EUROPEAN X-RAY LASER SYNCHROTRON

European X-Ray Laser Synchrotron Facility, Hamburg, Germany

In 2000, the construction of the X-ray laser synchrotron, XFEL (X-Ray Free-Electron Laser) has been launched (European and international research project). The main component of the project are 3 linear acceleration tunnels.

Scope

- 3 tunnels Ø 6.17 m, total length 3’085 m
- 8 tunnels Ø 5.48 m, total length 2’697 m
- 8 pits / shafts with max. depth of 40 m
- Various research halls, partially very large

Challenges

- Complex ground conditions, high groundwater level, cover only between 6 m and 38 m
- Under passing of buildings, settlement sensitive, works in urban area
- Stringent requirements for the position accuracy of the tunnels
- Very deep pits with complex reinforcements
- Complex coordination with physical research requirements

Amberg Services

- Project design within a joint venture
- Basic assessment and conceptual design
- Basic design
- Tender design
- Detailed design and structural engineering
- Site supervision
- Site management

AMBERG ENGINEERING

- Top view of XFE-Project at Hamburg

- Installation of shield TBM

- Shield area of TBM

AMBERG FACTS

Contracted value Amberg

- Total Amberg 1.43 Mio. €

Project Phases & Duration

- Start of planning 2001
- Construction works 2009 – 2015
- Technical Installations 2012
- Commissioning 2016

Project Details

Tunnel

- Use of slurry shield TBM's and segmental lining

Pits and Shafts

- Pits and shafts with underground caverns with 400 – 4'500 m^2, 15 – 40 m deep
- Very deep excavation pits using diaphragm wall construction with up to 45 m length, 1.5 m thickness and underwater concrete base
- Complex extensions for physical research

Research halls

- Subsurface research halls for physical experiments with areas of 400 – 4'500 m^2, 15 – 40 m deep
- Complex coordination with research requirements of the physical experiments with high demands

CLIENT FACTS

Overall costs

- Total construction: 1.22 Bn. € (incl. commissioning)
- Construction cost for planning services: 300 Mio. €

Overview Project

- X-Ray Free-Electron Lasers, XFEL, for physical research
- 3 Tunnels Ø 6.17 m, total length 3'085 m
- 8 Tunnels Ø 5.48 m, total length 2'697 m
- 8 pits and shafts with max. 40 m depth
- Various, partially very large research halls

Geology

- Difficult ground consisting of fine silicate sands and boulder clay layers
- High ground water level

Key person

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