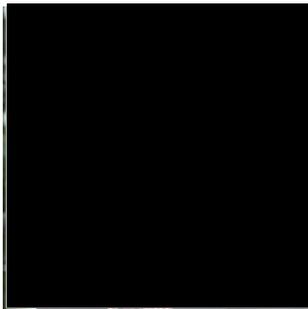


Hyuk-il Jung



Profession

Tunnelling & Geotechnical Engineer

Current Position

Associate (UKMEA Tunnels Skills Leader)

Joined Arup

2006 (secondment)
2009 (permanent)

Years of Experience

+19

Nationality

South Korean

Language

Korean (mother tongue)
English (fluent)

Qualifications

PE, Geotechnical engineering, Korea, 2004
MEng, Geotechnical Engineering, 2000 (thesis in static liquefaction)
BSc, Civil Engineering, 1998

Professional Associations

Member, British Tunnelling Society, (BTS)
Member, Korean Tunnelling Association (KTA)
Member, Korean Geotechnical Society (KGS)
Member, Korea Association of Professional Engineers in Soil Mechanics and Foundation Engineering (KAPE)

Joint Lecture

Colorado School of Mines, Tunnelling Fundamentals, Practice, and Innovations, 'Shotcrete design and construction', Oct 2017.

Lecture

Milan University Tunnels Masters lecture, 'Spray Membrane', May 2017

Hyuk-il Jung is an Associate of Ove Arup & Partners and he has more than 18 years of tunnelling & geotechnical experience since he completed his MEng in geotechnical engineering. He is currently taking a UKMEA Tunnels Skills Leader's role, and has worked on a number of major infrastructure projects both in the United Kingdom, USA, Hong Kong, Middle East and South Korea, specialising in tunnel design, including segmental lining design and sprayed concrete lining. He has experienced both in railway and road tunnel also has wide understandings on various types of infrastructure both in soft ground and hard rock condition.

Jung is the lead authors of PAS8810 which is the first UK standardization document for the design of precast concrete segment lining.

Jung has spent nearly 10 years in Crossrail project and experienced the full span of the major infrastructure project from the planning to the construction. He also led the HS2 Phase 1 Hybrid Bill scheme development for the Birmingham Section Bromford tunnel, and is now taking tunnels discipline lead role for the HS2 Phase2a, Phase2b and Euston Station.

Jung has wide understandings in different types of tunnels and this allowing him to achieve high-quality outputs even in a complex infrastructure projects.

HS2 Phase 1 S3 Euston Station, RIBA 3 stage design, SCL station tunnels, 2018-present

Tunnels discipline lead for the design of new SCL tunnels that will connect from the new HS2 station box to the existing Euston underground station. Design scope covers developing of the tunnels layout through interface coordination with architects, fire, ped modelling, geotechnics, and also structural design of SCL, cast in situ lining, hand mined square works.

Read Sea Marine Crossing, Feasibility Option Study, Kingdom of Saudi Arabia, 2018

Tunnels technical lead for the developing of options for the sea crossing. The study involves explore and understand the natural and man-made issues involved, and identify key aspects and parameters that influence the development of the Crossing solutions – including Transportation, Geology and Geotechnical, Seismic, Maritime, Rail, Highways, Environmental, Security, Wind and Tunnel Ventilation aspects. Also, the option study involved space proofing and the constructability review of tunnels for different options such as submerged floating tunnel, immersed tube tunnel and bored tunnels.

Invited speaker

“Technical Challenges in Segment Lining Design in Very Deep Subsea Tunnels”, International Forum on Subsea Tunnels, Seoul, Korea, Sep. 2015.

BASF design workshop for composite lining, Singapore, Hong Kong, Melbourne, Prague, London, Russia and Swiss, 2017-2018

Presentation: “Precast Concrete Segment Lining Design”, BTS Young Members Annual General Meeting, London, Nov. 2012

Publications

D. Lazarus and **H. Jung**, “Damage assessment & monitoring for building on the Elizabeth ling”, IStrutE special publication, to be published in July 2018.

L. Thring, **H. Jung** and C. Green, “Developing a simple spring interface modelling technique for a composite lining bond interface”, Dubai, WTC 2018 (oral presentation)

H. Jung, A. Pillai and C. Wilson, “Sprayed concrete composite shell lining design, Part2”, Oct/Nov 2017, Tunnelling Journal

H. Jung, A. Pillai, C. Wilson, F. Clement and D. Traldi, “Sprayed concrete composite shell lining design, Part1”, Sep 2017, Tunnelling Journal

H. Jung, F. Clement, A. Pillai, C. Wilson and D. Traldi, “Composite tunnel linings, allowing a more cost effective and sustainable tunnel design.”, WTC2017

A. Pillai, **H. Jung**, F. Clement, C. Wilson and D. Traldi, “Sprayed concrete composite tunnel lining – load sharing between the primary and secondary lining, and its benefits in reducing the structural thickness of the lining”, WTC 2017 (oral presentation)

Hyuk-il Jung (Lead Author), PAS8810 Code of Practice Tunnel Concrete Segment Lining Design in Soft Ground, BSI, 2016

HS2 Phase 2B Lot3 Westmidlands to Leeds, Hybrid Bill Scheme Development, 2km long TBM tunnel and 500m long C&C tunnel, 2017-present.

Jung is the tunnels and portals design discipline lead. Design involves feasibility stage design of tunnels and portals, including ground movement analysis and damage assessment to the 3rd party assets including live railway, utilities and buildings.

European Commission - Joint Research Centre (EC-JRC), member of expert group : Assessment of standardisation needs for design of underground structures, 2017-present

Member of expert group to assess the standardization need for the design of underground structures in Euro Code.

HS2 Phase 2a Birmingham to Crewe, Hybrid Bill Scheme Development to Additional Provision design, Precast concrete lined tunnel with ID= 8.8m, 2016-present

Jung is leading the tunnels and portals design as a discipline lead. Key scope involves tunnels and portals structural design, portal planning (head house, rescue area, etc.), settlement analysis and damage assessment, and interface coordination with Railway System designer for tunnel space proofing.

Station Road (Llanelli), new surface water trunk sewer tunnel, 1.5m diameter, 1.3km long. Carmarthenshire, Dwr Cymru Welsh Water (DCWW), 2016-present

New sewer tunnel in Wales. Design lead of settlement analysis and damage assessment of 3rd party assets. Construction is currently on going.

HS2 Phase 1 Employers Requirement Design(ERD) for Bromford Tunnel, Precast concrete lined tunnel with ID= 7.5m, 2015-2016

Jung is discipline lead of tunnel for the HS2 Employers Requirement Design work. The task involves review and update the Hybrid Bill design details prior to the issuing of the tender to the public. It requires continuous coordination meeting with the client and the other section’s designers to make the tunnel design compliant with the client’s specification, and consistent with each other.

Network Rail HS1 tunnel damage assessment guide, 2015

Developing of a damage assessment guideline document for the Network Rail’s HS1 asset protection engineers.

Developing of composite lining design skills, Arup-BASF collaborative research, 2014-current

Jung is leading the collaborative research titled above with BASF to develop new design approach that considers the composite action created by the use of sprayed waterproof membrane. This research involves approximately 100 core tests and many beam tests, which are used for creating of a new interface model element in LS-DYNA.

Colin Rawlings, John Carroll, Mark Leggett & Ben Harland, Ian Gee, Virginia Portal Cabezuelo and **Hyuk-il Jung**, “High Speed two (HS2) – General overview of project with focus on tunnelling challenges”, RETC 2015

Hyuk-il Jung, “Precast Concrete Segment Lining Design – with Case History”, Proceedings of the 12th KTA International Symposium on Mechanized Tunnelling Technology, Korean Tunnelling Association(KTA), Seoul, Korea, Nov. 2011.

John Davies, **Hyuk-il Jung** “Use of Steel Fibre Reinforcement in Precast Concrete Segment Lining from Europe to Asia ; Two case histories”, GSiCON, GS Construction, Vol.05, pp.45~53, 2011

Hyuk-il Jung, “Precast Concrete Segment Lining Design for TBM Tunnels – in Practice”, Proceedings of the 11th KTA International Symposium on Mechanized Tunnelling Technology, Korean Tunnelling Association(KTA), Seoul, Korea, Nov. 2010.

Hyuk-il Jung, “Design of PCC Segment Lining (II)”, Tunnelling Technology, Korean Tunnelling Association(KTA), Vol.12, No.1, 2010 – in Korean.

Hyuk-il Jung, “Design of PCC Segment Lining (I)”, Tunnelling Technology, Korean Tunnelling Association(KTA), Vol.11, No.4, 2009 – in Korean.

D.H.Kim, D.W.Ryu, **H.I.Jung**, S.K.Kim and W.J.Lee, “Estimation method of Key Block Size on a Large Scale Rock Slope by Simulation of 3-D Rock Joint System”, Journal of the Korean Geotechnical Society, Korean Geotechnical Society(KGS), Vol.23, No.10, pp.97~107, 2007

D.H.Kim, **H.I.Jung** and S.K.Kim, “A case study on joint system simulation results application to rock slope design”, Proceedings of 2005 joint conference of geotechnical engineering, Korean Geotechnical Society(KGS), pp.669~680, Gyeonggi, Korea, Oct. 2005.

PAS8810 Code of Practice Tunnel Concrete Segment Lining Design in Soft Ground, BSI, 2014- 2016

Jung is appointed as a lead technical author of the PAS8810. The PAS8110 will be the first design code for tunnels and covers wide subject from the planning to the construction of the tunnel lining design.

Crossrail Construction Phase Support, Precast concrete lined tunnel with ID= 6.2m, L=6.2km, London, 2013 – Present

Jung is discipline joint-lead of tunnels in the client’s design team. He is dealing with all the technical issues related to the segment lined tunnel construction and interface issues with other disciplines such as SCL, M&E and Pway.

UNOPS Design Planning Manual For Civil Works, UNOPS, 2014

UN is developing a design planning manual for Civil Works and Jung is developing the tunnels sections.

Eurasia tunnel Lender’s Technical Advisor, AVRASYA, 2014

Taking a regular visit to the construction site as a Lender’s Technical Advisor role as a tunnel specialist.

Camden Town Station Upgrade Concept design, London, 2014

Jung led tunnel design for the Camden Town station upgrade that involves double high SCL concourse tunnel and four challenging passenger connections to the existing stations platforms which require overcut and undercut of the existing platform tunnels.

Tuen Mun- Chek Lap Kok(TMCLK) Link Northern Connection Sub-Sea Tunnel Section, Precast concrete lined tunnel with ID=15.6m and ID=14.2m, L=4.17km, Hong Kong, 2013

It is approximately 4.17km long dual 2-lanes new road tunnel under the sea that has no ventilation shaft in the middle but at both portals. Jung provided his technical input for the space proofing, cross passage construction and segment lining design

Canal Tunnel, Assessment of tunnel stability, SCL + Precast concrete lined tunnel, London, ID=6.0m, 2013

Jung is leading the stability assessment of the 10m-long tunnel sections of Canal Tunnel that connects to St. Pancras station. It involves long term structural stability check, concrete spalling potential check and leakage mitigation.

Hybrid Use of Steel Fibre and Rebar Reinforcement in Precast Concrete Segment Lining, Desk Study, South Korea, 2014

Jung led the desk study project as a Project Manager. Arup’s role is to provide practical design examples and guidelines for the hybrid use of Steel Fibres with conventional rebar reinforcement in precast concrete segment lining.

S.C.Kim, D.H.Kim, **H.I.Jung** and S.K.Kim, "Estimation in-situ rockfall block weight distribution using scan-line survey results and examination its applicability in practical rockfall analysis", Proceedings of 2005 joint conference of geotechnical engineering, Korean Geotechnical Society(KGS), pp.639~648, Gyeonggi, Korea, Oct. 2005.

S.H.Kim and **H.I.Jung**, "Numerical analysis of the effects of the stress anisotropy and tunnel excavation shape on initial elastic-wall displacement", Journal of the Korean Geotechnical Society, Korean Geotechnical Society(KGS), Vol.18, No.6, pp.33~42, 2002.

S.H.Kim, **H.I.Jung** and M.S.Lee, "A numerical study for initial elastic displacement at tunnel side-wall due to configuration of the tunnel excavation", Tunnel Technology, Korean Tunneling Association (KTA), Vol.4, No.3, pp. 175~183, 2002.

S.H.Kim, **H.I.Jung** and S.K.Yoon, "Geotechnical aspects of tunneling in soft soils", Proceedings of the second conference on Improvement of Tunnel construction method, Korean Society of Civil Engineers(KSCE), Seoul, Korea, Aug. 2002.

B.H.Kang, B.S.Kim and **H.I.Jung**, "Effects of anisotropic consolidation on flow failure behaviour of a silty sand", Journal of the Korean Geotechnical Society, Korean Geotechnical Society (KGS), Vol.17, No.5, pp.173~180, 2001.

B.H.Kang, Y.W.Yoon and **H.I.Jung**, "Effects of anisotropic consolidation on flow failure behaviour of a silty sand", Proceedings of the Fifteenth International Conference on Soil Mechanics and Geotechnical Engineering (ICSMGE), Istanbul, Turkey, Aug. 2001.

H.I.Jung, "Effects of anisotropic consolidation on flow failure behaviour of a silty sand", Master of engineering thesis, Inha University, 2000.

Numerical Skills

HS2 Birmingham Section, Bromford Tunnel, Hybrid Bill Scheme Development, Precast concrete lined tunnel with ID= 7.5m, 2013

Jung led the tunnel design of the Bromford Tunnel for the developing of the Hybrid Bill Scheme by providing an inter-coordinated advice to the various project disciplinarians to develop an optimised scheme for the Bromford tunnel. It involves; portal planning in relation to the TBM launching/reception under shallow cover depth below river bed, supervising of the settlement analyses along the tunnel route, shaft planning, cross passages and low-point sump planning, advise on tunnel alignment and many other high level planning issues on TBM tunnelling.

Bujeon-Masan Metro Tunnel Project, Technical Opinion, Precast concrete lined tunnel with ID= 7m, L=4.4km, Busan, South Korea, 2013-2014

Jung is providing a technical opinion to the detailed designer of the project about designer-selected critical questions to help their decision making. The project area is located in very soft marine clay ground (SPT= 1 to 2) and has a river crossing with shallow cover depth (approximately 1D cover). Also, a highway road that has PBD (plastic board drain) underneath of it crosses the tunnel thus TBM has to cut through the PBD with a very tight settlement limit.

Segment Lining Reinforcement Requirements for Steel Fibre and Conventional Rebar, Desk Study, South Korea, 2012-2013

Jung led the desk study project as a Project Manager. Arup's role is to provide a segment lining design analyse result for both SFRC segment and RC segment for a client-provided virtual project. This desk study also involves a detailed discussion about the current segment lining design practice of SFRC segment and includes some recommendations in SFRC segment joint bursting design.

Crossrail Drive X Construction Support, Precast concrete lined tunnel with ID= 6.2m, L=6.2km, London, 2012 – 2013

Jung was the Lead Tunnel Design Engineer of Crossrail Drive X TBM tunnel where two EPB TBMs are being used for the construction of 6.2km twin bored tunnels. Jung leads the designer's site engineering team to support client's Engineering team.

Steel Fibre Reinforced Precast Concrete Segment Lining Design, Desk Study, South Korea, 2012

Jung led the desk study project as a Project Manager. Arup's role is to provide a technical consulting comprises providing details of current design practice about the use of Steel Fibre in segment lining design with some case histories.

Crossrail RIBA stage F design, Precast concrete lined tunnel with ID= 6.2m, L=6.2km, London, 2010 – 2011

Jung led a tunnel design team for RIBA F design of running tunnel on Drive X (Design Contract number C122, Construction

Rock Mechanics Software
Very experienced in the use of
rock mechanics software such as
DIPS, UNWEDGE, SWEDGE,
ROCKFALL, RocLab

FEM/FDM Software
FLAC 2D
Geotechnics Software
SLOPE/W, SEEP/W, TARLEN

Contract number C300). He led Drive X tunnels team since RIBA E stage and also took the lead of the TBM interfaces with multidisciplinary Framework Design Contractors(FDCs) and external parties to resolve any technical issues for the detail design.

RIBA stage F design scope of C122 includes interfaces with Royal Oak Portal, Paddington Station, Bond Street Station, Tottenham Court Station, Fisherstreet Crossover and Farringdon Station – 1 portal, 3 SCL stations, 1 box station and 1 SCL crossover - and he is leading the technical interface coordination between FDCs.

RIBA F design includes C300 Contractor's involvement to the design, and updating of the RIBA F detail designs to accommodate the agreed Contractor's suggested option.

Crossrail RIBA stage E design, Precast concrete lined tunnel with ID= 6.2m, L=6.2km, London, 2009 – 2010

Jung was team leader for running tunnel design on Drive X - between Royale Oak portal and Farringdon Station. Jung was responsible for the resolving of all technical interface problems between relevant Framework Designers such as SCL, architect, shaft, portal, rail track, M&E, etc. Drive X consists of interfaces between 1 portal, 2 SCL stations, 1 Box station and 1 SCL crossover.

He led the crossover interfaces to resolve spaceproofing issues with various FDCs such as P-way, SCL, M&E and involved in the interfacing of running tunnel spaceproofing and crosspassages. Jung also led the TBM break in and out interfaces with the SCL and box structure.

Also, during RIBA E stage design, Jung supported ITT(Invitation To Tender) process with regard to the TBM interfaces through stations, portal and crossover.

Porta Nuova Isola, complex building development, Milan, Italy, 2009

Jung gave a technical advice to Milan office for the assessment of the existing horse-shoe shaped 1960s-built metro tunnel beneath the project work site during the basement excavation.

ADSSC STEP(Strategic Tunnel Enhancement Programme) sewer tunnel, Tender design, Abu Dhabi, UAE, 2009

Jung designed steel fibre reinforced segment lining for the STEP sewer tunnel bid and provided technical advice of the precast concrete lining for the tender design of Korean contractor JinHeung.

Crossrail-MDC2 Running Tunnel Design, Scheme design, London, UK, 2006 – 2008.

Jung was integral in the design of the precast concrete segmental lining for the running tunnels and the space proofing of mined SCL station tunnels – Bond street station and Tottenham Court Road station.

No.7 Line Extension 'A' division, New York, MTA, 2008.

Jung was responsible for the initial support design of three vertical shafts in hard rock. This includes responsibility for rock mass characterisation & support selection & interpretation.

Lake Mead intake No.3, Las Vegas, 2007

It is a water intake tunnel which has max. overburden depth of 600ft (approx. 200m) from the ground surface.

Jung was involved in the tender design of a pre-cast concrete lining for a running tunnel and a lining capacity check for a tunnel access shaft. This lining will be the highest pressure segmental lining design first built.

Mount Tindaya, Canary Islands, rock cavern project, 45m x 50m x 65m main cavern with flat roof, 2007

Jung was responsible for the design of wedge stability of the cavern, shaft and slope. Rock fall analyses and interpretation of the joint strength parameter were also assessed. The cavern design was particularly challenging due to its flat roof & cubic shape.

BuJo-PoHang national railway project, Lot 1, Detailed design, South Korea, 2005-2006 *

Jung was responsible for the site investigation planning and interpretation of ground strength parameters for uncemented shalestone(mudstone). Also, he had designed bridge foundations and slope stability design. This project has 8.7km of length thorough the uncemented shalestone ground. This project has commenced its construction on 2008.

Busan new port north container terminal yard development project, Basic and detailed design, Turnkey Contract, South Korea, 2005 *

Jung designed 180m height rock slope which are created as a result of the cutting of the existing rock mountain behind the container terminal yard which has an area of 665,800m². Jung did rock fall analyses as well.

GulPo-Chun drainage canal project - includes expressway design parallel to canal, Basic and detailed design, Turnkey Contract Lot3, South Korea, 2004 *

Jung designed soft ground improvement and canal embankment/cut slope stability design for 14.3km length drainage canal which connects between Han river and Yellow Sea. The canal is under construction. Also, he evaluated liquefaction potential of the project area.

Damyang-SungSan Section of 88-Olympic Expressway, South Korea, 2003 -2004 *

Jung was integral in the detailed design of the Damyang-SungSan section of 88-Olympic Expressway project, which comprised 2 NATM tunnels. He was also involved in the site investigation planning and interpretation of soil investigation results for the rock tunnels, the bridge foundations and rock/soil slope design. He was also responsible for the soil and rock slope stability

analysis and the temporary soil support system design (soldier pile-strut). For the rock tunnel Jung designed a NATM mode of support and was responsible for calculating the quantity of construction material.

NokSan Great Bridge of Busan new port access road project, Detailed Design, Turnkey Contract, South Korea, 2002 *

Jung was responsible for the design of piled foundation on very soft ground condition for the 1.78km length bridge. The thickness of marine soft clay reaches to max. 70m below ground surface and high level of negative skin friction to the pile structure was expected. Jung suggested the use of 800mm dia. steel tubular pile with slip-layer coating on the pile surface to reduce negative skin friction. The bridge has been successfully constructed.

Also, he designed softground improvement using vertical drain for the road embankment (vertical drain depth = approx. 30m) and carried out an evaluation of liquefaction potential.

SungSan-SinPoong section of national railway project, Tender design, South Korea, 2002. *

Jung designed initial support system of 3.0km long NATM tunnel in hard rock condition.

JaeCheon-Dodam Section of National Railway Project, Tender design, South Korea, 2001 *

Jung was involved in the initial support design of NATM tunnels in karstic terrain. There were 4.3km of tunnels in total with different length per each tunnel. Jung was also highly involved with the site investigation planning for the rock tunnels in karstic terrain, including scheduling the rotary drilling and the in-situ and laboratory testing. Jung was responsible for analysing the test results and conducting the NATM design for the Tunnel support system.

WoongJin-Ri National Highway Project, Basic design, South Korea, 2000 *

Jung was a part of the team that conducted the basic design of the 2.1km highway tunnel. He was also involved with the site investigation planning for the rock tunnel (boring, in-situ & laboratory testing) and analysing the test results to determine soil and rock strength parameters.

NeungDong Tunnel of Sanwae-Sangbuk national highway project, Basic design, South Korea, 2000 *

Jung was involved with the basic design of the 4.58km hard rock tunnel. He was involved with the site investigation planning for the NATM rock tunnel (boring, in-situ & laboratory testing) and analysing the test results determine rock strength parameters.

* Denotes projects before joining ARUP