Tunnel Inspection 4.0
Smart Tunnel Maintenance using Artificial Intelligence
Switzerland

Presented by: Alžběta Prokopová
Facts & Figures Amberg Group Ltd

Amberg Group is addressing the challenges of growing urbanisation with solutions for a smart use of space both underground and aboveground.

Foundation
Since 2016 Holding “Amberg Group Ltd”

Facts
- 100% family owned
- 4 companies
- 400 employees worldwide
- 8 subsidiaries on 3 continents

Offerings
- Engineering Services
- Surveying Solutions
- Test Gallery
- Logistics solutions

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Alžběta Prokopová - Application Engineer Amberg Technologies AG
Cover the entire Tunnel life-cycle

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Tunnel Inspection with Artificial Intelligence
Why now?

5,000 km

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Why now?
Tunnel Inspection workflow

Data Capture

- Laser scanning with GRP/IMS5000
- Structural test

Prepare Inspection

- Phenomena Catalog definition
- Theoretical tunnel design
- Process point clouds to images

Tunnel Inspection

- Pre inspection
- Visual inspection
- Data analysis
- Tunnel safety evaluation

Tunnel maintenance actions

- Maintenance recommendations
- Effective maintenance work

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Amberg Inspection Cloud Platform
AI - Detection of damages from Images

Mobile Mapping

Trolley

Classic

Deep Learning

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Results – Wet areas

Input image

Inspection (manually)

Deep learning (automatic)

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Results – key stones

Input image

Inspection (manually)

Deep learning (automatic)
Results — steel arches

Input image

Inspection (manually)

Deep learning (automatic)
Results – cracks in sleepers

Input image

Inspection (manually)

Deep learning (automatic)

Deep learning Classification (automatic)

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Alžběta Prokopová - Application Engineer Amberg Technologies AG
Main Achievements

• Increase efficiency by up to 60% when using Artificial Intelligence
• Use Amberg competence for training the neural networks
• Classification of entire infrastructure

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Main Achievements

• Change tunnel inspection from periodically to event driven maintenance
• Decrease maintenance cost and increase safety
Main Achievements

• Open database – support of Amberg Trolley and third party data
• Open API for intersection with other infrastructure (e.g. BIM2FM) tools
Thank you for your attention

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