

Italy



Name: Società Italiana Gallerie (Italian Tunnelling Society)

Type of Structure: Scientific, non-profit, cultural association founded in 1974.

SIG mainly promotes and coordinates studies and research in the field of tunnelling and underground construction works. SIG is a founding nation of the ITA and EUTF (European Underground & Tunnel Forum).

Number of Members: About 800 members (80 corporate and 250 young members).

ASSOCIATION ACTIVITIES DURING 2020 AND TO DATE

Congress:

15-16th/10/2020: II SIG-YM Congress on Tunnelling 4.0: New Technologies and Future Perspectives for Maintenance, Upgrading and Refurbishment of Tunnels

4th/12/2020: S. Barbara Conference (on-line event), World Tunnelling Day, Adolfo Colombo Lecture (held by prof. Pelizza) and Master's degree Award

4th/12/2020: ITA Young Members World Tunnelling Day 24h on-line event.

Technical Visits:

25th/09/2020: Rome - Metro C line Project - visit to the Piazza Celimontana and Fori Imperiali station sites

Courses and Seminars:

27th/11/2020: Beyond a Tunnel Vision conference - SIG Plenary Broadcast parallel Section "Inspection, investigation and monitoring during service life"

15th/12/2020: CIFI - IFR e SIG Webinar - The mechanized excavation for the construction of urban railway tunnels (online event)

25th/03/2021: SIG Webinar - Safety in the tunnelling sector - data analysis and use of digital tools for prevention.

Others:

SIG is a sponsor of the Level II Masters in Tunnelling and Underground Constructions, in Italy at the Politecnico di Torino and at the Politecnico di Milano; of the Level II Masters in Geotechnical engineering at the Sapienza University in Rome; and at the Federico II University in Naples. These collaborations aim to bridge the gap between Universities and Industry to support the growth of future industry leaders.

Since 1976, the Journal "Tunnels and Major Underground Works" has been SIG's pride and glory. It is currently published once every three months reaching issue 137 in March 2021.

The periodical presents technical and scientific articles, as well as Editor's letters, news and tenders from around the world, bulletins from the Italian tunnelling market, reports on technical visits, and scheduled training courses and international congresses.

The association members take part in the ITA-AITES working group (WGs) and in the SIG working groups. Members proactively collaborate with national and international colleagues to exchange expertise and experience, hence divulging technical, scientific and business know-how in underground construction.

The SIG YM Group, in December 2020 having 250 young tunnellers, actively support SIG activities and connect young professionals from both University and Industry. The group appointed, in 2020, a board expanding the number of YM actively involved in the organization of events and activities. The group has also established a fruitful collaboration with the others ITA's Member Nations YM Groups.

SIG is engaged in the drafting of a "Handbook on Tunnels and Underground Works" an important and complete work, which will be published in 3 volumes, including the theoretical and construction aspects of the design, construction, monitoring and maintenance of tunnels and underground works.

Professors from the most important and influential Universities in Italy, professionals, specialists and technicians from large engineering companies and corporate infrastructure managers are actively participating in the drafting of the publication.

The first Volume "Concept-base principles of Design" will be published within December 2021.

CURRENT TUNNELLING ACTIVITIES Railway Projects

Third Givi Pass, Genoa - Tortona Railway:

37km of twin tunnels along the 53km section between Genoa and Tortona, part of the Rhine-Alpine TEN-T Corridor. The tunnels, excavated for 65% using conventional methods and for 35% by TBM, are located in the complex Apennines range between Piedmont and Liguria. The Valico tunnel (27km) is going to be the longest in Italy.

Brenner Base Tunnel: When complete in 2028, it will be 55km long between Tulfes/Innsbruck and Fortezza and, when including the junction in the Innsbruck tunnel, will

have a max. underground length of 64km, being the longest in the world. The works include the construction of two single track tunnels (9m dia.) with underground safety areas every 20km and a pilot/service tunnel (6m dia.). Two major sites are on the Italian side, Section Mules 2-3, and the Section under passing the Isarco river.

Mont Cenis base tunnel, Turin – Lyon: The project consists of two 57.5km long twin-tubes (45m on the French side and 12km on the Italian side), with 170 cross-passages (every 333m), four intermediate adits for construction and emergency, five ventilation plants and three underground safety areas.

Brescia-Verona high speed railway: 6.6km of bored tunnels, together with 10.2km of cut & cover tunnels to twice underpass the A4 highway (Lonato and Sona) and an urban centre near the Mincio river. This section is crucial for the completion of the high-speed railway line from Turin-Venice.

Napoli Bari high Speed Railway: The Napoli-Cancello section is under construction with the first cut & cover tunnel excavated in a hyperbaric chamber to sustain the water table. The Cancello-Frasso Telesino section includes a 4km tunnel (Monte Aglio). Excavation is almost completed. The Frasso Telesino – Teleso and Teleso-Vitulano sections include two tunnels, for a total length of 2km.

Furthermore, works are beginning on the Apice-Hirpinia section, with the Rocchetta tunnel (6.5km), Melito tunnel (4.4km), Monte Aglio tunnel (4.1km) and Grottaminarda tunnel (2km).

Florence high speed railway junction: The 8km long twin-tunnels underpass one of the most important art cities in the world, on the high-speed services along the Rome-Milan route.

Messina-Palermo railway: On the Fiumetorto-Castelbuono section, the excavation by conventional method of the 4.1km, S. Ambrogio tunnel (single tube, double track) is ongoing. In addition, a 10m diameter TBM will excavate the 6.7km long Cefalù tunnel (twin tubes) with a max. depth of 300m and a max. hydraulic pressure of 5 bar. Also, an underground station will be built in Cefalù. The 13km project will increase capacity and cut travel times between Messina and Palermo.

Genoa urban railway junction: Sextuplication of tracks along the Brignole-Principe section and quadrupling



of the Voltri-Sanpierdarena sections which are the busiest on the Genoa urban railway junction. The project will include with the extension of the existing Colombo tunnel and S. Tommaso tunnel.

Metro Projects

Naples Metro - Line 1 and 6: Two new metro lines excavated using technologies such as ground freezing and vertical shaft boring machines (SBM). Two twin TBM tunnels are currently under construction between Capodichino Airport station and Poggioreale station, on a 1km length, to close the Line 1 ring. A mini-TBM ventilation tunnel was completed in 2020 for the completion of Line 6.

Rome Metro - Line C: The overall investment is about €3.8bn for a project extending from south-east to north-west,

for about 25.5km (18km underground), with 30 new stations (20 underground).

Milan Metro - M4: 15km of twin-tunnels from Linate to Lorenteggio and several interchanges with the three existing lines. Currently the central stretch passing under the city centre is under construction using two EPBMs of 9.1m diameter.

FUTURE TUNNELLING ACTIVITIES Railway Projects

Napoli Bari High Speed Railway: The sections Hirpinia-Orsara (29km) and Orsara-Bovino (11km) will be awarded in 2021. The Hirpinia Tunnel will be 27km twin-bored with just 500m dividing it from the Orsara tunnel (10km twin-bore). The completion of works is scheduled for 2026.

Palermo-Catania railway: The project will link the two main cities in Sicily and involves the construction of several tunnels through central Sicily, such as: Alia (20km), S. Catana (7.8km), Marianopoli (6.6km), Salso (3.9km), Trinacria (13.4km), Montestretto (2.3km), Sicani (5.3km), Dittaino (2.3km).

Messina-Catania railway: 37km underground over a 42km alignment between Fiumefreddo (nearby Catania) and Giampileri (nearby Messina), including an underground station in Taormina. The project is divided into two lots, one of which was awarded in March 2021. The project will link the two main cities of Sicily and will help link Catania with Bari, Naples and Rome.

Verona-Fortezza new railway line: As part of the Southern Access to the Brenner Base Tunnel, four lots will be built. The Fortezza - Ponte Gardena section (23km) was awarded in 2020 and includes the tunnels "Scaleres" (16km), and "Gardena" (6km). The underground works will be approximately 62km, including the 2 twin-bored tunnels, connection tunnels, lateral adits and ancillary work, with a maximum overburden of 800m. Both conventional and TBM excavation will be used.

Salerno - Reggio Calabria high speed railway: After the Covid-19 pandemic, the Italian government decided to include this massive project in the country's strategic infrastructure plan to revitalize the economy and modernise southern Italy. Crossing complex ground, it would have 180km of twin-tunnels over a 400km total length, with an estimated cost of €20bn.

Catania urban railway junction: Will consist of an upgrading of the existing urban railway line, doubling the tracks and moving them under the city, with the addition of new underground stations. This will allow a new metropolitan railway service through the urban area, which will integrate with the existing metro line.

Palermo urban railway ring: The line will be integrated with the Messina-Palermo-Trapani railway and allow a metropolitan railway service within the city, interconnected with suburban services. The last section to be built will involve the construction of a new 1km long TBM tunnel which will connect Politeama to Notabartolo.

Highway Projects

Gronda di Genova: The project "Gronda di Ponente", will involve the construction of a new highway, the widening of the existing

STATISTICS

1. Length of tunnels excavated during 2020

Railway: TBM - 18.9km, Conventional - 16.8km
Highway: TBM - 1.8km, Conventional - 1km
Metro: TBM - 5.1km, Conventional 0.5km

2. Amount (Eur) of tunnelling / underground space facilities awarded in 2020:

€3.3bn, including €2bn (Rail), €0.8bn (Highway), and €0.5bn (Metro)

EDUCATION ON TUNNELLING IN THE COUNTRY

Politecnico di Torino, Turin – Master in "Tunnelling and Tunnel Boring Machines"

https://didattica.polito.it/master/tunnelling/2020/at_a_glance

Politecnico di Milano, Milan – Master in "Tunnel Engineering"

http://www.mastertunnelling.polimi.it/?page_id=77

Università di Roma "Sapienza" – Master in "Geotechnical Design"

<https://web.uniroma1.it/masterprogeo/en>

Università di Napoli "Federico II" – Master in "Geotechnical Engineering for Infrastructures"

<https://www.unina.it/-/20290075-geotecnica-per-le-infrastrutture->

Politecnico di Torino, Politecnico di Milano, Politecnico di Milano School of Management and Autostrade Group Master in "Integrated engineering and management of motorway networks"

<https://www.masterinfrastruttureautostrade.it/>

The II level Postgraduate Master in Tunnelling and Tunnel Boring Machines, held at Politecnico di Torino, has now reached its 13th edition. University lectures are merged with lectures/presentations by experts from construction companies, machines producers, design companies and professional to provide the multidisciplinary knowledge that is necessary to work in this sector. During 2020, despite of the Covid-19 pandemic, the course was regularly held through an online lecturing system without influencing the original schedule of the lecturers.

Master Degree Level

All the major Italian Universities, among the others in:

- Politecnico di Milano, Milan
- Politecnico di Torino, Turin
- Università di Roma "Sapienza"
- Università di Napoli "Federico II"
- Università di Bologna "Alma Mater Studiorum"
- Università Politecnica delle Marche

A10 highway in the section which crosses the municipality of Genoa, and will include more than 70km of new road, 54km of which will be underground, with 23 tunnels.

Metro Projects

Turin Metro – Line 2: The route will be 27km long with 33 stations. The alignment will connect the south-west side of Turin city (Orbassano) with the north and north-east areas of San Mauro T.se and Rebaudengo, intersecting the metro line 1 at Porta Nuova railway station. The construction works of the line will start in 2022 and the completion is expected by 2038.

Catania Metro: An extension of the existing metro is planned for both ends of the

current line, to reach the towns north-west of Catania (Misterbianco and Paternò) as well as the international airport of Catania Fontanarossa, including an interchange with the railway suburban services. The project will include more than 6km of new twin tunnels.

Naples Metro – Line 10: In 2020 the authorities of the Campania region presented the feasibility study of a new metro line linking the city centre (Cavour) and the existing metro network to the north-east area of the city. It would link the new high-speed railway hub of Napoli Afragola and the international airport of Capodichino. The alignment would be 12km long and run entirely underground.