IP-S2 HD

TOPCON

High Definition 3D Mobile Mapping System

- Integrated, turnkey solution
- Georeferenced, Time-Stamped, Point Clouds and Imagery
- High Density, Long Range LiDAR sensor for ultimate in visual detail
- High Accuracy IMU and DMI Odometry for positional accuracy and reliability
- 360° Camera for Spherical Image Capture
- Powered Retractable Mounting System

IP-S2 HD High Definition 3D Mobile Mapping System

The IP-S2 HD gives a high density point cloud with colorful image overlay for the ultimate in feature recognition and mapping detail.

Topcon's IP-S2 HD Mobile Mapping 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 encoders obtains odometry information. These three technologies work together 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.

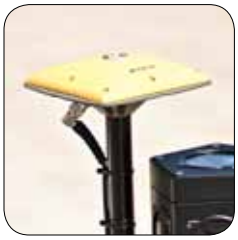
The standard IP-S2 HD system includes one sensor head of LiDAR containing 64 lasers oriented to cover roadside features up to 100m away. A 360° spherical digital camera is included to collect images at fixed distance intervals. Optional high resolution still digital cameras are available for enhanced object viewing. All sensor inputs are recorded and time stamped to a common clock driven by the IP-S2 HD.

Geoclean, Topcon's powerful software, will post-process the geo-referenced LiDAR and/or digital imaging data into a viewable 3D image representation which can be exported into 3rd party software. GNSS data can be post-processed against a permanent or temporary base station for higher accuracy. Spatial Factory software provides a simple interface for combining, viewing and working with your various sensor data from the IP-S2 HD.

The IP-S2 HD quickly provides high accuracy data and dynamic imaging for any mapping project. The vehicle-mounted 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, railways, utility corridors, and waterways.

High Definition Laser Scanner

- Captures 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 Encoders

- Encoders further enhance accuracy and reliability
- Detects rotation of each wheel
- Compares differnece in rotation speeds

Imaging Component

- 360° digital camera
- Add-on additional imagery sensors for enhanced clarity

IP-S2 HD Features

- High density point cloud for ultimate visual detail
- Extended range for additional data acquisition
- Geo-referenced spherical imagery produced
- Sensor fusion software provides colorized 3D models of the environment
- Easily export to Spatial Factory or 3rd party software for feature extraction
- Accurate vehicle position and attitude
- Factory calibrated, integrated system
- Cost effective, turnkey solution

IP-S2 HD Installation

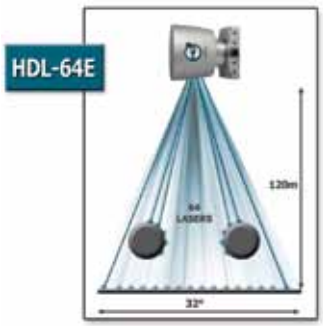
This turnkey solution is delivered fully calibrated and ready to deploy. No pre-data collection setup steps are necessary. A retractable mounting system allows the equipment to fold down for easy storage when the system is not in use.

PRIMARY FEATURES

High Definition Laser Scanner

The high definition laser scanner included with the IP-S2 HD collects 1.3 million points per second at a range of 100m. 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. Coupled with this high definition LiDAR scanner, the IP-S2 HD provides the greatest point cloud density and longest range available in a mobile mapping system today.

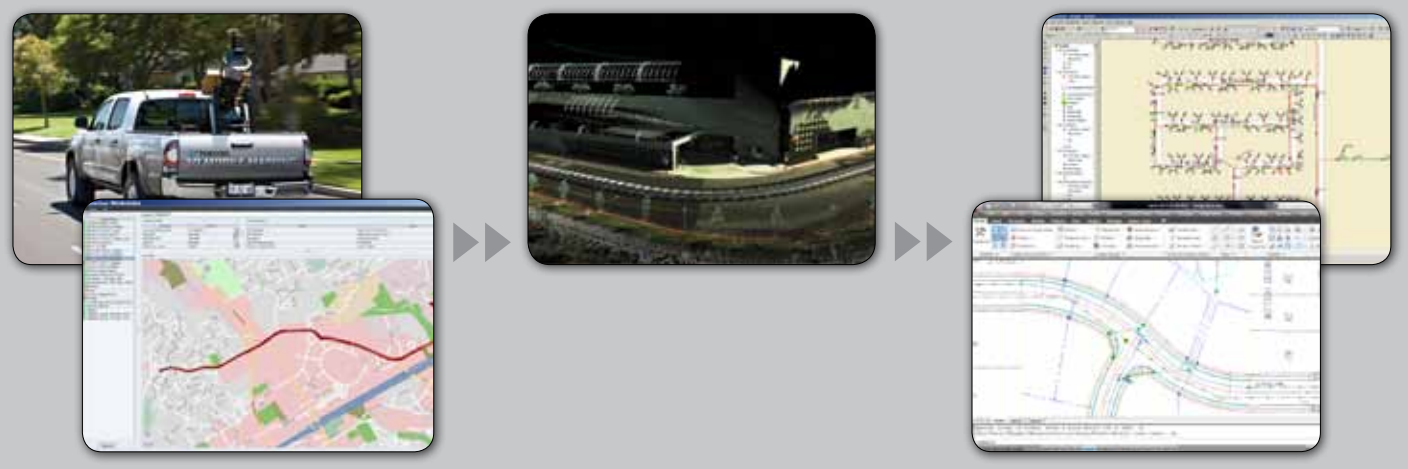
Velodyne®
HDL-64E S2



HDL-64E scans both sides of features

IP-S2 HD PROJECT WORKFLOW

MAP ▶▶ **EXTRACT** ▶▶ **DELIVER**



Drive vehicle through route

Pull features from point cloud and make measurements

Export data to GIS or CAD

The IP-S2 HD Software Provides User-friendly Data Collection and Processing Solutions

IP-S2 HD Dashboard-Data Collection Software

The IP-S2 HD Dashboard operates on a PC web browser. This software allows the user to easily control and configure the IP-S2 HD Box with all connected sensors. It also controls field data capture, storage and display.

Geoclean – Post Processing Software

GNSS Post Processing

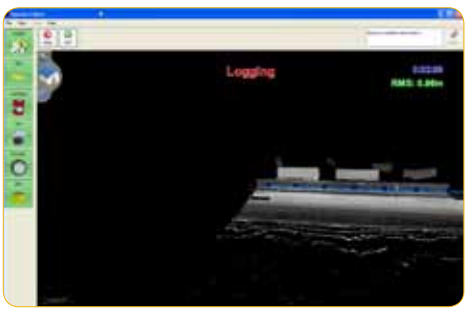
Geoclean determines the vehicle positions by means of continuous kinematic processing using the vehicle mounted GNSS receiver and fixed base station data.

Hybrid Analysis for Vehicle Attitude and Location

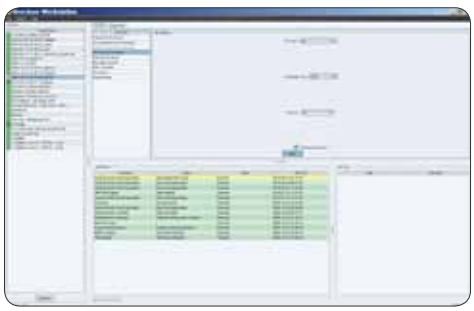
By integrating GNSS data with IMU and wheel encoder data, Geoclean determines a vehicle attitude correlated to accurate geographical locations.

Combining Images and Point Clouds

Geoclean software precisely combines imagery and scanned data to generate insightful full-color point clouds.



IP-S2 HD Dashboard



Geoclean Post-Processing Software

Image and Point Cloud in Geoclean Software

Applications

Utilities

GIS Asset Management

Transportation

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

Utilities

Topcon's IP-S2 HD effectively addresses utility infrastructure needs such as mapping electric and telephone grids in both urban and rural areas. In instances where it has been cost prohibitive to collect location and attribute data due to the time consuming, labor intensive nature of traditional data collection techniques, the IP-S2 HD now provides a fast and affordable means to create accurate map data. The amount of ground that can be covered in a day is greatly increased and the number of personnel required to do the job decreases in magnitude. The opportunity for human input error is also greatly decreased. The detail obtained in a high definition point cloud from the IP-S2 HD allow overhead power lines to be captured which may get missed with standard definition mobile mapping systems. As a result, management agencies are able to make accurate and quick maintenance decisions right from the office saving time and costly mistakes.

Point Cloud with Image Overlay

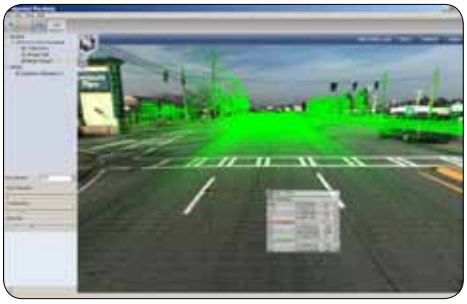
Point Cloud with Image Overlay

GIS Asset Management

Creating a GIS database of assets can be an overwhelming task as the number of items to map can be immense. Topcon's IP-S2 HD can simplify 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 vales is 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-S2 HD 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 GPS signals are blocked by nearby buildings and structures. Topcon's IP-S2 HD 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-S2 HD vehicle can also get data under overpasses and in areas where aerial fly-over methods produce no data. The detailed point cloud from the IP-S2 HD allows for data collection of small objects such as individual rail ties for railway applications. A combination of the high definition laser and the speed and accuracy of the IP-S2 HD make the system a perfect fit for transportation mapping applications such as highways, railways and roads.



Point Cloud with Image Overlay

IP-S2 HD

SPECIFICATIONS

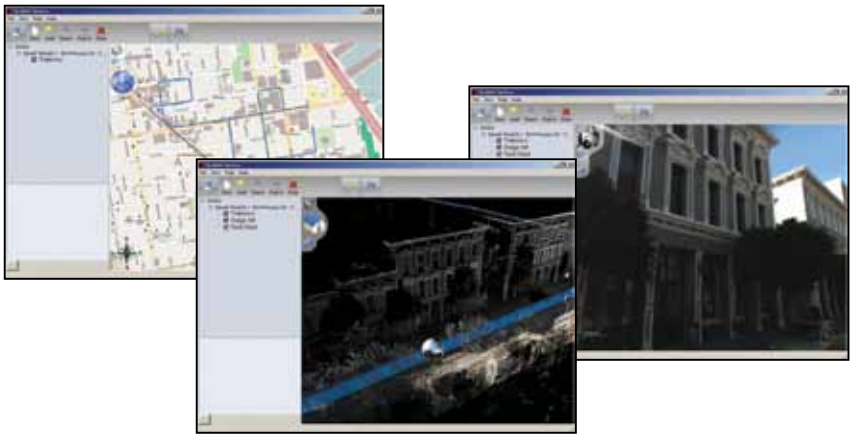
GNSS Component	
Channels	40 channels, all-in-view, L1 GPS, L1/L2 GPS, L1/L2 GLONASS, L1/L2 GPS + L1/L2 GLONASS, WAAS, MSAS, EGNOS
Low Signal Tracking	Down to 30 dBHz
Cold Start	< 60 sec
Warm Start	< 10 sec
Reacquisition	< 1 sec
Advanced Firmware Function	Up to 30 g's of dynamic multipath mitigation Co-Op tracking
Real Time Position & Raw Data	Up to 10 Hz update rate
RTCM SC104 v2.1, 2.2, 2.3, 3.0	Input/Output
NMEA 0183 v2.1, 2.2, 2.3 & 3.0	Output
High-Accuracy IMU	
Type	Honeywell HG1700
Data Rate	100Hz
Gyro Bias/Drift Rate	1°/hr, 3°/hr
Power	
Input Supply Voltage	Continuous 12-14 VDC with approximately 50 amp draw
System power consumption	Approximately 300W
Physical	
Size	56 x 27.5 x 49 in (1422 x 699 x 1245 mm)
Weight	approx 180 lbs.
Environmental	
Operating Temperature	-10 C to + 40C
I/O Ports	
CAN Bus	OBDII - MOLEX-9 Pin
Encoder	TTL quadrature input
Ethernet	100 Base-T
USB 2.0	Host input/output
RS-232-/422	Up to 2 Mb/s
High-speed Digital I/O (x4)	LVDS 400 Mb/s

For more specifications information:
topconpositioning.com/ips2-hd

SOFTWARE

Spatial Factory Software

A 3D viewing, editing, and feature extraction software for 3D point cloud, trajectory and panoramic image data.



Spatial Factory software provides a simple interface for combining, viewing and working with your various sensor data from the IP-S2 3D Mobile Mapping System.

Simple Interface

Provides an easy process for loading trajectory, point cloud and panoramic images for collected IP-S2 data.

Multiple Views

Collected IP-S2 data can be viewed in a variety of ways either by viewing the data on a background map, in 3D, or in the Panoramic view.

Panoramic View

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

The user can easily adjust Point Reduction, Transparency and Point Size using slider bars for a customized view.

Take Measurements

Just click the Measure Tool on the tool bar to measure the distance between 2 points in the view. Get Slope Distance and various Point Details.

GIS Feature Extraction

Point, line and area features and attributes can be mapped and edited directly from the viewing screen and exported in shapefile (.shp) format or as an ascii (.csv) file. Spatial Factory also supports the import and export of shapefiles including full attribution from existing geodatabases.

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