

Daniele Martinelli

Assistant Professor of Tunnelling

MSc (Tech), PhD

Politecnico di Torino - DIATI

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Personal data

Gender Male
Birthplace [REDACTED]
DOB [REDACTED]
Nationality Italian

Research Interests

- Conditioning of soils and rock masses for EPB tunnelling
- Geotechnical tests on conditioned materials
- Stability of filled mine voids
- Innovative grouting methods in soils and rock masses
- Numerical methods in Geotechnics
- Rock sliding and falling

Education

Jun 2016 **Ph.D. Degree in Environment and Territory**
Curriculum Georesources and Geotechnologies, Politecnico di Torino, I.

Tutors Prof. Daniele Peila, Prof. Monica Barbero

PH.D. THESIS

Title *Mechanical behaviour of conditioned material for EPBS tunnelling*

Description Study of the conditioned material for EPB tunnelling using geotechnical methodologies and innovative devices. The research has been focused on the variation of shear strength of granular conditioned soils at different confinement pressures.

Dec 2010 **Italian Chartered Engineer Exam (*Abilitazione all'esercizio della professione di Ingegnere*)**
Politecnico di Torino, I.

Oct 2008 – Oct 2010 **Master in Environmental Engineering**
Major in Geoengineering, Politecnico di Torino & Aalto University of Science and Technology, I and FIN.

mark 110/110 *cum laude*

- one academic year at the Civil and Environmental Engineering Dept., TKK Helsinki (ERASMUS exchange program)

— MASTER'S THESIS

Title *The Design of Geological Nuclear Waste Disposals: the Case of Onkalo (FI)*

Supervisors Prof. Daniele Peila, Prof. Giovanni Barla, M.Sc. Guido Nuijten

Description Numerical modelling of the technical area of ONKALO to assess the risk of spalling. Evaluation of damage and displacement around the excavations. Study of the stability of wedges with pilot holes data.

Oct 2004 – Sep 2008 **Bachelor in Civil and Environmental Engineering**
Major in Geoengineering, Politecnico di Torino, I.
mark 101/110

— UNDERGRADUATE THESIS

Title *Tests on conditioned soils for the excavation with EPB machines*

Supervisor Prof. Daniele Peila, Dr. Luca Borio

Description Study of soil conditioning following the excavation of metro line in Turin. In-situ and laboratory slump testing in order to establish a correlation with the soil conditions and foam content.

Experience

Vocational

Apr 2018 – **Assistant Professor (RTD-A) of Excavation Engineering and Safety (ING-IND/28)**
Politecnico di Torino, Torino, I.

- Experimental research activity on soil conditioning for EPB tunnelling;
- Teaching activity on Tunnelling, Excavation Engineering and Geomechanics courses;
- Member of the Executive and the Scientific Committee of the World Tunnelling Congress 2019, Naples (I);
- Coordinator of SIG-ITACET Training Events of the World Tunnelling Congress 2019, Naples (I);
- Topic Leader and Chair of the session “Logistics and Site Management for challenging TBM tunneling” at TBM-DiG 2019, Golden (CO, USA);
- Member of the Scientific Committee of the Egyptian Tunnelling Conference 2019 (ITA endorsed), Luxor (EG);
- Deputy Coordinator and Member of the Scientific Committee of the 2nd level Postgraduate Master in “Tunnelling and Tunnel Boring Machines”, Politecnico di Torino, I;
- Co-Supervisor of PhD thesis;
- Editor of the Journal “Geoingegneria Ambientale e Mineraria” (ed. Patron).

Nov 2016 – Mar 2018 **Manager of International Services and Head of the Rock Mechanics Dept.**
Kalliosuunnittelu Oy Rockplan Ltd, Helsinki, FIN.

- Marketing activity and international cooperation in the European Union market;
- Supervision and responsibility of the numerical modelling in rock masses;
- Project Manager of cooperation projects with foreign companies.

Mar 2013 – Oct 2016 **Ph.D. Candidate**
Politecnico di Torino, Torino, I.

Nov 2010 – Oct 2016 **Project Engineer**
Kalliosuunnittelu Oy Rockplan Ltd, Helsinki, FIN.

- Numerical calculations and design of underground structures such as tunnels and caverns for civil (i.e. roads and parkings) or industrial/mining uses (i.e. nuclear waste repositories, water treatment plants and mines);
- FEM, BEM and DEM 3D softwares, CAD, use of Word, Excel and Mathcad for applied engineering.

Jan 2010 – May 2010 **Project Assistant**
Kalliosuunnittelu Oy Rockplan Ltd, Helsinki, FIN.
CAD and use of Word, Excel and Mathcad for applied engineering.

Jun 2008 – Oct 2008 **Trainee**
ML3000 s.c.a.r.l., Torino, I.
Activity of research following the construction of the Turin Metro Line carried out with an EPB machine making slump tests and verifying the quality of the conditioned soil.

Relevant Projects

Politecnico di Torino

2019 – **Numerical modelling of Underground Excavations in Hard Rock**
Scientific Responsible for providing services on numerical modelling in Hard Rock
Client: *Rockplan Ltd*

- 2018 – **Lonato High-Speed Railway Tunnel (Brescia, I)**
 Scientific Responsible for laboratory testing and study of soil conditioning for EPB tunnelling and environmental testing of the conditioned soil in large scale tests
 Client: *Cepav Due*
- 2018 – 2019 **Napoli-Bari High-Speed Railway line (I)**
 Scientific Responsible for laboratory testing and study of soil conditioning for EPB tunnelling and environmental testing of the conditioned soil
 Client: *CNR-IRSA*
- 2016 **Orbassano High-Speed Railway Tunnel (I) - Preliminary study**
 Laboratory testing and study of soil conditioning for EPB tunnelling
 Client: *Italferr SpA*
- 2016 **Terzo Valico High Capacity Railway, Base Tunnel (I)**
Base tunnel railway Genova-Milano (total length 53 km)
 Laboratory testing and study of soil conditioning for EPB tunnelling
 Client: *COCIV*
- 2016–2017 **Metro Catania Lot Stesicoro-Airport (I)**
 Validation procedure and geotechnical analysis for the soil conditioning of the EPB used for the excavation
 Client: *CMC SpA*
- 2015 – **Santa Lucia A1 Highway Tunnel, Barberino di Mugello (I)**
TBM driven highway tunnel (diameter 15.87 m, L=7.7 km)
 Laboratory testing and study of soil conditioning for EPB tunnelling and environmental testing of the conditioned soil
 Client: *Pavimental SpA*
- 2015 – 2016 **Lima Metro (PE)**
 Laboratory testing and study of soil conditioning for EPB tunnelling
 Client: *Mapei SpA*
- 2015 **Ejpvovice Tunnel (CZ)**
 Conditioning tests on the rock masses to be encountered in the tunnel
 Client: *Mapei SpA*
- 2014 – 2016 **Study of rockfall hazard on Aosta Valley regional roads (I)**
 Surveying and risk analysis of the rockfall hazard
 Client: *Regione Autonoma Valle d'Aosta*
- 2014 – 2015 **Study of the durability of bicomponent backfilling for shielded TBM**
 Client: *Mapei SpA*
- 2014 **Los Angeles Metro Tunnel (USA), preliminary study**
TBM driven metro tunnel
 Laboratory testing and study of soil conditioning for EPB tunnelling of tar sands samples
 Client: *Astaldi SpA*
- 2014 **Caltanissetta SS640 Tunnel (I)**
Twin TBM driven road tunnel (diameter 15.08 m, length 4.4 km)
 Preparation of conditioned samples for chemical/environmental testing
 Client: *Empedocle2 SCpA*
- 2014 **Terzo Valico High Capacity Railway, Polcevera Tunnel (I)**
EPB driven service tunnel
 Laboratory testing and study of soil conditioning for EPB tunnelling
 Client: *COCIV*
- 2013 – **Study of the foaming agents for soil conditioning**
 Client: *Mapei SpA*
- 2013 – **Rodoretto Talc Mine (I)**
 Research and development for the control of the stability of the tunnels and the cemented backfilling of the mine activities
 Client: *Imerys Talc SpA*
- 2013 **Torino-Ceres railway line, Lanzo Tunnel (I)**
 Study of the stability and maintenance interventions of the lining
 Client: *GTT SpA*

- 2018 **Kittilä Mine (FI)**
New service level at -900 m
Supervisor for the numerical modelling 2D-FEM, 3D-FEM and 3D-DEM for the excavation of a service level in highly stressed environment
Client: *Agnico Eagle Oy*
- 2018 **Safety of the underground structures in Helsinki (FI)**
Risk Analysis and Risk Management Plan for designers of underground structures in Helsinki urban area
Client: *City of Helsinki*
- 2018 **Naistenlahti Powerplant, Tampere (FI)**
Pre-feasibility study of the underground storage caverns for fuel
Client: *Tampereen Sähkölaitos Oy*
- 2017 – 2018 **Kakolan Kortteli 7, Turku (FI)**
Supervisor for the numerical modelling 3D-FEM and 3D-DEM for the construction of new residential buildings over an underground water treatment plant in low overburden conditions
Client: *Kakola Yhtiöt*
- 2017 **ONKALO FISST Tulppa experiment, Olkiluoto (FI)**
Research stage
Project Manager and supervision of the 3D FEM rock mechanical analysis of the FISST plug experiment in Demotunnel 2 in ONKALO
Client: *Posiva Oy*
- 2017 **Shazar Parking caverns, Jerusalem (ISR)**
2 parallel parking caverns (height 27 m, width 19 m, length 270 m, total volume 300,000 m³)
Project Manager and supervision of the 3D FEM rock mechanical analysis
Client: *Pini Swiss Engineers*
- 2016 – 2017 **Tampere wastewater treatment plant, Tampere (FI)**
Total excavation volume 750,000 m³
3D-FEM rock mechanical analysis and rock engineering design
Client: *Tampereen Vesi*
- 2016 **Mikkeli wastewater treatment plant, Mikkeli (FI)**
Total excavation volume 550,000 m³
3D-FEM rock mechanical analysis and rock engineering design
Client: *City of Mikkeli*
- 2014 **Meilahti trauma-hospital, Helsinki (FI)**
3D-FEM rock mechanical analysis of the open pit excavation for evaluating the influence to the existing underground parking
Client: *HUS Meilahti*
- 2013 **Kakolanmäki wastewater treatment plant, Turku (FI)**
Access tunnel
3D-FEM rock mechanical analysis to evaluate influence of nearby foundations
Client: *Turun Seudun Puhdistamo Oy*
- 2012 **Lantmännen office building, Stockholm (SE)**
Open pit excavation
2D-FEM rock mechanical analysis to evaluate displacements vs. metro line
Client: *Lantmännen*
- 2012 – 2014 **LAGUNA-LBNO, Underground Liquid Scintillator cavern LENA, Pyhäsalmi (FI)**
Single cavern depth 1,450 m, volume 235,000 m³, max span 65 m, height 120 m
3D-FEM and 3D-DEM rock mechanical analysis and rock engineering design
Client: *The European Union*
- 2012 – 2014 **LAGUNA-LBNO, Underground Liquid Argon cavern GLACIER, Pyhäsalmi (FI)**
Twin caverns depth 1,450 m, volume 171,000 cu.m, max. span 96 m
3D-FEM and 3D-DEM rock mechanical analysis and rock engineering design
Client: *The European Union*

- 2012 – 2014 **Helsinki West metro extension, Espoo (FI)**
Keilaniemi-Koivusaari part (length 6 km, 2 stations and 4 shafts. Total volume 470,000 m³)
 3D-FEM rock mechanical analysis and rock engineering design
 Client: *Länsimetro Oy*
- 2011 **Keski-Pasila area, Helsinki (FI)**
Open pit excavation (25,000 m³)
 Rock engineering design
 Client: *Finnmap Consulting Oy and VR track Oy*
- 2011 **Blöminmäki wastewater treatment plant, Espoo (FI)**
Underground cavern and wastewater tunnels (tunnel length 16 km, cavern volume 785,000 m³)
 Pre-planning stage design
 Client: *HSY Espoo*
- 2011 **Aurajoki dock area, Turku (FI)**
Open pit excavation (80,000 m³)
 Rock engineering design
 Client: *Wärtsilä corporation*
- 2010 – 2012 **Mikkeli wastewater treatment plant, Mikkeli (FI)**
Access tunnel and caverns (Volume 137,000 m³)
 Preliminary rock engineering design and 2D-FEM rock mechanical analysis
 Client: *City of Mikkeli*
- 2010 – 2012 **Keilaniemi Towers**
Construction of 4 towers (Height 120 m)
 3D-FEM and 3D-DEM rock mechanical analysis to evaluate displacements vs. metro line
 Client: *SRV Oy*
- 2010 – 2015 **ONKALO rock characterisation facility**
Decline tunnel (4.5 km), technical rooms for underground investigation site (depth 456 m), 3 shafts: 2 ventilation and 1 personnel shaft (depth 456 m), 2 demonstration tunnels for future nuclear waste disposal. Total estimated volume 350,000 m³
 – 3D rock mechanical analysis (FEM) for spalling assessment and Rock engineering design
 – Site visit and supervision (grouting and reinforcement)
 – Research work on stress induced damage assessment and Working reports
 – Member of the Olkiluoto Modelling Task Force – Rock Mechanics Group
 Client: *Posiva Oy*

Computer skills

- **Diana:** *Midas GTS* (3D-FEM, excellent skills)
- **Itasca:** *3DEC* (3D-DEM, good skills)
- **Rocscience:** *Examine^{3D}* (3D-BEM, good skills), *Phase²/RS²* (2D-FEM, excellent skills), *Examine^{2D}* (2D-BEM, excellent skills), *Unwedge* (3D wedge stability analysis, excellent skills)
- **Autodesk:** *Autocad* (2D and 3D, good skills), *Revit Structure* (basic skills)
- **Mathworks:** *Matlab* (basic skills)
- **PTC:** *Mathcad* (intermediate skills)
- **Golden Software:** *Surfer* (basic skills)
- **Microsoft:** *Office* (good skills), *Visual Basic* (intermediate skills)
- **LaTeX** (good skills)

Language skills

General

Italian **Native proficiency.**

- English **Professional working proficiency**,
UNDERSTANDING, Listening: level B2
UNDERSTANDING, Reading: level C1
SPEAKING, Spoken Interaction: level B2
SPEAKING, Spoken Production: level B2
WRITING: level C1.
- French **Professional working proficiency**,
UNDERSTANDING, Listening: level B2
UNDERSTANDING, Reading: level B2
SPEAKING, Spoken Interaction: level B1
SPEAKING, Spoken Production: level B1
WRITING: level B2.
- Finnish **Elementary proficiency**,
UNDERSTANDING, Listening: level A1
UNDERSTANDING, Reading: level A2
SPEAKING, Spoken Interaction: level A1
SPEAKING, Spoken Production: level A1
WRITING: level A1.

Exams

- English **IELTS**
Cambridge ESOL, mark 6.0.
Year 2008

Membership

- 2007– **Member of the Italian Tunnelling Society (SIG).**
- 2019– **Full Member of Society of Mining Professors (SOMP).**
- 2011– **Registered Professional Engineer**
Torino, IT, 13705.
- 2011– **Member of the International Society of Rock Mechanics.**
- 2011– **Member of the Italian Geotechnical Association.**
- 2012– **Member of the International Society for Soil Mechanics and Geotechnical Engineering.**

Publications

Peer reviewed journal papers

- 2018 **Impermeabilizzazione di gallerie: problematiche ed aspetti realizzativi**
A. Luciani, D. Martinelli e D. Peila, Geingegneria Ambientale e Mineraria, 148 (3), Dec 2018, 103–114.
- 2018 **Moderno approccio per lo studio del condizionamento dei terreni granulari non coesivi per lo scavo con macchine EPB**
D. Martinelli, C. Todaro, A. Luciani, L. Peila, A. Carigi e D. Peila, Gallerie e Grandi Opere Sotterranee, 128, Dec 2018, 23–31.
- 2018 **Innovative techniques and technologies for underground construction and implications of OS&H**
D. Martinelli e D. Peila, Geingegneria Ambientale e Mineraria, 154 (2), Aug 2018, 88–92.
- 2017 **Undrained behaviour of granular soils conditioned for EPB tunnelling: a new experimental procedure**
D. Martinelli, R. Winderholler, D. Peila, Geomechanics and Tunnelling, 10 (1), 2/2017.
- 2016 **Preliminary study of wear induced by granular soil on metallic parts of EPB tunnelling machines**
C.G. Oñate Salazar, D. Martinelli, C. Todaro, A. Luciani, A. Boscaro e D. Peila, Geingegneria Ambientale e Mineraria, 148 (2), Aug 2016, 67–70.

- 2016 **Use of Tunnels for Landslide Stabilization**
D. Peila e D. Martinelli, *Geingegneria Ambientale e Mineraria*, 148 (2), Aug 2016, 61–66.
- 2016 **Laboratory tests on soil conditioning of clayey soil**
D. Peila, A. Picchio, D. Martinelli e E. Dal Negro, *Acta Geotechnica*, 11 (5), 1061–1074, DOI: 10.1007/s11440-015-0406-8.
- 2015 **Control of rockfall protection net fences for management and maintenance**
C. Dimasi, A. Luciani, D. Martinelli, M. Paganone e D. Peila, *Geingegneria Ambientale e Mineraria*, 146 (3), Dec 2015, 65–71.
- 2015 **Design and construction of a site for the geological and geotechnical characterization for a nuclear waste repository in Finland**
D. Martinelli, *Geingegneria Ambientale e Mineraria*, 145 (2), Aug 2015, 63–69.
- 2015 **Feasibility study for tar sands conditioning for EPB tunnelling**
D. Martinelli, D. Peila e E. Campa, *Journal of Rock Mechanics and Geotechnical Engineering*, DOI: 10.1016/j.jrmge.2015.09.002.
- 2015 **Long term behavior of two component back-fill grout mix used in full face mechanized tunneling**
D. Peila, A. Chierigato, D. Martinelli, C.G. Oñate Salazar, R. Shah, A. Boscaro, E. Dal Negro, *Geingegneria Ambientale e Mineraria*, 144 (1), Apr 2015, 57–63.
- 2014 **Laboratory grouting test for waterproofing and consolidation of granular soils by means of innovative materials**
A. Chierigato, C.G. Oñate Salazar, C. Todaro, D. Martinelli e D. Peila, *Geingegneria Ambientale e Mineraria*, 141 (1), Apr 2014, 63–68.
- Conference Proceedings**
- exp 2019 **Long-term durability analysis and lifetime prediction of PVC waterproofing membranes**
A. Luciani, C. Todaro, D. Martinelli, A. Carigi, D. Peila, M. Leotta, E. Dal Negro, *World Tunnelling Congress 2019, Napoli, I, 3–9 May 2019*.
- exp 2019 **Two component backfilling in shield tunneling: laboratory procedures and results of a test campaign**
C. Todaro, L. Peila, A. Luciani, A. Carigi, D. Martinelli, *World Tunnelling Congress 2019, Napoli, I, 3–9 May 2019*.
- exp 2019 **Tilt Sliding Test to assess the behaviour of conditioned soil with large amount of cobbles**
A. Carigi, A. Luciani, D. Martinelli, C. Todaro, D. Peila, *World Tunnelling Congress 2019, Napoli, I, 3–9 May 2019*.
- 2017 **Lesson Learnt from Operating Three Different Soil Abrasion Testing Systems, A Pathway to Find New Index of Abrasivity in Soft Ground Tunneling**
M. Hedayatzadeh, J. Rostami, D. Peila, M. Thewes, O. Forough, D. Martinelli, *12th Iranian Tunnelling Conference, Tehran, IR, 27–29 November 2017*.
- 2016 **Study of Wear in Conditioned Granular Soil by Using a New Test Device**
C.G. Oñate Salazar, D. Martinelli, C. Todaro, D. Peila, A. Boscaro, *World Tunnelling Congress 2016, San Francisco, USA, 22–28 April 2016*.
- 2016 **An Experimental Apparatus to Estimate the Shear Strength of Conditioned Soil for EPB**
D. Martinelli, R. Winderholler e D. Peila, *World Tunnelling Congress 2016, San Francisco, USA, 22–28 April 2016*.
- 2015 **Uso delle gallerie per la stabilizzazione di versanti in frana**
D. Peila e D. Martinelli, *Congress “Il buon uso del suolo e del sottosuolo nella prevenzione dei dissesti geologici”, convention Expotunnel 2015, Milano, I, 8–9 October 2015*.
- 2015 **Conditioning of fractured rock masses for the excavation with EPB shields**
D. Martinelli, A. Chierigato, C.G. Oñate Salazar, M. Barbero e D. Peila, *ISRM Congress 2015, Montrèal, CA, 10–13 May 2015*.
- 2014 **New study to assess the geomechanical behavior of the expansion of the Rodoretto talc mine**
D. Martinelli, D. Peila, F. Monticelli e M. Wurm, *World Tunnelling Congress 2014, Iguassu Falls, BR, 9–15 May 2014*.

- 2013 **Effect of Soil Conditioning on Tool Wear in Soft Ground Tunnelling Using Shield Machines**
M. Hedayatzadeh, A. Picchio, D. Martinelli e D. Peila, 10th Iranian Tunnelling Conference, Tehran, IR, 4–7 November 2013.
- 2013 **In-situ experiment of thermally induced spalling of round shotcreted shafts in deep crystalline rock**
L. Uotinen, T. Siren, D. Martinelli e M. Hakala, World Tunnelling Congress 2013, Geneva, CH, 31 May–7 June 2013.
- 2012 **Rock mechanical modelling of Keilaniemi metro station of Länsimetro in Finland**
D. Martinelli, J. Ström, G. Westerlund, L. Uotinen e G. Nuijten, Eurock 2012, Stockholm, S, 28–30 May 2012.
- 2012 **Rock engineering design process in ONKALO rock characterization facility**
L. Uotinen, G. Nuijten, D. Martinelli, R. Lehmusjärvi e M. Rinne, Eurock 2012, Stockholm, S, 28–30 May 2012.
- 2011 **Numerical spalling assessment methods in crystalline rock during the design of ONKALO rock characterisation facility**
T. Siren, D. Martinelli e R. Lehmusjärvi, World Tunnelling Congress 2011, Helsinki, FI, 20–26 May 2011.

Working reports

- 2011 **Assessment of the Potential for Rock Spalling in the Technical Rooms of the ONKALO**
T. Siren, D. Martinelli and L. Uotinen, Posiva Workreport 2011-35, www.posiva.fi/files/1706/WR_2011-35_web.pdf.

Others

- 2010 **3D Finite Element Modelling in Hard Rock with the Midas GTS**
T. Siren, D. Martinelli, A. Sjöblom and J. Ström, Diana elements - Spring 2010, tnodiana.com/upload/files/elements/DIANA_Elements_Spring_2010.pdf.