

Compact, High-Density 3D Mobile Mapping System



- Integrated, turnkey solution
- Ultra-compact design
- Multiple lasers minimize scanning shades
- Unparalleled ease-of-use
- No user calibration required
- Full integration of cloud and images

IP-S3 HD1 Compact, High Density 3D Mobile Mapping System

The lightweight, compact IP-S3 HD1 offers a high-density point cloud with colorful image overlays for the ultimate in feature recognition and mapping detail.

The IP-S3 HD1 bundles the longstanding experience of Topcon in mobile mapping systems in a small package. The system overcomes the challenges of mapping 3D features at a high level of accuracy. Accurate vehicle positions are obtained using three technologies: A dual frequency GNSS receiver establishes a geospatial position; an Inertial Measurement Unit (IMU) provides vehicle attitude; and connection to the vehicle or external wheel encoder obtains odometry information. These three technologies work in tandem to sustain a highly accurate 3D position for the vehicle even in locations where satellite signals can be blocked by obstructions such as buildings, bridges, or tree lines.

The IP-S3 HD1 system includes a single sensor head of LiDAR containing lasers oriented to cover roadside features up to 100 m away. The panoramic, high-resolution 30 megapixel camera is included to collect images in fixed distance intervals. All sensor inputs are recorded and time stamped to a common clock driven by the IP-S3 HD1.

Use the powerful, all-in-one Mobile Master Field and Office software suite to collect and process geo-referenced LiDAR and/or digital imaging data into colorful 3D representation which can be exported to third party software. Matching techniques and ground control functionality help optimize precision and absolute accuracy. Mobile Master software provides a simple interface for combining, viewing and working with your various sensor data collected from the IP-S3 HD1.

The IP-S3 HD1 quickly provides high-accuracy data and dynamic imaging for any mapping project. The easily mounted vehicle system can map data at normal travel speeds for roadway surface condition assessments and roadside feature inventories. Safety is increased by removing pedestrians from the travelled lanes. Other applications include pipelines, utilities, as-builts, construction progress monitoring and risk management.

IP-S3 HD1 Hardware Features

- Small and lightweight system
- Simple mount and dismount from vehicle
- High-precision point cloud

IP-S3 HD1 Software Features

- All-in-one processing software
- Advanced matching and ground control functionality
- Full featured accuracy reporting
- Extensive projections and geoids exports
- Segment point clouds to facilitate import into third party applications



High Definition Laser Scanner

- Capture high-resolution, high-density 3D point clouds
- Included software projects data into 3D global coordinates with accurate time stamps
- Produce geo-referenced panoramas



Positioning Component

- Determine precise vehicle position and attitude
- Integrated dual frequency GNSS receiver
- Inertial Measurement Unit
- Constantly monitor vehicle motion and attitude



Vehicle Wheel Encoder

- Encoder further enhances accuracy and reliability
- Detects rotation of the wheel
- Only one wheel encoder required



Imaging Component

- Panoramic 30 megapixel camera
- Add-on additional imagery sensors for enhanced clarity

IP-S3 HD1 Installation

This turnkey solution is delivered fully calibrated and ready to deploy. No pre-data collection setup steps are necessary. Simple mounting allows for easy dismounting for safe storage after fieldwork is complete.



MOBILE MAPPING FIELD-TO-FINISH WORKFLOW

The Topcon IP-S3 HD1 is a turn-key package including all hardware, software, training and support for a complete field-to-finish mapping solution.

MAP

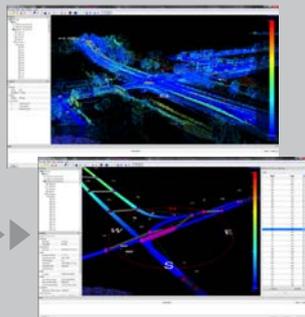
PROCESS

EXTRACT

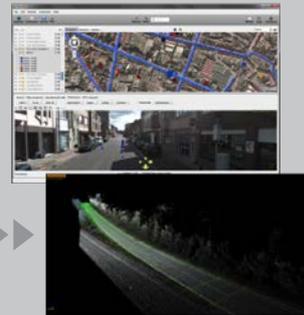
DELIVER



Drive vehicle through route



Process, optimize data
and export scans



Pull features from
point cloud and
make measurements



Export data to GIS or CAD

Map

Mapping with the IP-S3 HD1 allows you to collect more data in less time. A complete dataset is collected while keeping field personnel safe inside a vehicle.

All inclusive Mobile Master Field software ensures successful data collection by importing pre-defined routes, checking sensor status while driving, displaying roads already covered on the map, and playing back datasets while in field.

Process

Easily process your data with Mobile Master Office software. Get high-precision with automatic pass and intersection matching. Achieve high-accuracy with control point matching. Produce colorized scans with images and excellent data visualization and utilization. Generate accuracy reports and optimize data to suit downstream applications for any client requirements.

Extract

Mobile Master Office software easily moves the data to a point cloud extraction software of your choice such as Topcon ScanMaster, Orbit Asset Inventory software, Autodesk Recap, or Bentley PointTools. Point clouds and images from Mobile Master Office can be projected into any of an extensive list of coordinate systems minimizing required workflow steps.

Deliver

Export extracted information into GIS and CAD deliverables, enabling the use in down-stream workflows.

Applications



Civil Engineering /Construction



GIS Asset Management



Transportation

Full-color, high-resolution, high-density point clouds dramatically increase efficiencies in the following areas:

Civil Engineering / Construction

Civil engineering and construction tasks such as as-builts, DTM generation, pavement management, cross-sections, risk management/compliance and clearance surveys can be accomplished faster and in more comprehensive ways with Topcon 3D mobile mapping solutions. Datasets are enhanced with detailed photographic documentation and progress can be easily monitored during each phase of work.

Data from IP-S3 HD1 goes directly into design workflows using Autodesk Civil 3D and InfraWorks supporting Autodesk's statement "the point cloud is the model". IP-S3 HD1 data in Autodesk allows designers the power of working in the context of reality.



Point Cloud with extracted linework



Point cloud and image locations

GIS Asset Management

Creating a GIS database of assets can be an overwhelming task as the number of items to map can be immense. The Topcon IP-S3 HD1 simplifies the task by obtaining data on all assets in a particular area as the truck drives through. The high-definition point cloud ensures that data on smaller utilities such as water valves are obtained. In addition to location information, asset managers can view descriptive details of the assets using the colorized point cloud image overlay. It is not necessary to predefine the attribute values needed in the GIS database before fieldwork. All information is in the IP-S3 HD1 database and can be extracted at any time after the field work is complete.

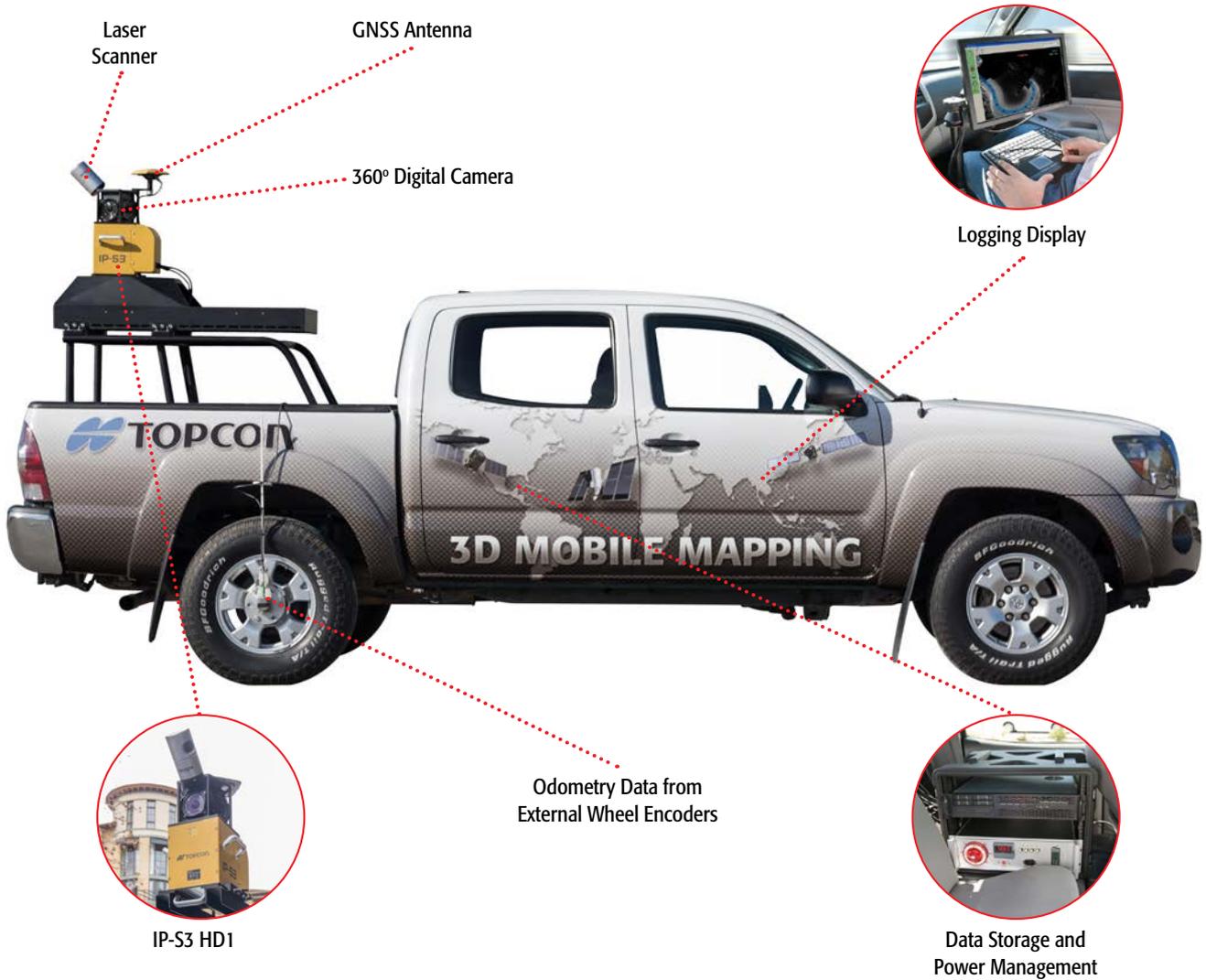
Transportation

Using GPS alone for data collection of transportation facilities such as roads, highways, tunnels and overpasses can often pose problems as signals are blocked by nearby buildings and structures. The Topcon IP-S3 HD1 becomes a great solution for transportation mapping as the combination of GPS and IMU sensors allows for continued accurate position updates in GPS outage areas. The IP-S3 HD1 vehicle also captures data under overpasses and in areas where aerial fly-over methods produce no data. The detailed point cloud from the IP-S3 HD1 allows for data collection of small objects such as individual rail ties for railway applications. A combination of the high-definition laser with the speed and accuracy of the IP-S3 HD1 makes the system a perfect fit for transportation mapping applications such as highways, railways and roads.



Point cloud and image locations

PRIMARY FEATURES

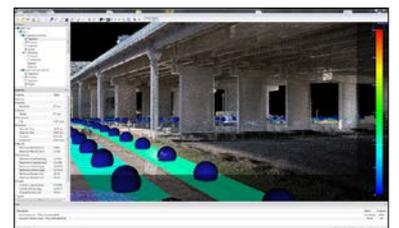


High Definition Laser Scanner

The high-definition laser scanner included with the IP-S3 HD1 collects 700,000 points-per-second at a range of 100 m. The scanner has a 360° horizontal field of view and a 30° vertical field of view to increase data collection coverage and minimize laser shadowing. With those features, the system remains lightweight at under 18 kg making it the lightest and most compact high-precision mobile mapping system available today.



**32 lasers,
calibrated by Topcon**



**Multiple lasers provide
optimum coverage**

SPECIFICATIONS

IP-S3 HD1 Timing Unit

Dimensions	260(W)×160(D)×121(H) mm
Weight	3.0 kg (6.6 lb)
Input/Output ports	Power supply, Ethernet, scanner, spherical camera, wheel encoder, IMU, GNSS antenna
Timing resolution	10 nsec

Sensor Unit

Dimensions (w x d x h)	300×500×600 mm
Weight (including sensors)	18 kg (39.6 lb)

GNSS Receiver

Tracking	226 universal channels for reliable, "all in view", dual-frequency L1/L2 code/carrier GPS and GLONASS tracking
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IMU

Gyro bias stability	1°/hr
Acceleration bias stability	7.5 mg

Laser Scanner

Measurement rate	700,000 point/sec
Range	100 m at 100% reflectivity, 70 m typical
Calibration	Topcon calibrated for high precision

Spherical Camera

Camera unit	CCD camera (6 pcs.)
Maximum resolution	8000 × 4000 pixels

System Performance

Absolute coordinates accuracy	50 mm at 10 m distance (1 sigma) ^{*1} 10 mm on road surface (1 sigma) ^{*2}
Continuous surveying time	8 hours (results in approx 1TB of data)

Environmental / Temperature Range

Operating	32° to 113°F (0°C to 45°C)
Storage	-22° to 140°F (-30°C to 60°C)

Electrical

Input voltage	9V to 36V
Power consumption	60W

1) Comparison to 10 known points, 30 passes at 30km/h Surface accuracy

*2) Plane fitting results on flat road surface

For more specifications information:
topconpositioning.com/ips3

SOFTWARE

Mobile Master Office

Viewing, processing, projecting and export software for 3D point cloud, trajectory and panoramic image data.



Mobile Master Office software provides a simple interface for combining, viewing, projecting and working with your various sensor data from the IP-S3 HD1 Mobile Mapping System.

Simple Interface

Providing an easy process for loading trajectory, point cloud and panoramic images for collected IP-S3 HD1 data.

Multiple Views

Collected IP-S3 HD1 data can be viewed in a variety of ways either by viewing the data on a background map, in 3D, in the Panoramic View, or a combination of these modes.

Panoramic View

The Panoramic View allows the user to see the images overlaid with collected point cloud data to perform extraction of desired features.

Process and Correct Trajectories

Process trajectories using a combination of positioning sensors and base station data. Optimize precision using automatic matching. Apply ground control points to bring accuracy to the required level.

Feature Extraction

Easily extract points, polylines or polygons and export them to CAD formats.

Project to Selected Coordinate System

Select a coordinate system from an extensive list of options and project your data before exporting to third party software. Taking care of this important step in Topcon software will tighten up your workflow and speed up your mapping process.



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