

RIEGL LiDAR

Hardware integration guide

OXTS Survey





Overview

Riegl manufacture high precision high power LiDAR units that are used extensively in the survey industry. Riegl's own post-processing software is compatible with OxTS Inertial Navigation System (INS) devices which are used to supply the navigation information.

Importantly, OxTS INS navigation data, NCOM, is supported by Riegl's own software so only a PPS, NMEA and NCOM connection between the two devices needs to be created for the complete system.

Requirements

For the LiDAR to function correctly with an INS it needs to be receiving NMEA messages from the INS and time synchronisation messages. NMEA messages and pulse per second (PPS) messages can be sent to the Riegl device by wiring into it correctly. The Riegl device can receive NMEA over RS232 or ethernet. Further to this, NCOM data must be sent from the INS to the Riegl device over an ethernet connection.

Riegl software should be used for recording and processing data.

Hardware

In order to fulfil the requirements above, a cable must be created to communicate between the two devices. The exact design of the cable will depend on your data capturing requirements. Wiring diagrams are included in the manuals of our INS devices and each of the Riegl LiDAR manuals to give you all the necessary information.

The pinouts of the main connectors of each INS are described in their manuals. An example is this table from the xNAV650 manual:

Pin #	Name (Function)	I/O Type	Description
1	Supply+	P	Power supply +
2	Supply+	P	Power supply +
3	Serial	I/O	Serial RS232 RX
4	Serial	I/O	Serial RS232 TX
5	ERX-	I	Ethernet receive -
6	ERX+	I	Ethernet receive +
7	ETX-	O	Ethernet transmit -
8	ETX+	O	Ethernet transmit +
9	I/O signal 2	I/O	Configurable I/O. (contact OxTS for options)
10	I/O signal 1	I/O	Configurable I/O. (contact OxTS for options)
11	Signal ground (isolated)	P	Isolated signal ground
12	PPS (isolated)	O	Pulse per second synchronisation output, referenced to isolated signal ground (#11)
13	Signal ground	P	Signal ground
14	Supply-	P	Power supply -
15	Supply-	P	Power supply -





Similarly, Riegl provides information on the signals into the connector on the Riegl unit:

Pin	Assignment	Note
1	GPS TxD	RS232 transmit
2	GPS_PPS	TTL input
3	GND	Ground
4	GND	Ground
5	GPS RxD	RS232 receive
6	USER.Tx	TTL output
7	USER.Rx	TTL input
8	GND	Ground
9	Remote On/Off	Connection to GND switches the instrument on/off
10	GND	Ground
11	CAM_Trig	TTL input
12	CAM_Exp	TTL output
13	D2+	LAN1 ethernet data pair 2 +
14	+UB	Power supply +
15	D1-	LAN1 ethernet data pair 1 -

Pin	Assignment	Note
17	-UB	Power supply ground
18	D4+	LAN1 ethernet data pair 4 +
19	D4-	LAN1 ethernet data pair 4 -
20	+UB	Power supply +
21	D3+	LAN1 ethernet data pair 3 +
22	D3-	LAN1 ethernet data pair 3 -
23	-UB	Power supply ground
24	D2-	LAN1 ethernet data pair 2 -

A cable can be created that matches the signal outputs from the pins on the INS connector to the input signal pins on the Riegl device. PPS messages must be sent to the Riegl by wiring into it from pins 12/11 on the xNAV to pins 2/3 on the Riegl. NMEA messages can be sent to the Riegl over RS232, pin 4, or by ethernet.

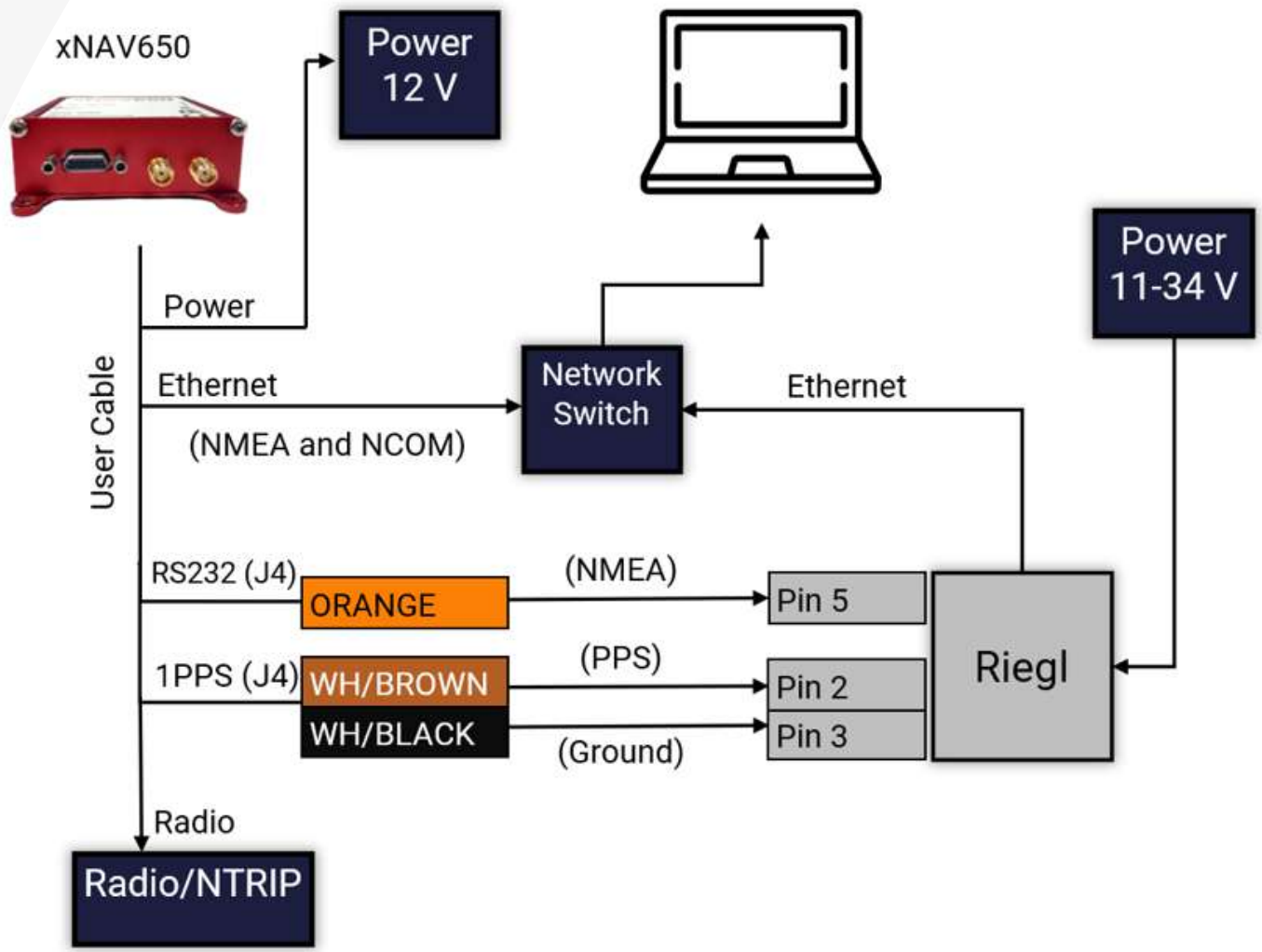
An ethernet connection in necessary between the units, the Riegl must be receiving NCOM data which it decodes to use as its navigation data. You can do this through a network switch and configure it as described in the following section.





Riegl PPS Setup

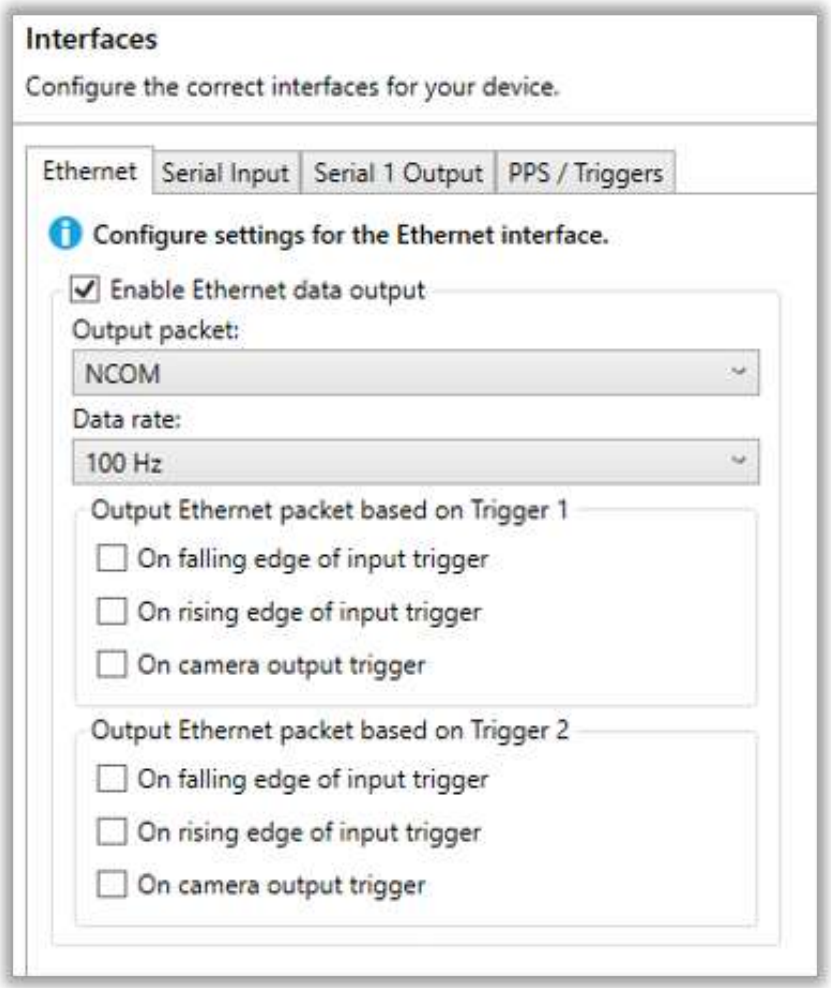
An example setup using PPS:



Configuration

To configure your INS device to work with the LiDAR you need to ensure that the correct messages are being sent. This can usually be done in the Interfaces tab of OxTS' complimentary INS device configuration software, NAVconfig.

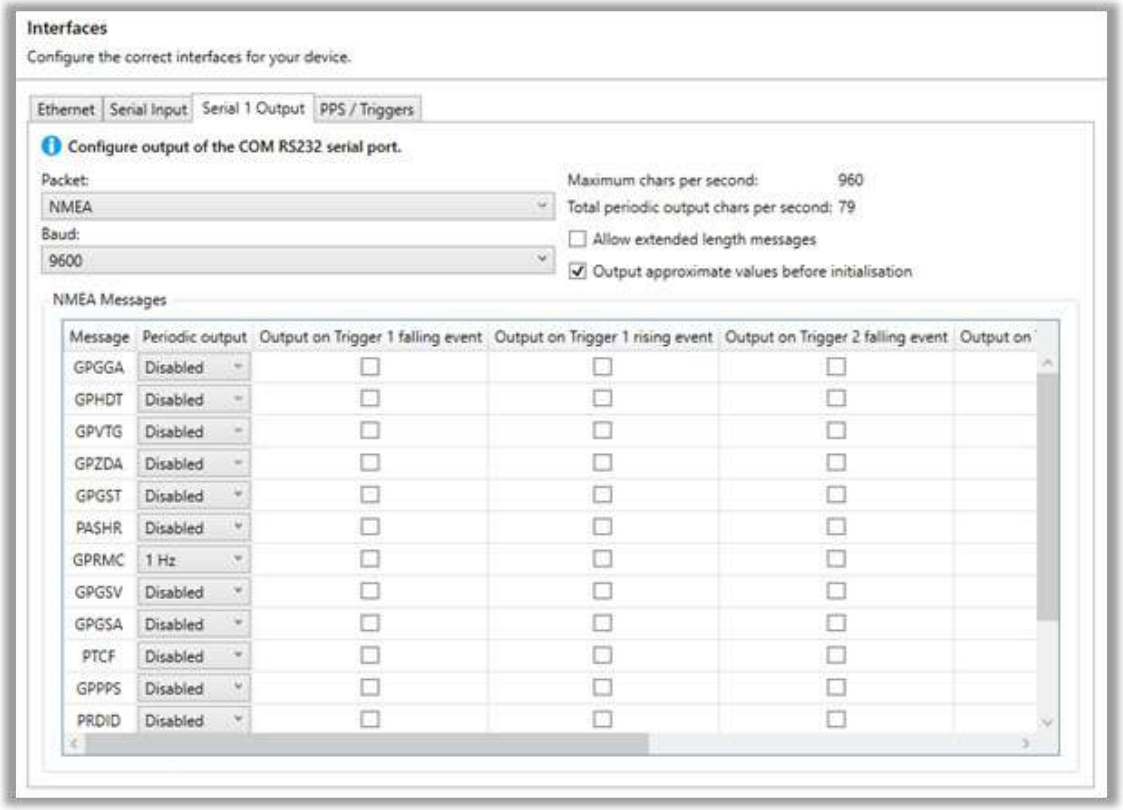
NCOM must be configured to be sent over ethernet, this is done in the Ethernet tab.



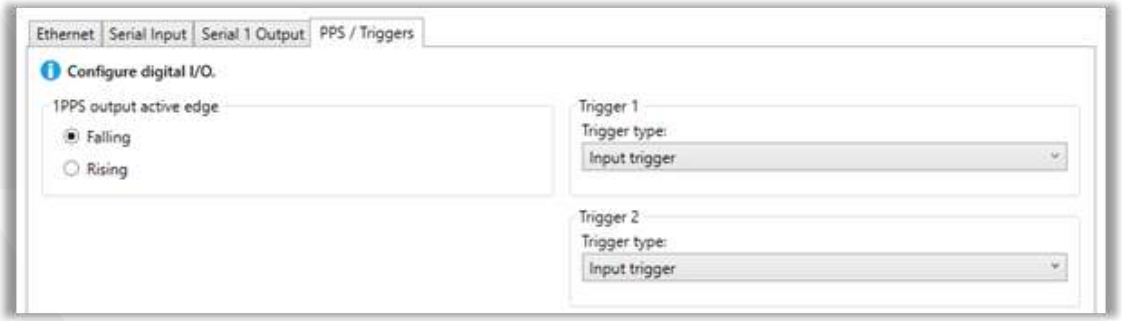




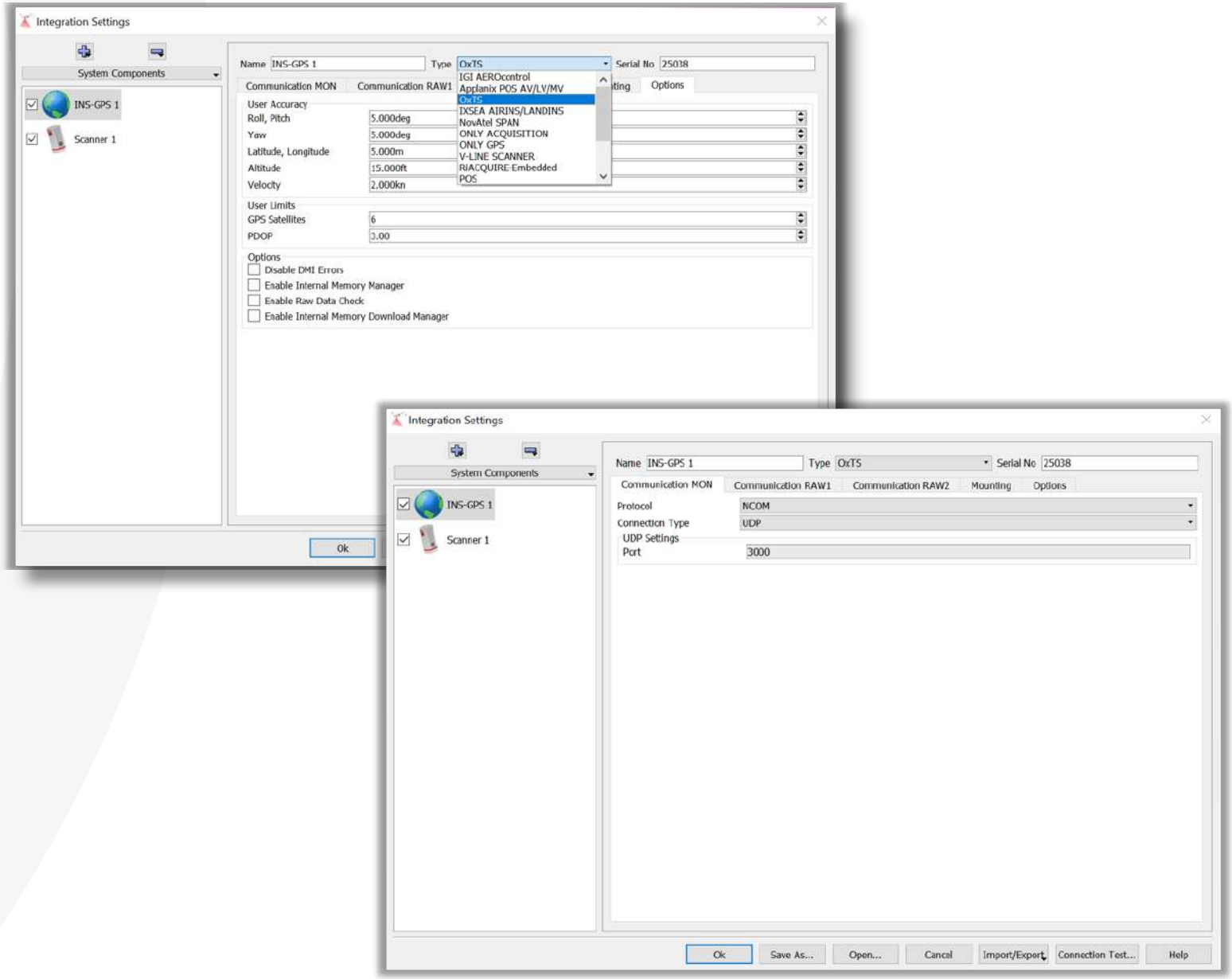
In the Serial 1 Output tab you will need to select the correct NMEA message type and baud rate for the Riegl device. Select GPGGA messages and a baud rate 115200 at 1 Hz.

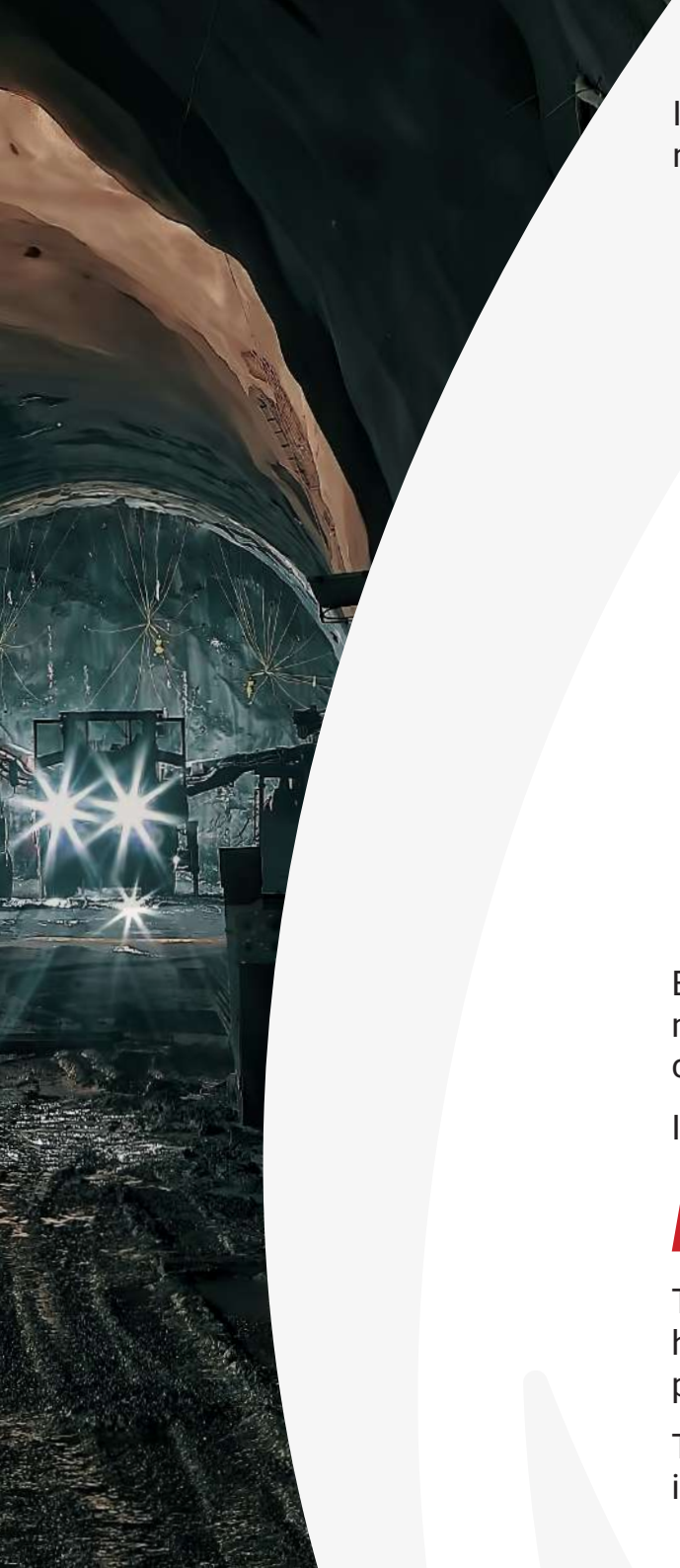


PPS messages are selected in the PPS/Triggers tab.

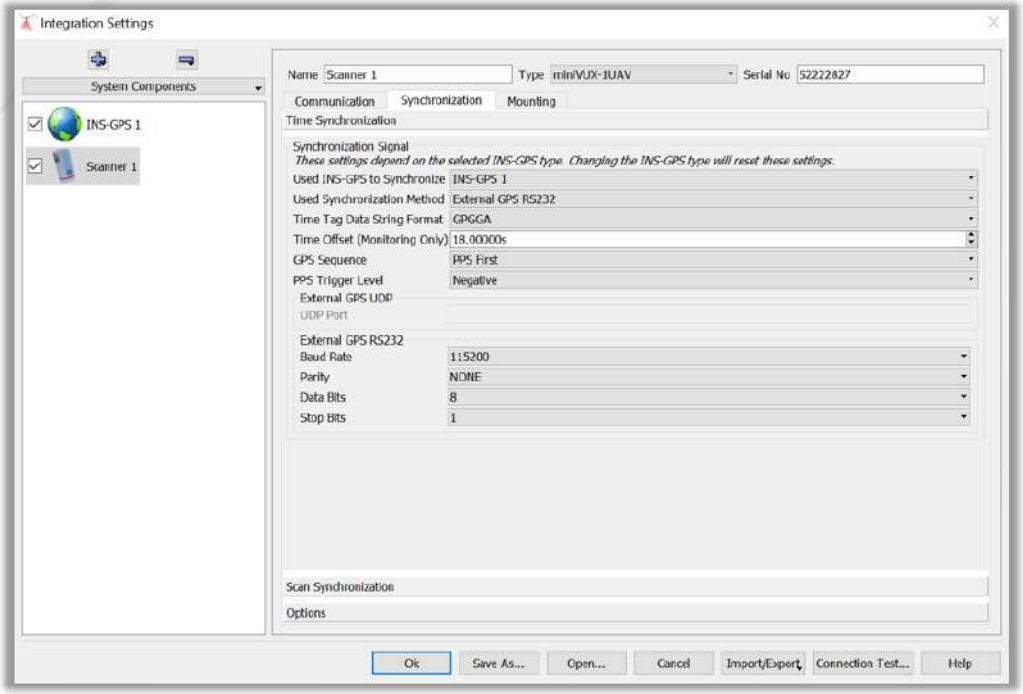


In the Riegl software, select the OxTS NCOM option in the INS option list, this will decode the INS data into the position, time and orientation data that the LiDAR requires.





In the integration settings of the Riegl software, configure the protocols to be expecting messages that match what you have selected in NAVconfig for the PPS and serial outputs.



Before you begin collecting data, ensure that you are getting time synchronisation and NMEA messages. You can use the Riegl software to see that position and time information is updating correctly.

Important: The INS must be initialised to send valid NMEA messages.

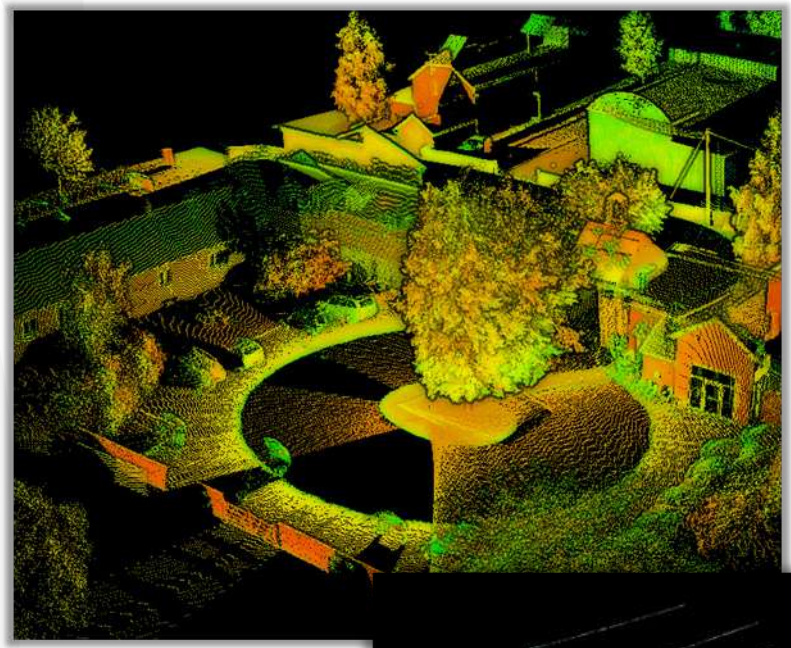
Post processing

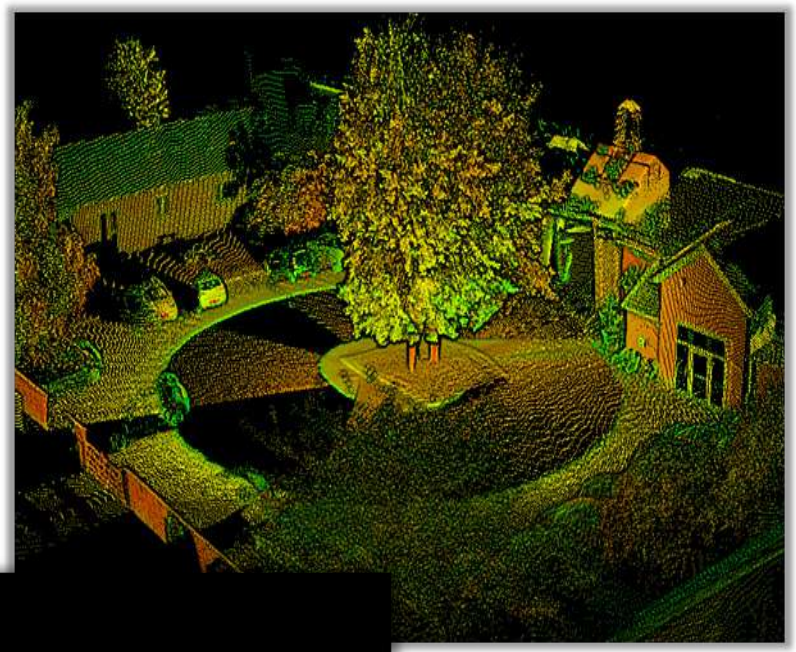
The Riegl software will decode the NCOM data in real-time for its navigation data. It is therefore highly recommended to have access to a base station in real-time to get the highest quality pointcloud.

To create a pointcloud, follow the instructions in the Riegl software wizard with the correct input files.

Example data

The below survey was conducted using an OxTS xNAV v3 INS and a Riegl LiDAR sensor. The data was processed using Riegl's own post-processing software.









Need further assistance?

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