

Dear Professors/Academic committee for Post-docs/Research faculty appointments

Greetings!

I worked at *Cessna Aircraft Company* as a Durability & Damage Tolerance (DADT) engineer from Oct'08-Mar'09. I hold a MSME (2003) from the University of Oklahoma, Norman campus and plan to graduate with a PhDME in the Summer 2009 (also from OU). My doctoral research is focused on the dynamic behavior of bridge structures under moving loads and masses using the Differential Quadrature Method (DQM).

I have a high regard for teaching in academia and I seek positions that could offer me a very good starting point for becoming an independent researcher. I seek post-doc positions that extend my present capabilities to conduct researches under contract agreements and writing proposals for further researches in the areas of my interest which include fatigue and fracture mechanics, structural dynamics, finite element analysis and other related solid mechanics subjects. One of the areas that I look forward to work is structural health monitoring and control mechanisms but I am also open to other frontier areas in the field of fatigue/fracture/vibrations/dynamics/FEA as well.

I worked as an Assembly Engineer at the Rear Axle and Differential unit, Kirloskar Systems Limited (Bangalore, India) for a year before coming to OU. My master's thesis is an experimental study on slow crack growth and fracture strength characteristics of thin sheet aluminum alloys with and without corrosion damage. I also worked in a mini-project to experimentally investigate the fatigue performance (includes static tension, fatigue crack growth rate, and high cycle fatigue life tests) of AA 7055-T76 (recently introduced by Alcoa) and AA 7075-T6 in moist and dry air conditions for material substitution studies. I am also conversant with theory and experimental procedure involving low cycle fatigue tests, and familiar with post fracture micro probe analysis.

I am skilled in using *Ansys* (Classic and Workbench with APDL experience) and have worked as Ansys lab assistant for 3 years at OU, and assisted students in using Ansys for their class and capstone projects. I am also skilled in *Catia* (Part & Sketcher, Generative shape design/surface modeling and meshing tools), Enovia 3DCOM, Pro/E Wildfire (Mechanica, Mfg., Drawing, etc), *Mathematica* (Wolfram certified Advanced Foundations Level User), *FEMAP* (with Nastran solver), Sigma Plot, Fortran, and Adams, and familiar with MSC/Adams (View module), Patran / Nastran packages.

I take this opportunity to invite you to look at my resume which is attached herewith and share your thoughts on me as a post-doc/researcher in your research team.

Thank you.

Warm Regards,

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OBJECTIVE: Benefit company using experience gained in Fatigue/Fracture Mechanics, Structural Dynamics, FEM

EDUCATION

- ♦ **PhD** in Mechanical Engineering from **University of Oklahoma**, Norman Campus, **SUMM'09** (expected), GPA 3.7/4.00
- ♦ **MS** in Mechanical Engineering from **University of Oklahoma**, Norman Campus, **SPR' 03**, GPA 3.67/4.00
- ♦ **BS** in Mechanical Engineering from **National Institute of Technology**, Kurukshetra University, India, **May 1997**, first class

PROFESSIONAL EXPERIENCE: 1 YEAR AND 6 MONTHS

Oct'08 – Mar'09: *Durability & Damage Tolerance Engineer* at **Cessna Aircraft (A Textron Company)**; Tasks included Damage tolerance studies on stiffened panels with debond effects, released Cessna Instrumentation report on Light Sport Aircraft (LSA)

Jan'98 – Dec'98: *Assembly Engineer* in the Rear Axle and Differential Unit at **Kirloskar Systems Limited**, Bangalore, India; Duties included implementing design changes in the fixtures used, maintaining inventory database for assembly equipments, machineries, conversion of hardcopy version of assembly layouts obtained from Toyota Motors Corporation, Japan into softcopy (AutoCAD) and modifications needed for setting up an auto-ancillary unit at Bangalore, India

INTERNSHIP PROGRAMS

- ♦ University of Oklahoma: Student Assistant in Multimedia assisting faculty in course content development, SUMMER 01
- ♦ Hindustan Aeronautics Limited (HAL), Bangalore, India, Trainee, Engine Division, SUMMER 96
- ♦ Hindustan Motors Earthmoving Equipments Division (HM-EED), Tiruvallur, India, In-plant Trainee, SUMMER 95

RESEARCH EXPERIENCE: 7 YEARS

- ♦ Graduate Research/Teaching Assistant, FALL'00 – SPR'08, AME, University of Oklahoma.
Thesis Title for MSME program: *Fracture strength of aluminum panels with corrosion damage* (work completed)
Research Areas for PhD program: *Dynamic behavior of bridge structures under moving masses* (work on progress)

CONFERENCES/PRESENTATIONS

- ♦ *Graduate Student Research & Creativity Poster Presentation*, University of Oklahoma, April 2007
- ♦ *9th International Fatigue Congress*, Atlanta, Georgia, May 2006 (presented 2 papers)
- ♦ *Aging Aircraft 8th Joint NASA/FAA/DoD Conference*, Palm Springs, California, February 2005 (1 paper)
- ♦ *23rd and 26th AIAA/ASME Oklahoma Regional Conferences*, Norman, Oklahoma, March 2003 and April 2006 (1 paper)

PROJECTS

- ♦ *Material Substitutions in Aging Aircraft*: Evaluation of AA 7055-T76 as a substitute for AA 7075-T6 (externally sponsored)
- ♦ *Structural Optimization of a Ten Bar Truss System* using FEMB/GENESIS, ANSYS
- ♦ *Bending of Circular Plates with Thickness Variation*
- ♦ *Design and Manufacturing of Automotive Door Hinges* using Pro/Mechanica and Pro/Mfg

SOFTWARE SKILLS

- ♦ Advanced level **ANSYS** user (**Classic/Workbench** and **APDL**) with adequate exposure to classical stress analysis
- ♦ Skilled in **Catia Part & Sketcher**, **Pro/E** modules, **FEMAP** (pre/post with Nastran solver), 3DCOM, **Fortran**, AFGROW
- ♦ Adequate experience in using **MTS** software (Test Star II) for Material Testing, and in handling CNC mill codes
- ♦ **Mathematica**: Wolfram Certified Advanced Foundations Level user of *Mathematica* (May 2008)
- ♦ Other: Adams (View/Flex modules), *Sigma Plot*, *I-deas*, Mat Lab, C/C++ and exposure to working in Linux and Mac OS

RELEVANT COURSEWORK

Finite Element Method (I-DEAS)	Multimedia in Engineering	Knowledge Based Engineering
Fracture Mechanics (AFGROW)	Product Family Design	Concurrent Design & Manufacturing (Pro/E)
Applied Statistical Methods	Advanced Engineering Analysis	Computer Integrated Manufacturing (Pro/Mfg)
Elastic Stress Analysis (ANSYS)	Elastic Plate Structures	Structural Analysis & Optimization (ANSYS)
Vibration Analysis	Design for X-ability	Electron Probe Micro Analyzer (Cameca SX50)

ACTIVITIES

- ♦ Voluntary Member for Academic Misconduct Hearing Panel, SPR'06, FALL'04-SPR'05
- ♦ Editorial Committee Member of **OU ACCENTS-** A Magazine for OU Students, FALL'04-SPR'05
- ♦ **Graduate Student Senate** member: FALL'03-SPR'04 (Ways & Means), FALL'00 – SPR'01 (Academic Affairs Committee)
- ♦ Served **Captain** of College Chess Team, REC Kurukshetra, for the term 1996-97

AFFILIATIONS

- ♦ Student Member of **Golden Key**, an *International Honor Society* 2007-08
- ♦ Student Member of **Pi Tau Sigma** (2001-02 and 2003-04), **Gamma Beta Phi**, (2005-06) and **ASME** (2003-08)

1. MS Thesis: Fracture Strength of Aluminum Panels with Corrosion Damage – 2003.

This is an experimental program targeted at evaluating the mode I, plane-stress fracture strength (K_{Ic}) of T-L oriented high strength AA 7075-T6 and AA 2024-T3 sheets. The specimens used were of center-crack tension (CCT) – also called as middle tension (M(T)) – configuration measuring 4” W x 12” L x (0.040”, 0.063”, 0.090”) B with center notches as per ASTM E 561 as well as tapped holes for holding clip gages to record crack opening displacement (COD). Both plastic-zone as well as compliance methods were applied to develop crack growth resistance curves (R-curves) to compute fracture strength of the panels. Both baseline (non-corroded) as well as corroded panels were included in the program so as to ascertain the impact of corrosion damage on the fracture properties of these alloy sheets. Residual strength characteristics of these cracked sheets were also covered and compared with the past research works.

This study gave me a good understanding about fracture behavior of thin sheet alloys, and damage tolerance methods and available experimental techniques. This research effort has been partially supported by the Air Force Office of Scientific Research.

2. Mini Project: Experimental Characterization of Al 7055-T76 as a Candidate Substitute Material for Aging Aircraft - 2005.

The primary objective of this study is to evaluate the fatigue performance of the candidate substitute material 7055-T76 relative to 7075-T6. The program involved conducting a series of static coupon tensile tests and constant amplitude fatigue crack growth rate (FCGR) tests as well as fatigue life estimation tests on 7075-T6 and 7055-T76 sheets. While ASTM standards E 647 was followed for the FCGR tests, the fatigue life estimation tests were carried out on the AGARD guidelines except that the effects of corrosion damage on fatigue life were not addressed. However for the FCGR tests, both baseline and corroded panels were tested and the corrosion methods included both ASTM G 34 EXCO method as well as Alcoa’s ANCIT method. In addition, environmental effects on fatigue crack growth rate were also covered by testing the specimens in dry ($RH < 15\%$) and moist ($RH > 85\%$) air conditions. Fatigue life estimation tests were carried out at laboratory air conditions ($RH \sim 50\%$). Test results show similar performance of 7055-T76 and 7075-T6 on the basis of tensile and fatigue properties and highlight the improved corrosion resistance of 7055-T76. Statistical comparisons were made between baseline and corroded panels of same material type tested at similar test conditions (i.e., combinations of Stress ratio $R = 0.05, 0.50$ and Relative Humidity $RH < 15\%$, $RH > 85\%$) as well as baseline specimens of 7075-T6 and 7055-T76 at $RH < 15\%$ only since both the material type behaved similarly at dry air conditions.

This is a joint work study carried out by Mr. Pratyush Kumar and myself, under the supervision of Dr. Baldwin who is our thesis advisor, and Principal Investigator of this project. This project is sponsored by S & K Technologies.

I also supervised/assisted colleague who was working on low cycle fatigue life characteristics of aluminum alloy 2024-T3. I started my PhD studying the crack

nucleation phenomenon in aluminum alloys but later shifted my focus to structural dynamics arena and started working on an interesting topic involving bridge-vehicle interaction phenomenon. The University of Oklahoma is actively engaged in developing an intelligent vehicle bridge system (IVBS). I joined the Dynamic Structures Sensing & Control (DySSC) center as a modeling and simulation team member.

3. PhD Thesis: *Dynamic behavior of bridge structures under moving loads and masses*

My PhD thesis is a numerical study on the dynamic behavior of highway bridge structures under moving vehicular loads. This study extends the application of one of the recently introduced numerical approximation technique called Differential Quadrature Method (DQM) to solve for transient dynamic problems. I implemented the numerical procedure for moving load analysis using Mathematica code, and developed beam and plate models to study the effect of moving forces (no inertia effects), masses (inertia effects included – interaction effects neglected), and oscillators (both inertia and vehicle interaction effects included). Mathematica codes for single and two axle load systems were developed, and the effects of parameters on vehicle to bridge interaction (VBI) phenomenon were studied. I also used Ansys to study the dynamic behavior of a beam and plate under moving loads for demonstration purposes. **I plan to defend my thesis in this Summer 2009.**

This study is a part of the extensive research work carried by the DySSC team at OU with key objectives to design and implement an intelligent vehicle bridge system (IVBS) for effective monitoring and control of vibration effects of vehicles on highway bridge structures. This work is funded by both the School of AME and DySSC center at OU.

I also joined with other DySSC team members to participate in the installation of accelerometers in vehicles and bridges, and subsequent testing at both the four post Vehicle Test System (vehicle shaker from MTS), and at test sites – bridge and highway roads. I learned some aspects of bridge monitoring techniques as well as vehicle to bridge communication procedures that enable monitoring and control of systems.

4. Engineer DADT at Cessna Aircraft Company (A Textron Company):

I worked as a Durability and Damage Tolerance Engineer at Cessna Aircraft, Wichita from Oct'08 through Mar'09. At Cessna, I **a)** completed damage tolerance studies on stiffened panel with debond effects using modified crack closure technique in FEMAP w/ Nastran solver, sized specimen configurations for valid residual strength data and specified instrumentation requirements for the tests, **b)** completed and released Cessna report (S-162-920 Vol 1 and Vol 2) on instrumentation documentation for Cessna's Light Sport Aircraft "SkyCatcher", and **c)** completed preliminary damage tolerance studies on a non-round pressure bulkhead to be fitted to a non-round pressurized cabin for further investigation and design validation. I also participated in other team projects focusing on damage tolerance studies on integral skin-stringer wing-box, monolithic engine support beams, and static and fatigue tests on structural members of the Cessna's LSA "SkyCatcher".