

ABSOLUTE MEASUREMENT



Apart from inwall defects and structural deformation inspection, MS100 provides an additional absolute measurement solution to obtain the tunnel mid-line/track mid-line data, which helps to specify protection zones for the metro tunnel. By integrating a precision tactical-grade MEMS IMU and adding a 360° prism onto TrolleyAuto, the system may collaborate with a robotic total station setup nearby and continuously collect the readings used to compute the mid-line.



The tunnel damages or even collapses induced by earthwork projects nearby happen quite often especially in those fast-developing cities, and therefore the tunnel mid-line measurement in as-built survey is very critical.



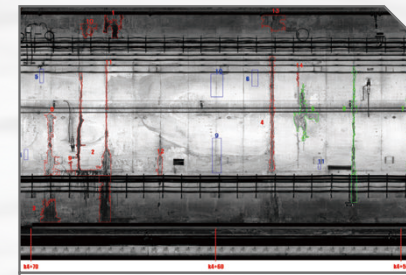
violated operations in earthwork projects

protected area signs

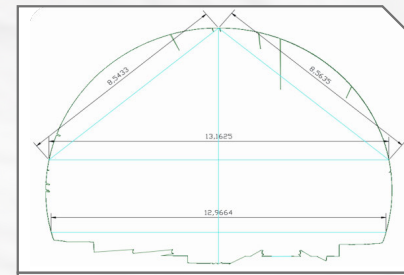
CASE STUDY



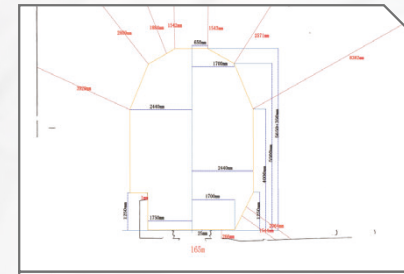
full inspection
@ Guangzhou Metro Line 4
(tunnel clearance, diseases, etc.)



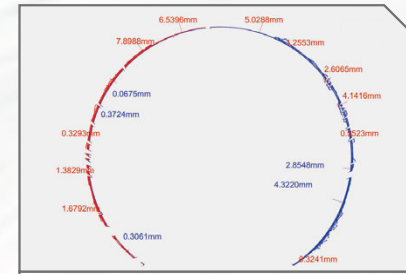
disease inspection
@ Shenzhen Metro Line 11
(2-way completed in 1 hour)



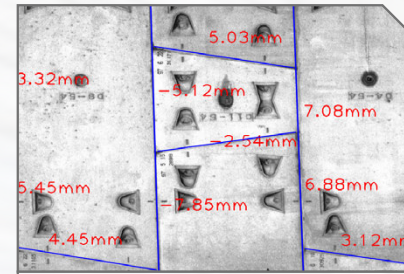
sectional inspection
@ Hunan High-speed Railway
(comparison with historical data)



platform gauge inspection
@ Guangzhou Metro Line 3
(1.8 km/h, results done on site)



segment faulting inspection
@ Shenzhen Metro Line 2
(sectional data display)



segment faulting inspection
@ Guangzhou Metro Line 1
(faulting display in orthophoto)

SPECIFICATION

TrolleyAuto		Clover	
Dimension	1566mm × 589mm × 411mm (LxWxH, without scanner)	Applicable for	shield tunnels, diameter 5.5±1.5 m, single-hole & single-link
Parts	central control box and carbon fiber base stand, quick assembly/disassembly within 2 min	Carrier	TrolleyAuto (as default platform, 400 mm wheelbase)
Applicable for	railway track gauge 1425-1445 mm (standard 1435 mm)	Function	captures RGB images, BMP or RAW format
Weight	less than 30 kg (without scanner)	Image Resolution	0.26 mm @ 5.4 m, best for detecting tiny cracks up to 0.2 mm
Material	carbon fiber, composite materials, aluminum alloy	FOV	360° coverage
Temperature	working -20~40°C; storage -30~40°C	Weight	9 kg
Humidity	≤90%, non-condensing	Imaging Sensor	3x RGB matrix camera, 14 fps max.
CPU	Intel i7/i9	Consumption	overall < 240 w, each illuminator group < 30 w
Software	Tunnel Scan&Go	Depth of Focus	approx. 1 m
Button	physical	Work Mode	spiral imaging
Language	Chinese / English	Working Mileage	2 km (when SSD 2 TB built in, as default); 4 km (when SSD 4 TB built in)
Input	DC 25.2V	IMU (for absolute measurement only)	
Battery	2 × 12,000 mAh, endurance > 8 hrs	type	3 FOGs integrated with 3 MEMS accelerometers
Wi-Fi	hotspot available for remote access	input rate	±490°/sec max.
SSD	1 TB	bias instability (25°C)	≤0.1°/hr, 1σ max.; ≤0.05°/hr, 1σ typical
RAM	32 GB	bias offset (25°C)	±2°/hr
Data Transfer	data download by USB interface	initialization time	≤1.5 sec
Raw Data	FLS, TXT, BMP, RAW, JPG, PNG, etc.	Control Mode	Wi-Fi access and physical buttons control
Output Format	TXT, TIFF, DOC, XLS, TSD, etc.	Speed Control	0.05-5.5 km/h, with adaptive cruise control
Drive Mode	driven by dual-motor engine	Computer Configuration (for process)	
Control Mode	Wi-Fi access and physical buttons control	CPU	Intel Core i7 or above
Speed Control	0.05-5.5 km/h, with adaptive cruise control	RAM	32 GB or above
		GPU	Nvidia GTX 960 or above (for point cloud only); Nvidia GTX 4060 or above (for HD images)

Note: all information above is subject to change without any prior notice.

SOUTH
Target your success

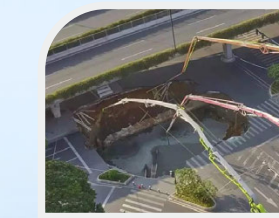
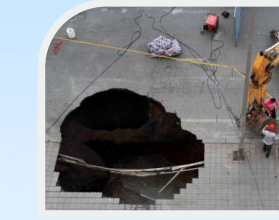
E-mail: mail@southsurvey.com solutions@southsurvey.com
http://www.southinstrument.com http://www.southsurvey.com

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SOUTH Surveying & Mapping

SOUTH
Target your success

ONE-STOP AUTOMATED METRO TUNNEL INSPECTION SYSTEM MS100

AI-based RoboCheck Exclusively Engineered for Rail Authorities



0 blind spot in computer vision

0.2 mm tiny crack width to detect

1 stop solution from field to report

3 hours to submit for one-km mission

RoboCheck @site + One-stop Process & AI Detection

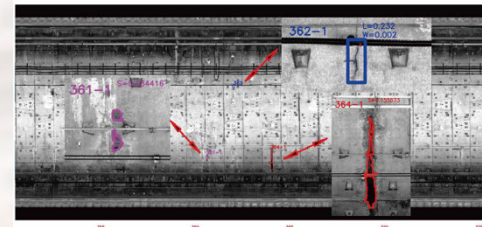
Save Big + Efficiency Won't Lie



REVOLUTIONARY SOLUTION AND AMAZING EFFICIENCY BROUGHT BY ROBOCHECK AND AI

INTRODUCTION

To guarantee operational safety, it's a must to inspect rail tunnel health conditions at regular intervals, otherwise, the structural deformation and tunnel defects might result in safety hazards and incalculable losses. MS100 was particularly designed to deal with those existing headaches (see below) and serve as a perfect trouble-shooter for the industry.



HEADACHES & REMEDIES



typically short stoppage time
harsh underground environment
movements restricted much
comparably low efficiency
long time to wait for results
limited outputs for reference

- 👉 automated data acquisition mode
- 👉 big data captured by scanning (and imaging)
- 👉 motorized trolley running on rail tracks
- 👉 cutting-edge RoboCheck other than manual
- 👉 field-to-office packaged in one solution
- 👉 AI-based detected results and analysis reports



SYSTEM COMPONENTS

standard parts ① TrolleyAuto; ② All-in-one software Tunnel Scan&Go; ③ 3D laser scanner
optional components ④ multi-lens camera system Clover; ⑤ camera system mount stand.



automatically rotates and captures HD images, and enables the system to detect tiny cracks up to 0.2 mm

helps the camera to collaborate with the system in fieldwork

Faro models with automation preferred, 70/150/350 meter range optional

RoboCheck core, industrial PC built in, access to field software Tunnel Scan&Go @site via Wi-Fi

highly integrated, durable and portable platform, suited to one-man operation

engineered to work in all types of rail tunnel environments

easy assembly, simple settings, and one-key start, then full automated data acquisition

motorized trolley running on railway tracks powered by system control

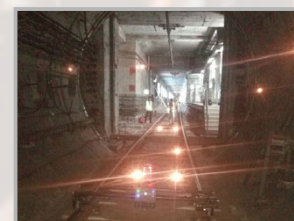
JOB ENVIRONMENTS



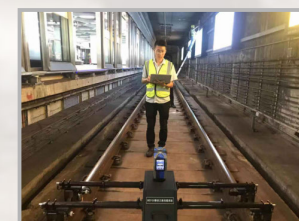
bored tunnel



shield tunnel



open-cut to shield structure part



open-cut structure station

ALL-IN-ONE SOFTWARE

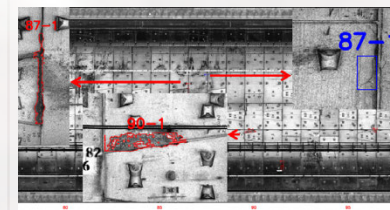
The All-in-One software Tunnel Scan&Go is the core of the system, which plays a vital role in the whole process. It enables the users to conduct automated scanning, data analysis, intelligent detection, report export, etc. and features largely in an A-to-Z solution. The deliverables include circular orthophoto, 3D point cloud, structural data analysis and detected inwall defects.



SOFTWARE FEATURES



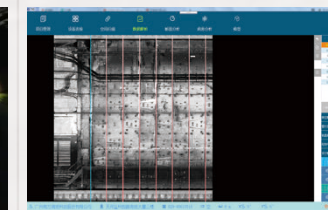
realtime outputting to show basic results on site



AI-based defect detection saving big in labor and time



quick results, ready for immediate response

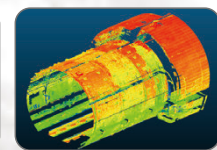


independent R&D, customizations available

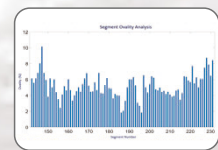
OUTPUTS DISPLAY



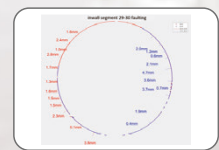
high-resolution circular orthophoto



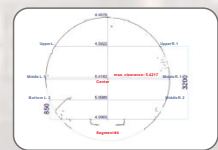
3D point cloud analysis



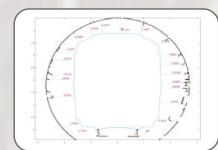
segment ovality analysis



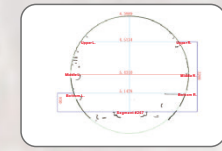
segment faulting analysis



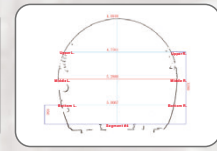
tunnel clearance analysis



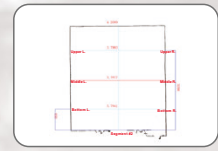
tunnel gauge analysis



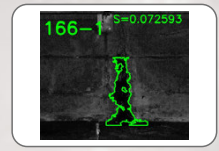
shield tunnel sectional data



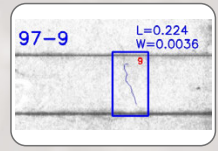
bored tunnel sectional data



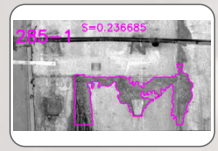
metro station sectional data



detected water seepage



detected inwall crack

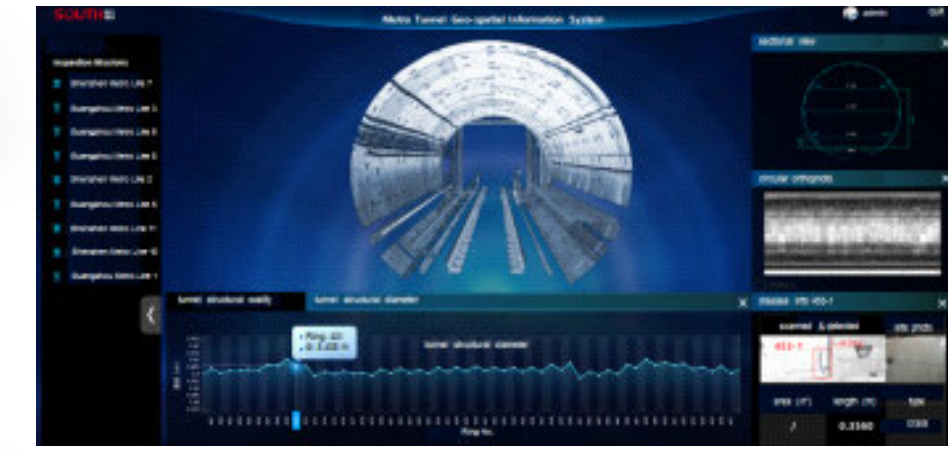


detected concrete peeling

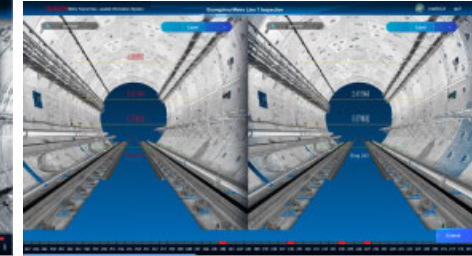
RESULTS COMPARISON

example	photo taken by iPhone	software display	
		scanned result on site	computed & detected result
1			
2			

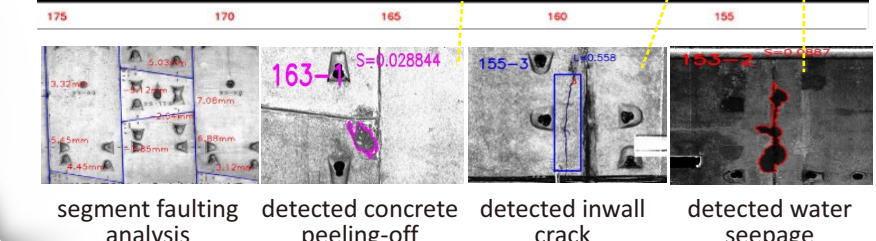
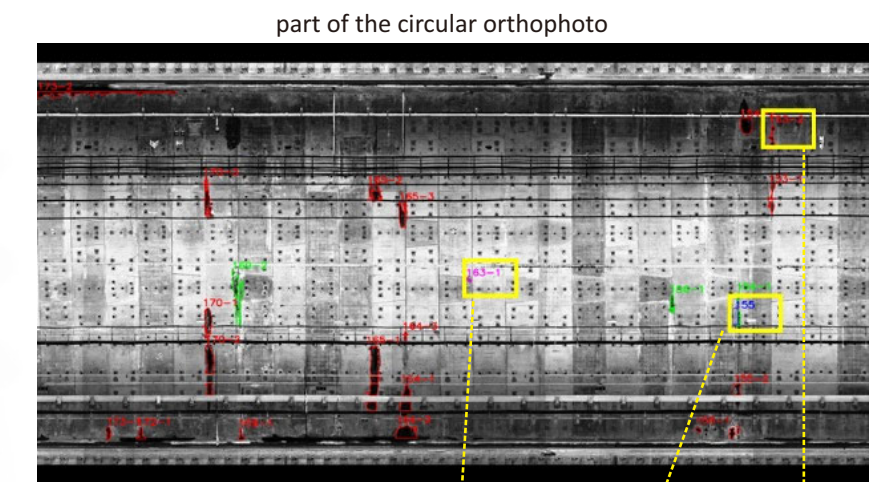
SYSTEM PLATFORM



visualized tunnel troubles, easier for tracking and maintenance



comparison of Before & After, easier for effective monitoring



segment faulting analysis

detected concrete peeling-off

detected inwall crack

detected water seepage

Tunnel Fulcrum (Tunnel Full-life-cycle Control Platform)

- scientific management of historical results
- all data traceable and analyzable in the long run
- easy to perform tendency changes based on analysis of Before & After
- out-of-tolerance alerts triggered ahead of emergency
- a powerful system platform ready to manage plenty of metro lines

153-2	0.0887	/	/	moist	
154-1	0.0726	/	/	seepage	
154-2	0.2171	/	/	moist	
155-1	0.1402	/	/	moist	
155-2	0.1592	/	/	moist	
155-3	0.1588	0.0024		crack	

part of the inspection report

The big data analysis based on machine learning techniques would help much to generate a quality inspection report clarifying all "what is where", which is how artificial intelligence revolutionizes and benefits the industry.