



## Tunnelling in the Alps for railways construction: the Turin Lyon Base Tunnel

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The opening of Stockton-Darlington railway in 1825, marked the beginning of railway's age throughout Europe: just few years later in 1839, king Ferdinando II di Borbone, opened the first railway stretch in Italy, from Naples to Portici (7,640 km); he also promoted the construction of the first tunnel, the Orco tunnel, just 11 years later the first railway tunnel in Europe, the Schlossberg near Baden (1846-47).



*The opening day of the Napoli-Portici railway*

**Crossing the Alps was the great challenge between the half of '800 and the first decades of '900.** The oldest Alpine tunnel is the Fréjus-Moncenisio, 13.7 km long, opened in September 1871. Its construction was started by Cavour in 1857, to connect Piemonte to Savoy. In following decades, other long tunnels were built: San Gottardo (1882), Colle di Tenda (1898), Sempione (1906), The Sempione tunnel measures roughly 19'800 meters: at the time of construction, and for the following 76 years, it was the longest railway tunnel in the world.

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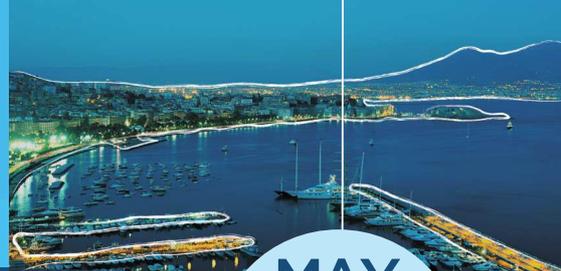
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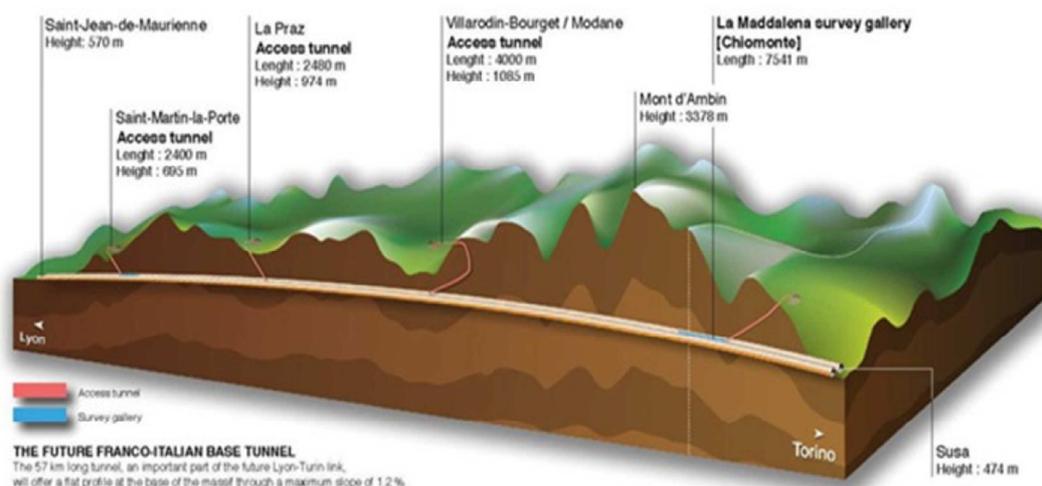
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Nowadays, the European Union is promoting the TEN-T railway network, a new highspeed system, conceived for transportation of goods and passengers, having an extension of 17.500 km; it crosses the Alpine arch by means of 7 new base tunnels: Koralm (32 km), Semmering (27 km), Brenner (56 km), Ceneri (15.4 km), San Gottardo (57 km), Lötshberg (14.6 km) and the new Moncenisio (57.5 km). This last one is under construction: once completed, it will be the longest railway tunnel in the world and it will connect Milan to Paris in just 4 hours.

The Moncenisio Base Tunnel is designed as a twin tube, excavated thanks to 4 access tunnels. Three are on the French side: Saint-Martin La Porte, La Praz and Modane and one on the Italian side: La Maddalena. Unlike the old nineteenth-century tunnels, the modern ones are called base tunnels because allow to cross the Alps at the plain level. The old Moncenisio tunnel crosses the mountains 1300 m a.s.l., while the new base tunnel is placed 800 m lower, ensuing time and cost savings for goods and passenger's transportation.



The new Moncenisio Base Tunnel for the Turin-Lyon railway

Currently, the excavation of the access tunnels has been completed and the works are ongoing along the South Base Tunnel, by means of Tunnel Boring Machines (TBM) or traditional "drill and blast" methods: the work's amount necessary to complete the whole giant tunnel within 2029 is amazing. Governments didn't hesitate in the past in front of the challenge represented by the Alpine tunnels, despite insufficient technical and economical

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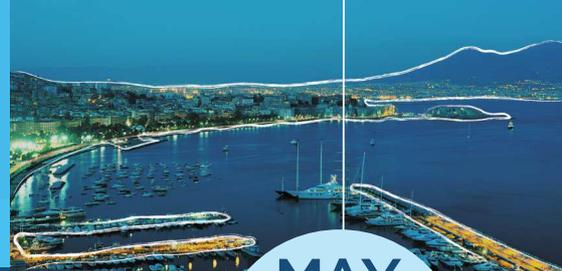
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capabilities: notwithstanding these limits, the investments for new tunnels were considered vital to enhance welfare and integration among European countries.

**Today, like in the past, planning these investments means to imagine infrastructures before they become really indispensable:** if they were thought about late with respect to the development times, welfare growth and environmental protection would be unavoidably delayed and disharmonic. It is essential to look at Alpine Tunnels in their future perspective, namely by imagining the future now.

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