


## METRO AND MASS TRANSIT TUNNELS


Selected References  
Projects considered since 2010


<b>AUSTRIA</b>		
Owner Client	Project Services	Year
<b>Wiener Linien</b>  ARGE U2 17-21 (Strabag/Porr)	<b>U2/17-21</b> ; approx. 2 x 2 km single track TBM tunnels; 4 stations, 3 track change facilities with emergency exits (NATM), several shafts and connecting structures to the existing lines U3 and U4. The new line extends from the neighboring lot U2/22 Rathaus to Matzleinsdorfer Platz and runs in densely built-up areas. The total length is 3.277 m  Construction and heading survey, motorlaser systems, tunnel laser scanner, geotechnical monitoring and instrumentation incl. 3D displacements for all underground EUPALINOS	2021 -
<b>Wiener Linien</b>  ARGE U2 x U5 Rathaus/ Frankplatz (Swietelsky/ Habau/Hochtief)	<b>U2/22 „Rathaus“, U5/2 „Frankplatz“</b> ; The existing U2 station Rathaus will be upgraded to a U2/U5 line hub. The line U2 from Karlsplatz to Rathaus will be part of the new fully automated operating U5. Therefore extensive underground construction work for the station Rathaus is required. Tunnelling for the 2 stations and about 2 x 1.300 m single track tunnels will be done by NATM  Construction and heading survey, motorlaser systems, tunnel laser scanner, geotechnical monitoring and instrumentation incl. 3D displacements for all underground works, EUPALINOS	2021 -
<b>Wiener Linien</b>  Swietelsky/ Max Bögl	<b>U1/8 Alaudagasse</b> ; 2 x 350 m single track subway tunnel (NATM), 237 m C&C station box and 85 m switch shaft  Geotechnical monitoring incl. 3D displacements, network and control survey, construction and heading survey, motor laser systems, tunnel laser scanner, KRONOS tunnel information system, EUPALINOS	2013 - 2016

Owner Client	Project Services	Year
<b>Wiener Linien</b>  STRABAG	<b>U1/9 Altes Landgut &amp; U1/10 Troststraße;</b> 2 x 518 m single track and 1.225 m twin track subway tunnels (NATM), 2 stations each 120m (partially NATM), 2 x 40 m cross passages  Geotechnical monitoring and instrumentation incl. 3D displacements, network and control survey, construction and heading survey, motorlaser systems, tunnel laser scanner, IP-inclinometers and rotating laser level system with automatic data acquisition, KRONOS information system, EUPALINOS	<b>2013 - 2016</b>
<b>Linz AG</b>  Hinteregger/ÖSTU-Stettin/ Dywidag	<b>Tramway Harter Plateau;</b> Linz, 2 single track tubes 2 x 1.000 m, C&C section 440 m  Construction and heading survey, geotechnical instrumentation, EUPALINOS	<b>2009 - 2010</b>

Explanation of abbreviations for Austria owners and clients:

ARGE                      Joint venture companies

<b>GERMANY</b>		
Owner Client	Project Services	Year
<b>DB Netze</b>  Geoconsult Germany	<b>2. Core S-Bahn route Munic, VE 30 Main station with tunnel, VE 41 station Marienhof;</b> 2 TBM tunnels l = 2x 2.974 m, 2 stations  Construction supervision. The services include the monitoring activities during construction for surveying services incl. documentation of all results	<b>2019 -</b>
<b>City of Dortmund</b>  Wayss & Freytag	<b>Stadtbahn Dortmund, line III, lot S 10.1.2;</b> alteration of the main station, all in all 1.300 m NATM tunneling with cross-sections from 36 to 185 m <sup>2</sup>  TALOS motor laser, EUPALINOS	<b>2015 - 2016</b>

<b>DENMARK</b>		
Owner Client	Project Services	Year
<b>Copenhagen Metro</b>  Metroselskabet	<b>Nordhavn extension of Copenhagen Metro;</b> The Nordhavnen Metro comprises a 3 km track with two new stations and one shaft  KRONOS tunnel information system, geotechnical instrumentation, GeoRobot – automatic 3D deformation monitoring, EUPALINOS	<b>2014 -2020</b>

Owner Client	Project Services	Year
<b>Copenhagen Metro</b>  Metroselskabet	<b>Cityringen;</b> extension of Copenhagen Metro, ring line, two single-track tunnels, l=15,5 km, 17 stations with average dimensions of 65 x 20 m, three construction and ventilation shafts, a ramp structure and subsidiary structures  Geotechnical instrumentation, optical 3D deformation monitoring, GeoRobot- automatic 3D deformation monitoring, automatic data acquisition, KRONOS tunnel information system, EUPALINOS	<b>2011 - 2018</b>
<b>Copenhagen Metro</b>  Metroselskabet	<b>Sydhavn extension of Copenhagen Metro;</b> The extension will be 4.5 km long and consist of five new stations from Fisketorvet to Ny Ellebjerg.  KRONOS tunnel information system, 3D displacement on the surface, noise and vibration monitoring, slab track surveying	<b>2017 -</b>

## FRANCE




Owner Client	Project Services	Year
<b>Société du Grand Paris</b>  ARGE AVENIR (Demathieu Bard Construction / Pizzarotti / Implenia /Bam Contractors)	<b>Grand Paris Express Ligne 17, Lot 1;</b> around 6 km tunnel, 2 stations (Le Bourget Aéroport and Triangle de Gonesse), 6 annexes (mainly ventilation shafts and safety access shafts)  KRONOS tunnel information system	<b>2019 -</b>


## GREAT BRITAIN





Owner Client	Project Services	Year
<b>London Underground</b>  Bechtel	<b>London Underground Vauxhall Station Upgrade;</b> The station, its subways and stairways will be completely refurbished and a lift will be installed between the ticket hall and platforms  KRONOS tunnel information system, geotechnical instrumentation, GeoRobot - automatic 3D-deformation monitoring, EUPALINOS	<b>2012 - 2015</b>
<b>Crossrail</b>  JV BAM/Ferrovial/Kier	<b>Crossrail London, C410, Bond Street &amp; Tottenham Court Road Station;</b> construction of two underground station buildings (NATM)  KRONOS tunnel information system, optical 3D deformation monitoring, EUPALINOS surveying software, construction surveying and heading control, network and control surveys, profile check, tunnel scanner	<b>2012 - 2016</b>


Owner Client	Project Services	Year
<b>Crossrail</b>  JV Lain O'Rourke/ STRABAG/ Züblin	<b>Crossrail London, C430, Farringdon Station, subsurface interchange between Thameslink, Crossrail and London Underground;</b> construction of the eastern and western integrated ticket halls, both surrounded by residential and commercial properties  Geotechnical instrumentation, optical 3D deformation monitoring, GeoRobot – automatic 3D deformation monitoring, automatic data acquisition, KRONOS tunnel information system, environmental monitoring, construction surveying and heading control, network and control surveys, EUPALINOS	2011 - 2013

<b>GREECE</b>		
Owner Client	Project Services	Year
<b>Attiko Metro</b>  Aktor ATE	<b>Metro Thessaloniki, extension Kalamaria;</b> 2 parallel 1-track tunnels, excavation with 2 TBMs, 5 stations, total l = 4.780 m  Geotechnical instrumentation, optical 3D deformation monitoring, GeoRobot – automatic 3D deformation monitoring, automatic data acquisition, KRONOS tunnel information system, EUPALINOS	2014 -
<b>Attiko Metro</b>  AEGEK-IMPREGILO- ALSTOM JV	<b>Metro Athens, Holargos, Nomismatokopeio, Agia Paraskevi Stations;</b> The stations were not completed during construction of line 3 due to pressure to complete the metro in time for the Athens Olympic Games in 2004  Geotechnical instrumentation, optical 3D deformation monitoring, GeoRobot – automatic 3D deformation monitoring, automatic data acquisition, KRONOS tunnel information system, EUPALINOS	2008 - 2010
<b>Attiko Metro</b>  JV Aegek/ Impregilo/ SELI/Ansaldobreda	<b>Metro Thessaloniki;</b> 2 parallel 1-track tunnels, excavation with 2 TBMs, 13 stations, total l = 7.700 m  Geotechnical instrumentation, optical 3D deformation monitoring, GeoRobot – automatic 3D deformation monitoring, automatic data acquisition, KRONOS tunnel information system, EUPALINOS	2007 - 2017


<b>HUNGARY</b>		
Owner Client	Project Services	Year
BKV  BAMCO Kkt	<b>Metro Budapest, line 4;</b> 2 single-track running tunnels 7,3 km long (TBM), NATM excavation of Gellert station  Geotechnical instrumentation, optical 3D deformation monitoring, construction surveying and heading control, network and control surveys, motor laser system, EUPALINOS surveying software, KRONOS tunnel information system	2007 - 2010


<b>SWEDEN</b>		
Owner Client	Project Services	Year
Trafikverket  Züblin Scandinavia AB	<b>Södermalmstunnel, Citybanan Stockholm;</b> 1.400 m long twin-track tunnel with parallel emergency gallery under historical buildings  Geotechnical instrumentation, horizontal IPIs, DAMOS automatic data acquisition system	2012 - 2014

<b>USA</b>		
Owner Client	Project Services	Year
<b>Metropolitan Washington Airports Authority</b>  Dulles Transit Partners, LLC	<b>Metro Washington;</b> Tysons Corner NATM tunnel construction with 520 m length about 15m to 20 m below freeway  Optical 3D deformation monitoring, network and control surveys, consulting / training, EUPALINOS, KRONOS tunnel information system	2009 - 2012


<b>ARGENTINA</b>		
Owner Client	Project Services	Year
<b>Ciudad Autonoma de Buenos Aires</b>  Roggio/Geoconsult Buenos Aires SA	<b>Subte Buenos Aires, line B, lot C;</b> holding cavern, NATM excavation  Optical 3D deformation monitoring, network and control surveys, consulting & training, EUPALINOS	2010




<b>CHILE</b>		
Owner Client	Project Services	Year
<b>Metro de Santiago</b>  Metro de Santiago	<b>Line 3 &amp; 6;</b> line 3: 21.2 km twin track tubes with 18 stations; line 6: 15.3 km twin track tubes with 10 stations  Optical 3D deformation monitoring, geotechnical monitoring and instrumentation, automatic horizontal inclinometer chains, KRONOS tunnel information system, EUPALINOS	<b>2013 - 2017</b>


<b>INDIA</b>		
Owner Client	Project Services	Year
<b>MMRC</b>  JK Infra Projects Ltd.	<b>Metro Mumbai line 3 package - 05;</b> 5 km twin tube TBM tunnels, 5 stations  EUPALINOS surveying software	<b>2020 - 2022</b>
<b>BMRCL</b>  L&T Constructions	<b>Bengaluru Metro phase 2, package RT02 &amp; RT03;</b> Line 4 (pink), 5UG stations, l = 5,65 km tunnel  KRONOS information system	<b>2020 -</b>
<b>MMRC</b>  CEC-ITD CEM-TPL JV	<b>Metro Mumbai line 3 package-04;</b> 3 TBM drives total length 11 km, 3 stations  EUPALINOS surveying software	<b>2019 - 2023</b>
<b>MMRC</b>  J. Kumar Infraprojects Ltd.	<b>Metro Mumbai line 3 package-06;</b> 4,45 km twin-tube TBM tunnels, 2 stations  EUPALINOS surveying software	<b>2019 - 2021</b>
<b>MMRC</b>  L&T-STEC JV	<b>Metro Mumbai line 3 package-07;</b> 7 km tunnel excavation, 3 stations  EUPALINOS surveying software	<b>2019 - 2020</b>
<b>DMRC</b>  Prathiba Industries Ltd.	<b>Metro Delhi, Phase III, DMRC CC-23;</b> 5 underground stations and a total length of 9.080 m bored tunnels with 4 TBM  EUPALINOS surveying software	<b>2014 - 2016</b>
<b>DMRC</b>  J. Kumar Infrastructure Ltd.	<b>Metro Delhi, Phase III, DMRC CC-24;</b> 2 TBM tunnels with a total length of approx. 6,8 km  EUPALINOS surveying software	<b>2013 - 2015</b>
<b>DMRC</b>  Prathiba Industries Ltd.	<b>Metro Delhi, Phase III, DMRC CC-18;</b> tunnel length 1.994 m (TBM)  EUPALINOS surveying software	<b>2013 - 2015</b>

Owner Client	Project Services	Year
<b>DMRC</b>  L&T/SUCG JV	<b>Metro Delhi, Phase III, DMRC CC-27;</b> 5 TBM tunnels with a total length of 4,49 km and 5 stations  EUPALINOS surveying software	<b>2013 - 2014</b>
<b>DMRC</b>  Era Infra Ing. Ltd.	<b>Metro Delhi, Phase III, DMRC CC-07;</b> 2 TBM tunnels with 2.040 m length of each tunnel  EUPALINOS surveying software	<b>2013 - 2014</b>
<b>DMRC</b>  Continental Eng. Corp.	<b>Metro Delhi, Phase III, DMRC CC-04;</b> 2 TBM tunnels with 2.145 m length of each tunnel  EUPALINOS surveying software	<b>2013 - 2014</b>
<b>DMRC</b>  Prathiba Industries Ltd.	<b>Metro Delhi, Phase III, DMRC CC-01;</b> 1 launching shaft, 2 metro stations and 2 approach tunnels with a total length of 2.3 km  EUPALINOS surveying software	<b>2012 - 2014</b>
<b>CMRL</b>  Mosmetro	<b>Metro Chennai, packages UAA-02 and UAA-03;</b> 6.4km of twin TBM running tunnels and seven underground stations  EUPALINOS surveying software	<b>2012 - 2015</b>
<b>DMRC</b>  Larsen & Toubro Ltd.	<b>Metro Delhi, Phase III, DMRC CMC-1;</b> Launching Shaft, Retrieval Shaft and 3.2-Km long tunnel alignment around Safderjung Airport  EUPALINOS surveying software	<b>2010 - 2013</b>
<b>DMRC</b>  Alpine/ HCC JV	<b>Metro Delhi, AMEL-C6 Project;</b> double track metro tunnel (NATM), length 2,5 km  Consulting & Training, EUPALINOS surveying software	<b>2008 - 2010</b>
<b>DMRC</b>  Alpine/ Samsung/ HCC JV	<b>Metro Delhi, AMEL-C1 Project;</b> 2.2km long twin bored tunnels  Consulting & Training, EUPALINOS surveying software	<b>2008 - 2010</b>
<b>DMRC</b>  Metro Tunneling Group	<b>Metro Delhi, DMRC Corridor Contract BC-18;</b> 3,1 km long metro twin tunnel and two underground metro stations  EUPALINOS surveying software	<b>2007 - 2010</b>

<b>ISRAEL</b>		
Owner Client	Project Services	Year
<b>NTA – Metropolitan Mass Transit System LTD.</b>  China State Construction Engineering Corp. Israel	<b>Green Line Tel Aviv;</b> the length of the line is approx. 39 Km, of which 4,5 Km are underground, with 61 stations, five of which are underground  KRONOS tunnel information system	<b>2020 -</b>

Owner Client	Project Services	Year
<b>NTA – Metropolitan Mass Transit System LTD.</b>  NTA	<b>Red Line Tel Aviv;</b> 24 km subway with 11 km twin tunnels and 10 underground stations.  KRONOS tunnel information system	<b>2012 - 2022</b>

<b>QATAR</b>		
Owner Client	Project Services	Year
<b>Qrail</b>  QVDC/GS E&C/ADE JV	<b>Doha Metro Red Line South;</b> 12.8km twin-tube underground line  EUPALINOS surveying software	<b>2014 - 2017</b>

<b>AUSTRALIA</b>		
Owner Client	Project Services	Year
<b>NSW Government</b>  John Holland CPB Ghella JV	<b>Sydney MetroWest - Eastern Tunnelling Package;</b> 3.5 km of twin tunnels, caverns and shafts, turnback tunnels  Kronos, railway, bridge and technical monitoring services. >6 Automated total station monitoring systems	<b>2022 -</b>
<b>NSW Government</b>  Gamuda Laing O'Rourke JV	<b>Sydney MetroWest - Western Tunnelling Package;</b> 9 km of twin tunnels, crossover structure  Early works contract for Kronos, groundwater monitoring, strain monitoring. Survey monitoring	<b>2022</b>
<b>Sydney Metro</b>  Metro Central Tunneling Package Acciona Ferrovial Joint Venture	<b>Sydney Metro West - Central Tunneling Package;</b> 14 km twin Metro railway tunnels between Rozelle and Homebush  Surface monitoring, building monitoring systems, heritage item monitoring, automated railway monitoring system	<b>2021 -</b>
<b>Sydney Metro</b>  Metro2TSE - CPB John Holland Ghella	<b>Sydney Metro City &amp; Southwest;</b> 15.5-km twin railway tunnels between the end of Sydney Metro Northwest at Chatswood and Sydenham, 6 new stations  KRONOS tunnel information system, over 10 automation total station monitoring systems, with integrated vibration and geotechnical measurement systems, over 25 Km of track surveys using GRP 1000 track trolley	<b>2018 - 2021</b>