

Personal Details

Nationality	British
Year of Birth	1968
Profession	Civil Engineer
Specialisation	Numerical Modelling of Tunnels and Underground Space



Summary

Chartered Professional Civil/Geotechnical Engineer with strong analytical problem-solving skills with international experience working on a diverse range of geotechnical projects.

Experience with a range of clients including consultants, contractors, public sector, research organisations and specialist suppliers. Accustomed to working under pressure to deliver in terms of time, cost and quality. Has successfully trained and supported the development of external and internal clients both nationally and internationally.

Internationally recognised expert in the field of numerical modelling of tunnels and underground space. Currently commissioned to write the NAFEMS Guidance Book on Geotechnical Finite Element Modelling for SCL Tunnels.

- Experienced in **quantifying design risk** through the considered application of finite element analysis (**FEA**) e.g.
 - Independent Geotechnical/Structural Review of the Sprayed Concrete Lining (SCL) Design for Crossrail C510
 - Assessment of the influence of compensation grouting on face stability and tunnel linings
 - Network Rail Category 3 check of a crane monopile foundation at Kings Cross Redevelopment Site
 - Ultimate and Serviceability Limit State Assessment of 60m high reinforce earth walls in Dubai
- **Structural optimisation and assessment** experience of reinforced concrete, steel and nuclear structures e.g.
 - Structural optimisation of Kit T-Beam Foundation Units (for Roger Bullivant)
 - Structural assessment of AGR nuclear graphite cores (for British Energy)
 - Seismic analysis of B241 overbuilding and services building and the BNFL technology centre
 - AEA coordinated research programme: safety significance of near field earthquakes
 - Crack modelling for the Heysham1/Hartlepool Power Station Boiler Closure Units
 - Joint Strike Fighter Ski Jump Design Assessment of MGB components
 - Military trackway SSI analysis
 - Electromagnetic gun structural analysis assessment
- **Geotechnical Engineering Design** experience having worked on **major projects** in UK and Australia e.g.
 - Crossrail C510 Sprayed Concrete Lining Assessment for Liverpool Street and Whitechapel Station Tunnels
 - Gateway Motorway Upgrade Project Brisbane Australia (Soft soil design of geotechnical structures)
 - Kempsey Bypass Alliance Project Sydney Australia (Ground improvement design assessment)
 - Channel Tunnel Rail Link North Downs Tunnel (CTRL 410 Contract)
- Good knowledge and experience of working to **industry codes of practice**
- Experienced in **preparing project proposals** providing fee and time estimates
- High regard for maintaining high standards of **health, safety and welfare** on projects (CSCS Civil and Structural Engineering Design Professional Membership, HS&E Tested)
- Member of the NAFEMS Geotechnical Committee and **Author** of NAFEMS Guidance Book on Geotechnical FEA
- **Author** of the forthcoming NAFEMS Guidance Book on FEA of Sprayed Concrete Lined Tunnels

PROFESSIONAL EXPERIENCE

Colin Eddie Consulting Limited

Current

CHIEF ANALYTICAL DESIGN ENGINEER

Development of numerical modelling capability within the newly formed CECL Business, with a particular emphasis on the professional application of Plaxis 3D and Plaxis 2D to tunnelling and underground space problems.

Finalising the NAFEMS Design Guide in FEA Modelling of SCL Tunnels (due for publication Q1 2018).

UnPS Limited, UK (A Morgan Sindall Group Company)

2011-2017

Underground Professional Services: Engineering Space Underground

CHIEF ANALYTICAL DESIGN ENGINEER

Responsible for the advanced 3D modelling of tunnelling and underground space problems. The largest single commission being that of Crossrail C510's Liverpool Street and Whitechapel Station SCL design. Devised a methodology for carrying out three-dimensional (3D) FEA of soil-structure interaction (SSI) for the primary elements of C510's SCL design, including construction shafts and adits, platform tunnels, tunnel boring machine (TBM) launch chambers, cross-passages, ventilation ducts and escalator barrels. Ground breaking work investigating the effects of compensation grouting on tunnel face stability and loads on tunnel linings.

Business Improvement

- Advanced numerical modelling lead of the company, coordinating high level geotechnical activities and providing training and checking of FEA work
 - Commissioned by NAFEMS to write a guidance book on numerical modelling of SCL tunnels
 - Authored and presented papers at the NAFEMS World Conference in Salzburg, Austria; San Diego, USA; and Stockholm, Sweden in 2013, 2015 and 2017 respectively
 - Invited Speaker and Panel Member at the Ground Engineering Instrumentation & Monitoring Conference 2014. Discussed Crossrail C510 FEA design technology work and compared predicted findings with monitoring of geotechnical and structural assets followed by a panel discussion
 - Module Champion for the Finite Element Course in Tunnelling M.Sc. at The University of Warwick, 2016 & 2017. Developed course material and delivered the lectures and workshops for the finite element module of this BTS/ITA accredited Master of Science course on Tunnelling and Underground Space
 - Invited speaker at the first UK PLAXIS User Group Meeting held in London in 2013.
 - Invited to prepare and deliver a lecture on advanced 3D FEA modelling of SCL tunnels at the PLAXIS Advanced User Course held in Manchester in 2013
- Improved technical software quality assurance systems for the company by:
 - Reviewing and modernising operating procedures for the use of external programs and in-house developed programs
 - Managed change to ensure the best practice application of software tools for projects

COFFEY GEOTECHNICS, UK/Australia

2007-2011

Global Specialist Geotechnical Consultancy

PRINCIPAL ENGINEER

Worked on a wide range of high level geotechnical design projects producing value engineering solutions for external and contractor clients, external design consultancies and internal market-driven clients (e.g. rail, contractor services, Coffey Australia).

Have worked both nationally and internationally with teams possessing a diverse range of skills and experience.

Client Projects

- Achieved substantial cost savings for clients by quantifying design risk through the application of finite element analysis including:
 - Gateway Motorway Upgrade Project (Brisbane, Australia, Aus\$1.37 Billion Development)
 - Kempsey Bypass Alliance Project (Sydney, Australia, Aus\$618 Million Development)
 - Bath House Farm – Sainsbury Supermarket (Cardigan, South Wales, £50 Million Development)
 - Dense Asphaltic Concrete Steepwall Landfill Lining System (WALO and Environment Agency)
- Independent Assessment Work applying engineering knowledge and experience to make a practical assessment of the risks associated with the design:
 - Dubai-Fujairah 60m high reinforced earth wall stability and serviceability limit state assessment
 - Lead checker for a Network Rail Category 3 geotechnical design check for a major temporary works crane foundation at the site of Kings Cross Redevelopment (London, £774 Million Development)
 - Hill of Fiddes Wind Turbine Foundations (Vibro-stone Column) ground improvement design assessment/Category 3 independent geotechnical check)
 - Korean underground radioactive waste storage silo (Proposal preparation of an outline methodology and estimation of fees, identifying appropriate analysis tools to evaluate the performance of the primary and secondary lining)

Business Improvement

- Lead the numerical modelling team for the UK operations of Coffey Geotechnics:
 - Designed and delivered new training modules on finite element based geotechnical analysis to internal and external clients
 - Evaluated feedback from participants for continual improvement to increase sales through service
 - Member of the NAFEMS Geotechnical Committee providing direction and review of best practice guidance documentation for the industry. NAFEMS is the International Association for the Engineering Modelling, Analysis and Simulation Community
 - Authored and presented two papers at the Numerical Methods in Geotechnical Engineering (NUMGE) 2010 conference in Norway which attracted over 200 international delegates to increase industry awareness of Coffey Geotechnics and their expertise
- Improved technical software quality assurance systems across the company by:
 - Successfully modernising operating procedures for the use of external programs and in-house developed programs
 - Managed change to ensure the best practice application of software tools for projects

DONALDSON ASSOCIATES, UK (now a COWI Company)

2006-2007

Specialist in tunnel, geotechnical and civil design

PRINCIPAL ENGINEER

Client Projects

- Achieved substantial cost savings for clients by quantifying design risk through the application of finite element analysis including:
 - Worked as part of a design team to assess the design of the foundations supporting the wind turbines at Whitelee Windfarm. Used finite element based methods of analysis to optimise the design to create better value for the client

- Worked as part of a design team to assess the various design options for a flood protection scheme in Renfrewshire. Used finite element based methods of analysis to optimise the design and investigate potential cost savings

WILDE & PARTNERS, UK (now Wilde Analysis)

1997-2006

Engineering Analysis, Consulting Services and Software Agents

PRINCIPAL ENGINEER, 2003-2006
SENIOR ENGINEER, 1999-2003
APPLICATIONS ENGINEER, 1997-1999

- Responsible for managing two finite element based civil and geotechnical engineering software packages: DIANA and PLAXIS, providing expert services to industry which led to training and consulting opportunities for the company

Client Projects

- Delivered advanced engineering solutions on a diverse range of client facing projects e.g.
 - Structural optimisation of Kit T-Beam Foundation Units (for Roger Bullivant)
 - Structural assessment of AGR nuclear graphite cores (£5 Million Safety Case)
 - Crack modelling for the Heysham 1/Hartlepool Power Station Boiler Closure Units
 - Seismic analysis of the B241 Overbuilding and Services Building
 - Seismic analysis of the BNFL Technology Centre
 - Joint Strike Fighter – Ski Jump Design (structural checks of medium girder bridge components)
 - Military Trackway Analysis and Electromagnetic Gun Analysis (SSI and structural analysis assessment)
 - Used advanced geotechnical knowledge and reinforced concrete modelling to assist in the design of the shotcrete tunnel lining for the North Downs Section of the Channel Tunnel Rail Link. Provided training, technical support and engineering analysis services to this client

Business Improvement

- Developed industry recognition through marketing of specialist skills which led to substantial business opportunities for the company:
 - From 2000-2006 responsible for organising and managing a 3-day Numerical Methods in Geotechnical Engineering Course held annually in the UK which attracted engineers from all sectors and companies of all sizes
 - Managed a team of Senior Engineers to work on numerous high-level engineering projects including structural assessment of nuclear reactor components and seismic response of reinforced concrete structures e.g. AEA Coordinated Research Programme: Safety Significance of Near Field Earthquakes on behalf of NII
 - Invited by Nottingham Trent University to develop and provide a series of lectures and workshops for their M.Sc. Course on Earthworks and Slopes
 - Member of the NAFEMS Nonlinear Working Group
 - Commissioned by NAFEMS to write a guidance publication on “How to Undertake Finite Element Based Geotechnical Analysis” which led to the organising and chairing of the first NAFEMS Geotechnical Awareness Seminar in 2002
 - Developed links with TNO DIANA BV which led to the company becoming sole agents for the distribution of DIANA software in the UK and Ireland
 - Developed links with PLAXIS BV which led to the company becoming sole agents for the distribution of PLAXIS software in the UK and Ireland
 - Commissioned by TNO DIANA BV to write several geotechnical examples for their DIANA Geotechnical Analysis User Manual

MANCHESTER UNIVERSITY/SIEP, UK & The Netherlands

1994-1997

POST-DOCTORAL RESEARCH FELLOW

- Returned to the UK to continue association with Shell at the University of Manchester
 - Identified an opportunity to improve the existing method of assessing the stability of boreholes by integrating my Ph.D. research developments into the Shell developed software tool
 - Volunteered to give lectures to undergraduates on numerical methods and soil mechanics

SHELL INTERNATIONAL EXPLORATION AND PRODUCTION (SIEP) [Formerly KSEPL], The Netherlands **1993-1994**

Multinational Group of Energy and Petrochemical Companies

ASSOCIATE RESEARCH ENGINEER

- Began career with international working based in SIEP Rijswijk, The Netherlands
 - Applied engineering knowledge and technology to address the problem of loss of production due to borehole collapse
 - Developed analytical and problem-solving skills whilst working as part of the management team responsible for developing engineering software tools at Shell. Advised on system requirements and developed comprehensive test suites to ensure the validity of data output by the new program

EDUCATION

- 1986-1989 B.Eng.(Hons.) Civil Engineering, First Class, The University of Manchester
- 1989-1993 Ph.D. Geotechnical Engineering (Thesis: Adaptive Mesh Refinement for Nonlinear Problems in Geomechanics Using an Advanced Constitutive Law) – Required no Amendments, The University of Manchester

PROFESSIONAL DEVELOPMENT

- 2010 C.Eng. MICE, Chartered Engineer and Member of the Institution of Civil Engineers, London
- 2008 Committee Member of the NAFEMS Geotechnical Working Group
- 2007 Member of the British Geotechnical Association
- 2007 Member of the International Society of Rock Mechanics
- 2005 Fellow of the Geological Society of London

PUBLICATIONS

Mar, A. (1993). Adaptive Mesh Refinement for Nonlinear Problems in Geomechanics using an Advanced Constitutive Law. Ph.D. Thesis. University of Manchester.

Mar, A. (1995). Adaptive Mesh Refinement Capability, Project Reference WC/26636. Rijswijk, The Netherlands: Koninklijke/Shell Exploratie en Productie Laboratorium (KSEPL).

Mar, A., & Hicks, M. A. (1995). A note on local and global discretisation errors for a simple deformation problem. Association of Computational Mechanics in Engineering, (pp. 77-80). Oxford, UK.

Mar, A., & Hicks, M. A. (1996). A Benchmark Computational Study of Finite Element Error Estimation. International Journal for Numerical Methods in Engineering, 32(23), 3369-3983.

Mar, A. (1998). Staged construction analysis of an embankment 'Stage', DIANA Geotechnical Applications Manual Version 7.1, TNO Building and Construction Research.

Mar, A. (1998). Rigid strip footing analysis 'Strip', DIANA Geotechnical Applications Manual Version 7.1, TNO Building and Construction Research.

Mar, A., & Eddie, C. M. (1999). The Channel Tunnel Rail Link: North Downs Tunnel Analysis. DIANA World Publication.

Mar, A. (2002). How to - Undertake Finite Element Based Geotechnical Analysis. NAFEMS, London, 2002

Mar, A. (2008). Some Recent Application of FEA. Using FEA in Geotechnical Engineering Seminar. London, UK: NAFEMS (The International Association for the Engineering Analysis Community).

Mar, A. (2009). Plaxis Practice: Crane Monopile Foundation Analysis. Plaxis Bulletin, May Issue, 6-11.

Mar, A. (2010). Crane monopile foundation analysis. In T. Benz, & S. Nordal (Ed.), Numerical Methods in Geotechnical Engineering (pp. 711-716). Trondheim, Norway: CRC Press/Balkema, Taylor & Francis Group.

Mar, A., Tonks, D. M., & Gorman, D. A. (2010). Practical numerical modelling for very high reinforced earth walls. In T. Benz, & S. Nordal (Ed.), Numerical Methods in Geotechnical Engineering (pp. 735-740). Trondheim, Norway: CRC Press/Balkema, Taylor & Francis Group.

Mar, A. (2012). Liverpool Street Station Platform and Concourse Tunnels Influence of TAM Compensation Grouting. UnPS-CFT-GEN-GEN-R-50849: Morgan Sindall Underground Professional Services.

Mar, A. (2012). Whitechapel Platform Tunnel Design Package 3 Westbound Tunnel - CAT 2 Check. UnPS-CFT-WCH-PTU-C-06752: Morgan Sindall Underground Professional Services.

Mar, A., Eddie, C. M. (2013). Modelling the Influence of Compensation Grouting and Multiple Tunnel Construction using Advanced Finite Element Analysis. NAFEMS World Congress Summary of Proceedings 2013: NAFEMS. 152-153, Salzburg, Austria, 2013.

Mar, A. (2015). Practical Finite Element Modelling for Sprayed Concrete Lined Tunnels. NAFEMS World Congress Summary of Proceedings 2015: NAFEMS. San Diego, USA, 2015.

Mar, A. (2017). The Simulation of Sprayed Concrete Lined Tunnelling Using the Finite Element Method. NAFEMS World Congress Summary of Proceedings 2017: NAFEMS. Stockholm, Sweden, 2017.

Mar, A. (2017). Awareness and Application on Sprayed Concrete Lined Tunnelling. NAFEMS, London, in preparation.