



PANORAMIC TUNNEL LINING VISIBILITY FOR SMART MAINTENANCE

The Amberg OIS Vision enables high-speed, high-resolution tunnel lining inspection from in-service trains or dedicated inspection vehicles. The system captures continuous panoramic tunnel surface images and supports AI-assisted detection of cracks, water leakage, spalling and ancillary facility defects, helping operators improve inspection efficiency.

Key Customer Benefits

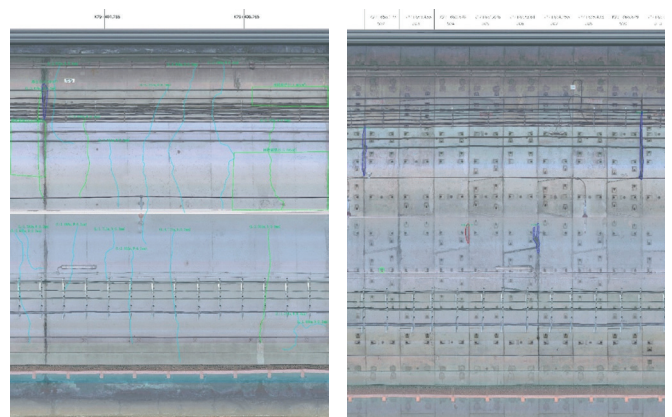
- **Efficient Operation:** Vehicle-mounted inspection at up to 120 km/h, with no service interruption
- **Full Tunnel Visibility:** Continuous high-resolution panoramic imaging of tunnel lining surfaces
- **AI-Powered Defect Detection:** Automated detection, classification and measurement of cracks, leakage and spalling
- **Comprehensiv Reporting:** Standardised defect records and customisable reports for inspection and maintenance workflows

Inspection Deliverables

- High-resolution tunnel lining images and unwrapped panoramic views
- Chainage-referenced defect records for cracks, water leakage and spalling
- Defect classification and measurements, including location, angle, size and area
- Standardised and customisable reports and a structured defect database for inspection review, maintenance planning and digital asset management



Amberg OIS Vision



SYSTEM PERFORMANCE AND TECHNICAL DATA

System configuration	
System components	Vehicle-front imaging module and in-vehicle cabinet module
Camera configuration	8 high-resolution color line-scan cameras
Illumination configuration	8 laser illumination modules
Illumination technology	Laser active illumination
Vehicle-front imaging module	115 kg, 760 × 470 × 690 mm
In-vehicle cabinet module	Power conversion unit and server host
In-vehicle cabinet module	23 kg in total
Rack interface	4U + 2U, 19-inch standard cabinet

System performance	
Max. measuring speed	120 km/h
Image acquisition coverage	290°
Intelligent crack detection rate	≥ 90%
Mileage referencing accuracy	± 1 m

System accuracy	
Imaging & optical Parameters	
Overall tunnel image resolution	≥ 50 MP
Camera resolution	4096 × 3, 4K true color
Image spatial resolution	≤ 1 mm / pixel
Line frequency	45 kHz
Optimal working distance	5 m
Defect detection accuracy (Ø 5 m tunnel diameter)	
Crack detection accuracy	± 0.5 mm
Water leakage detection	Better than 10 mm × 10 mm
Spalling detection	Better than 10 mm × 10 mm
Ancillary facility defects	Cable, pipeline, bracket, bolt and communication equipment condition review supported

General technical data	
Front-mounted imaging module	
Power input	DC 110 V / AC 220 V
Maximum power consumption	2400 W
Illumination power	25 W
In-vehicle cabinet module	
Power input	DC 110 V / AC 220 V
Maximum power consumption	370 W

Environmental specifications	
Working temperature range	-25 °C to +50 °C
Protection class	IP65
Humidity (non-condensing)	≤ 90%

Data export format	
Database	SQLITE
Image	TIFF / PNG / JPEG
Engineering reports	PDF / XLSX