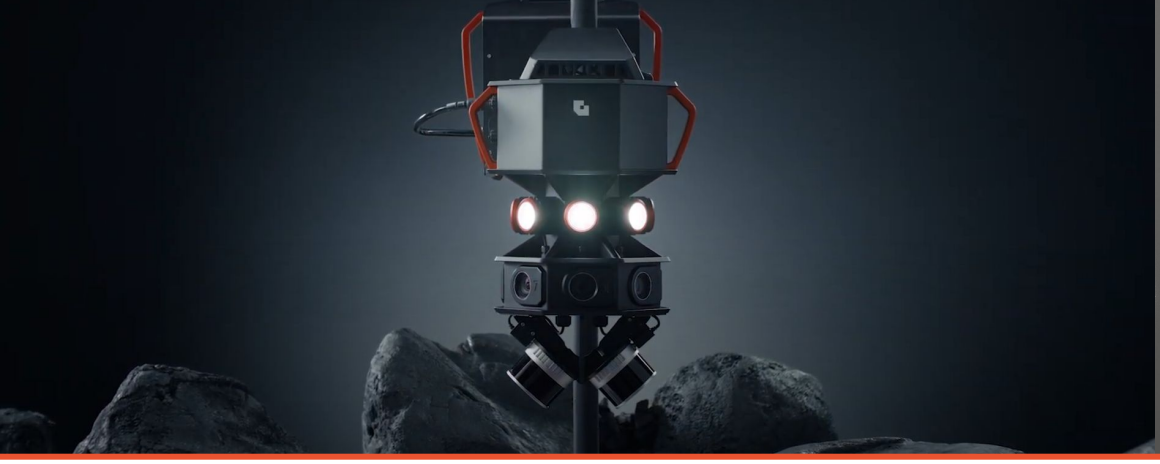


LAZARUSS

Automated Mine Shaft Inspection Scanner

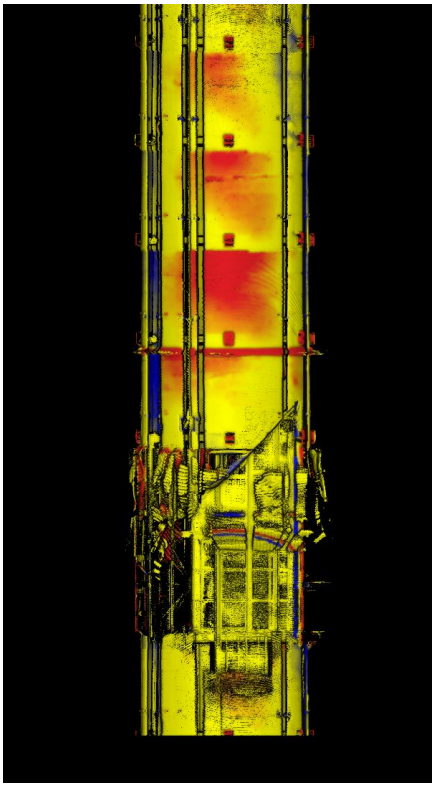
The Lazaruss scanner specializes in swiftly acquiring an accurate 3D model coupled with high-resolution 360° images of your mine shaft.

- Designed for harsh mine environments: waterproof, dustproof, aluminum casing.
- Installed and operational in less than 10 minutes. Adapts to all cable sizes and types of mine shafts.
- Powerful Real Time Environment Adaptive Lighting (7 x 10,000 lumens).
- Stand alone batteries that allow for two (2) hours of autonomous scanning. Easily swapped.
- Onboard web-based application for simple operation. No monitoring required.

Automated PDF & KPI reports

Model to model deviation detection

Point Cloud, Heatmaps, 360 Videos



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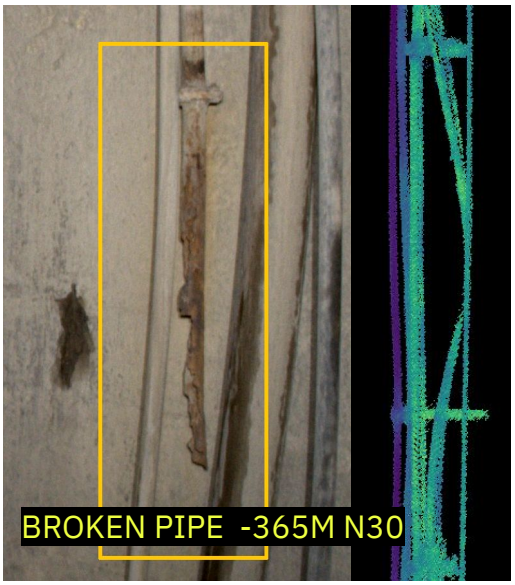
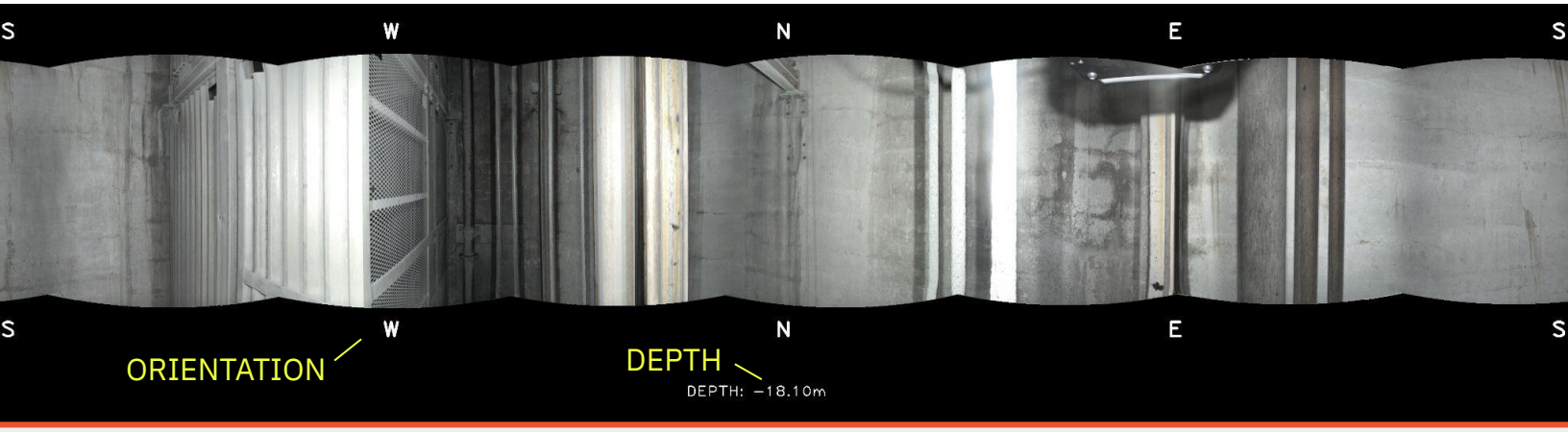
APPLICATIONS



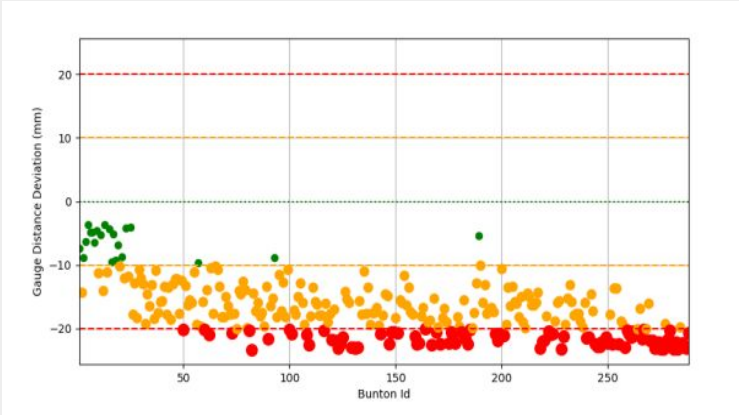
1 - Visual Inspections

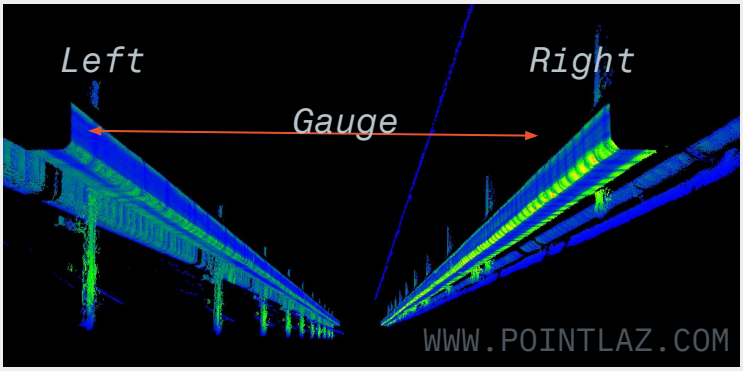
360 View; *Orientation & Depth Reference*
Database; *knowledge transfer*
Simply visualization; *No expertise required in order to understand the shaft data*
Facts Based; *Reliable & consistent data*
Past; *Easily compare previous scans*
Accurate Planning; *Prepare maintenance work with real context understanding.*

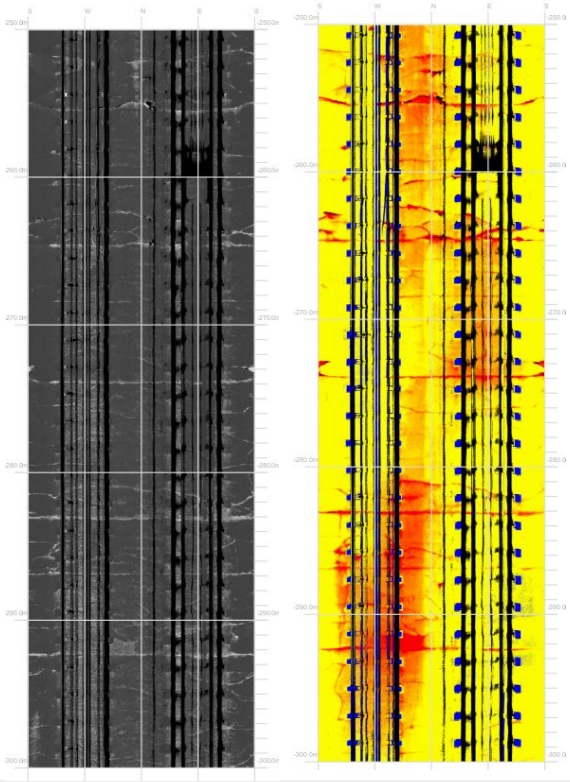


2 - Guide Misalignment

Guide Sensors; *5mm accuracy sensors dedicated to guides.*
Alignment Analysis; *PDF report to highlight guides irregularities*
Flagging System; *Threshold to put emphasis on critical guides*
Profile; Profiling guides from gauge, left,right,x,y faces.







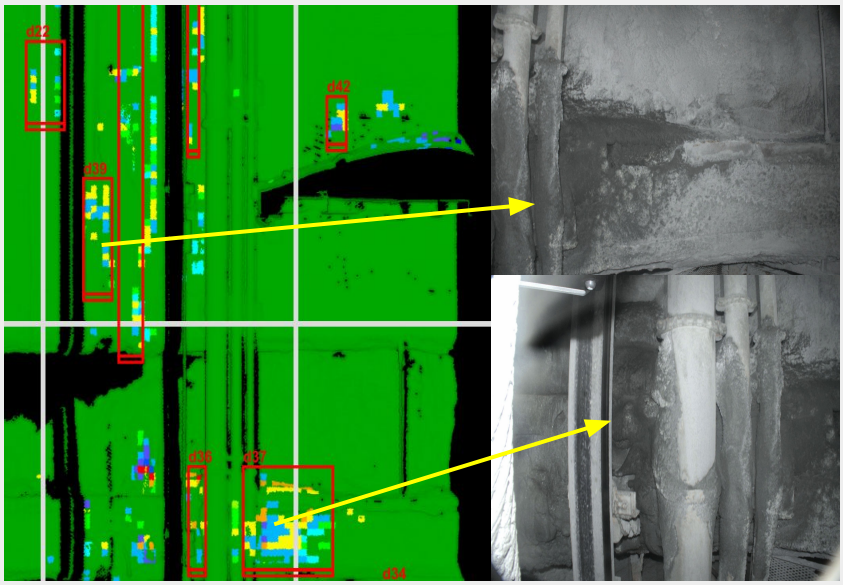
3 - Change Detection

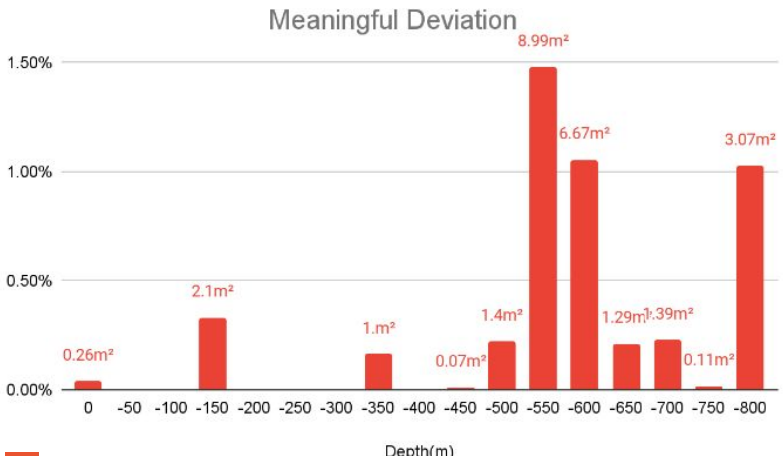
A. Radius Deviation;

- *Automated pdf reports.*
- *Detects nominal shaft diameter deviation.*
- *Data showcased in rolled out heat map view of the generated point cloud.*
- *NESW and depth identifiers present in order to easily identify where you are within the shaft..*

B. Cloud to Cloud Change Detection;

- *Automatically detects changes between current and prior scans.*
- *Changes are highlighted in red boxes on the heat map and linked directly to a photo of the area of concern.*
- *Making tracking changes over time incredibly simple.*



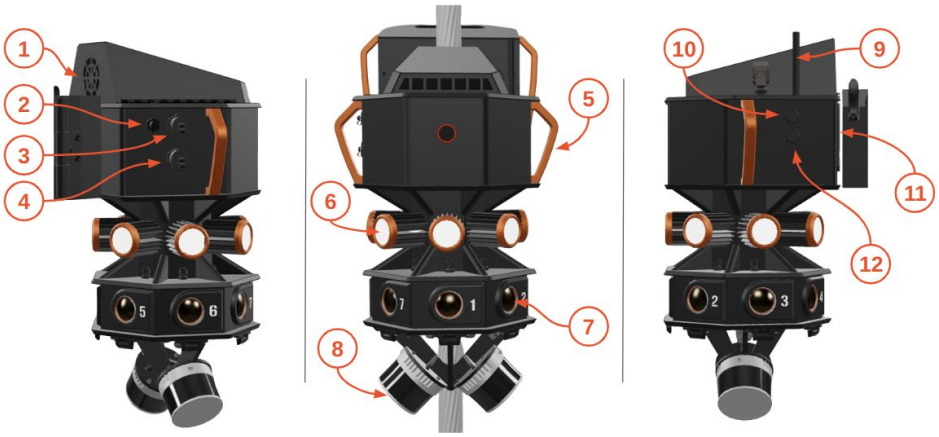


C. Overview Graphics;

- *Provided graphics highlight the depth ranges that have the most changes.*
- *Mine staff are able to make calculated decisions in regards to maintenance.*
- *Easily monitor overall change in shafts.*

List of Components

1 - Intake Fan	7 - Camera Units
2 - Power Supply	8 - Lidar Units
3 - USB-A Port	9 - Wifi Antenna
4 - Ethernet Port	10 - Power Button
5 - Ergonomic Handles	11 - Network Button
6 - Adaptive Lighting Units	12 - Aluminum Casing



TECHNICAL SPECIFICATIONS

INSTRUMENTS	
Adaptive Lighting (7x)	10,000 lumens, Pulsing Flash 10hz
Cameras (7x)	5.1MP RGB, Global Shutter 10hz, 70° x 80° FOV, 2464(H) x 2064(V), JPG/Bayer/Lossless
Computer (1x)	i7 14th Gen, 8TB SSD, 64Gb RAM
IMU (1x)	800 Hz, Gyro 5°/hr, Accelerometer < 0.04 mg
Lidar (2x)	600,000 pts/s, 32 Channel, +/- 15mm accuracy, Class 1

ENVIRONMENTAL	
Atmospheric Pressure	70 to 135 kPa
Ingress Protection	Designed to IP-67 standards.
Operating Temperature	-30°C / +45°C (-22F / 113F)
Relative Humidity	30 to 90% without condensation.
Storage Temperature	10°C / 30°C (50F / 86F) - Applies to all components.
Minimum Opening	Rectangular: 1.5m by 1.5m (59" by 59") Circular: 2m (78") diameter

HARDWARE - LAZARUSS	
Dimension (L X W X H)	35.3cm x 41.8cm x 72.0cm (13.9" x 16.5" x 28.3")
I/O	1x USB 3.0 port 1x Ethernet RJ45 port
Material	Aluminum
Power Supply	20-24 VDC (Battery) / 120-240V AC (Wired)
Weight	Scanner: 25kg (56lbs) Battery: 14kg (31lbs) Rope Adapter: 3kg (7lbs) Mounting Bracket: 9.5kg (21lbs) Total Payload: 54.5kg (115lbs)
Wifi	802.11 a/b/g/n/ac/ax 2T2R BT5.2 M.2 2230 key-A-E

TECHNICAL SPECIFICATIONS (continued)

HARDWARE - ROPE ADAPTER	
Hoist Compatibility	Koeppe, Dual, Single, Blair
Max Diameter	63mm (2.5")
Safety Factor	8
Supported Mine Shaft Shapes	Circular, square, rectangular
Supported Mine Shaft Structure Type	Wooden, Tubing. in-situ, concrete. shotcrete

HARDWARE - BATTERY	
Type	Lithium-Ion (Li-ion)
Number of Cells	7 @ 97.5Wh each
Swappable?	Yes

DATA PROCESSING	
Slam Drift Rate	<.5%
360 Video	Up to 16 000px by 8 000px. Automatic Depth, Bunton, N/E/S/W Indications overlay. Flat 360° output. .mp4 format.
Point Cloud Output	.ply, .laz, .e57 file formats. Full Resolution, Subsampled, Unrolled.
Control Points	3DoF Way Points
Change Detection	Automated Registration Between Scans. >15mm Automated Detection.
PDF Reports	Deviation, Change Detection, Intensity maps, Linked Height Images
Processing Time	~10 hours per km

RECORDING	
Data Rate	8 Gb/min
Hoisting Speed	Downwards: 1m/s (197ft/min), (3.6km/h) Upwards: 3m/s (590ft/min), (10.8km/h)
Battery Life	4 Hours, Lithium-Ion (Li-ion)
Deployment Time	5 minutes rigging / 3 minutes unrigging

USER INTERFACE	
Web Based App	Google Chrome/Safari/Firefox compatible. On-Board Processing.
Software Compatibility	Point Clouds: CloudCompare, Point Studio, Deswik & more. Video Files: VLC PDFs: Acrobat Reader, Google Chrome.