FiX1

Fixed Installation Scanner

The FiX1 – 'Fixed Installation Scanner' from Carlson is a completely automated system for obtaining regular, real-time volumetric data of stockpiled material. With connectivity through Ethernet, Wi-Fi and cellular networks, the FiX1 can be permanently installed in remote, inaccessible areas.

Once installed with a direct view over your stockpiles, the system scans the material and, on its onboard processor, processes and delivers a volume without any user intervention.

The FIX1 carries out volumetric scans that are triggered manually or by a user-defined schedule. Results are displayed via the onboard web interface on your PC or mobile device and can also be automatically delivered by email.

For large facilities, too big for a single FiX1 to observe, multiple FiX1 units can be installed and configured into a single, geo-referenced system. One unit acts as a 'hub' and all additional units are the 'spokes'. All the spokes are accessed and controlled through the hub. A single volume or set of volumes is returned from the hub-and-spoke system.

Multiple units located in geographically separated facilities can be gathered together in CarlsonOPS software. CarlsonOPS works as a management system allowing combined volumes, allocation of admin rights, views of historic data and trends.

Advantages

- Automated delivery of volumetric data
- Accurate, direct measurement of volumes can replace estimates or indirect measurement of material in and out
- Provides stockpile volume information in geographically remote areas without assigning manpower and resources
- No requirement for tripod mounted survey instruments and multiple setups around each stockpile
- After installation, no knowledge of surveying, data processing or point cloud manipulation is required by users
- Improves safety by removing the need for personnel on the ground in hazardous areas, such as quarries, open pit mines or other industrial facilities
- Identify trends in stockpiled material and usage
- Multiple units can be connected in a network to allow the monitoring of large stockpiles or groups of stockpiles
- If different materials are stockpiled alongside each other, the scanned area can be cut into regions, each of which report separate volumes.
- Mounting plate supplied for easy and versatile installation
- Cell phone connection for installation in facilities with no local network infrastructure
- Access point mode for easy connection by mobile devices
- Serial and USB ports provide opportunities to interface with external sensors for more advanced configurations
- Remote software and firmware upgrades
- Rugged design for durability in extreme conditions

How it works – Installation

- Mounted units are installed with the best possible view over the stockpiles
- Units are surveyed into the local site coordinate system, if needed
- If necessary, multiple units may be needed to cover the large or complex areas. Each unit in the hub-and-spoke arrangement is georeferenced so that scans from each unit mesh together seamlessly
- All units are connected to the same network by ethernet cable, Wi-Fi or cell phone.
- Pre-existing base data is uploaded to provide a geo-referenced floor level
- Polylines delineating regions within the scan area are uploaded if separate volumes are needed from different grades or types of material in the scanned area
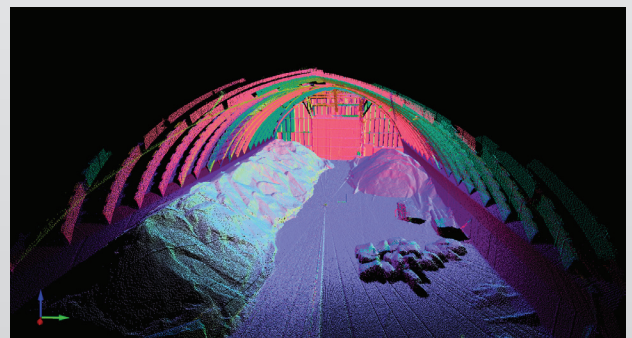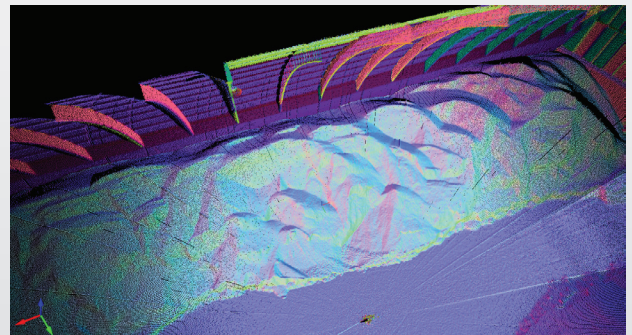
FiX1 Web UI on the Carlson RT4

Manage settings, diagnostics, scan scheduling, and view performance over three connectivity options:

- Cellular
- Wi-Fi
- Ethernet

How it works – Operating

- The FiX1 Web UI is accessed through a networked PC, or on a mobile device, depending on network installation
- The Web UI gives complete access to the FiX1 settings and diagnostics
- Set up a schedule of scanning: hourly, daily, specified times etc.
- Setup a list of emails to receive automated reports for each scan or if the volume is outside specified limits
- In multiple system configurations, one of the FiX1 systems will act as a HUB and provides the connection to all networked systems so that they can be configured and accessed through a single interface.

How it Works – Scanning

- When a volume is requested, manually or via a predefined schedule, the FiX1 starts scanning the area according to preset scan settings
- In a hub-and-spoke system, the hub requests scans from all the spokes
- The data collected is filtered and smoothed on-board. A surface grid is created representing the top surface of the stockpiles
- In a hub-and-spoke system, all spokes return a grid to the hub and a single, georeferenced surface is created
- The top surface is compared to the base surface, and a volume computed
- All processing takes place onboard, without user intervention

How it works – Volume Data

- The volume is presented to the user through the main page of the web UI
- Multiple volumes can be reported if multiple regions have been delineated
- All recent, computed volumes are displayed on the web UI, showing recent trends in graphical or tabular form
- A PDF report is automatically generated for each requested volume
- The report is sent out to all listed emails addresses if user-defined triggers are hit
- Scans can be viewed via a 3D viewer in the web UI to check for anomalies or foreign objects
- Point clouds can be downloaded for further analysis and verification, if occasionally required for QC and troubleshooting
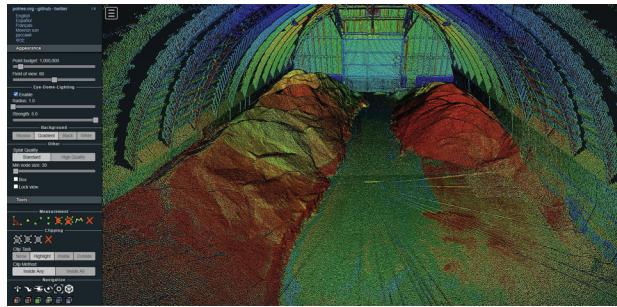
Instant scan review in the FiX1 Web UI
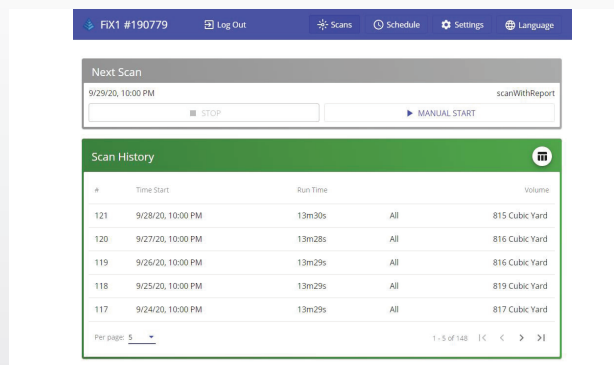
Volume and scan history in the FiX1 Web UI

CarlsonOPS

- FiX1 units are self-contained engines which scan and compute volumes independently. However, if you own multiple installations in facilities over a wide geographical area, CarlsonOPS enables you to manage all units from a single interface.
- The cloud-based software maintains a network link to all units in your fleet. An online map plots the locations of each system and graphs show individual and consolidated volumes at each facility or across groups of facilities.
- Volumes of different grades of material can also be displayed and totalled.
- Permissions for management of FiX1 installations can be allocated and groups of FiX1s created according to geographic area or material type.
- Keep track of material movements and track how the stockpiles are distributed over time.

Applications

- Salt domes for winter road maintenance
- Processed concentrates in covered mine facilities
- Exterior ore Stockpiles in quarries and open pit mines
- Agricultural silos
- Material storage in ports and harbours

Carlson
BREAK NEW GROUND

Laser Module

Type	InGaAs Laser Diode
Wavelength (typical)	905nm
Accuracy*	±10mm
Maximum Energy per Pulse	0.461uJ
Beam Divergence	2.25 x 1.5 mrads
Range Resolution	10mm
Maximum Range to Passive Target**	250m
Minimum Range	0.5m
Lens Aperture Size and Location	28mm located in tilt head
Beam Footprint at 50m	141mm x 103mm
Maximum Measurement Rate (points per second)	15,000Hz

Physical Data

Size	(H x W) 495mm x 314mm (rotational clearance 368mm)
Weight	12.5kg
Power	85 – 265VAC, 80W

Environmental

Water & Dust Resistance	IP67
Operating Temperature	-40°C to +50°C
Storage Temperature	-40°C to +85°C

Angle Measurement

Type	Opto-electronic Encoder
Angular Accuracy	0.0055°
Pan Angle Resolution	0.0055°
Tilt Angle Resolution	0.0055°
Pan Range	360°
Tilt Head Range	360°
Scanning Field of View (Pan)	360°
Scanning Field of View (Tilt)	200°
Motion	Servo controlled Brushless DC Motor

External Connections

Serial	Rugged 9-Pin Lumberg
Ethernet	Rugged RJ45
USB	Rugged STD USB A Female
Antenna	2 x 50Ω SMA (IP67)
Power	4-pin Rugged Binder Connector
SIM Card	Access via IP67 threaded plug

Web UI Connectivity

Serial	115200baud, with 12V, 1A power. Isolated data and power.
USB	Full Speed USB2.0 with 5V, 500mA power.
Ethernet	10/100 Base T
Wi-Fi	• High performance 2.4/5 GHz IEEE 802.11 a/b/g/n • Up to 100Mbps (UDP), and 80Mbps (TCP)
Browser	Chrome, Firefox, Safari (Edge not supported)

Cellular

USA	LTE Cat 4; 3G fallback; LTE bands 2, 4, 5, 13, 17
Europe, Asia	LTE Cat 4; 2G and 3G fallback; LTE Bands 1, 3, 5, 7, 8, 20
Japan	LTE Cat 4; 3G fallback; LTE Bands 1, 3, 5, 8, 19
APAC, S. America	LTE Cat 4; 2G and 3G fallback; LTE Bands 1, 3, 5, 7, 8, 28

Dimensions
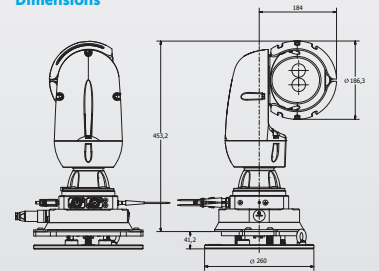
CLASS 1 LASER PRODUCT

* Max measuring accuracy recorded at 50 m against Kodak white card (90% reflectivity) to 1σ. Accuracy is defined as the degree of conformity of the measured sample mean range to its actual (true) value, measured with reference to a total station under Carlson test conditions.

** Max measuring ranges are recorded against Kodak white card (90% reflectivity).

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

020-240-32