Transrapid – Munich Main Station – Munich Airport Project management for planning, engineering and design from pre-design to approval

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ABSTRACT: Transrapid Munich Main Station – Munich Airport, Project management for planning, engineering and design, Project management of a complex iterative interdisciplinary planning process with emphasis on quality control, management of cost estimate, management of reply to pleas and statements in the public hearing procedure of the planning approval procedure.

Since October 2003 the consortium Vössing Engineering, Dornier Consulting and Frölich & Sporbeck Environmental Consulting have carried out project management services for the planning, engineering and design of the maglev project Transrapid Munich Main Station – Munich Airport as the project management team within the organization of the project owner DB Magnetbahn GmbH.

On basis of feasibility studies and as a result of the regional planning procedure, during which route variants were investigated and evaluated, the so-called “west-route” was determined to be the most appropriate.

Figure 1: Main Station to Airport
Based on forecasts and the pre-set objectives the project outline parameters, the track scheme, the operation scheme, the alignment, the propulsion system, the guideway, the stations, bridges and the control and maintenance center as well as further facilities have been elaborated during an intensive iterative planning, engineering and design process.

The results meet the requirements of a comfortable premium product to be offered to the client passengers with a highest degree of safety and reliability of operation whereas design was optimized to investment and operating costs in order also to achieve an economical solution.

**Project Outline**

**Fact**
- Increase of passengers at Munich airport
  - 2003: 16.5 Mio / year
  - 2020: 31.0 Mio / year

**Objective**
- Relieve highway congestions by attractive transit system

**Solution**
- Trip time: 10 min
- Frequency: 10 min
- 5 trains (3 sections each)
- 320 persons / train
- Check in possibility at Munich main station
- 8 Mio passengers / year

**Costs / Returns (2003)**
- Investment costs: ~ 1.600 m€
- Operating costs: ~ 32 m€ / year
  - Full fare: ~ 13 € / Trip
  - Returns: ~ 58 m€ / year
  - Project effect: ~ + 26 m€ / year

**Munich Main Station**
Alongside Highway A92

Fig. 4

Crossing the Isar river

Fig. 5
This process has been controlled by the DB Magnetbahn GmbH and its interdisciplinary project management team lead by Vössing Engineering.

Latest methods and tools have been applied to successfully cope with the range of project management services.

**Project Management in Planning, Engineering an Design Phase**

- **develop**
  - project structure
  - project organisation
  - process flows

- **control**
  - planning, engineering and design process
  - interfaces

- **coordinate**
  - meetings
  - decision making
  - reporting

- **document**
  - objectives
  - change orders
  - progress of work

- **review and verify**
  - drawings, calculations, project descriptions

- **structure and organize**
  - cost estimate

- **establish and follow up**
  - overall, contract, steering, detailed, time schedules
The project was structured and an organization was found that proved to be suitable for the efficient cooperation of all the various project participants in order to reach the target in time.

More than 30 renowned engineering companies and consultants, legal advisors and numerous experts of all the disciplines involved have been integrated, coordinated, controlled and directed, while authorities and public have been kept informed on the target-oriented progress of work.

The planning, engineering and design process was characterized by an iterative interdisciplinary approach, a step by step improving, detailing and optimizing from pre-design to approval and project decision.

Main activities of the project management have been:

- Plan review and verification of the huge number of drawings, documents, calculations prepared by the engineering companies, consultants and experts in different lots and disciplines
- Organization and control of the project owner’s part in preparing for the public hearing procedures of the planning approval procedure
- Organization and control of cost estimate carried out by different engineering companies, consultants and experts on basis of preset and permanently controlled standardized method and criteria in order to gain a complete accurate and solid cost estimate as a basis for the project decision
- A special Vössing software tool has been applied in organizing and managing of replying to more than 23,000 pleas in 5 parallel approval procedures

Fig. 8
Planning / Engineering / Design up to Approval and Project Decision

<table>
<thead>
<tr>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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</thead>
<tbody>
<tr>
<td>Feasibility study</td>
<td>Draft cost estimate</td>
<td>Regional planning procedure</td>
<td>Preliminary planning, engineering, design</td>
<td>Preliminary cost estimate</td>
<td>Review and verification</td>
<td>Planning, engineering, design I</td>
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<td>Review and verification</td>
<td>Planning approval procedure</td>
<td>Design II</td>
<td>Cost estimate</td>
<td>Review and verification</td>
<td>Financing / Project agreement</td>
<td>Tendering and contract award</td>
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</tbody>
</table>

Fig. 9

Cost Estimate

Draft

Preliminary

Arriba

(IT-calculation tool)

Cost estimate

Granid

(IT-management tool / Interface to SAP)

13 sections

appr. 500 objects

appr. 10,000 items

- compile
- check
- evaluate
- optimize

detailed unit price / quantity calculations

basis for cost monitoring, invoicing, budgeting during - contract phase - construction phase - handing over - final certification - operation

Fig. 10

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5 Planning Approval Procedures in parallel

<table>
<thead>
<tr>
<th>PAP 1</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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<tbody>
<tr>
<td>Application for approval</td>
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<tr>
<td>Pre-check of documents</td>
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<tr>
<td>Laying open to public / Call for statements</td>
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<td>Replies to pleas and statements</td>
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<td>Public hearings</td>
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<td>Final report of hearing procedure</td>
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<td>Elaboration of plan approval</td>
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<td>Plan approval</td>
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<td>Legal effect of approval</td>
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</tbody>
</table>

PAP 2

PAP 3

PAP 4

PAP 5

Fig. 11

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Project Management of the Hearing Procedure in the Planning Approval Procedure

Replies to pleas and statements

- privat pleas
- statements of authorised bodies
- scan - register
- analyse

Prepared replies catalogue
- general subjects
- immision subjects
- environmental subjects

Prepared replies catalogue
- expert groups prepare replies in detail (standardized and individuell)

Letter
objection
objection
objection
reply
objection
objection
objection
reply
objection
objection
objection
reply

Reply letters to senders

Invitations, access control, papers for hearings

final hearing report

pms.voessing.de
- internet based IT-management tool
- number of pleas: ~ 23,000
- number of statements of authorized bodies: ~ 100

Fig. 12

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Project management has been successfully carried out so far. The approval documents are prepared and submitted to the authorities. The planning approval procedures are under way.

Presently the public hearings are being prepared for. At the same time design work has been continued and the cost estimate is under way to render one basis for the general project decision.