


**INVESTIGATION AND UTILITY GALLERIES,  
CAVERNS, SHAFTS AND HYDROELECTRIC  
POWER PLANTS**

Selected References  
Projects considered since 2010

<b>AUSTRIA</b>		
<b>Owner</b> Client	<b>Project</b> Services	<b>Year</b> Project Type
<b>Verbund AG</b>  ARGE PSW Limberg III - Marti/Porr/Hinteregger	<b>HEPP Limberg III, 480 MW;</b> headrace tunnel I = 3.000 m and penstock I = 584 m (TBM), powerhouse and transformer caverns (85.000 m <sup>3</sup> excavation volume), several other tunnels, galleries and shafts with 4.500 m length  Construction and heading survey, geotechnical monitoring and instrumentation, EUPALINOS surveying software	2021 -  Hydropower
<b>TIWAG</b>  ARGE SKW Kühltai - Swietelsky/Jäger/Bodner	<b>HEPP Kühltai, 130 MW;</b> water transmission tunnel I = 25 km (TBM); power house cavern with 80.000 m <sup>3</sup> excavation volume and 4 km NATM tunnels, rockfill dam 113 m high, crest length 510 m and 2 km NATM galleries  Construction and heading survey, geotechnical monitoring and instrumentation, EUPALINOS surveying software	2021 -  Hydropower
<b>Verbund AG</b>  ÖSTU-Stettin	<b>HEPP ESA Reisseck II plus;</b> efficiency enhancement plant, access tunnel, headrace tunnel, tailrace tunnel, by-pass and drainage tunnel, total length 890 m, power house cavern  Construction and heading Survey, supply of geotechnical instruments, EUPALINOS surveying software	2021 -  Hydropower
<b>ÖBB</b>  ARGE Untertagebau KW Obervellach II - ÖSTU- Stettin/Jäger Bau	<b>Traction Power Station Obervellach II;</b> 37 MW, headrace tunnel I = 3.862 m, access tunnel, 2 inclined galleries, total length 380 m, storage tunnel and plant chamber I = 662m  Construction and heading Survey, supply of geotechnical instruments, EUPALINOS surveying software	2020 -  Hydropower

<b>Owner</b> Client	<b>Project</b> Services	<b>Year</b> Project Type
<b>ÖBB</b>  ÖBB, Swietelsky Tunnelbau	<b>HEPP Tauernmoos 170 MW;</b> power house cavern, tailrace tunnel l = 1,6 km, access tunnels total length approx. 4,2 km  Geotechnical monitoring and instrumentation, EUPALINOS surveying software	2020 -  Hydropower
<b>illwerke vkw AG</b>  ÖBB, Swietelsky Tunnelbau	<b>Rodundwerk I;</b> penstock tunnel l = 300 m, penstock shaft l = 470 m, 36° inclined  TAUROS TBM guidance system	2020 - 2021  Hydropower
<b>Octapharm</b>  ÖSTU-Stettin	<b>Medientunnel Inneryard/Basiy neu; l = 14 m</b>  Heading Survey, TALOS motorlaser, EUPALINOS	2019  Utility tunnel
<b>Verbund/TIWAG/ Engadiner Kraftwerke</b>  ARGE GKI Maria Stein - STRABAG/Jäger/ Hinteregger	<b>Comunity HEPP Inn (Austria/Switzerland), 89 MW;</b> power house Prutz/Ried and headrace tunnel, l = 23,2 km  Geotechnical monitoring incl. optical 3D deformation, construction and heading survey, network and control survey, profile check, gyro measurements, EUPALINOS surveying software	2017 - 2022  Hydropower
<b>Austrian Federal Forests</b>  ÖSTU-Stettin	<b>HEPP Taurach; penstock l = 420 m</b>  Optical 3D displacement, construction and heading survey, network and control survey, profile check, motor laser system, EUPALINOS surveying software	2017  Hydropower
<b>KELAG</b>  Züblin	<b>HEPP Feldsee; raising of the storage dam</b>  GEOROBOT automatic 3D-displacement monitoring	2015  Hydropower
<b>Ski Area Operator Zauchensee</b>  HTB Bauges. mbH	<b>Gallery Zauchensee; water supply for snow canons, l = 130 m</b>  Construction and heading survey, motor laser, EUPALINOS	2015  Water supply
<b>KELAG</b>  HTB Bauges. mbH	<b>HEPP Reisseck; widening of existing tunnel, l = 40 m</b>  Construction and heading survey, EUPALINOS	2014 - 2015  Hydropower
<b>MA 31, City of Vienna</b>  Marti GmbH	<b>Neubrucker Lehenstollen; drinking water supply, l = 1.075 m</b>  Construction and heading survey, geotechnical monitoring and instrumentation incl. 3D displacements, vibration monitoring, EUPALINOS	2014 - 2016  Water supply
<b>Vorarlberger Illwerke</b>  Pöyry Illwerke	<b>HEPP Obervermunt II, 360 MW;</b> pumped-storage power plant, several galleries with total l = 8,1 km, powerhouse and transformer caverns  Construction and heading survey, geotechnical instrumentation	2014 - 2017  Hydropower
<b>ÖBB Infrastructure</b>  Bemo Tunneling	<b>HEPP Tauernmoos; investigation gallery l = 850 m</b>  Construction and heading survey, geotechnical monitoring incl. 3D displacement, EUPALINOS	2013

<b>Owner</b> Client	<b>Project</b> Services	<b>Year</b> Project Type
<b>Project Company</b> <b>KWK Stanzertal</b>  JV ÖSTU-Stettin/ Hinteregger	<b>HEPP Stanzertal, 20 MW; headrace and pressure tunnel</b> <b>l = 5,4 km</b>  Geotechnical monitoring incl. optical 3D displacement, construction and heading survey, network and control survey, gyro measurements profile check, motor laser system, TAUROS TBM guidance system, EUPALINOS surveying software	2013 - 2015  Hydropower
<b>TIWAG</b>  Swietelsky Bau GmbH	<b>HEPP Kaunertal 900 MW</b> , upgrading of existing plant, headrace gallery, l = 4.500 m, access tunnel, inspection tunnel & shafts with total l = 1.000 m  Optical 3D deformation monitoring, construction and heading survey, network and control survey, profile check, motor laser system, EUPALINOS, KRONOS tunnel information system, TAUROS TBM guidance system	2012 - 2014  Hydropower
<b>ÖBB Infrastructure</b>  ÖBB Infrastructure	<b>Ventilation structure Paierdorf</b> , complex underground structure for ventilation purposes as part of Koralmtunnel high speed rail  Geotechnical instrumentation, optical 3D deformation monitoring	2012 - 2013  Ventilation
<b>VERBUND AHP</b>  ARGE PSKW Reisseck II – Hinteregger/ÖSTU-Stettin/ Porr/Swietelsky	<b>HEPP Reisseck II, 430 MW</b> ; pumped storage power plant, upgrading of existing power plant scheme Malta/Reisseck, headrace and pressure shaft, l = 5,3 km, powerhouse and transformer caverns  Optical 3D deformation monitoring, geotechnical instrumentation, construction and heading survey, network and control survey, profile check, motor laser system, tunnel scanner, TAUROS TBM guidance system, KRIOS online monitoring system, EUPALINOS	2010 - 2014  Hydropower
<b>TIWAG</b>  Alpine Bemo Tunneling	<b>HEPP Kühtai</b> ; investigation gallery Längental, l = 735 m  Optical 3D deformation monitoring, construction surveying and heading control, EUPALINOS surveying software	2010  Hydropower
<b>STRABAG</b>  STRABAG	<b>Mucking Gallery Diabas</b> ; Saalfelden, l = 3.000 m  Heading survey, TAROS machine guidance system, EUPALINOS	2008 - 2010  Mining
<b>VOESTALPINE</b>  ÖSTU-Stettin	<b>Gallery Annaberg</b> ; Leoben, water supply concept for steel plant, l = 600 m  Construction and heading survey, profile check, EUPALINOS	2007 - 2008  Water supply
<b>VERBUND AHP</b>  JV Jäger/STRABAG/ Frutiger	<b>HEPP Hieflau, 63 MW</b> ; headrace tunnel, l = 600 m drill & blast and 4.900 m TBM excavation  Optical 3D deformation monitoring, construction and heading survey, network and control survey, profile check, motor laser system, TAUROS TBM guidance system, EUPALINOS	2007 - 2009  Hydropower

## Selected references


Investigation and utility galleries, caverns, shafts and hydroelectric power plants





Owner Client	Project Services	Year Project Type
<b>SALZBURG AG</b>  Jäger Bau	<b>HEPP Hintermuhr 104 MW;</b> pumped storage power plant, penstock, l = 129 m  Geotechnical monitoring and instrumentation incl. 3D displacement monitoring, construction and heading survey, EUPALINOS	2006 - 2007  Hydropower
<b>VERBUND AHP</b>  JV Hinteregger/ÖSTU-Stettin/Porr/Swietelsky	<b>HEPP Limberg II, 480 MW;</b> pumped-storage power plant, headrace, l = 4.200 m, penstock 45%, l = 770 m, power house cavern 66.650 m <sup>3</sup> , NATM and TBM excavation. Total l = 15 km  Geotechnical monitoring and instrumentation incl. 3D displacement, laser scanning, gyro measurements, motor laser system, TAUROS machine guidance, KRIOS online monitoring system, EUPALINOS	2006 - 2010  Hydropower


Explanation of abbreviations for Austria owners and clients:


ARGE	Joint venture companies
ASFINAG	Austrian federal road administration (responsible for construction, maintenance and financing of the Austrian freeways)
ÖBB	Federal railway company


<b>DENMARK</b>		
Owner Client	Project Services	Year Project Type
<b>HOFOR</b>  HOFOR	<b>Kalvebod Brygge Cloudburst Tunnel;</b> l = 1.250 m  Surface monitoring (3D-displacement), noise and vibration monitoring, extensometer	2021 -  Flood protection


<b>ENGLAND</b>		
Owner Client	Project Services	Year Project Type
<b>Bazalgette Tunnel Limited</b>  BMB JV	<b>Thames Tideway West;</b> 6 km sewer tunnel from Acton in West  London to Wandsworth in South West London Operation of KRONOS tunnel information system	2015 - 2016  Waste water


GERMANY		
Owner Client	Project Services	Year Project Type
Emschergenossenschaft  ÖSTU-Stettin/ Hinteregger	<b>Emscher Sewage Canal, BA40;</b> 10 km section between Bottrop and Oberhausen with to parallel shield tubes, total l = 20 km  3D displacement monitoring, construction and heading survey, network and control survey, profile check, motor laser system, EUPALINOS	2014 - 2016  Waste water
<b>Regional Authority in Baden-Württemberg</b>  ARGE Emscher ba 40	<b>Emergency tunnel Hugewald, B294;</b> emergency tunnel for existing road tunnel, l = 1.200 m  Geotechnical monitoring and instrumentation, construction and heading survey, network and control survey, gyro measurements	2011 - 2012  Tunnel safety


GREECE		
Owner Client	Project Services	Year Project Type
INTRAKAT  Jäger Bau	<b>Aposelemis Tunnel;</b> 3,5 km long water supply tunnel in Creta  TAUROS TBM guidance system	2014 - 2018  Water supply


ITALY		
Owner Client	Project Services	Year Project Type
ANAS  Hinteregger	<b>SS38 Morbegno;</b> escape tunnel l=2,3 km  TAUROS TBM guidance system	2017  Tunnel safety
<b>AHR-ENERGIE G.m.b.H.</b>  STRABAG	<b>HEPP In der Klamme, 8,7 MW;</b> penstock, l = 1.300 m  Optical 3D deformation monitoring, EUPALINOS surveying software	2010  Hydropower


NORWAY		
Owner Client	Project Services	Year Project Type
VAV Oslo Kommune  Marti AS	<b>Tunnel Skullerud - Enebakkveien;</b> l = 3.320 m (drill & blast), 2 access galleries l = 100 m + 200 m, 2 shafts  Construction and heading survey, EUPALINOS surveying software	2020 -  Water supply


<b>BHUTAN</b>		
Owner Client	Project Services	Year Project Type
<b>SJVNL/Druk Green Power Corp.</b>  Druk Green Power Corp.	<b>HEPP Kholongchu, 600 MW;</b> headrace tunnel, l = 15,8 km, diversion tunnel, l = 420 m, power house cavern  Geotechnical instruments, EUPALINOS surveying software	2014 - 2019  Hydropower

<b>CANADA</b>		
Owner Client	Project Services	Year Project Type
<b>Regional Municipality of Halton</b>  STRABAG Inc.	<b>Mid Halton Outfall Tunnel;</b> wastewater tunnel, l = 6,3 km, 2 x 60 m deep shafts  EUPALINOS surveying software	2015 - 2017  Waste water
<b>Ontario Power Generation</b>  STRABAG Inc.	<b>Niagara Tunnel Facility Project,</b> diversion tunnel, l = 10,2 km  Network and control survey, gyro measurements, EUPALINOS	2009 - 2011  Hydropower

<b>CHILE</b>		
Owner Client	Project Services	Year Project Type
Alto Maipo S.p.A.  Strabag SE	HEPP Alto Maipo, Alfalfal II und Las Lajas section, 531 MW total; Alfalfal II headrace tunnel, l = 14,5 km, Alfalfal II tailrace tunnels, l = 3,4 km, Las Lajas headrace tunnel 1& 2, l = 5,8 + 3,7 km, Las Lajas tailrace tunnel, l = 12,9 km, access tunnels, l = 4,3 km, 2 power house caverns and several shafts, NATM and TBM excavations Total length: TBM 30,8 km; NATM 44,5 km  Optical 3D displacement monitoring, construction and heading survey, network and control survey, gyro measurements, profile check, TALOS motor laser systems, EUPALINOS	2013 -  Hydropower

INDIA		
Owner Client	Project Services	Year Project Type
ISPRL  Hindustan Constr. Comp. (HCC)	<b>Padur Crude Oil Strategic Storage Project Unit 1;</b> 2 caverns, 656 m/20 m/ 30 m (L/B/H) and 2 caverns, 700 m/ 20 m/ 30 m (L/B/H), capacity: 2,5 MMT  Optical 3D displacement monitoring, EUPALINOS, KRONOS tunnel information system, training & consulting, laserscanning, calculation of strapping tables	2011 - 2014  Storage
LANCO Teesta  Lanco Infratech Ltd.	<b>HEPP Teesta VI, 520 MW;</b> North-Sikkim, 2 headrace tunnels, l = 13,65 km, 4 tailrace tunnels, l = 250 m  Optical 3D displacement monitoring, consulting & training, EUPALINOS	2010 - 2011  Hydropower
DANS Energy Pvt Ltd.  DANS Energy Pvt Ltd.	<b>HEPP Jorethang Loop, 96 MW;</b> head race tunnel, l = 6,8 km, tailrace tunnel, l = 30 m, surge shaft, d = 25 m  Optical 3D displacement monitoring, consulting & training, EUPALINOS	2010 - 2013  Hydropower
Brihan Mumbai Municipal Corp. (BMC)  Pratibha/ÖSTU-Stettin	<b>IV Mumbai Water Supply Project;</b> intake tunnel, l = 7,5 km, high pressure tunnel, l = 15,1 km  Construction surveying and heading control, network and control survey, gyro measurements, consulting & training, EUPALINOS	2009 - 2010  Water supply

TURKEY		
Owner Client	Project Services	Year Project Type
Enerji SA  Sargin Construction	<b>HEPP Dogancy, 62 MW;</b> headrace tunnel, l = 6.900 m  TAUROS TBM guidance system, GNSS network and control survey	2012 - 2015  Hydropower

USA		
Owner Client	Project Services	Year Project Type
Orange County California  KEC Engineering	<b>Edinger Storm Channel Improvements;</b> Huntington Beach, CA, water channel undercrossing IS 405, l = 85 m  Optical 3D displacement monitoring, GEOROBOT automatic 3D monitoring, KRONOS tunnel information system, EUPALINOS	2012 - 2014  Flood protection