Semmering Base Tunnel

The 41 km mountain route across the Semmering was opened in 1854 and has played a central role in European railway connections all times and in 1998 it became an UNESCO World Cultural Heritage site.

With its combination of narrow radii and steep climbing gradients, which in most parts can only be overcome using two locomotives, it increasingly presents itself as a technical bottleneck for 21st century rail operations, particularly for freight transport.

The only solution to alleviate this situation and improve environmental conditions is the construction of a state-of-the-art base tunnel.

European Connection / Overall Concept

The traffic and freight flows in the enlarged Europe require a transport axis, which connects the Baltic Sea with the Adriatic Sea. This Baltic-Adriatic axis allows opening new markets and economic regions – an advantage with a direct impact on Austria. The new Semmering base tunnel – together with the New Vienna main station and the New Koralm railway line – will create an attractive traffic solution, providing important stimuli to Eastern and Southern Austria and the regional development.

Project Objectives

The signal for the new planning was given by the resolution of the Council of Ministers in spring 2005. Therefore, an area of approximately 300 km² between the starting point Gloggnitz and the area to be linked to, Mürzzuschlag/Langenwang was surveyed.

According to the requirements, the new Semmering base tunnel was designed with a shallow inclination and this will result in a significant facilitation for heavy freight trains. As a consequence it will be possible to operate the entire Southern line – including the Koralm railway line which is presently under construction – with only one locomotive.

Apart from an economic and contemporary freight transport enhancement, the overall travel time between Vienna and Graz will be shortened by 30 minutes. In addition, cruising speeds up to 250 km/h and attractive transfer options will ensure noticeable improvements in travel comfort.

The new Semmering base tunnel was designed as two-tube tunnel system. With cross headings between the tunnel tubes at intervals of 500 m and an emergency stop in the tunnel, it meets all safety-relevant requirements and specifications.

Process

Hand in hand with the planning, an extensive campaign was initiated to inform the approximately 30,000 citizens living in the concerned project area. The important project was discussed intensely in the region in citizen forums and at regional forums. Moreover information on the planning situation was provided through different print media, an information office, a homepage as well as accompanying media work.

The different rail paths were compared according to coordinated criteria in the specialist areas Transport & Technology, Space & Environment as well as Costs & Risks.

Thus, the selection procedure involved the technical assessment of the planning team as well as the individual requirements of the population – ensuring that a solution could be found, meeting both the technical requirements of the experts and the needs of the population.

What We Did

In the beginning, the planning work focussed on the analysis of the surveyed area as well as on extensive geological and hydro-geological surveys. Surface field mapping, almost 11,000 running meters of exploratory drilling and hydro-geological field tests supplied important findings on the soil, in which the tunnel will be built.

Major attention was paid to the issue of ground and mountain water, particularly to the existing and potential water uses and the existing wetland habitats. Roughly 3,700 springs, wells and brooks were documented, 600 spots included into an ongoing observation programme and regularly examined. Biologists and zoologists mapped animals in more than 1,000 wetland habitats and groundwater experts analysed potential impacts of a tunnel on these habitats.

Apart from the environment, also the technology came under scrutiny. The programme included calculations of energy consumption and journey time as well as surveys on the longitudinal gradients and tunnel safety. Detailed concepts were drawn for each train path version in order to compare the impacts.

In Styria, the future location of the station was a topic of central interest. Traffic surveys, interviews with travellers and surveys on the individual mobility behaviour formed the basis for the technical assessment.
Overview above the Versions

All four resulting tunnel paths – “Preiner Gscheid”, “Ochnerhöhe”, “Kleiner Otter” and “Pfaffensattel” – start in Gloggnitz in the Lower Austrian part. These paths connect the new Semmering base tunnel with a maximum inclination of 8.5 per mille with the five possible Styrian train stations – Mürzzuschlag, Ziegenburg, Hönigsberg, Pichlwang and Langenwang – and the existing “Südbahn” line. An overall of 13 versions with a total length of approximately 360 km were examined.

Decision on Rail Path

The rail path “Pfaffensattel” emerged under survey to be the best of all versions, because it has a lot of advantages.

It has the lowest impacts on man and nature and it is routed through optimal geological areas. Moreover, it offers considerable benefits to the settlement and economic area and it has received a good and balanced expert’s assessment. In addition, the former investments in the pilot gallery and the urgent investments in the “Mürzzuschlag” train station can be used optimally as a result of the shorter construction time and the lower construction costs.

Compared with the mountain route, the base tunnel will bring a shortening of the overall travel time up to 30 minutes. Other advantages are energy savings of 25 percent in the train operation as well as a reduction of the carbon dioxide emission in freight traffic of approximately 35 percent.

Illustration: Selected train path Pfaffensattel

Caption:
- Junction station
- Selected train path - tunnel
- Selected train path - open
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