# C-ALS® HD

Carlson
BREAK NEW GROUND

## Cavity Auto-Scanning Laser System Equipped with a High-definition Camera and 874-Lumen Spot Light

The Carlson C-ALS HD is a Cavity Auto-Scanning Laser System equipped with a high-definition camera and a 874-lumen spot light. The new system is capable of 360° scans in underground cavities and rugged environments for observation, mapping, risk assessment, and more. The C-ALS HD is deployable through a 76 mm borehole and offers versatile deployment options. The C-ALS HD features an extended deployment range of up to 205 m.

Carlson Scan is the included operational Windows-based software that provides a live, full-color video feed of the deployment path as it is being deployed. Within Carlson Scan, operators can utilize the free-moving joystick controls to look at geologic faults, observe existing conditions, or initiate a complete scan of the cavity.

Scan and map what you can't see, explore, or investigate. Visualize geologic faults or workings that you can't reach, observe existing conditions, monitor changes over time, map old workings, assess dangerous rock falls and observe obstacles with the universal scanner — the C-ALS HD

## Advantages

- Full 360-degree scanning capability
- Deploy at any angle with internal gyro
- Scanning range up to 150 m
- High-definition camera and lighting payload with 5mm visibility at 25 m
- Free-moving joystick controls for camera head
- Automatic gravity-based camera orientation
- Fully integrated surface controller
- Slip ring drum for quicker cable deployment

CLASS 1
LASER PRODUCT
IEC / EN 60825-1: 2014

LRQA CERTIFIED ISO 9001 UKAS MANAGEMENT SYSTEMS 0001

BREAK NEW GROUND

# View the Void in High-definition

Visualize what you couldn't before with the C-ALS HD nosecone camera equipped with a 874-lumen LED spot light. Operators can view the pathway to the void through Carlson Scan in real-time to see any possible obstructions or obstacles as the probe enters the void. Once deployed into the void, the C-ALS HD maintains visibility of 5 mm at up to a 25 m distance. The operator can freely move the head of the system to visually examine before or after a scan. Always know what is up and what is down with automatic camera orientation.

## Map What You Cannot Reach

- With a diameter of just 50 mm, the Carlson C-ALS HD system is easily deployed through boreholes, downhole or uphole, in order to survey the inaccessible
- Survey the collar location on your mine coordinate system to give a starting point for the survey
- Use the supplied calibration jig to initialize the gyro to a known heading
- Connect to the C-ALS HD using the included Carlson Scan software and a ruggedized tablet or laptop
- Control the C-ALS system from the integrated control box
- As the C-ALS HD is deployed, take regular readings at fixed intervals
- The IMU establishes the heading and inclination of the probe as it is deployed and as it scans in the void
- The high-definition nosecone camera provides onscreen video and a real-time view of the borehole as the probe is deployed — allowing operators to see any obstructions and to judge the point at which the probe breaks through into the void
- Once in the void, operators can visually examine the void by using the on-screen joystick control or begin a scan to measure the 3D shape of the void with full 360° coverage, up to a range up to 150 m
- Using Carlson Scan, the operator can view live data, with the option to import existing data as a backdrop to the ongoing survey

***Spot Light Visibility***

Spot light visibility brings powerful 874-lumen LED illumination to voids and innaccessible sections for expansive camera visualization of up to 25 m.

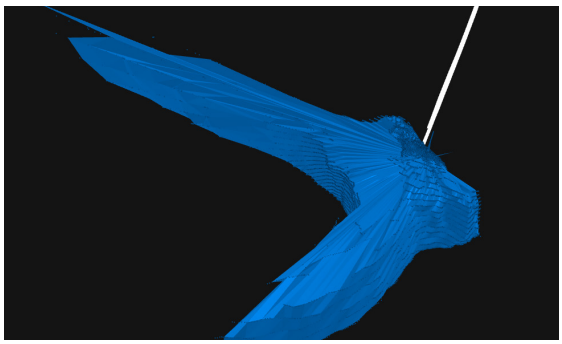
***Slip Ring Drum Deployment***

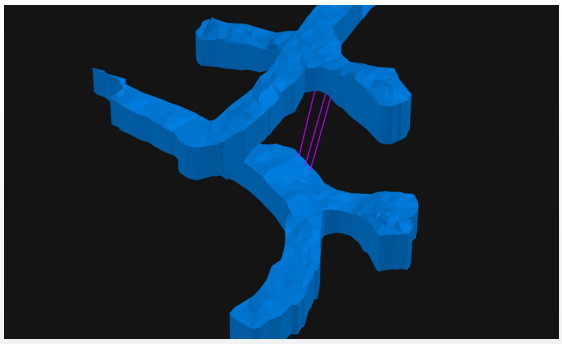
The all-new slip ring drum offers a simple and quick method for deployment. This means a seamless process from deployment, to scan, to recovery.

# Value

Value comes from insight. By using C-ALS HD to determine the size, extent, and status of inaccessible voids, sites gain valuable insight. The C-ALS Gyro provides a full understanding of the layout of underground workings. Their relation to operations is essential for safe underground and open-pit operations using heavy machinery, explosives, and personnel. The C-ALS HD can provide an accurate view of:

- Excavation and infill of stopes
- Location of voids
- Geometry and condition of mine workings
- Inaccessible historic workings
- Collapsed areas, sinkholes, and troughs
- Erosion of ore passes
- Volumes of voids
- Position of cavities in relation to other underground workings and structures
- Size and location of remaining pillars
- Location of the voids/workings relative to surface features





# Carlson Scan

Carlson Scan software for the C-ALS HD makes it easier and quicker for operators to use the system, to analyze collected data and to produce sharable and integratable industry-standard deliverables.

- Simplistic and easy-to-recognize design
- Smooth and efficient animation and point cloud rendering
- Optimised for ruggedized, touchscreen tablets for easy in-field use
- Desktop mode for reviewing and editing data in the office
- See the live heading, inclination and activity of the animated C-ALS probe at all times
- Real-time surfacing and volume calculation from raw scan data for the production of closed 3D models and volumes
- Import existing point clouds and surfaces to see real-time comparisons with design data or previous surveys
- Quickstart mode with single-click project setup up and instrument auto-detection
- View and save live footage from the C-ALS HD camera
- Easy integration with third-party packages with the ability to import and export formats, such as LAS and DXF

Carlson C-ALS® *HD*

Dimensions given in mm

## C-ALS

### Laser Module

| | | |
|---|---|---|
| **Laser classification (IEC / EN 60825-1: 2014)** (Complies with 21 CRF 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.) | | Class 1 |
| **Type** | | InGaAs laser diode |
| **Wavelength (typical)** | | 905 nm |
| **Resolution** | | 1 cm |
| **Maximum range to a passive target**[1] | | Up to 150 m |
| **Minimum range** | | 0.5 m |
| **Range accuracy**[2] | | ± 5 cm (Under Carlson test conditions) |
| **Divergence** | | < 2 milliradians |
| **Maximum average power** | | 20.5 µW |

### Angle Measurement

| | | |
|---|---|---|
| **Accuracy** | | 0.2° |
| **Resolution** | | 0.1° |
| **Range** | Vertical | -90° to 90° |
| | Horizontal | 0° to 360° |
| **Motion** | | Servo-driven gear systems with manual clutch override |

### IMU Sensors

| | | |
|---|---|---|
| **Type** | | IMU comprising triaxial gyro and accelerometers |
| **Pitch-and-roll accuracy** | | ±0.2° |
| **Pitch-and-roll range** | | 360° |
| **Gyro heading drift** | | Typically, <1° during a 20 minutes deployment |

### Physical data

| | | |
|---|---|---|
| **Construction** | | Machined aluminium and stainless steel |
| **Water and dust resistant** | | IP67 |
| **Operating temperature range** | Probe | -10° C to +60° C |
| | Surface unit | 0° C to +50° C |
| **Dimensions** | Probe | 1110 mm x 50 mm |
| | Probe with extension piece | 2189 mm x 50 mm |
| | Surface unit | 270 mm x 245 mm x 170 mm |
| **Weight** | Stainless steel probe | 6 kg |
| | Single-section steel extension piece | 3 kg |
| | Main C-ALS cable | 0.18 kg/m |
| | 1 m Boretrak rod | 0.4 kg |
| | Surface unit | 4.1 kg |

### Power

| | | |
|---|---|---|
| **External power input** | | 11.5 Vdc to 15 Vdc |
| **Mains power adapter input** | | 110 Vac to 240 Vac |
| **Max current draw during scan** | | 4.5 A |

### Camera

| | | |
|---|---|---|
| **Lighting** | | 874 lumens |
| **Lens** | | 10 mm fixed |
| **Video signal** | | AHD |
| **Resolution** | | Full HD (1920 x 1080) @25fps |

For further information and the best possible application and performance support please contact Carlson at lasermeasurement@carlsonsw.com

910-290-40