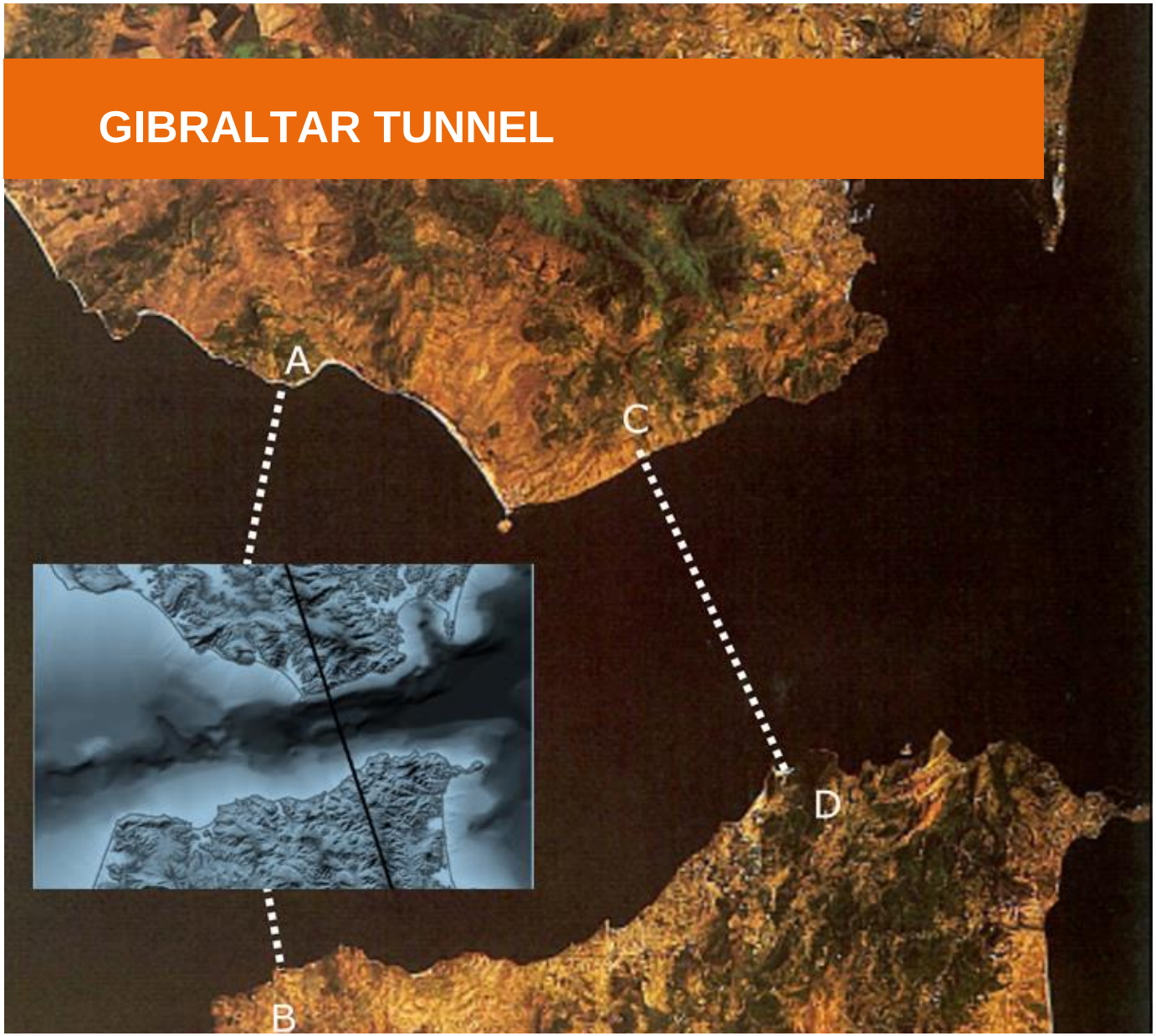

Gibraltar Tunnel, Morocco

Project description

At the end of 2003, Spain and Morocco have agreed upon a budget of 27 Mio € for the elaboration of a feasibility study for a tunnel link between Europe and Africa.

Scope

- Feasibility study for a twin-tube railway tunnel and a service tunnel beneath the Straits of Gibraltar
- Overall length: 38.7 km, under water: 27.7 km
- Max. depth under sea-level 475 m
- Excavation presumably by TBM heading

Challenges

- Socioeconomic constrains
- Underwater passage of strait of Gibraltar
- Geology, esp. tectonic features in the centre of the strait

Amberg Services (JV with YSTRA SA and Cowi A/S)

- Assessment of the preliminary design
- Comparison tunnel / bridge option
- Socioeconomic study
- Technical review of the preliminary design (for construction and operation phase)
- Review of the ventilation and safety concept, including an undersea rescue station
- Consulting services to client for subsequent steps

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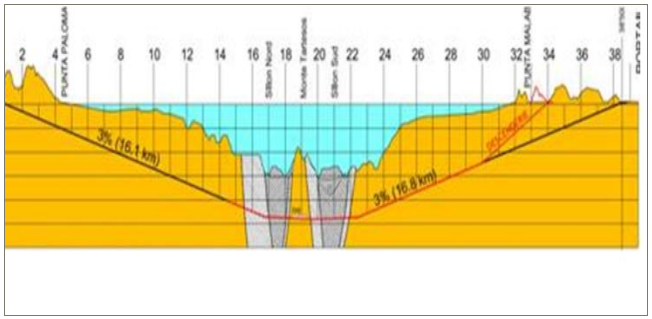
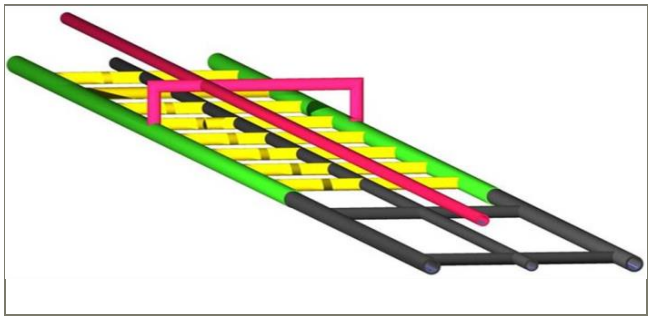
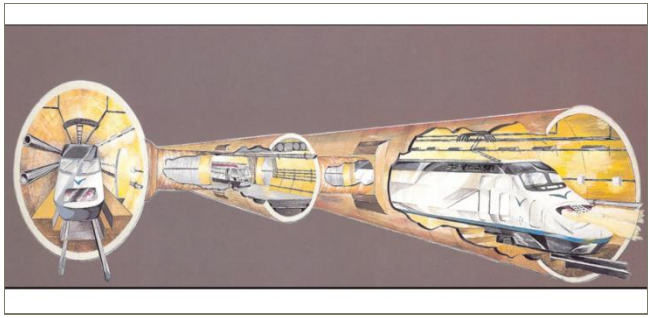


- Cross-section of the Strait of Gibraltar



- Layout of tunnel system



- Model of tunnel system

AMBERG FACTS

Contracted value JV

- 280’000 €

Contracted value Amberg

- 48’000 €

Project Phases & Duration

- Planning & Tendering 2010 – 2011
- Possible realization 2012 – 2025

Project Details

Tunnel Project

- Overall length: 38.7 km, under water: 27.7 km
- Maximum gradient: 3%
- Cross-passages at a distance of approx.: 340 m
- Max. depth of sea: 300 m
- Max. depth of tunnel: approx. 475 m
- Longitudinal ventilation
- Emergency ventilation and extraction of fumes
- Emergency stop (ZAS) at the centre of the tunnel
- Excavation presumably by TBM

CLIENT FACTS

Overall costs

- Overall cost 6 – 9 bn €

Overview Project

- Railway tunnel beneath the strait of Gibraltar
- Evaluation study

Geology

- 2 Paleo channels at the centre of the strait filled with quaternary material
- Flysch formation and breccia rock mass

Contact

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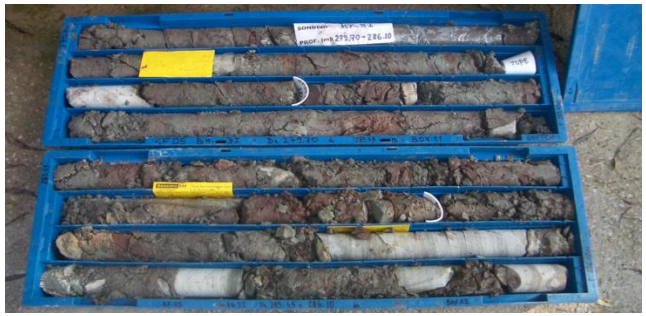
CHALLENGES



- Core drilling revealing Breccia rock

Passing through Breccia of the Gibraltar Strait

- Heading through difficult geology (Breccia) with very high water pressure
- Excavation in squeezing and instable soft soil formation
- Geological prospection (soil investigation by drilling) very difficult in Strait of Gibraltar because of great water depth and strong tidal currents

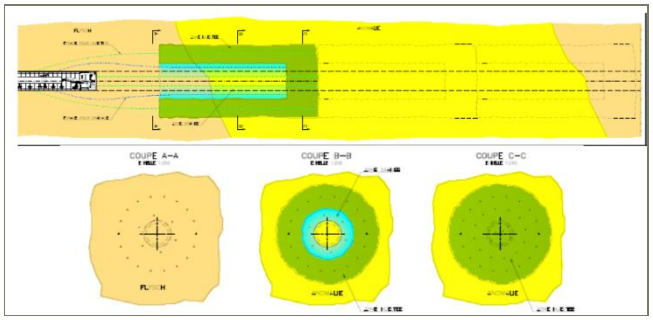
ENGINEERING APPROACH

- Difficult conditions for drilling in Strait of Gibraltar

Feasibility Study

- Review of the social economic study
- Review and assessment of the execution
- Review and assessment of the tunnel operation
- Determination of future actions

TECHNICAL SOLUTIONS



- TBM excavation with drainage / injection system

Planning Synthesis

- Social economic studies
- Report of the technical evaluation of conduction
- Diagnosis of the project
- Synthesis of the findings
- Report about future actions and required additional investigations
- Conclusions summarized in final report

Final Result

- Recommendation: Proceeding only after further geological investigations of the seafloor of the strait in order to improve the basis of decision making. The basics of the project are too unreliable, to start the project with the construction of a pilot gallery (approx. 500 to 900 Mio €).

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