Life Cycle Management at the Austrian Federal Railways ÖBB

Cost Optimisation Track Maintenance & Renewals Congress 2012
ÖBB Infrastructure
Network data

Life Cycle Cost strategies
LCC, investment strategy

Life Cycle Management
condition management

Discussion
ÖBB Infrastructure
Network data

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Discussion
ÖBB Group 2011

6.25 billion Euro in total revenues

4,825 km rail network

40,800 employees

450 million passengers (rail & bus)
16,904 employees

More than 1,100 stations and stops

222 tunnels

6,440 trains (daily), 144 million train kilometres

10 self-owned hydroelectric power stations

74 billion gross tonne-kilometres (1990: 47 bn)

1,15 bn. Euro for maintenance and renewal
Technically oriented company

- Approx. 16,900 employees (incl. subsidiaries)
- Average age: approx. 43.7
- Proportion of women: approx. 7.2 %
- High percentage on the operational side
We are investing in the rail network of tomorrow
Growing demand for mobility

Capacity utilisation of infrastructure
Status as of 2009
Traffic forecast 2025+

- > 100% capacity utilisation
- > 80% and < 100% capacity utilisation
- < 80% capacity utilisation
- No evaluation of capacity

Capacity utilisation was measured over an operation period of 24 hours. The relevant direction was used in case of two-track routes.
... as part of the strategy for target network 2025

Master plan 2011 – 2016
12.8 bn Euro

Peak funding for infrastructure investments
over 2 bn euro per annum

Includes stimulus package and Brenner Base Tunnel
European transport hub

- Through station east-west/north-south connections
- Link-up of 3 TEN corridors
- Urban development project
- Total area > 100 ha
  - 20,000 jobs
  - 5,000 apartments
- Urban infrastructure: public transport, park, schools

Vienna Central Railway Station
New Vienna – St. Pölten section

Length: 44 km, divided into 3 sections:

- 14.4 km Wienerwald section
- 17 km Tullnerfeld section
- 12.6 km West section

Completion date: 2012
The new Semmering Base Tunnel

Key project of the new southern railway and the Baltic-Adriatic axis (Danzig-Bologna)

27.3 km long, twin bore tunnel

Most easterly standard level railway in the Alpine region

Train speeds up to 230 km/h

Construction time 2012-2024
Building cost: approximately 3.1 Bn. Euro
New twin-track high-performance line

Length: approx. 130 km

Approx. 33 km
Twin-track Koralm Tunnel

Investment volume: 5.373 bn euro

Building contractors:
Arge Massivbau-Plantrans, Strabag AG,
Swietelsky Tunnelbau GmbH & CO KG, Alpine Bau
GmbH, Beton- und Monierbau GmbH,
Held&Francke, Wayss & Freytag Ingenieurbau and others
Effective investments

1 euro invested in railway expansion

Infrastructure construction phase

Infrastructure operational phase

has the effect of 1.5 to 2.3 euro in the national economy

1 bn euro of investment creates and/or safeguards approx. 17,000 jobs

Improved accessibility and development of the regions creates and safeguards jobs for the long term
Backlog of issues in the existing network

- 70% of ÖBB train paths still date back to the Austro-Hungarian Empire
- Westbahn is near its breaking point
- Quality problems in the existing network
- Inefficient branch lines
- Challenge: maintenance work during ongoing operations
- 2010: 215 condition based slow orders in the core network
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Network data

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condition management

Discussion
Life Cycle Cost Analysis – Permanent Way

In cooperation with Graz Technical University
Life Cycle Cost Analysis – Permanent Way

less life-span

reduction of maintenance costs
reduction of operational hindrance costs
Life Cycle Cost Analysis – Permanent Way

- PROLONGING SERVICE-LIFE
- HIGH INITIAL QUALITY
Since 1994: 826 km of mechanised formation rehabilitation

Measurement charts prove the sustainability

„The right measure at the right time“
 Investment strategy – Ballast protection

- Under Sleeper Pads reduce the stresses in the ballast bed.
- Additional Costs of a track: plus 3 %
- Life Cycle Costs of this new track type: minus 23 %
Investment strategy - rails

- Head Hardening of rails (350 Brinell) reduces the side wear of the curved rails.
- Additional costs + 10 %
- Life Span in curves + 300 %
Quality behaviour of the track

- Condition behaviour
- Bettering due to maintenance
- Behaviour of substance
- Economical life-span
- Technical life-span
Quality management
ÖBB Infrastructure
Network data

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condition management

Discussion
„You can‘t manage it, if you can‘t measure it!“
Presentation of Quality Figures

Lage der Messfühler:
1. Encoder
2. OGMS
3. Appliance-MU
4. GPS-Anchor
5. Riffelensensor

ÖBB-Infrastructure / Florian Auer
Life Cycle Management at the Austrian Federal Railways

ÖBB INFRA
Fahrwegtechnisches Streckenband
linke Schiene
rechte Schiene
Befestigung
Schwellen
Schotter
Untergürt

Verläufsgraten 100m-Abschnitt
Strecke 8052, Gleis1, km 176.200 bis km 176.300

Auswertediagramm Zustand
Schienenoberfläche linke Schiene

Ultrasschall und Wirbelstrom linke Schiene

© ÖBB, Hannes
Presentation of Quality Figures

safety, availability, sustainability

LCM
- substance
- renewal
- condition
- maintenance
- functionality
- fault clearing
- safety / quality
- inspection / small maintenance

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Life Cycle Management at the Austrian Federal Railways

20/11/2012
Presentation of Quality Figures

safety, availability, sustainability

expert system NATAS
Track quality

Development of track geometry deterioration

• better planning of maintenance work

• deterioration behaviour gives the condition of subsoil and ballast bed
- Systematic analysis of the rail failures
- Allows prognosis of residual life-span
- Number of broken rails
  - 2008: 240 pcs.
  - 2011: 87 pcs.
Rail fastenings

- Implementation of new measurement signals rail inclination and base gauge.
- Analysis of the condition of the fastenings with a new quality.

Base gauge (rail foot distance)
The rail fastenings are the cheapest, but especially in curves also the weakest parts of the track.

To ensure the economic life-span it is necessary to keep the condition of the fasteners on a high level.
Development of a new track design (no corrugation on low rail).

Corrugated rails are up to 15 dB louder than tracks without showing this phenomena.
Renewal prognosis

- The expert system NATAS supports at the prognosis of the track components’ residual life-span.
- This information is necessary to do life cycle cost analysis.
Since 2011 a LCC-cost analysis has to be done for every track renewal.

Variante 1: total renewal 2011

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€ Investition und € Instandhaltung

Variante 1

Variante 2: partial renewal 2011, total renewal 2020

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€ Investition und € Instandhaltung

Variante 2

Δ € per year (annual costs)
The right measure at the right time!

Development of slow orders

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„You can manage it, if you can measure it!“

Cost Optimisation Track Maintenance & Renewals Congress 2012

ÖBB-Infrastruktur AG
Florian Auer
Nov, 20th London