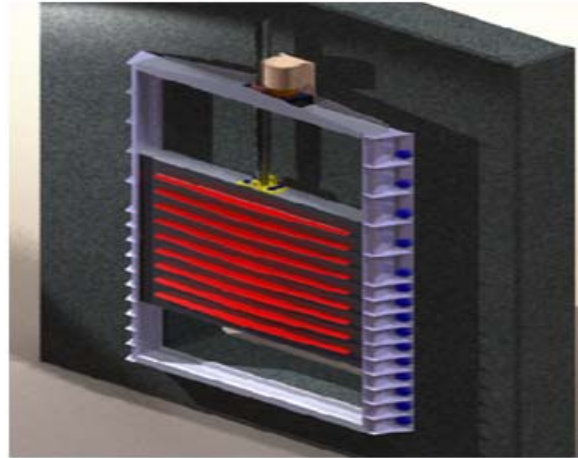
7. **Design of Solar Car II, Spring 2011**

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.



8. **Design of a 4m² Penstock-Dam Door, Spring 2011**

Objective: Students to utilize fluid statics along with mechanical engineering design knowledge to design a remotely operated penstock dam-door (sluice-gate). 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 (Jedda)



9. **Design of a New Concept Wheelchair, Spring 2011**

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.



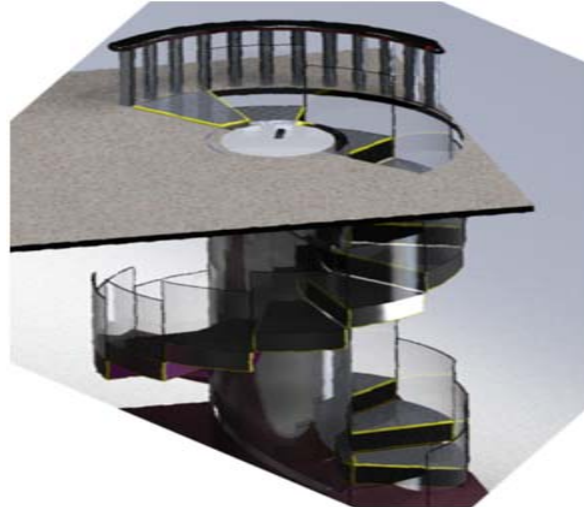
10. **Design of Date-Picking elevator, Spring 2011**

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.



11. **Design of Spiral Escalator, Spring 2011**

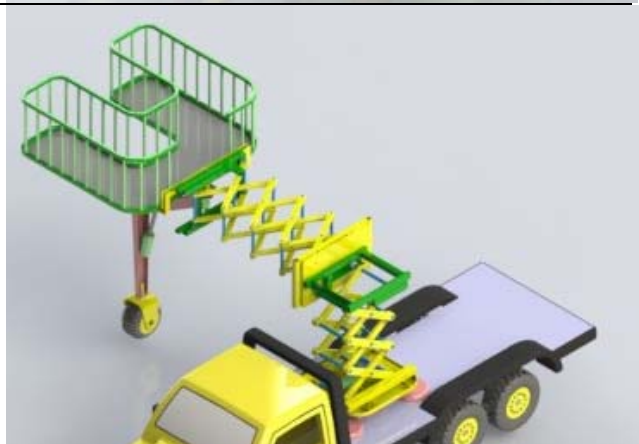
Objective: Students to design and virtually prototype a spiral escalator system to be used in application where space is limited.



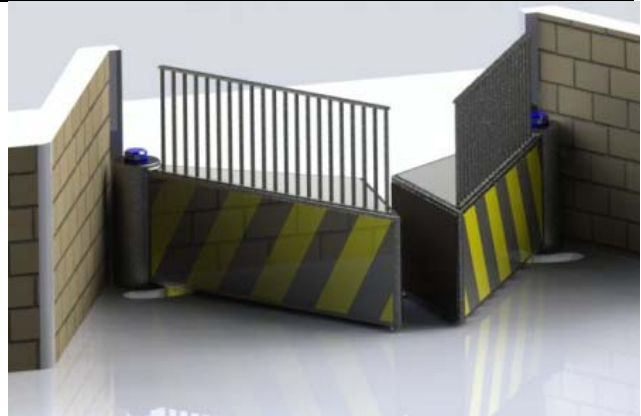
12. **Design of Low Cost Hospital Bed, Fall 2012:** Students to design a low cost hospital be to be used in the field hospitals serving in disaster areas.



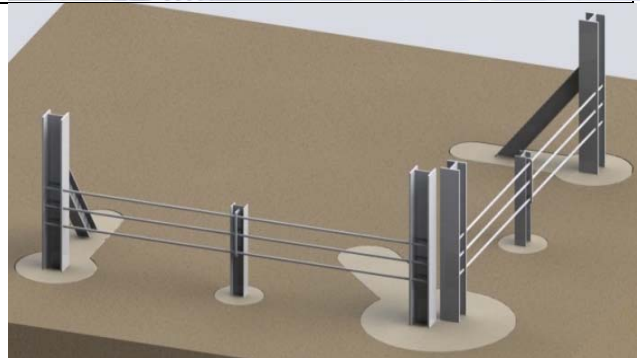
13. **Design of truck-mounted Date Harvesting Implement, Fall 2012:** Students to design implement that can be mounted on a flatbed truck to be used to harvest dates from palm trees.



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



10. **Design of 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.



ASSESSMENT & QUALITY IN HIGHER EDUCATION (HIGHLIGHTS):

- 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.
- 3+ 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 • Manufacturing Engineering • Finite Element Analysis: Structural and Thermal/Fluids applications. • Computational Fluid Dynamics • Virtual Reality Engineering Applications 	<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

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- 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)
 - Organizational Behavior
 - Engineering/Business supervision
 - Managing product development cross-functional teams
 - **GD&T** ASME Y14.5-2009 revision
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MAJOR CONSULTING EXPERIENCE:

1. (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 space craft.
2. 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.
3. 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.
4. Several consulting services for Gail Industries (former employer) since 1997 in the areas of high pressure triplex water pumps.
5. Structural analysis and failure diagnosis of aluminum extrusions for use in high-end office tables. The Gunlocke Company, New York , May-August 2005
6. CAD design of sheet metal and plastic components and assemblies of residential water heaters, using Solid Works®
7. Design and failure analysis of sluice gates for flood control applications, Kuhaimi Metal Industries, KSA, 2009-present.
8. Design of Channel type sluice gates for Dammam Port Authority and Water Treatment Plants, , Kuhaimi Metal Industries, Dammam, KSA 2009-present

9. Design, failure and frequency analysis of explosion-proof doors for petrochemical, defense and security applications, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA 2010-present
10. Design and Implementation of Parametric CAD assemblies for Hollow-Metal doors, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA August 2011-in progress

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 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

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

1. 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.
2. 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.
3. 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.
4. Waste heat recovery from supplemental heating system. This project was sponsored in part by the Iowa Energy Center, Energy Research Station in Ankeny, Iowa.
5. 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.
6. 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.
7. Optimal design of insulated flue pipes for fireplaces and stoves. Ceramic fiber blanket material was utilized to provide insulation for vent pipes.

8. 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.
9. 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.
10. 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.
11. CFD and heat transfer field applications for office environment
12. 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.
13. 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.
14. 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.
15. 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.

16. 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 warranty purposes.
17. CAD design of sheet metal and plastic components and assemblies of residential water heaters, using Solid Works®
18. Design and failure analysis of sluice gates for flood control applications, Kuhaimi Metal Industries, KSA, 2009-present.
19. Design of Channel type sluice gates for Dammam Port Authority and Water Treatment Plants, , Kuhaimi Metal Industries, Dammam, KSA 2009-present
20. Design, failure and frequency analysis of explosion-proof doors for petrochemical, defense and security applications, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA 2010-present
21. Design and FEA analysis of Crash Rated Fence (CRF) for Saudi Aramco, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA 2011-present
22. Design and FEA analysis of Road Blockers, Kuhaimi Metal Industries, SPD-Division, Dammam, KSA 2011-present

REFERENCES

1. Dr. Karim Malek, Professor of Biomedical Engineering *and Director, Center for Computer Aided Design* The University of Iowa, Iowa City Iowa 52240, USA. Tel.: 319- 335 6163 amalek@engineering.uiowa.edu
2. Dr. I. Khattat, President, American Institute of Sustainable Science and Technology, 5 Dee Rd, Talacre, CH8 9RS, UK, Tel +44 1745 855 181 email: info@sustainable-science.org
3. Dr. K. R. Asfar, Formerly, Professor of Mech. Engineering, School of Mechanical Engineering, Purdue University, 585 Purdue Mall, West Lafayette, IN 47907-2088, email kasfar52@yahoo.com. *Currently, Associate Dean, College of Engineering and Professor of Mechanical Engineer at Jordan University of Science and Technology, Irbid, Jordan.*
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