

Professional CV**Key Qualifications:****DR MUHAMMAD FAHAD**

PhD in Mechanical Engineering from The University of Manchester, UK. 2012; MSc in Advanced Manufacturing Technology and Systems Management from University of Manchester Institute of Science and Technology, UK (now the University of Manchester), 2004; B.Eng. in Mechanical Engineering from NED University of Eng. & Tech. Karachi, Pakistan. 2001

Key Experience:

Fifteen years of experience in the field of mechanical and nuclear engineering, with over ten years of experience in numerical (Finite Element Modelling: Static and Dynamic analyses) and analytical modelling of metals and ceramics. Currently working on structural integrity assessment of the United Kingdom Civil nuclear Advanced Gas-cooled Reactors and design assessment of Generation IV reactors. Successfully developed several methodologies using Finite element modelling (with UMAT) to analyse the ageing behaviour of Advanced Gas-cooled reactors. Advanced user of leading industrial-standard design and analysis packages including ABAQUS, COMSOL Multiphysics, Pro-Engineer, Solid Works, FORTRAN, MATLAB and Mathematica.

Achievements/Awards/Memberships:

- Successfully delivered a webinar in partnership with COMSOL Multiphysics and IMechE. The webinar was intended to demonstrate that how COMSOL can be used to address a complex issue related to Advance Gas-cooled Reactor.
- Secured four years project twice in 2019 and 2015 from the Office for Nuclear Regulations, UK: Title: "The Provision of regulatory support in analysis of irradiated graphite brick cracking and weight loss in AGR cores".
- Scientific/technical reviewer of Proceeding of the IMechE, Part B: Journal of Engineering Manufacturing, Journal of Machining Science and Technology and Journal of the International Measurement Confederation and The First International Conference on Sustainable Materials Processing and Manufacturing, Skukuza, Kruger National Park, South Africa.
- Invited speaker at "International Symposium on Advancements in Innovation and Commercialization".
- Developed and verified machining process Finite element models and methodologies which include Thermal and Thermo-Mechanical modelling-static and dynamic (please see publications and technical report sections).
- PhD scholarship from the School of Mechanical, Aerospace and Civil Engineering, The University of Manchester.
- Member of Hong Kong Society of Mechanical Engineering and Nuclear Institute. Working towards membership of the Institution of Mechanical Engineers; Academic qualifications have been accepted.

Senior Engineer

Engineering Analysis Services Limited (EASL), Altrincham

July 2020 - present

Key projects include:

- Support EDF NG nuclear engineering projects under framework.
 - Predicting failure of nuclear graphite components of AGRs.
 - Conducting complex sensitivity studies to foresee effects of varying material properties and geometries of AGR components on failure predictions.
- SQEP accreditation to the following roles:
 - 0 - Classical strength of materials, statics/mechanics, limit load analysis, fatigue etc.
 - 2 - Stress finite element analysis.
 - 16 - Reactor Graphite Core Structural Modelling (Technical Lead)
 - 17 - Reactor Graphite Component Stress Analysis (Technical Lead)

- Peer review of structural analysis including material performance analysis and assessment for multiple power stations NB.

Research Fellow in Nuclear Graphite
The University of Manchester

Nov 2012 – May 2020

- Structural integrity/stress analysis of Advanced Gas-cooled Reactors (AGR) using Finite Element (FE) Modelling and methods: Single, multilayer and array modelling of AGR (all UK civil nuclear stations) components.
- Combined Mechanical-Thermal-Irradiation FE modelling using highly sophisticated user material subroutine (UMAT).
- Bringing together stress and strength predictions to determine the structural integrity of the graphite components, taking account of the statistical variation in the graphite properties.
- Prediction of change in irradiated strength of components in the reactor.
- Developing failure criteria for UK AGR graphite components.
- Determination of the effect of irradiation induced creep and its effects on stresses predictions

Technical international talks

- M Fahad, E. Tan, N. Warren, A. Jones and G. Hall (2019), Effect of AGR fuel brick end-face features on stress predictions, INGSIM-2019, Brugge, Belgium.
- M Fahad (2017), Effects of nuclear graphite material properties changes on Advanced Gas cooled reactor bricks contact conditions and ovality, Third International Conference on Mechanical and Aeronautical Engineering ICMAE, Dubai, UAE.
- M Fahad, G Hall, K McNally, B J Marsden, P Mummery, and N Warren (2015), Finite element modelling of nuclear graphite brick bore ovality, INGSIM-16, Nottingham, UK.
- M Fahad, K McNally, G Hall, B J Marsden, P Mummery, and N Warren (2013), Development of a stress-based emulator for AGR moderator bricks, INGSIM-14, Seattle, USA.

Projects co-ordinator and Lecturer

2005 – October 2012

National University of Science and Tech. (NUST).

Worked within a new department development team: IME (Institute of Manufacturing Engineering). The tasks included procurement, set-up of manufacturing equipment including FMS (Flexible Manufacturing System) etc. Also, involved in lecturing on the following subjects:

- Stress analysis/ Finite element modelling/ Numerical modelling using Fortran (BEng)
- Materials Engineering (BEng).

Note: Study leave during 2009 and 2012

Trainee Mechanical Engineer

2001 – 2002

Petrochem Engineering & Industrial Consultants.

Worked on the following projects for the petrochemical industry:

- 2-Miles Crude Oil Pipeline 6": Successfully completed a project which involved designing 2 miles of crude oil piping from jetty to the client's local reservoirs.
- Glass Furnace external piping for water and fuel supply: Designed furnace piping for one of Pakistan's leading glass manufacturers. The project involved verification of existed piping layout and re-designing external piping for new furnace installation.
- Troubleshooting: As a trouble-shooter, worked on mini-projects including valve failure and pipe burst for Shell Pakistan and Engro Vopak Terminals.

Knowledge and technology transfer

2012 - Present

Research Fellow at The University of Manchester: The quality research work has always been accredited by the Office for Nuclear Regulation and their counterpart (the Licensee).

Outreach and public engagement

Publication of teaching materials and promotion of engineering and physical sciences



- 2019: Nuclear Graphite Research Group external two day course for nuclear industry professionals, which was held at The University of Manchester. Developed new course module and delivered a module on FEM and AGR assessments.
- 2017: Successfully delivered a training course: Introduction to programming with Raspberry Pi and python scripting (AQA: 73852) at Community revival, Manchester (Volunteer work).
- 2010: M. Fahad, P.T. Mativenga and M.A. Sheikh, Recent developments in FEM with coated tools, ISTE/Wiley (UK)-Research book titled "Finite Element Methods in manufacturing process" (Book chapter), pp. 45-85: ISTE/Wiley (UK) ISBN 978-1-84821-282-4.