

# Kiranmaye Aluru

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## Professional Summary

- Professionally qualified and a Meticulous **CAE/MATLAB Engineer** with 10 years of **automotive industry experience** in Engine Durability and Structural Analysis of Powertrain Engine Components and development of in-house software simulation tools using MATLAB and Simulink
- Strong software tool development experience in developing in-house software simulation tools to help assess engine component design and development
- Developed a software that can assist in analyzing cam bore distortions for single and multiple loading cases using MATLAB
- Developed a new MATLAB-based utility for creating automatic transmission shift and converter lock and unlock schedules
- Knowledge of Model-Based Development (MBD) software in MATLAB Simulink.
- Thorough understanding of Hybrid Powertrain controls and calibration.
- Knowledge of creating the Stateflow Models using MATLAB Simulink.
- Developed a MATLAB simulation utility to assess Variable Displacement Vane Pump performance due to pressure variations, variable oil conditions such as aeration, viscosity etc.
- Worked closely with customers to provide technical guidance for successful adoption of in-house MATLAB software tools
- Proven experience of developing in-house software simulation tools where I have played dual role of developing the software simulation tools along with validation/testing the tools by creating detailed test cases covering various scenarios and executing them and reporting the results to the leadership to obtain the approvals and release the tools for the end user usage.
- Proven experience using ATI Vision for calibration, testing and data acquisition.
- Expert-level knowledge to perform advanced MATLAB programming (highly proficient user) to perform signal processing, internal proprietary software development, GUI coding, dynamic belt drive alignment calculation using Monte Carlo simulation, and analyzation of waveform of belt drive Noise-Vibration-Harshness (NVH).
- Good Knowledge and thorough functional understanding of the Hybrid Electric Vehicle (HEV) system.
- Knowledge and experience on HIL simulations.
- Proficiency in SimDrive (software) modeling to analyze Front-End Accessory Drive (FEAD) dynamics including diesel, gasoline, and mild hybrid Belt-Driven Starter Generator Systems.
- Product knowledge in Engine Front-End Accessory Drive (FEAD), Synchronized Belt Drive, and Crank Train Damper System.
- Capability to model synchronized belt drive system and crank train damper for dynamic simulations.
- Expert-level knowledge in FEA simulation in linear and nonlinear vibration, and fatigue life analysis on Engine components.
- Expertise in using the Altair's HyperWorks software products like HyperMesh, HyperGraph, HyperView, SimLab and OptiStruct etc.
- Expertise in Durability & exposure to NVH
- Proficient in linear/ non-linear static, thermal & dynamic analysis procedures
- Proficient in Elastic, Elastic-Plastic, Hyperelastic material models
- Expertise in ABAQUS and HYPERMESH
- Proven experience with applied mathematics fields of iterative method and numerical analysis and mechanical vibrations
- Proven experience with dynamic simulations in powertrain
- Proven experience with linear and non-linear finite element analysis
- Familiar with fatigue life/FOS calculation using FEMFAT
- Performed topology/shape optimizations using TOSCA Structure, DOE/Parametric optimizations using Optistruct

- Good programming skills. Automated several CAE processes. Some of the tools reduced cycle time by more than 90%
- Proven experience in Engine Durability, Structure, Sealing and Fatigue analysis for engine components including cylinder head, engine block and other accessory engine components using HyperMesh, SIMLAB, ABAQUS, FEMFAT Softwares
- Proven ability to apply CAE skills effectively to evaluate the performance of engine components and optimize their designs
- Proven ability to assess product designs and provide feedback to the design team for enhancing product performance while reducing mass
- Strong analytical and technical background in durability/fatigue, sealing or manufacturing
- Good overall knowledge of internal combustion engine/powertrain or electrified powertrain
- Experience in engine experimental/Dyno tests
- Proven ability to solve highly nonlinear problems involving contacts using ABAQUS
- Worked closely with design engineers on field failure issues
- Exposure to CFD. Map temperature results from CFD to a mechanical stress analysis. Simulation CFD includes the ability to map results to standard FEA decks (inp, nas, dat, etc) which can be used by other packages.
- Proven ability to solve mechanical design problems develops design requirements, perform piece part design, and coordinate fabrication, assembly, and qualification of hardware
- Proven experience in delivering technical presentations to various stakeholders; also participated in various technical reviews throughout the product development cycle.
- Developed CNC program for dovetail slotting on gas turbine compressor wheel using FANUC system
- Proven experience in stress analysis using ANSYS software
- Proven ability to understand mechanical systems, mechanisms, and tests
- Strong Knowledge in mechanical engineering and design/development of mechanical components for manufacturing
- Exposed to all phases of product development life cycle
- An excellent team player with polished organization, communication, and presentation skills.

### Technical Expertise

Pre & Post Processing Tools	HyperMesh, HyperView, HyperGraph, HyperMorph, ABAQUS CAE/Viewer and SimLab, SimDrive, LS-Dyna, DEP/Meshworks
Fatigue tools	FEMFAT/ nCode – DesignLife, Fe-Safe
FEA Solvers	ABAQUS Standard/Explicit, Nastran/Optistruct
Data to Decision Platforms	d3view, Vcollab
Optimization Tools	TOSCA Structure, OptiStruct
1D Simulation Environments	AMESim, GT-Suite
Automation/Simulations/Scripting/Calibration/Testing	C, C++, C#, Shell Scripting, Python, Excel VBA, MATLAB/Simulink/Stateflow, Model Based Development (MBD), MIL, SIL, ATI Vision etc.
CAD Tools	Unigraphics, NX, AutoCAD software, Pro-Engineer, Solid Works, CREO
Production Technology Lab Skills	Casting, Molding, Pattern Making, Forming, Powder Processing etc.
Packages	Microsoft Word, Microsoft PowerPoint, Microsoft Excel, MS Project, WinEdt Editor, Microsoft Office
Project Planning Skills	Microsoft Office Project
Other Skills	Attention to Detail, Excellent communication skills, Analytical Thinking, Dependability, Initiative, Cooperation, Persistence, Innovation, Adaptability/Flexibility, Stress

	Tolerance, Achievement/Effort, Fast learner
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## Professional Experience

**Employer: Dayco Products, Inc, Troy, MI**

**Sep 2019 – Dec 2020**

**Role: Sr. CAE Engineer**

### Duties and Responsibilities

- Conducted system virtual test with CAE software to perform Front-End Accessory Drive (FEAD), Belt Driven Starter Generator Systems, synchronized belt drive simulations and cranktrain damper optimization; to ensure the results meet Dayco design standards and customer engineering requirements in a timely fashion.
- Analyzed results from test data on noise, vibration, and harshness (NVH), using statistical data reduction techniques to predict product durability, reliability, and performance.
- Expanded Dayco analysis ability by developing internal proprietary software for new analyses programming.
- Lead activity related to global coordination of analysis software upgrades ensuring consistency of analysis and reporting methods.
- To evaluate system acceptability and update Dayco design guidelines on system simulations.
- Comprehend and utilize Finite-Element Analysis to compute stress, strain, and modal response of the mechanical products (e.g. tensioner and damper).
- Represented Dayco to external customers regarding simulation methods and expertise. Discuss at a high level with customer CAE engineers and technical specialists.
- Worked with Dayco CAE team to apply standard methodology globally
- Worked with testing group to enhance the correlation between physical and virtual tests.
- Supported other Dayco Engineering departments or branches (e.g., Dayco India, Dayco China, Dayco EU, Dayco SA) worldwide with system simulation service.
- Maintained awareness of industry trends and technological advancements in virtual test and simulation methods, and analysis.
- Maintained awareness of the advancement of Information Technology and integrate it into engineering to enhance efficiency (e.g., web-based tracking computing).
- To Mentor less experienced engineers with simulation and programming skills.
- Lead activity related to global coordination of analysis software upgrades ensuring consistency of analysis and reporting methods.

**Employer: Altair ProductDesign Inc, Troy, MI**

**Jan 2011 – July 2019**

**Role: CAE Engineer/MATLAB/SIMULINK Development Engineer**

**Client: Fiat Chrysler Automobiles (FCA), Auburn Hills, MI**

### Duties and Responsibilities

- MATLAB scripting, GUI work, MATLAB Simulink
- Develop software simulation tools to help assess engine component design and development.
- Post processing CAE results
- Defined a new process for selection of spring rate and pre-load for VDVP
- Validate spring rate and pre-load choices using MATLAB simulation engine
- Work with engine development personnel to assess and validate the new spring's performance

- Develop a software tool that can assist in analyzing cam bore distortions for single and multiple loading cases
- Good knowledge in understanding bore sticking problems
- Develop a software tool that can assist in analyzing valve alignment distortion
- Developed a new MATLAB-based utility for creating automatic transmission shift and converter lock and unlock schedules
- Knowledge of Model-Based Development (MBD) software in MATLAB Simulink.
- Knowledge of creating the Stateflow Models using MATLAB Simulink.
- Analyzed Engine Durability/Structural integrity for engine components including Cylinder Head & Block, Camcover, Front Cover & Rear Cover, Oil Pan, Oil Pickup Tube, Alternator Bracket, Water pump, EGR Housing, Ladder Frame, Rear Retainer, Oil Filter Adapter, Oil pump housing, Idler Shaft, Valve Cover, EGR pipe, Bolt Head slippage, Head/Block Fastener analysis, Cam Tower, Cam Cap, BSG Tensioner etc.
- Analyzed different types of joints for sealing integrity including Multi Layered Steels (MLS), Rubber Coated Metals (RCM), RTV Joints, Elastomeric/Rubber Press In Place (PIP), O-rings
- Performed analysis on Thermal Clamped bore shapes for Form Honing
- Performed Cylinder Head Durability and High Cycle fatigue analysis
- Performed Cylinder Head Deck Plate Honing Analysis
- Performed Cylinder Bore Distortion, Piston Ring Conformability Analysis
- Performed Crank Bore and Cam Bore Distortion and Misalignment Analysis
- Performed Block Top and Bottom End Durability Analysis
- Performed Valve seat/guide Distortion and Misalignment Analysis
- Performed Shape and Topology optimization based on fatigue results using Tosca and Optistruct software
- Performed Powertrain system level NVH.
- Familiar with mapping temperature results from CFD to a mechanical stress analysis. Simulation CFD includes the ability to map results to standard FEA decks (inp, nas, dat, etc) which can be used by other packages.
- Interact and communicate with UAW staff and other powertrain engineers.
- Component and vehicle level modeling and analysis
- Developing structural design of products
- Correlate models created. Utilize models to assess feasibility, operating condition effects, possible new applications and necessity of modification
- Determine stress analysis of a thick plate having a circular hole under axisymmetric radial load using ANSYS software
- Writing internal technical reports
- To derive radial pinching force on a ball bearing from the hooting pulley as a function of its angular position
- Other job-related duties as assigned

**Employer: The University of New Mexico, ABQ, NM**

**Jan 2010 – Dec 2010**

**Role: Mechanical Engineer Intern**

**Duties and Responsibilities**

- To perform computational modeling on the mechanical behavior of composite materials.
- To write and publish Journal papers (Journal of Microelectronics Reliability).
- To perform finite element modeling on the mechanical behavior of composite structures using ABAQUS software
- Increase the scope or application of previous deformation analysis on failure path to incorporate ductile damage in the simulation, to be able to predict actual failure
- Examine the effects of strain rate on the overall ductility and failure pattern, especially during fast loading (drop impact) conditions
- Develop predictive modeling capabilities to address the increasing concern of drop and impact reliability

- Perform finite element modeling to investigate the Ductile Failure Morphology in Solder Joints under fast monotonic and cyclic deformations

**Employer: The University of New Mexico, ABQ, NM**

**Jan 2008 – Dec 2009**

**Role: Graduate Research/Project Assistant, ME Department**

**Duties and Responsibilities**

- To perform finite element modeling on the mechanical behavior of composite structures using ABAQUS software
- Build the computational model
- Increase the scope or application of previous deformation analysis on failure path to incorporate ductile damage in the simulation, to be able to predict actual failure
- Examine the effects of strain rate on the overall ductility and failure pattern, especially during fast loading (drop impact) conditions
- Develop predictive modeling capabilities to address the increasing concern of drop and impact reliability
- Perform finite element modeling to investigate the Ductile Failure Morphology in Solder Joints under fast monotonic and cyclic deformations
- Other job-related duties as assigned

**Employer: JNTU University, Hyderabad, India**

**Aug 2006 – July 2007**

**Role: Assistant Professor, ME Department**

**Duties and Responsibilities**

- Teaching mechanical engineering courses: Metallurgy and Materials Science, Engineering Mechanics, Kinematics of Machines and Dynamics of Machines
- Design, purchase equipment and build Materials lab
- Contribute to research and writing
- Undertake the faculty and university committee assignments and administrative assignments
- Member of student advising committee, ME Department

**Employer: Bharat Heavy Electricals Limited, Hyderabad, India**

**June 2005 – July 2006**

**Role: Mechanical Engineer Intern**

**Duties and Responsibilities**

- Develop code in 'C' Language to carry the performance analysis
- Analyze the performance of Gas Turbine on test bed
- Suggested techniques to improve the performance of gas turbine
- Other job-related duties as assigned

**Education**

**University of New Mexico, Albuquerque, NM**

**2007-2009**

- Master of Science in Mechanical Engineering

**Jawaharlal Nehru Technological University, Hyderabad, India**

**2002-2006**

- Bachelor of Technology in Mechanical Engineering

**Relevant Courses**

- Mechanical Behavior of Materials, Material Modeling, Engineering Mechanics, Advanced Materials Science, Fracture Mechanics, Solid Mechanics, Advanced Thermodynamics I, Thermal System Design and Optimization, Heat Transfer, Finite Element Methods, Random Dynamic Processing and Controls, Metallurgy, Machine Tools, Production Technology, Hydraulic Machines, Fluid Mechanics, CAD/CAM, Automation in Manufacturing, Engineering Graphics, Design of Experiments,

Manufacturing Process (Heat Treatment, Machining, Assembly, Casting, Injection, etc.), Rubber Sealing, RTV Sealing, MLS Sealing, Dynamics

#### Professional Affiliations

- Professional member of ‘Society of Automotive Engineers’ (SAE)
- Professional member of ‘American Society of Mechanical Engineers’ (ASME)
- Professional member of ‘Society of Women Engineers’ (SWE)
- Valued member of The University of New Mexico Alumna
- Center for Integrated Tool Design Certification (AutoCAD)

#### Journal Publications

1. Kiranmaye Aluru, Yu-Lin Shen, Department of Mechanical Engineering, UNM. “Numerical Study of Ductile Failure Morphology in Solder Joints under Fast Loading Conditions”, Journal of Microelectronics Reliability, 2010.
2. Kiranmaye Aluru, Yu-Lin Shen, Department of Mechanical Engineering, UNM. “Simulation of Ductile Failure of Solder Joints under Fast Monotonic and Cyclic Deformations”, Journal of Finite Elements in Analysis and Design, 2010.
3. K. Aluru, F.-L.Wen, Y.-L.Shen, “Modeling of Solder Fatigue Failure due to Ductile Damage”, Journal of Mechanics, 2011.

#### Technical Paper Publications

1. Kiranmaye Aluru, Bruce Geist, FCA “Calibrating an Adaptive Pivoting Vane Pump to Deliver a Stepped Pressure Profile”, April 16th, 2013, Detroit, Michigan, United States, SAE 2013 World Congress & Exhibition.
2. Kiranmaye Aluru, Bruce Geist, FCA “Assessing the Likelihood of Binding in Distorted Stepped Radius Cylinder Bores”, April 8th, 2014, Detroit, Michigan, United States, SAE 2014 World Congress & Exhibition.