

Muhammad Bilal Ashraf

Address: House A224/Z-6 Gulshan-e-Maymar, Khi

Cell# +92-342-2851750

E-Mail: sheikhbilal375@gmail.com

bilal.ashraf@khi.au.edu.pk

LinkedIn ID: <https://www.linkedin.com/in/bilal-ehs>

CAREER SUMMARY:

Mechanical Engineer with robust experience in aerospace thermal analysis, computational fluid dynamics (CFD), and air dispersion modeling (AERMOD). Specialized in satellite thermal control, upper atmosphere research, and launch vehicle emission simulations. Certified in NEBOSH IGC, ISO 45001, and OSHA 30-Hour.

WORK EXPERIENCE:

Lecturer

Mechanical Engineering Department
NED University of Engineering & Technology
Karachi, Pakistan
Mar'26 – Present

- Delivered undergraduate modules in thermal sciences and fluid mechanics.
- Contributed to departmental academic processes by taking part in curriculum reviews, drawing up examination materials, and putting together accreditation documentation. Also engaged in faculty meetings and carried out continuous improvement initiatives to uphold teaching quality and academic standards.

Lecturer

Air University – Mechatronics Engineering Department
Karachi, Pakistan
Sep'25 – Mar'26

- Taught undergraduate courses in thermal sciences and fluid mechanics, delivering comprehensive instruction on thermodynamics, heat transfer, fluid statics, and fluid dynamics. Emphasized conceptual clarity, analytical reasoning, and the application of governing equations to real engineering systems.
 - Designed course materials included lecture notes, assignments, laboratory manuals, and assessment tools. Incorporated contemporary engineering case studies, simulation-based demonstrations, and experimental data interpretation to enhance student engagement and applied learning.
 - Supervised undergraduate research projects related to thermal engineering, aerodynamics, and flow analysis. Supported students in developing research methodologies, computational models, and academic writing skills.
 - Oversaw laboratory sessions for heat transfer and fluid mechanics, ensuring safe operation of equipment, accurate execution of experiments, and proper documentation of results. Delivered technical briefings to build students' practical competence.
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Fire Safety & Risk Assessment Consultant

Mosh Consultants Private Limited – Karachi, Pakistan
Dec'24 – Present

Provided expert advisory and compliance services to clients across various industries, focusing on fire prevention, life safety, and regulatory adherence.

- **Regulatory Compliance & Auditing:** Advise clients on the application and compliance with NFPA codes for fire, life, and electrical safety. Conduct comprehensive risk assessments and safety compliance audits to identify gaps and develop actionable corrective plans.
- **System Design Review:** Review and validate fire protection system designs (e.g., sprinklers, alarms, suppression

systems) against NFPA standards and local regulations to ensure efficacy and compliance.

- **Policy & Procedure Development:** Develop and implement robust HSE policies, Standard Operating Procedures (SOPs), and detailed emergency response plans tailored to client-specific operational hazards.
 - **Technical Training & Culture:** Design and deliver specialized NFPA-aligned safety training programs to strengthen workplace safety culture, enhance employee awareness, and ensure preparedness for emergencies.
 - **Hazardous Materials Management:** Guide organizations in the safe handling, storage, and processing of hazardous materials, implementing best practices to mitigate risks of fire, explosion, and toxic releases.
 - **Technical Advisory:** Provide expert input on complex projects involving fire safety engineering and pollutant dispersion modeling, leveraging advanced simulation expertise to inform safety strategies.
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Assistant Manager (Mechanical)

Pakistan Space & Upper Atmosphere Research Commission (SUPARCO)

Feb'20 – Nov'24

- **Atmospheric & Dispersion Modeling:**
 - Conducted AERMOD-based simulations to predict pollutant dispersion from rocket exhaust plumes during launch/re-entry, ensuring compliance with environmental regulations.
 - Modeled upper atmosphere wind patterns using WRF-Chem to assess orbital debris dispersion risks for satellite constellations.
 - Developed Gaussian plume models for ground-level emission scenarios at launch sites, integrating meteorological data (CALPUFF).
 - **Thermal & CFD Analysis:**
 - Led finite element analysis (FEA) for satellite thermal management, optimizing heat pipe layouts to sustain $\pm 50^{\circ}\text{C}$ operational ranges in LEO/MEO orbits.
 - Simulated re-entry aerodynamics using ANSYS Fluent, reducing thermal shielding mass by 12% through material-stress coupling analysis.
 - Automated CFD workflows (Python + OpenFOAM) for parametric studies on solar array cooling efficiency.
 - **Research & Compliance:**
 - Published SUPARCO technical reports on planetary boundary layer (PBL) effects on launch vehicle trajectories.
 - Aligned propulsion system designs with ISO 14620-1 (Space Systems Safety Requirements) through hazard operability studies (HAZOP).
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Production Engineer

SUI Southern Gas Company Limited

Apr'19 – Feb'20

- **Key Achievements:**
 - Spearheaded end-to-end production of 1,250+ Gallus 2000 (G 4.0) gas meters daily, managing assembly, calibration, and dispatch with <2% defect rate.
 - **Process Optimization:**
 - Reduced production downtime by 30% via SMED (Single-Minute Exchange of Dies) for rapid tooling changeovers.
 - Implemented Kanban inventory control, cutting excess stock costs by 25% while maintaining JIT (Just-in-Time) delivery.
 - **Quality & Lean Initiatives:**
 - Deployed Poka-Yoke (error-proofing) mechanisms, decreasing calibration errors by 40%.
 - Led Kaizen events that improved workflow efficiency, saving 200+ labor hours/month.
 - **Maintenance & Reliability:**
 - Applied TPM (Total Productive Maintenance) to boost equipment uptime to 98%.
 - Trained 15+ operators in Autonomous Maintenance (Jishu-Hozen), reducing breakdowns by 35%.
 - **Data-Driven Improvements:**
 - Used SPC (Statistical Process Control) to monitor critical parameters, achieving ISO 9001 compliance.
 - Conducted Genchi Genbutsu (Gemba walks) to identify bottlenecks, increasing throughput by 18%.
 - Conduct Genchi Genbutsu (go and see) visits to suppliers and benchmark best practices.
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ACADEMICS:

Dec 2019	Master of Engineering (Energy Systems)	NED University of Engineering and Technology, Karachi.
Dec 2017	Bachelor of Engineering (Mechanical Engineering)	NED University of Engineering and Technology, Karachi.

PUBLICATIONS:

1. Ashraf, M. B., Siddiqui, M. A., & Yousuf, M. U. (2023). Autoregressive integrated moving average (ARIMA) modeling for wind resource assessment. International Journal of Energy and Water Resources. <https://doi.org/10.1007/s42108-02300254-z>
 2. M. Mahrukh, B. Ashraf, U. Allauddin, and U. Saleem, "Computational Fluid Dynamics Analysis for Ventilation and Air-Conditioning of an Office Room," in Conference on Emerging Technologies and Industrial Application, 8th International Mechanical Engineering Conference, 2018, pp. 1–8.
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TECHNICAL SKILLS

- **Air Dispersion Modeling:** AERMOD, CALPUFF, WRF-Chem
 - **CFD/Thermal Tools:** ANSYS Fluent, COMSOL, Thermal Desktop
 - **Programming:** Python (NumPy, SciPy), MATLAB
 - **Data Visualization:** Power BI, Paraview
 - **Certifications:** NEBOSH IGC, ISO 45001:2018, OSHA 30-Hour, IOSH MS, HABC
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PROFESSIONAL AFFILIATION:

- Registered Engineer with Pakistan Engineering Council MECH/38448
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