
Dr. Zeeshan Ahmer

General Manager at SUPARCO ¹

Mechanical Engineer/Aerospace Engineer/Doctorate in Material Sc. & Engg.

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Skills/Areas of interest: Technical Project/Program Management, System Engineering, Structural/Mechanical design, analysis and testing, Thermal/Thermo-Mechanical design, analysis and testing, Mechanical Integration, Space Propulsion, Research and Development in a relevant area

Education:

- **PhD (January 2005-July 2008):** Material Science and Engineering, "**Ecole de Mines Paris-MINES ParisTech, France**" 'An investigation on Thermomechanical Fatigue Behaviour of a Tool Steel X38CrMoV5/AISI H11'; defended with honors.
- **Master of Science (September 2003-January 2005):** Aeronautical Engineering, "**Ecole Nationale Supérieur de l'Aéronautique et de l'Espace, ISAE/SUPAERO, Toulouse, France**" (Mention – Very Good: A-Grade)
- **Bachelors of Engineering(1995-1999):** Mechanical Engineering, "**NED University of Engineering and Technology, Karachi, Pakistan**" (A-Grade: First Division)

Work Experience:

- **August 2008 to date:** ¹-Pakistan Space and Upper Atmosphere Research Commission (SUPARCO)

General Manager (April 2013 to date): Currently heading Leo satellite structure/thermal/mechanism division which includes 8 graduate engineers, one PhD and 20 technicians.

- I have been involved in the mission planning, system engineering and program/project management of a Low earth orbit remote sensing satellite PakTES.
- Managed a team of engineers to conduct preliminary and critical design review (PDR) of structure/thermal/mechanism and propulsion subsystems of a proposed 300 kg class PakTES satellite at system/subsystem and unit level including all technical documentation/reports following European Corporation for Space Standardization (ECSS).
- Carried out all the resourcing and procurements for the development of Structural/Thermal/Propulsion qualification model, whose structure is composed of honey comb sandwich material with embedded and surface heat pipes and other passive thermal control components with hydrazine based propulsion system.
- Successfully headed a team of engineers to carry out design, analysis, development and vibration testing of a Qualification Structural Model based on dummy masses to replicate subsystems/units.
- Heading a team of aeronautical/mechanical engineers to design, develop and install air born small aperture radar antenna (SAR) and housings for its support electronics on a small aircraft.
- Detailed planning of structural and thermal environmental testing at system, subsystem and unit level has also been carried out.

Technical Manager (August 2008 to March 2013): Well rounded satellite mechanical engineering experience in Structural Design and Analysis, Thermal Design and Analysis, Mechanical Packaging and Integration and Testing.

Structural Design and Analysis: Lead structural engineer of PakTES and customer furnished electronics units of PakSAT-1R

- Designed structural configuration as per the mission requirement including the design (based on rib stiffening system to achieve higher natural frequency) of several housings/boxes for electronic subsystems such as power, AOCS, OBC/OBDH and payload modules etc.
- Performed detailed housing/box-level structural analysis including normal modes, static, and frequency response analyses. Further, design optimization was carried out in order to achieve the required margin of safety by reducing the number of fasteners and the thickness of sandwich panel etc.
- I have also been a team member, which was responsible for the mechanical design, analysis, manufacturing and testing of the housings/boxes of several customer furnished electronic units which are installed in PakSAT-1R and functioning successfully in-orbit.

Thermal Design and Analysis: Lead thermal engineer of PakTES and customer furnished electronics units of PakSAT-1R.

- Performed all thermal design and analysis at all stages of satellite design. Built all thermal models (main Space Vehicle model, all box-level, and all board-level models), evaluated environmental considerations, selected all emissive coatings, and provided feedback into mechanical and structural designs.
- Worked with payload to integrate their thermal model into satellite thermal model.
- Researched heat pipe design and optimized baseplate thermal coverage and heat sinking capabilities, and worked with vendor for quotes and cost-effective design.
- Designed small thermal and support brackets for electronics boards
- Participated in all thermal vacuum and thermal cyclic tastings of customer furnished instruments for PakSAT-1R.

Mechanical Design and Development: Participated thoroughly from conception to execution in the following projects.

- Design and fabrication of a solar panel deployment mechanism based on torsion and tape spring for the engineering qualified model of a remote sensing satellite.
- Design and fabrication of a zero-G simulator for solar panel deployment mechanism.
- Design, fabrication and testing of cold gas thrusters and storage tank.
- Design and fabrication of GSE for several environmental testing of customer furnished instruments for PakSAT-1R.
- Good experience in creating mechanical drawings for several types of parts. Performed mechanical design and packaging of several boxes and enclosures. Created enclosures that required tight EMI seals.

- **January 2005 to July 2008: Institut Clement Ader (ICA-Albi), Ecole de Mines d'Albi, France**

Researcher : In order to prepare a PhD dissertation in the area of Material Sciences and Engineering.

- The aim of this work was to predict the cyclic behaviour of AISI H11 tool steel with a nominal Rockwell Hardness of 47. Various isothermal and non isothermal conditions have been investigated with different strain rates, strain amplitudes and temperature levels, by applying two different approaches. A constitutive thermo-elastoviscoplastic model was considered which includes kinematic and isotropic components to define strain rate effects, dynamic recovery and cyclic softening.
- To progress conditions, two types of loading conditions (variable temperature and variable strain amplitude) had been designed. A test bench had been developed to conduct these experiments and a complete time-temperature-strain history is presented further in terms of applications of these models and to observe the behaviour of the material under complex loading.
- In accordance with the experimental data base, these behaviour models had been characterized and analyses of their pertinence and limitations had been carried out in order to upgrade them to satisfy different working conditions.
- Finally, numerical simulation on a structural thermomechanical fatigue test specimen had been performed by using these constitutive laws to analyse their applicability under severe loading conditions.
- Submitted and defended the PhD dissertation with honors in Albi, France, in front of an international jury composed of a professor from Karlstad University Sweden, a professor from Ecole Polytechnico di Turino Italy, along with other professors from France.

- **July 2000 to June 2003: Pakistan Space and Upper Atmosphere Research Commission (SUPARCO)**

Assistant Manager (Technical): Satellite Research and Development Centre, SUPARCO, Pakistan. Headed one engineer and 18 technicians/workers of a mechanical workshop.

- Participated in the design and fabrication of prototype satellite structure based on honey comb sandwich panels. One-shot fabrication technique was used and sine sweep testing was performed to validate the fabrication criteria.
- Conducted compressive strength testing of honey comb sandwich panels to determine in plane and out of plane compressive strength. These tests were performed on aluminium and glass fibre panel facings in order to compare their mechanical properties.
- Trouble shooting and maintenance of a space simulator/humidity chamber.
- Development of a mechanical work shop, procurement of different machines e.g. lath, milling, shearing and drilling etc.

- **August 1999 to June 2000: Plastipack Machines Pvt. Ltd., Karachi, Pakistan**

Services Engineer: This work included maintenance, after sale services and marketing of plastic processing and packaging machines.

- Participated in a team project of designing and fabrication of 1 ton ammonia based ice plant.

Computer Skills:

Operating Systems	Office Tools	CAD/Mechanical design tools	Structure and Thermal Analysis Tools	Programming Languages
Windows	MS Word	IDEAS	MSC Nastran/Patran	Fortran
Unix	MS Excel	Pro/E Wild Fire	ABAQUS	Matlab
Linux	MS Power Point	AutoCAD	ANSYS Workbench	
Apple Mac.	MS Project	SolidWorks	Sidolo 2.4	

Selected Publications:

- Z.Ahmer, V. Velay, F. Rezai-Aria, G. Bernhart, Cyclic behaviour simulation of X38CrMoV5-47HRC (AISI H11) tempered martensitic hot work tool steel, 7th International tooling conference.
- Z.Ahmer, V. Velay, F. Rezai-Aria, G. Bernhart, An updated version of the paper, Cyclic behaviour simulation of X38CrMoV5-47HRC (AISI H11) tempered martensitic hot work tool steel, International journal of microstructure and material properties, issue 2008, vol 3.
- Y. Ayub, Z.Ahmer, S. Riffat, M.A.Shah, Mechanical behaviour characterization of aluminum based honey comb structure by optimized modeling and numerical simulations, Journal of space technology, issue June 2011.
- Z. Ahmer, V. Velay, F. Rezai-Aria, A study of mechanical behaviour of AISI-H11(X38CrMoV5-47HRC) under complex isothermal(LCF) and complex non-isothermal(TMF) loading conditions, submitted in the journal of Material science and engineering (A) 2014.
- Z.Ahmer, A. Shah, Design optimization through numerical simulation and testing of a 5N cold gas thrusters.' Journal of space technology issue 2014.

Awards/Accomplishments and Complementary Information:

- Attained scholarship to carry out Master of Science studies in ISAE/SUPAERO from Société française d'exportation des ressources éducatives (SFERE).
- Attained scholarship from Ecole de Mines d'Albi to carry out PhD studies.
- **Linguistic Skills:** Bilingual; English and French (Fluent)
- **Sports:** Captain of SUPARCO Pakistan cricket team; squash, swimming, snooker and a regular GYM member.
- **References:** Available upon request.

