

# KHALID R. SHELTAMI

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## Work Address:

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## OBJECTIVE & SUMMARY OF QUALIFICATIONS

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To participate in research and teaching in the field of Mechanical Engineering with special interest in machine design, solid modelling, CAD/CAM, automation & control, packaging, thermal and stress analysis.

- Broad experience in research and teaching in machine design, automation and control, CAD/CAM, opto-mechanical and packaging design, thermal and stress analysis
- Strong mathematical and analytical skills
- Effective interpersonal and leadership abilities
- Strong industrial experience
- Excellent technical and communication skills  
(Refer to the attached list of publications)

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## EDUCATION

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### Doctorate of Philosophy

*Jun 2000: Mechanical Engineering, University of Waterloo, Canada*

*Thesis:* Tool Path Verification and Gouge Avoidance in Five-Axis Machining

*Main topics:* Solid Modelling, CAD/CAM, Automation & Control, Solid Mechanics and CNC

### Master of Applied Science

*May 1994: Mechanical Engineering, University of Waterloo, Canada*

*Thesis:* ADVENT/SC: A Computer Simulation program for Constrained Mechanical Systems.

*Main topics:* Multi-Body Dynamics, Solid Mechanics, Graphics and Graph Theory

### Bachelor of Science

*June 1990: Mechanical Engineering, University of Garyounis, Benghazi, Libya*

*Project:* Vibration and Calibration of Different Mechanical Systems

*Main topics:* Mechanical Vibrations and Balancing

**ACADEMIC**

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**Assistant Professor**

***Feb 2003- Present: Mechanical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia***

- Taught the courses below on Mechanical Engineering in accordance with ABET standard. Course material was developed on the web for students. Also WebCT was utilized to develop the material for distant learning.

**Manufacturing Processes I (ME 206)**

**The course focused on the following topics:** Manufacturing methods of metals and plastics including metal casting, forming, machining, welding and plastic processing. Laboratory experiments and demonstrations in material behavior, forming, casting, welding, machining operations, metrology and dimensional control.

**Text Book:** Serope Kalpakjian and Steven R. Schmid Manufacturing. "Processes for Engineering Materials", 4th Edition, Prentice Hall, 2003

**Machine Design I (ME 307)**

**The course focused on the following topics:** Design process. Review of stress, strain and deformation analysis as applied to mechanical design. Properties of materials. Review of static failure theories. Designing against fatigue failures. Element design: shafts, keys, couplings, power screws, bolted, riveted and welded joints.

**Text Book:** J. E. Shigley, C. R. Mischke and Richard Budynas. "Mechanical Engineering Design", 7th Edition, McGraw-Hill, 2004

**Machine Design II (ME 308)**

**The course focused on the following topics:** Design of elements: bearings (journal and anti-friction), springs, spur, helical, bevel and worm gears; flexible drives (belts and chains); clutches and brakes. Design optimization. Laboratory sessions to supplement and to apply the material covered in the lectures. Consideration of manufacturing aspects of the design (limits and fits). Projects, in stages, leading to an assembly.

**Text Book:** J. E. Shigley, C. R. Mischke and Richard Budynas. "Mechanical Engineering Design", 7th Edition, McGraw-Hill, 2004

**Senior Design Project (ME 415)**

**The course focused on the following topics:** Integrating various components of the curriculum in comprehensive engineering experience so that the basic sciences, mathematics and engineering sciences which the student has learned in his freshman-to-senior years of study can be applied. It considers design of a complete project or system including establishment of objectives and criteria, formulation of the problem statements, preparation of specifications, consideration of alternative solutions, feasibility considerations and detailed

engineering designs. The design should take into consideration appropriate constraints such as economic factors, safety, reliability, ethics and environmental and social impact. Submission of a written report is an essential requirement for completion of the course. Team design projects, where appropriate, are highly encouraged.

**Text Book:** George E. Dieter. “Engineering Design”, 3rd Edition, McGraw-Hill, 2000

- Obtained excellent students evaluation in all courses
- Supervised and directed research and development projects and advised graduate students research and theses leading to BSc and MSc in Mechanical Engineering
- Coordinated a 5-day short course “Principals of CAD/CAM” and was involved in teaching in other short courses
- Initiated multi-disciplinary projects between different departments including Mechanical, Electrical Engineering and Chemistry
- Established the art of mechanical packaging of the High-Tech modules and components (such as pump lasers, tunable dispersion compensators, optical amplifiers, etc) through capstone projects and seminars
- Introduced students to the state of art software packages in mechanical packaging and machine design (SolidEdge, ProE, SolidWorks, Ansys and IcePak)
- Refereed several technical papers for reputable journals and international conferences
- Supervised graduate students during their Co-Op training program with local utilities and industries such as ARAMCO, SCECO, SABIC, etc.
- Served as Faculty Academic Advisor and Course Coordinator to undergraduate students and other departmental committees
- Principal Investigator of the following Projects:
  - “Thermal Effects Investigation in Distribution Transformers Using Modern Technologies” (SABIC Project), approved
  - “Investigation of Mechanical/Thermal and Electrical Degradation in Cable Joints and Terminations” (KACST Project), under review
- Co Investigator in a KACST Project:
  - Heat Effects Investigation in Distribution Transformers Used In Critical Industrial Processes (KACST Project), under review
- Served as a consultant for local industries, such as ARMCO, SCECO, Riyadh Cables and Jeddah Cables

**RESEARCH EXPERIENCE**

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**Assistant Professor**

*Feb 2003- Present: Mechanical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*

- Initiated original research topics related to packaging and CAD/CAM
- Submitted three multi-disciplinary and one CAD-CAM research proposals, one of which got approved
- Published several technical papers in regional and international journals and conferences
- Supervised several students in many hi-tech senior design projects (using the state of the art packaging software as well as experimental work) pertaining to Fiber Optics components and modules.
- Currently, Supervising an M.S. student in a crack propagation research

**Sr. Opto-Mechanical Design Engineer and Thermal Analyst**

*June 2000-Feb 2003: JDS Uniphase and GamEng, Ottawa, Ontario, Canada*

- Led the mechanical research activities in design, thermal and stress analysis
- Supervised a group of junior engineers
- Delivered several training courses and seminars

**Research Associate**

*May 1992-June 2000: Automation and Control Group, Mechanical Engineering, University of Waterloo, Waterloo, Ontario, Canada*

- Developed and implemented novel techniques for CAD/CAM tools in five-axis CNC machining using C++ and OpenGL
- Conducted advanced studies in different topics in manufacturing processes and worked in a several consultation projects
- Developed 3-D solid modelling tools for Unix and Windows (95/98/NT) platforms
- Developed an expert system to simulate multi-body dynamic-mechanical systems
- Performed stress and vibration analysis using graph theory and FEM
- Utilized Five-Axis CNC machines in machining automotive test parts and designed gouge-free tool-paths

- Supervised fourth year students in their final projects
- Developed verification methods to compare the simulated results with the scanned measurements, from the Coordinate Measuring Machine (CMM), of the machined parts.
- Used AutoCad, SDRC Ideas and MasterCam in designing complex surfaces and automotive parts

## TEACHING EXPERIENCE

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### Lecturing

#### *June. 2000 – Feb 2003: JDS Uniphase and GamEng*

- *Sept. 2002 – October 2002 and January 2003–February 2003:* Fundamentals of Machine Design (Short/Condensed Course)

*The course focused on the following topics:* Calculations of stresses in 2 and 3 dimensions. Static and variable loading failure theories. Power Screws design and analysis. Introduction to simple vibration analysis. Numerical modeling using Ansys Finite Element Modeling program.

- *Sept. 2000 – October 2000 and January 2001–February 2001:* Fundamentals of Heat and Mass Transfer (Short/Condensed Course)

*The course focused on the following topics:* Different heat transfer processes and with emphasis on conduction and convection. Introduction to finite element method. Introduction to CFD Fluent solver.

- *November 2000 – December 2000 and March 2001–April 2001:* Advanced topics in Electronic Cooling and Thermal Stresses (Short/Condensed Course)

*The course focused on the following topics:* Different packaging techniques used in today's industry. Calculations of thermal stresses. Introduction to simplified Ansys (Finite Element) models.

### Teaching Assistant

#### *May. 1992 - May 2000: Mechanical Engineering, University of Waterloo*

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|---|----------------------------|
| ▪ Mechanics of Deformable Solids (I, II, III) | ▪ Machine Design (I, II)   |
| ▪ Aerodynamic Design                          | ▪ Differential Equations   |
| ▪ Dynamic of Machinery                        | ▪ Statistics for Engineers |
| ▪ Heat and Mass Transfer                      | ▪ Kinematics and Dynamics  |

**INDUSTRIAL EXPERIENCE**

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**Mechanical/Thermal Engineer**

*Dec 2001-Feb 2003: GamEng Info Technology, Ottawa, Ontario, Canada*

- Provided thermal solutions to several startup HiTech companies supported with vigorous analytical and numerical analysis using CFD software (IcePak)
- Developed mechanical packages for optical modules
- Performed stress and vibration analysis for several mechanical components using Ansys software
- Designed heat sinks for optical and TelCom applications
- Converted 3-axis CNC machine to 5-axis by installing a tilt-rotary table. The controller was also provided (based on FUNC controllers) to integrate the motion of the 5-axes
- Performed pumps diagnosis in terms of bearings life, sealing efficiency and lubrication methods
- Designed gouge-free and interference-free tool paths to manufacture complex automotive parts

**Sr. Opto-Mechanical Design Engineer and Thermal Analyst**

*June. 2000 – Dec 2001: Advanced R & D Fiber Optics Modules, JDS Uniphase*

- Designed several opto-mechanical modules and components, bending and assembling jigs with accurate tolerance analysis using SolidEdge
- Designed opto-electronic packages with thermal analysis using IcePak and stress verifications using Ansys
- Defined the power dissipation Road Map for Telecom equipments
- Developed compact thermal models for Telecom equipments
- Performed extensive thermal analysis for optical shelves, optical modules such as Dynamic Dispersion Compensator, Optical Dispersion Compensator, different Optical Amplifiers (EFDA) and optical components such as Dynamic Gain Equalizer, Tunable Dispersion Compensator, Tunable Pump Lasers and Large Scale Optical Cross-Connect (OXC) using Icepak
- Supported different groups inside the company and customers
- Developed thermal software for optimizing heat sinks for both natural and forced convection

- Performed stress and vibration analysis for several mechanical components using Ansys software
- Submitted and reviewed technical reports
- Involved in hermetically packaging optical devices
- Developed environmental specs. for power supplies based on BellCore
- Supported experimental testing for different optical modules

**Project Engineer**

*Oct. 1990-Dec. 1991: Ministry of Scientific Research, Tripoli, Libya*

- Designed and implemented techniques to improve the performance of gas turbines, pumps and heat exchangers
- Solved the daily problems related to gas turbines, pumps and heat exchangers
- Gained valuable experience in troubleshooting pumps and other mechanical devices
- Taught several mechanical and computer courses

**AFFILIATIONS**

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- Member in the electronic packaging committee in the American Society of Mechanical Engineers (ASME)
- Member in the Saudi Society of Mechanical Engineers (SSME)

**ACADEMIC AWARDS**

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***University of Waterloo***

Faculty of Engineering Scholarship

University of Waterloo Scholarship

***University of Garyounis***

Postgraduate Scholarship for Doctoral degree

Postgraduate Scholarship for Master's degree

*Garyounis* high academic standing Scholarship

**COMPUTER PROFICIENCY**

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**Design paradigms:** Procedural, Functional, Object-Oriented

**Programming Languages:** C, C++, Visual C++, Fortran, Pascal, OpenGL, X-windows and Visual Basic

**Operating Systems:** UNIX (X-Windows and Open-Windows) environments, DOS and Microsoft environments.

**Software Packages:** Maple, Matlab, SolidEdge, SolidWorks, ProE, IcePak, Ansys, AutoCad, SDRC Ideas, MasterCam, Latex, Microsoft Office, Corel Suite

**PUBLICATIONS**

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Sheltami, K, Andrews, G.C., "The VecNet Simulation Program", Annals of the CIRP, vol 42/2, pp. 707-716, 1992

Sheltami, K and Chandrashker, M., "Modeling of the Truss-Network", Journal of Manufacturing Engineering, vol. 111, pp. 15-25, 1993

Sheltami, K, Andrews, G.C., "Advent/SC dynamics simulation program", Journal of Design and Manufacturing, vol. 3, pp. 244-261, 1994

Sheltami, K., Bedi, S. and Ismail, F., "Swept Volumes of Toroidal Cutters Using Generating Curves", International Journal of Machine Tools and Manufacture vol. 38 pp. 855-870 1998

Sheltami, K., Bedi, S. and Ismail, F., "Simulation of Swept Volumes for General tools in Multi-Axis Machining", Journal of Engineering for Industry, vol. 125, pp. 329-348, 2001

Sheltami, K., Bedi, S. and Ismail, F., "Accurate Tool Positioning Based on a New Gouge-Detection Technique", accepted for publication in the International Journal of Machine Tools and Manufacture, 2001

Sheltami, K. and Refai-Ahmed, G., "Thermal Management of Telecommunication Optical Module in Forced Convection Mode", Eighth Intersociety on Thermal Conference Phenomena in Electronic Systems, San Diego 2002

Sheltami, K. and Shwehdi, M.H. "Power Transformers Modelling and Simulation Using IcePak CFD software for Thermal Analysis and Performance", GCC-SIGRE Power Conference in Muscat, Oman, Dec. 2003

Sheltami, K. "Evaluation of Thermal Performance of Telecom Devices in Forced Convection Mode", accepted for publication in 4<sup>th</sup> European Thermal Sciences Conference 2004, UK.



Sheltami, K. “Gouge Detection and Avoidance Using the Generating Curves in 5-axis” submitted for publication to ASME Journal, CAD-CAM, 2003, under progress

Sheltami, K. “Swept Volumes Generation for General Tools in Multi-Axis Machining”, accepted for publication in the 3<sup>rd</sup> International conference on advanced manufacturing technology (*ICAMT 2004*), Malaysia

Sheltami, K. “Swept Volumes Generation for General Tools in Multi-Axis Machining” (Journal Version), submitted for publication in the Journal on advanced manufacturing technology (*ICAMT 2004*)

Sheltami, K., Refai-Ahmed, G. and Shwehdi, M.H., “Thermal Management of High Power Transformer in Different Outdoor Environment Conditions”, I-Therm Conference, 2004, Las Vegas, USA

Sheltami, K., Refai-Ahmed, G. and Shwehdi, M.H., “Thermal Management of High Power Transformer in Different Outdoor Environment Conditions”, (Journal Version) Promoted to be submitted to ASME I-therm Journal

Sheltami, K., “Anti-Gouging Strategy in 5-Axis Machining”, accepted for publication in the First International Conference on Modeling, Simulation and Applied Optimization, ICMSAO, February 2005, Sharjah, Unted Arab Emirates

## **ACTIVITIES & INTERESTS**

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- GSA Director at large in the University of Waterloo (1994, 1997, 1998)
- Chess champion of my home town and won chess tournaments in Waterloo, Ontario (1994, 1996, 1999)
- Playing soccer, swimming, weight lifting and jogging regularly
- Community work in general and helping others

## **REFERENCES**

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Available upon request