



Métrie, Implantation, Réseaux, Études



Knowledge

Monitoring

In the area around any tunnelling activities, it is imperative to know the excavations effect on the surroundings, both above and below ground.

Main monitoring stages :

Drawing up specification for the work (frequency, precision, alert thresholds etc.)

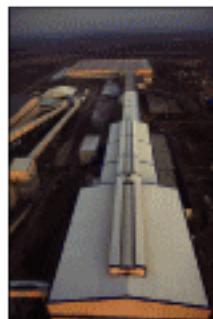
Visual inspection of concerned area, installation of monitoring points, preparation of location drawings, and baseline measurements.

Surface monitoring:

- Precise levelling
- Crack measurement
- Banking measurements.
- Auscultation measurements in tunnel:
- Precision levelling.
- Optical convergence measurements

Equipment used :

- Optical levels (NA2 + parallel plate micrometer)
- Digital electronic levels (Zeiss DINI 12T)
- Automated total station



References

- > EOLE Worksite (Paris) : SNCF
- > Saint-Ouen tunnel (Paris): CPCU
- > La Boule flyover (Nanterre) : DDE of Yvelines
- > LIRE Sud worksite (Paris) : SAGEP
- > Saint-Petersbourg underground (Russie) : IMPREGILO-NCC
- > Mariage bridge(Lille) : DG Construction
- > Roubaix Viaduc: SNCF
- > Lille Loop, works monitoring: SPAC
- > Railway monitoring while boring of a micro tunnel : SNCF Tours
- > Railway monitoring: Neuilly sur Marne
- > Inspection pit expansion: RATP, St Ouen
- > Float construction: St. Gobsin, Romania
- > Leveling and monitoring campaign for metro lines (5 years): RATP
- > Switch gears monitoring for Lyon tramway: Alstom



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Knowledge

Training

Training for applied topography adapted to the environment, like for example: training for railway applied topography dedicated to young surveyors, beginners or professional. These trainings are essentially focused on practice and learning the tricks of the trade. It could also aim for technical office staff in the context of "refreshing" their topographical knowledge. Thus, exchange between topography section and technical section is made much easier.

Railway module :

Railway applied topography :

• **Aim of training :**

- Master the field topography
- Acquire an auto-control system.

• **Program :**

Day 1 :

- Reminder
- Contractual documents
- Plans, Longitudinal profiles, equipment diagram, curvature studies.
- Glossary of railway terms

Day 2 : Equipment

- Presentation
- Operating modes :
 - Level
 - Total station
 - Laser
 - Breightaup
 - Odometer
 - Leveling rule

Day 3 :

- Practice on site

Day 4 :

- Documents control
- Example of final documents: Tamping sheets, diagrams...

Other modules :

- IT module (Office, AutoCAD, Covadis, Amatis, Planister,...)
- Management module for topography works





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Knowledge

For tunnel boring machine guidance

Whatever system of machine guidance is used, MIRE® is able to assist tunnelling contractors achieve the maximum compliance with design profiles.

Work areas

Phase 1 :

Establishing control network or using client supplied control network on the surface, transfer of control via access shafts, precision traverse along tunnel, gyroscopic alignment checks, and checks after completion.

Phase 2 : Machine guidance

Specific measurements of TBM, equipping with prisms or targets, instrument calibration (clinometers, detectors, joints, overcuts, etc), system installation (caps, tacs, internal systems, etc). Real Time distance calculation, TBM position monitoring and guidance. Ring segment selection.

Phase 3 :

Checking of completed work. "Wriggle" surveys, profilometer measurements etc.



References

- > EOLE worksite (Paris) : SNCF
- > Saint-Petersbourg Tunnel (Russia) : IMPREGILO-NCC
- > Gênes tunnel (Italia) : METROGENOVA
- > LIRE Sud worksite (Paris) : SAGEP
- > Epais les Louvres : GTM.
- > EPR3 Flamanville :



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Knowledge

Gyroscope

In any underground works one has to be constantly aware of the direction in which work should be proceeding. The gyro-theodolite guarantees a bearing with a precision equivalent to +/- 2.5 seconds. Our partnership with SNCF engineering management makes available a profitable synergy between survey professionals.

Equipment summary :

Our equipment is the GYROMAT 2000, coupled to a Leica T1600 theodolite. Special pillar plates and tripods are used to ensure accurate forced centring of the gyroscope on traverse stations.

Avantages :

Gyroscopic surveys, coupled with regular resurvey of the main underground traverse, represent the only effective and reliable way to avoid heading drift. It provides an essential support for all guidance systems.



References

- > EOLE Tunnel (Paris) :
 - lot 35B : 2 x 1,7 kms
- > Pannerdensch Kannal (Pays -Bas) :
 - 3,3 kms
- > CPCU (Galerie de St-Ouen) :
 - 250 mètres
- > St-Petersbourg underground (Russie) :
 - 2 x 900 mètres
- > Eplais-les-louvres microboring machine :
 - 5 x 250 mètres
- > Lire Sud worksite (Paris) :
 - SAGEP 2,5 kms
- > EPR3 Flamanville
 - Galerie de rejets en mer, 650 m à 100 m de profondeur.



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Savoir-Faire

Informatique : Sites Internet

Many civil works companies have the intention to create their own internet web sites. In response to this growing demand, and having good knowledge of the civil works profession, MIRE® S.A proposes real solutions to assert their presence on the web. Our skillful service allows us to better adjust a good product in every case.

Applications :

Web sites :

- Conception and development
- Setting of computer networks
- Maintenance
- Data back-up
- Training and consultancy



References :

> www.miretopo.com



Miróis, Implantations, Reliefs, Études.



Knowledge

Advertising media



References :

- > Logos
- > Institutional brochures
- > Greeting card
- > Internet banners
- > Promotional insert
- > Posters
- > Leaflets
- > Calendars...



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Knowledge

Software Development

After developing specific software for our internal needs, we have developed this activity to meet the needs of our clients and in partnership with the SNCF (National Railway Company). We can mention: Armatis®, Planisfer®, Saisam®, Prisme®...

ARMATIS

Armatis :



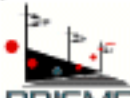
Creates a railway equipment diagram by means of simple dialogue boxes and generates automatically an AutoCAD file

PlanisFer

PlanisFer :



Creates a railway planning on the same basis as Armatis.



Prisme :

For surveyors, automatic formatting of railway statements and standard reference marks.

Three softwares which facilitate informations exchange with AutoCad, accelerate the creation of AutoCad documents, and are easy to use for all users.

I.D.AL :

Computerization of given information for linear applications. This software, developed following the same concept as the previous one, is particularly adapted for the follow-up of tunneling works.



Saisam :

Capture of metro equipment diagrams conceived the same way as in ARMATIS, this software is adapted to metro lines (under development).



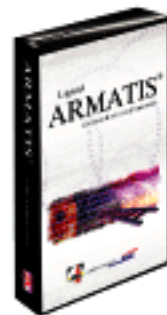
AxiFer :

For surveyors use, using a follow-up of plotted points, it helps to generate a metric point and offsets of each of these points from a know railway axis

GAPAV :



Developed to the special of our client ALSTOM, it allows creating automatically an equipment diagram directly from Excel sheets without any manual data capture.





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Knowledge

Conventional railway lines, maintenance, rvb works

Inherited from a big enterprise of railway works, our skills in topography on classic lines are in continuous progress. Along all the projects of renewal of ballasted lines or setting out of new ones, our teams have acquired the confidence of our clients during the past ten years.

Principal phases of study

Our intervention on the rail lines includes the following phases :

- Phase 1 :** Plotting before works
- Phase 2 :** Restoring the actual line
- Phase 3 :** Studying of the layout, the curves and the compensation
- Phase 4 :** Proposing new alternatives for layout, longitudinal profiles
- Phase 5 :** Equipment diagram

Principal phases of works :

Our intervention on the rail lines includes the following phases :



- Phase 1 :** Traverse works
- Phase 2 :** Plotting of rails
- Phase 3 :** Setting out of side pegs
- Phase 4 :** Tamping sheets
- Phase 5 :** Compensation study
- Phase 6 :** Precise leveling
- Phase 7 :** As-built documents

Equipment used :

- Optical levels (NA2 + parallel plate micrometer)
- Digital electronic levels (Zeiss DINI 12T)
- Automated total station (Geodimeter 640)
- Breighaupt viewer
- Odometer

References :

- > Avallon : track replacement, smoothing and tamping records : 11kms
- > Macon : 3 kms as above
- > Valence-Pierrelatte : 49 kms : sees 1
- > Arcenc station : Control network
- > Montélimar smoothing and tamping records
- > Villeneuve St-George : smoothing and tamping records
- > Dieppe Malaunay : Slewing and tamping (40 km)
- > PK 17
- > Macon
- > Rouen
- > Renewal of ballasted lines :
 - Coutances
 - Toulouse
 - Bandol/ La clotat
 - Nice/ Breil
 - Villard les Dombes
 - Villeneuve St Georges



Mining, Implementation, Reliability, Studies



Knowledge

Traditional underground survey

The basic principles behind the techniques used for the guiding of underground excavations go back to ancient Egypt. Nowadays, the use of modern instruments greatly eases the application of these techniques, whether the excavation is by explosive, TBM, or road header.

Main work elements :

Phase 1 :

Establishing control, or accepting existing site control network. Transferring control down the tunnel via the shafts, and precision underground traverse.

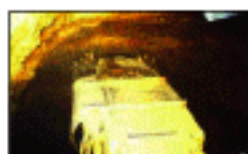
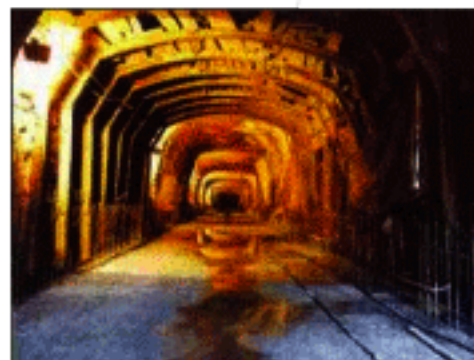
Phase 2 :

Several methods can be adopted for controlling the excavation

- Use of Laser guidelines
- Installation of machine guidance system
- Profile checking by normal surveying techniques

Phase 3 :

Real time checking of the excavation, shotcrete , and lining formwork are normally our main tasks, culminating in as built surveys. Our teams make daily use of profilometers and reflectorless total stations to carry out these tasks.

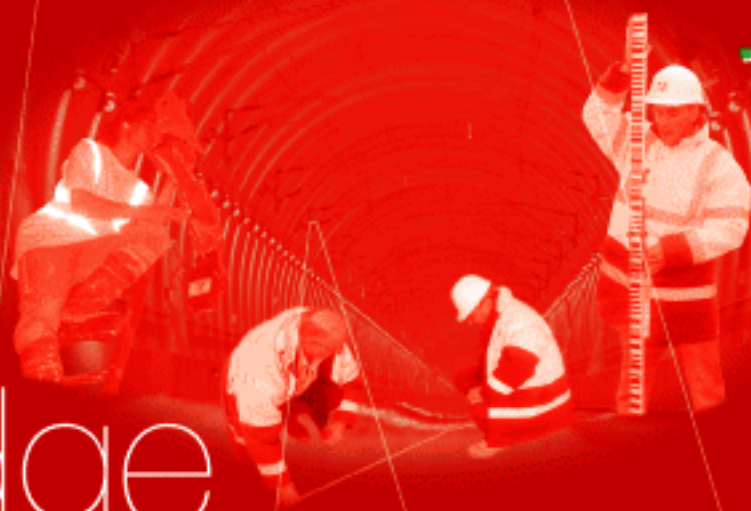


References :

- > EOLE Sud Tunnels T1, T2, T3, T4 (Lynx).
- > Bank in France : (limited attack)
- > Muids tunnel (Lynx)
- > Tunnel de Muids (Lynx).
- > Saint-Ouen tunnel for GPCU (Lynx).
- > Chavants tunnel (Explosive and robofore).
- > Epiais-Les-Louvres tunnel (Microt boring machine).
- > Planoro tunnel (BRH).
- > Cheval Noir tunnel (GTM).
- > PR 3 Flamanville



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Knowledge

Profilometer

For underground works, knowing the precise geometry of the excavation realized is necessary. This device allows rapid comparison of the theoretical and the realized. The traceability of the results obtained comes up in a quality process and delivers measurements in real times.

Summary description of the device and of the operating mode :

The profilometer is composed of a Dior assembled on a stepper motor and equipped with a prism. The land surveyor reads its position thanks to a theodolite propped up on the base traverse.

Method advantage :

Conceived for underground works, this method permits to work in security, in a quick and flexible way. The inaccessible vault points are measured without platform. Results are obtained in the form of an Autocad file compatible with every plan. As-built phase is in this way ensured on absolute.

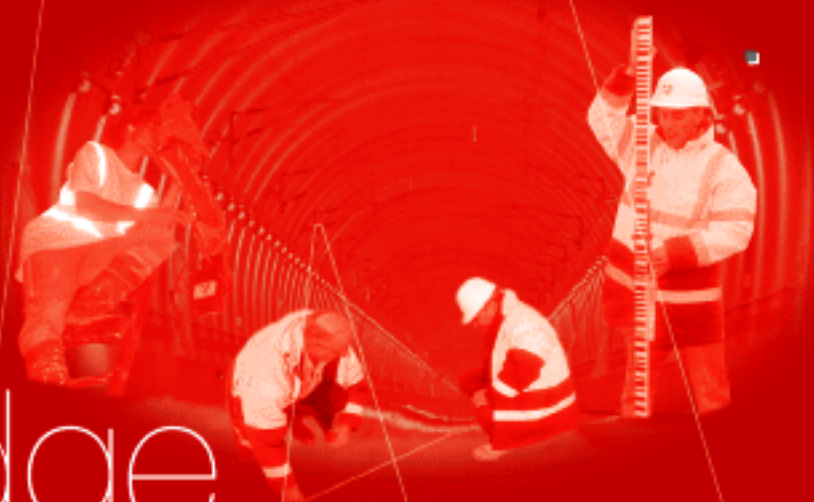


References :

- > EOLE underground (Paris) : Lot 35 B
Quantity : 1123
- > Lille underground:
Quantity : 553
- > CPCU (St-Ouen gallery) :
Quantité : 258 unités
- > Planoro tunnel (Italie) :
Quantity : 1549
- > Chavants tunnel
- > Tunnel de Digne
- > Algiers metro



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Knowledge

TCRM - TCRP

The advantages of the new generation of motorized and robotized total stations are no more to demonstrate.

We currently use this equipment to guarantee reliability and precision always increasing.

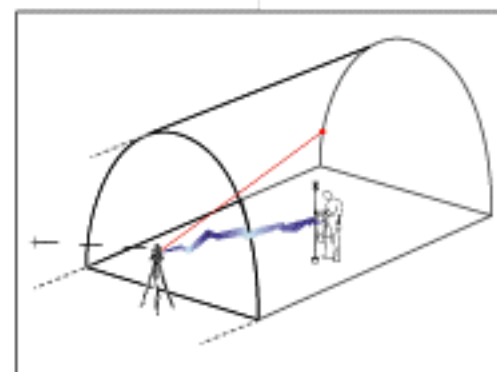
Summary of equipment and operation :

It consists of a Leica TCRM 105 coupled via radio modem to a ruggedised lap top, which contains an electronic model of the tunnel. As measurements are taken in the field, a comparison is made between the theoretical profile and the measured point, and this is displayed in real time.

Method advantages :

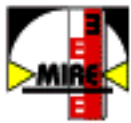
This immediate presentation of the results has obvious advantages, it immediately highlights areas of under or over excavation, allowing rectification works to be carried out with the minimum of lost time.

Recognised by Project managers and contractors alike, this real time information is destined to become an essential tool for all tunnelling projects.



References :

- > Planoro tunnel (Italie).
- > St-Petersbourg metro (Russie).
- > Algiers metro



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Knowledge

Tramway and Tram-Train

The important development of tramway networks all over France has necessitated a great involvement of survey works of railway type in urban surroundings. The experience of MIRE SA has been formed in the course of the past few years

Fields of intervention

- Precision traverse
- Projects,
- Precision levelling
- Platform reception
- Plotting of streets and networks
- Setting out of rails
- Pre-concreting control
- As-built
- Equipment diagram and topographic as-built documents

Equipment :

- Robotized precision total station
- Bar code level



References :

> Tramways et Tram-Train :

- Maréchaux Sud
- Montpellier
- Grenoble
- Nantes 1 et 3
- Alger 1
- Bobigny
- Léa à Lyon
- Mulhouse



MIRIS, Implantations, Réseaux, Études.



Knowledge

High Speed Lines works

The French know-how in high speed lines is no more to demonstrate: it acquired topography at the same level of its technology. For ten years now, MIRE SA has been specialized in this field and is reaping today the fruit of its competences; for example by modestly contributing to the establishment of the world speed record 574.8km/h on the Eastern High Speed Line where the teams of MIRE has set the position of rails on a 200km length of platform.

Principal phases of works on a high speed line :

Phase 1 : Precision traverse

Phase 2 : Acceptance of platforms and civil works

Phase 3 : Precise setting out of main points, setting out of switch gears, catenaries and gutters

Phase 4 : Follow-up of tamping machine.

phase 5 : Additional leveling

phase 6 : As-built of the line and dowels



Equipment :

- Classic levels (NA2 + micrometer).
- Automatic levels with bar code (Dini 12T ZEISS).
- Précision theodolite (Robotized Geodimeter 640
- Roadline Software.
- Measuring carriage GRP 3000 Leica.



References :

- > Méditerranéan High Speed line : 2 x 115 kms
- > Belgian High Speed Line : 2 x 62 kms
- > Korea High Speed Line: 2 x 400 kms
- > Méditerranéan High Speed Line : setting out of 1550 Tellura markers
- > English High Speed Line : CTRL 2 x 20 Kms CTRL2 rédaction du "Survey plan"
- > Estern High Speed Line : Lot 2 2 x 100 Kms
- > Estern High Speed Line : Lot 3 2 x 100 Kms
- > Belgian High Speed line : Ayeneux (2 x 35 Kms on concrete platform)
- > Pallas system survey setting out and maintenance of dowels (200 Kms)
- > Atlantic High Speed Line : Chartres : 50 Kms