Beyond Design: The Construction of New Railway Stations and BIM

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Parallel Session 5 – Station Design 2

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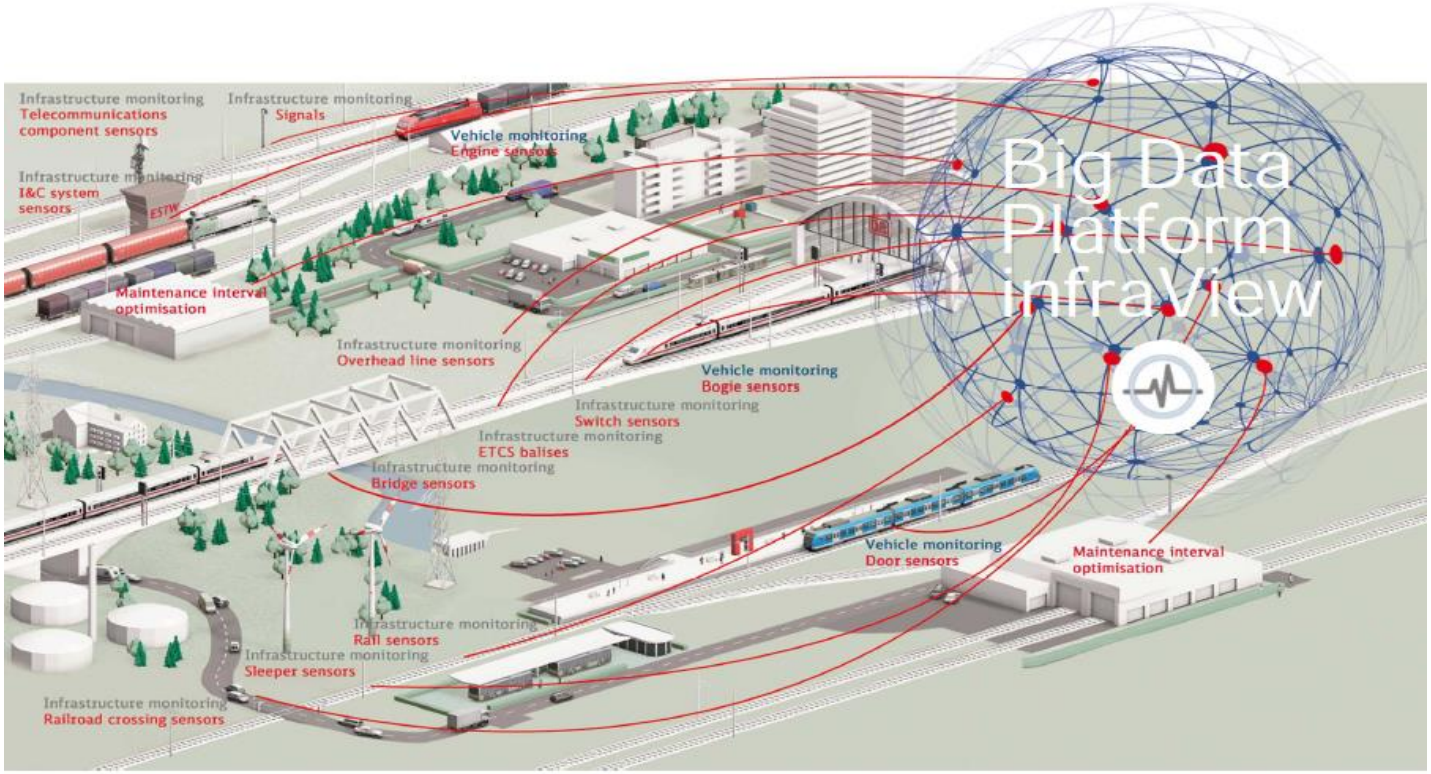
Introduction



Building Information Modeling (BIM)

Application areas in:

- Local and regional transport
- Long-distance and high-speed transport
- Freight transport and logistical infrastructure
- Plant, industrial and harbor rail transport

BIM can make a significant contribution to project execution:

- Better planning quality
- Greater cost certainty/ increasing efficiency
- Greater scheduling reliability
- Better life cycle viewing
- Increased acceptance for infrastructure projects

Drafting BIM-Capable Databases

Management and Consulting

- Project management
- Project coordination
- Project control
- Interface management
- Construction site management and local construction supervision for individual specialty fields
- Quality management/ assurance
- Design and acceptance testing
- Risk management
- Time and cost management

Consulting

- Setup of a BIM infrastructure
- Inventory data management
- Model and data structure

Data Acquisition (Data Entry)

- Control point
- Laser scanning
- Tachymetric surveying
- Track geometry
- Geotechnical examinations
- Analysis building substance
- Ground-penetrating radar (railroad)
- Multicopter

Providing BIM Data Sources

- Point cloud products
- TruView data
- Recap data
- 3D point cloud map
- Georeferenced CAD status quo data
- Results of the construction-related examination

Creation and Processing of BIM-Compatible Data

Modeling/ Data Maintenance

- 3D status quo models
- Conversion of 2D plans into a 3D model
- Digital surface model (DSM)
- Hybrid models
- Modeling of object information
- Component modeling (families)

Engineering-Related Planning (Throughout all Service Phases)

- Track system, engineering structures, structural engineering
- Railway-related electromechanical engineering
- Mechanical, electrical and plumbing (MEP)

Visualisation

- Object-oriented 3D modeling
- Visualisation of the planning alternatives

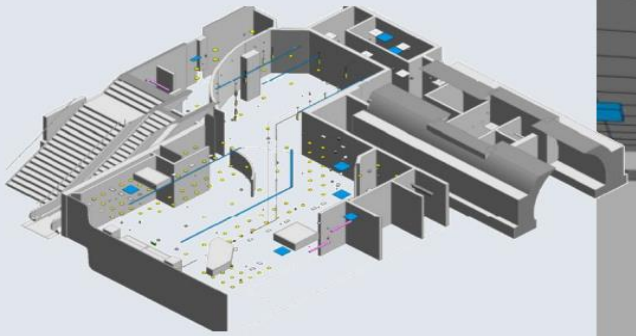
Construction Operations Planning/ Simulation

Construction Supervision Railway

Survey of coordination environment, Gladbeck-Zweckel stop, Germany, © Carmen Ehrenberger / Navisworks

Real Case Studies:

1) Renewal of Gladbeck-Zweckel stop



Our References (BIM)

PBM inspection at Hanover Main Station, Germany

The last major rebuilding work at Hanover's main station took place for Expo 2000. Retail facilities were installed below the rail bridge substructures, while technical rooms and access routes were enlarged. These changes made it impossible or difficult to inspect the bridge substructures. The redesign also resulted in difficulties for building inspection activities in the commercial areas of the central passenger tunnel. Checking the support and abutment elements in the retail units requires the use of alternative inspection methods. Making it possible to perform checks is intended as a means of counteracting risks affecting the safety of operations, transportation activities, and stability.

Customer: DB Station & Service AG
Project duration: July 2015 – December 2018

- Surveying
- Support for modifying construction documents and inspecting bridges
- Establishing access for bridge inspection activities
- Drafting inspection plans/instructions
- Planning demolition and modification of fittings
- BIM: 3D situation assessment, 3D model creation, visualizations, planning coordination, drafting of 2D plans based on 3D models
- Identifying areas & quantities based on 3D models

Ceiling surface, Douglas, Hanover Main Station, Germany, © Kevin Omnitz/ Revit

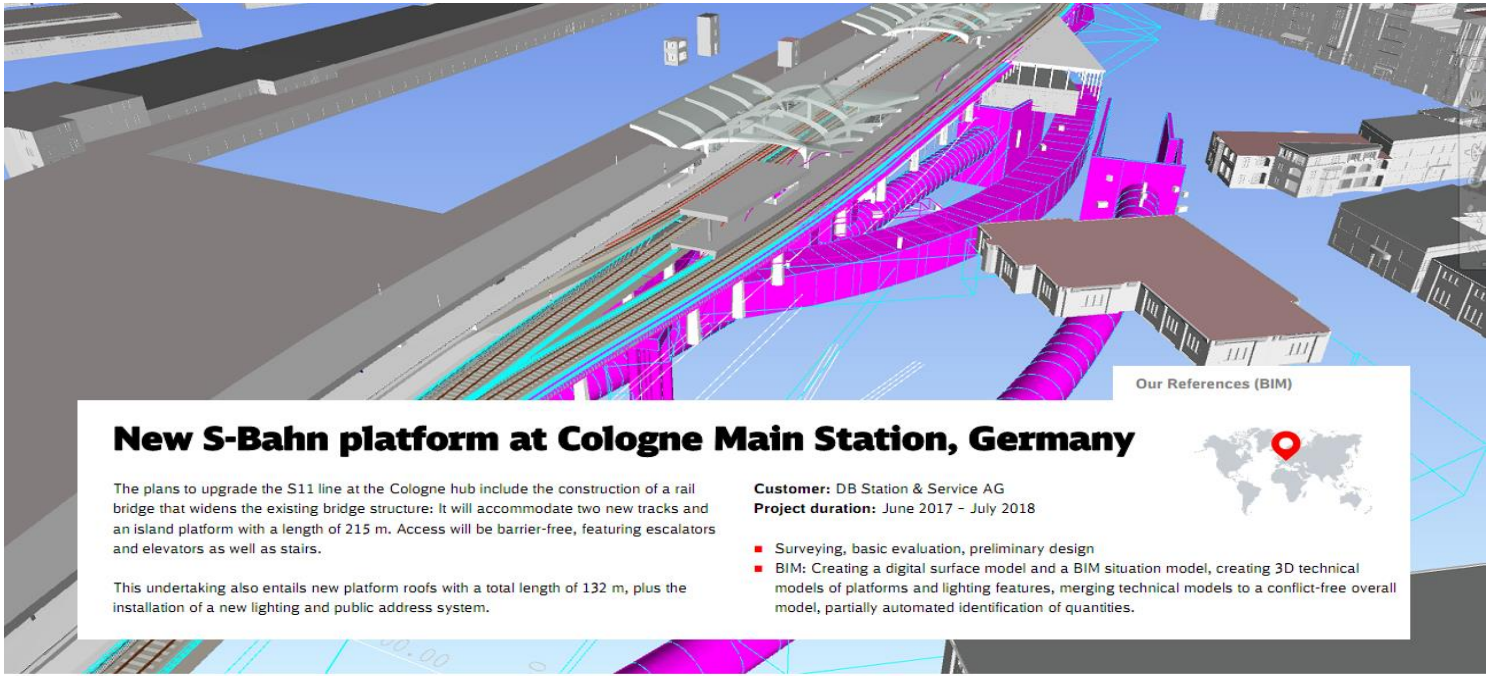
Real Case Studies:

2) PBM inspection at Hanover Main Station

Coordination model of Unterlüss station, Germany, © Daniel Ast/ Navisworks

Real Case Studies:

3) FIP station at Unterlüss



Coordination model, Cologne Main Station, Germany, © Amir Safiri / Navisworks

Real Case Studies:

4) New S-Bahn platform at Cologne Main Station

Visualization: DB Engineering & Consulting

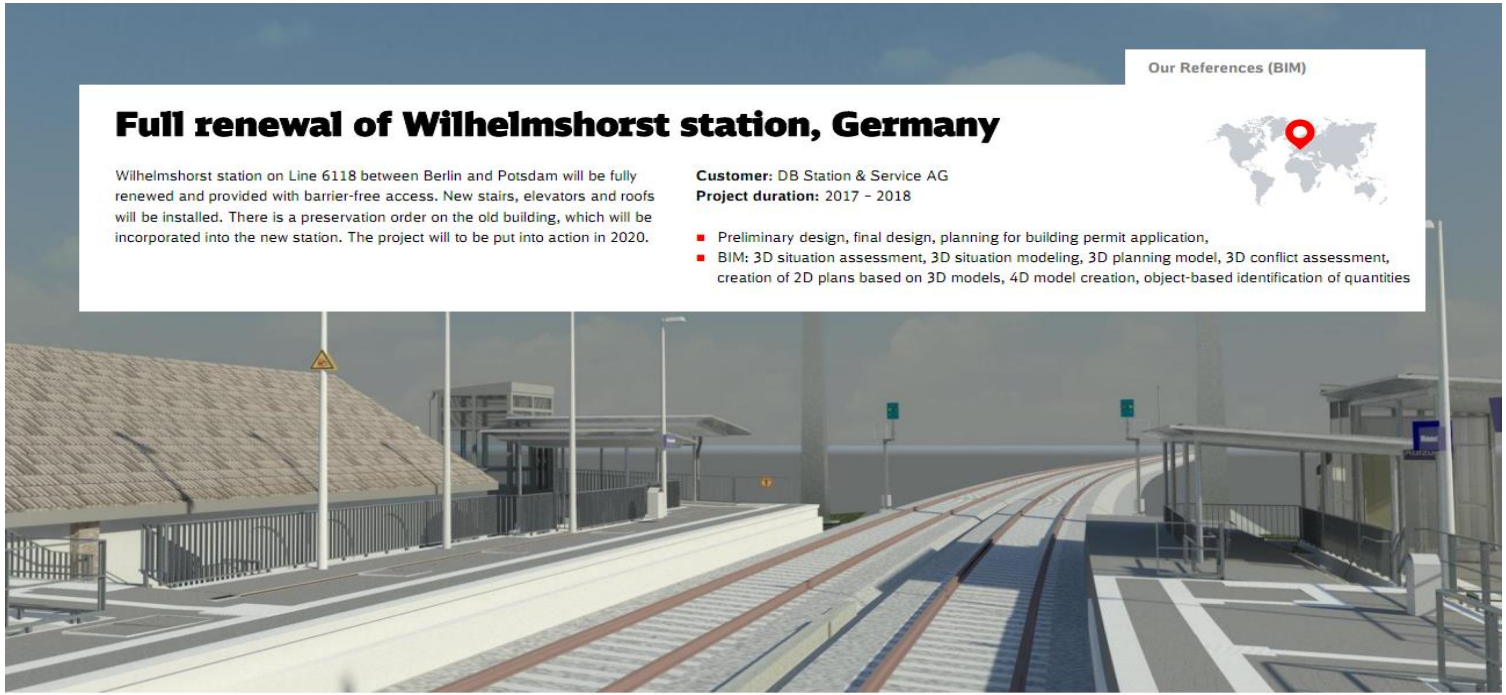
Real Case Studies:

5) Renewal of Bietigheim station, Baden-Württemberg

Visualization: Hannes Eckerth, DB Engineering & Consulting

Real Case Studies:

6) New stop at Kaufbeuren-Haken



Visualization: DB Engineering & Consulting

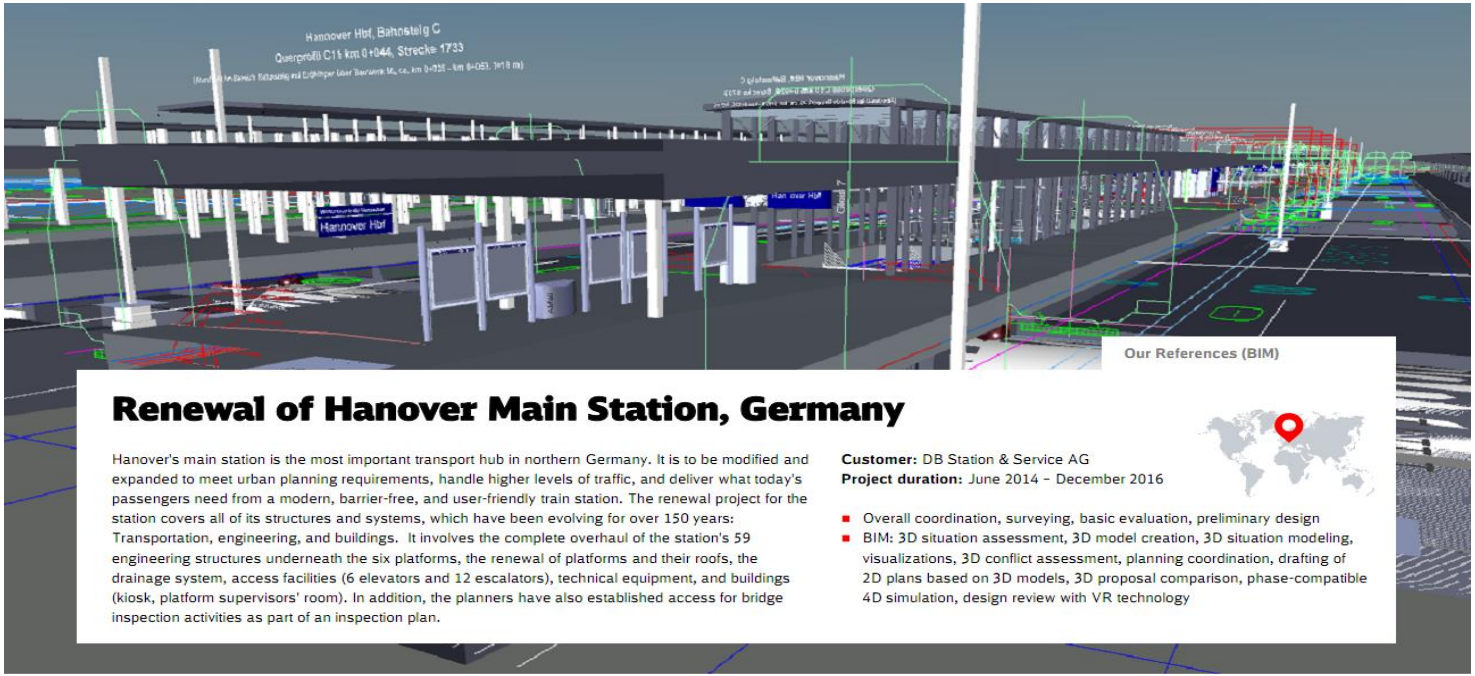
Real Case Studies:

7) Full renewal of Wilhelmshorst station

Visualization: DB Engineering & Consulting, Region Western Germany, Duisburg planning office

Real Case Studies:

8) New stop at Herten-Mitte



Hanover Main Station, Germany © Dr. Katja Maaser

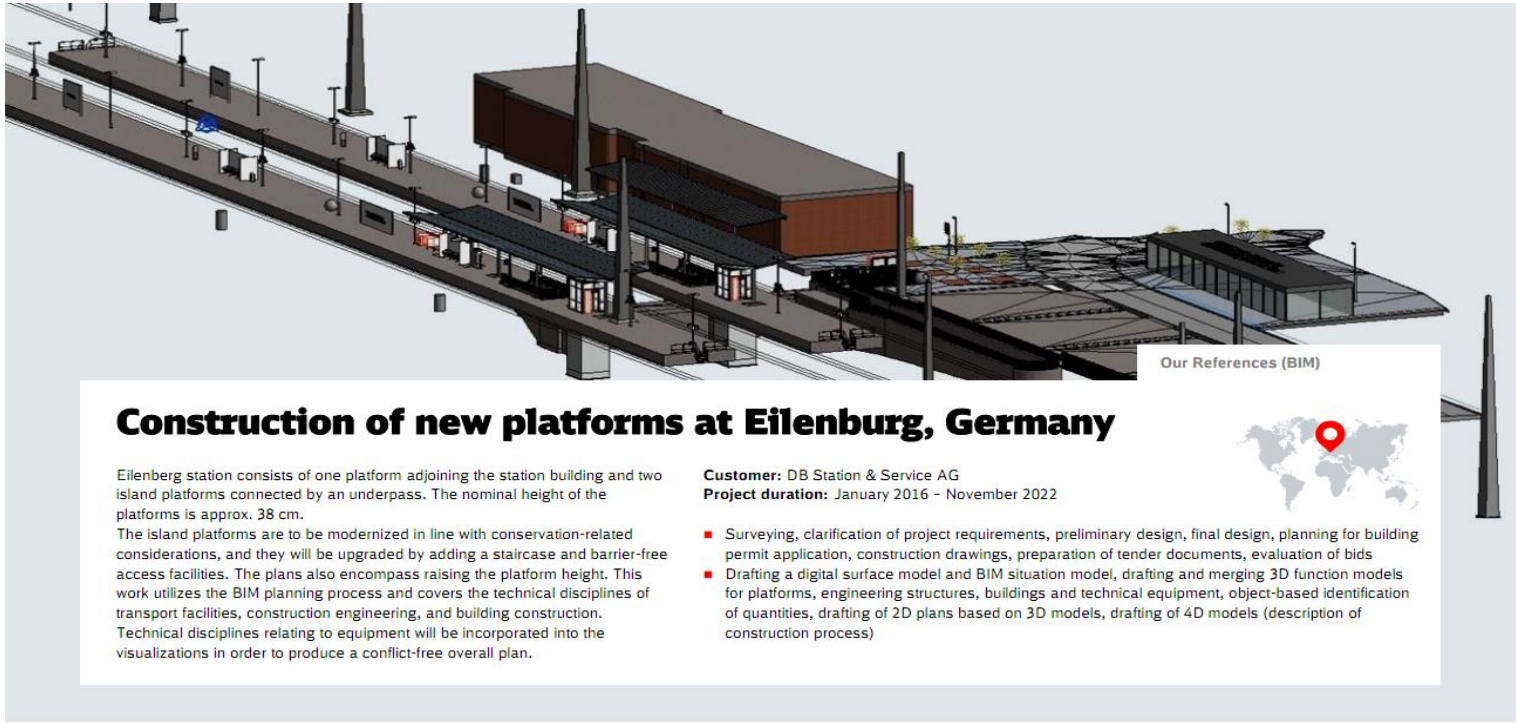
Real Case Studies:

9) Renewal of Hanover Main Station

Coordination model of Nörten-Hardenberg station, Germany, © Torsten Johst / Revit

Real Case Studies:

10) FIP station at Nörten-Hardenberg



Excerpt from BIM model for new platforms at Eilenburg, DB E&C Southeast Region, Marco Linke (project manager)

Real Case Studies:

11) Construction of new platforms at Eilenburg

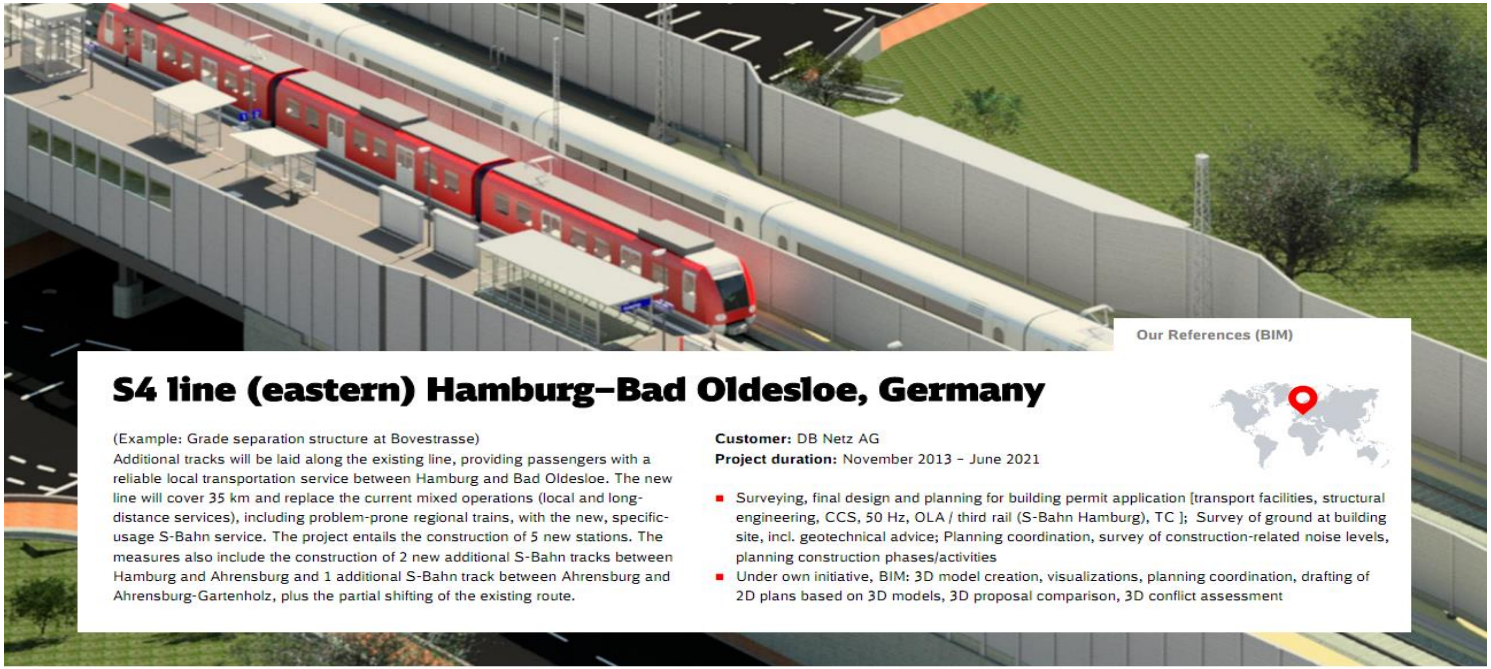
Visualization: DB Engineering & Consulting

Real Case Studies:

12) Fehmarn Sound crossing

Real Case Studies:

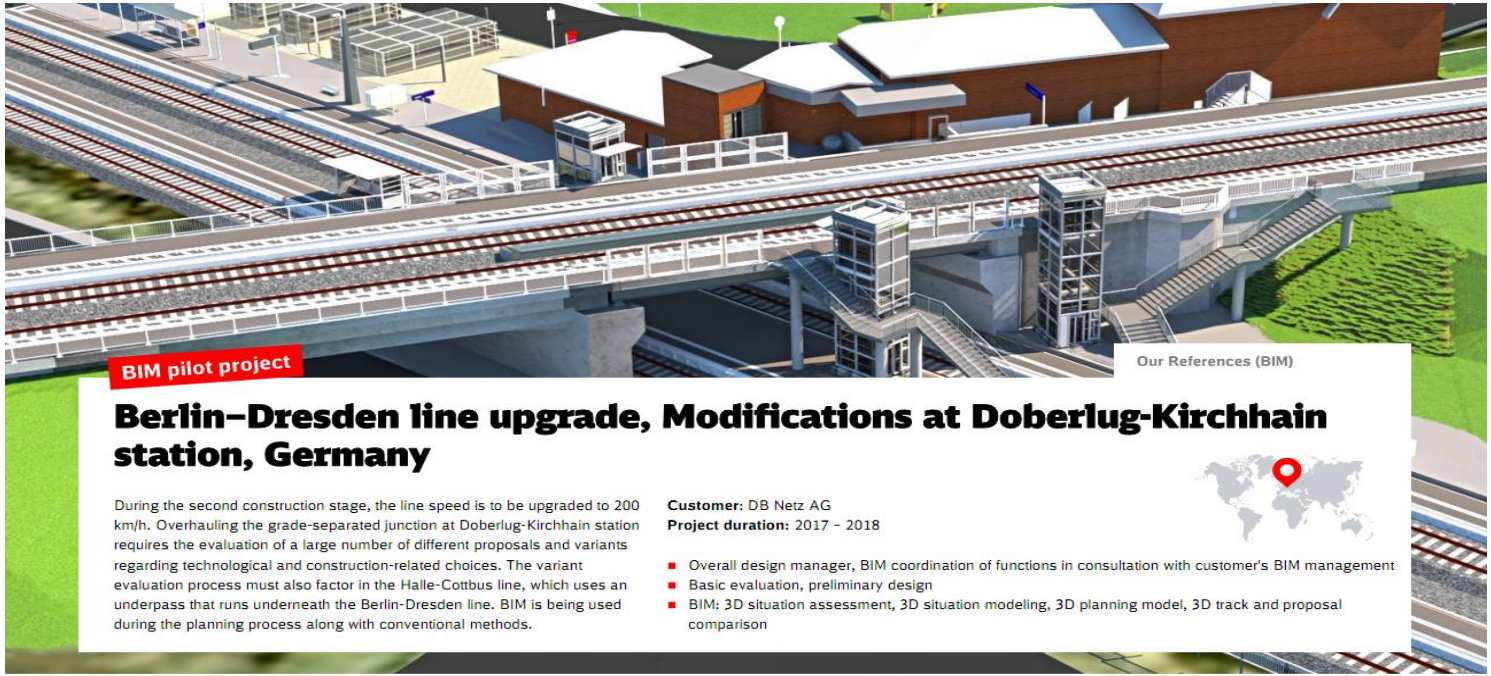
13) Railway overpass upgrading in Bernau, Berlin–Stralsund



Coordinated setting: S4 overpass at Bovestrasse, Germany, © Navisworks

Real Case Studies:

14) S4 line (eastern) Hamburg–Bad Oldesloe



Real Case Studies:

15) Berlin–Dresden line upgrade, Modifications at Doberlug-Kirchhain station

Coordination model of Nörten-Hardenberg station, Germany, © Daniel Ast/ Navisworks

Real Case Studies:

16) Railway overpass at Rude

Visualization: Martin Münnig, DB Engineering & Consulting

Real Case Studies:

17) Double-tracking project Homburger Damm

Situation model of the lock on the Ernst-August Canal, Germany © Torsten Johst/ Navisworks

Real Case Studies:

18) Replacement of bridge lock: Ernst-August-Schleusenbrücke

Ohlsdorf water tower, current situation and models, Germany © Anna Yakushina

Real Case Studies:

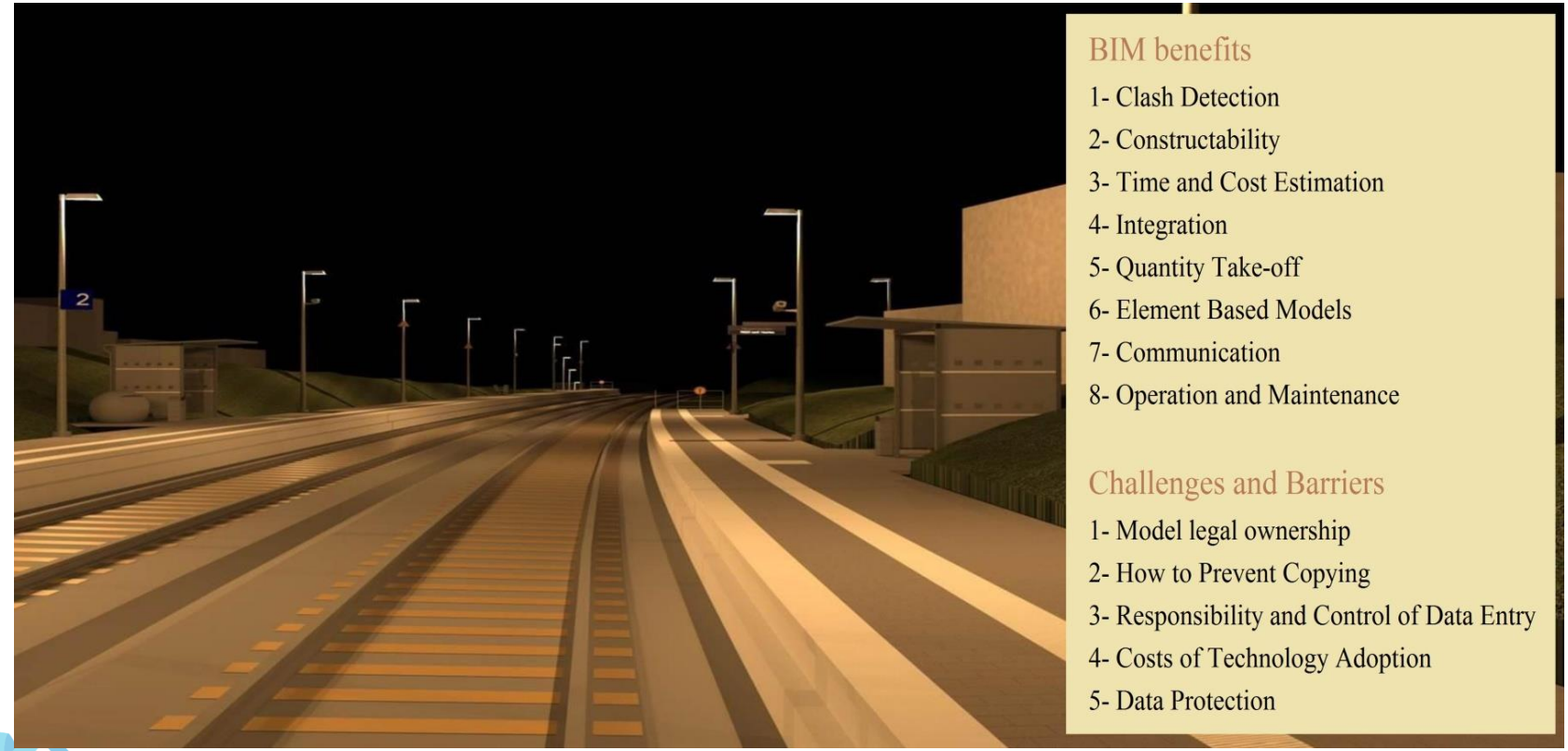
19) Enlargement and repurposing of Ohlsdorf water tower

Coordination model, Köln Messe/Deutz station, Germany, © Amir Safiri / Navisworks

Real Case Studies:

20) New S-Bahn platform at Köln Messe/Deutz station

Conclusion



BIM benefits

1- Clash Detection
2- Constructability
3- Time and Cost Estimation
4- Integration
5- Quantity Take-off
6- Element Based Models
7- Communication
8- Operation and Maintenance

Challenges and Barriers

1- Model legal ownership
2- How to Prevent Copying
3- Responsibility and Control of Data Entry
4- Costs of Technology Adoption
5- Data Protection

Conclusion

- The transportation infrastructure is an integral part of the economic growth and social development of any country that requires a good and efficient management as a whole. Aging and deteriorating infrastructure are two major problems in a country's transport network. Traditional inspection and management systems are now inefficient due to the widespread deployment of this network and there is an urgent need to move towards modern and automated management systems. The use of Building Information Modeling (BIM) in conjunction with emerging technologies for infrastructure management can contribute to more secure, stable and secure network performance while reducing maintenance costs and risks while that it brings significant income to all stakeholders. Having a thorough understanding of the technology, applications, advantages and disadvantages, enhancements and limitations can help owners and clients, designers and other freight experts to have a better knowledge of the best set of automated and strategic plans. To better manage the infrastructure network through it. The whole project life cycle (PLC) in this abstract, a comprehensive review of the literature on building information modeling (BIM) for transportation infrastructure is presented. The real case studies show that there is increased research and application of BIM for transport infrastructure, although limited to mainly roads, highways and bridges. This analysis also leads to the current state of research, the use of BIM for transport infrastructure, the use of emerging technologies as well as fundamental gaps in research. Finally, this research presents the construction of railway stations and BIM technology facing the transportation industry, discusses the main need for collaboration and current efforts to achieve interoperability, and makes recommendations for promoting future research.

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Thank you

for your kind attention

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