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[Case Study – Topcon GLS-2000 scan colourisation]

## 3D Documentation - TerraDat

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**Organisations involved:** TerraDat

**Products used:** NCTech iSTAR & ColourCloud

*"We use the iSTAR every other day - we've always got scanning jobs on - and it always goes out on them... it's such a useful and quick tool for getting a representation of what's there"*

*[Nick Rusill, Co-founder and Managing Director at TerraDat]*



TerraDat is a specialist geophysical and geomatic mapping company, established in 1992, which is based in the UK and has subsidiary offices in Italy and Australia. The core business is sub-surface geomapping using non-destructive techniques (which do not involve cameras) but the company has expanded significantly into other surveying areas where high resolution reality capture, including photographic imagery, is integral.

Examples are, BIM (Building Information Management) and terrestrial laser scanning, which includes forensic work - both training and support - on crime scenes and mapping large scale disaster scenes where rapid collection of accurate datasets is essential. Other significant activity is structural monitoring, coastal erosion studies for local authorities, architectural visualisation work and digital preservation of heritage structures.

## Profile

Company co-founder Nick Russill first learned about iSTAR from the Laser Scanning Forum a couple of years ago. He followed the camera's development because he considered the optical imaging ability of many terrestrial scanners was far from optimal, especially in challenging lighting or busy urban sites.

When NCTech released the ColourCloud software that enables users to apply the imagery from the iSTAR to any point cloud from a scanner he decided to purchase one of these cameras.

"We were seeking a unique selling point to enhance our deliverables. The panoramas and better colouring and automated workflow from iSTAR were obvious reasons for the purchase.

Another reason was that, with the exception of a couple, much of the scanning hardware we use does not have very good onboard cameras. For example, if you are out in the street and the sun is shining you can have over-exposed highlights and under-exposed shadows and the overall result is not very satisfactory."

## Controlling Imagery Capture

"Furthermore, terrestrial scanners acquire their imagery as part of an automated acquisition cycle, so you have little control over when you are capturing the images, and if something happens like a bus stopping in front of the scanner for 30 seconds, the images will be useless for colouring the data in that part of the scan. However, with iSTAR you can choose your moment to rapidly acquire the image and it gives a much better range and truer representation of what is actually there."

"Prior to having iSTAR we did have instances of working on heritage buildings using laser scanners where the visual imagery of the target was as important as the point cloud measurements, and if the scan cameras did not give a good result we had to resort to external imagery using a digital SLR camera. It means a lot of additional post-processing work to colour the points from the external imagery."

"And our final reason for buying iSTAR was to be efficient on a large project examining the condition of defences against coastal erosion where our time per station was reduced by around two minutes."



## Using iSTAR with Topcon GLS-2000

"It's been particularly good on coastal sites which are difficult places to get accurate exposure settings for a picture to cover the full 360 degrees of the scene using just one exposure. You can have cliffs that might be a dark coloured rock and perhaps sunny skies which are very, very bright and everything else in between. Having the iSTAR's high dynamic range means we can capture everything - nothing is left over or underexposed - and the most important feature is the ease and the ability to integrate the imagery with our point cloud data."

"The laser scanner we use is a Topcon GLS-2000 and we are the first company to use this in conjunction with iSTAR. As such, we've had to tread the pioneering ground in terms of the workflow, getting the compatibility of the scan files to go into the iSTAR software, so it was a bit of a steep learning curve but now we've got it sussed."

"The better quality imagery means we do not have to consider reacquiring imagery if it's below standard. We can work in a greater range of light - it works better at dusk and in low light conditions than do scanners where you might well get more 'noise' in an onboard camera."

"The functionality of the high dynamic range acquisition and the batch processing of that data is impressive - you can pretty much leave it and forget about it and then come back and it's all done. The price is pretty reasonable, and it does save us money in terms of speeding up our workflow on site. We can get more scans per hour as a result of not having to wait for the onboard camera and that means we can do more jobs over a given period and clients gain as our charges reflect reduced time on site. Our clients, and my colleagues, have all been extremely impressed with the iSTAR's outputs."



## Working Closely with NCTech

"It's one thing to design a good a bit of kit in a workshop and try and cater for all the possible applications but we like to think that the feedback from dedicated users like ourselves in specific markets is pretty invaluable. This is something we have been doing with NCTech and we find they value the feedback and are extremely supportive if we have any questions that crop up during field use. For example, my guys on site found that the rubber cover for the door on the memory card can be pushed in the wrong place which ejects the card."

"The facility to trigger the camera from a mobile smartphone is very handy because you can get out of the way and not be in the picture yourself. You can hide behind a rock when taking shots on a beach, but the mobile interface is a bit 'clunky' and takes a bit longer than pressing the button manually on the iSTAR. I fed that back to NCTech and they are working on an App that tells the user more about what is happening so you don't waste time waiting to make sure the camera has finished taking its shot."

"We are also talking to them about the ability to manually assign a name of a picture. At present iSTAR uses a date and time stamp system. Going back to the office with hundreds of scans to match up with the correct image is challenging - it means your note taking has to be extremely rigorous."

An option to let us put in 'Station 1', or 'S1', 'S2' etc. as the title of each image would mean matching it up with the correct scan would be much simpler. When doing a lot of scans - say, 20 scans in a row along a beach - we use a USB GPS that NCTech recommended and this is a very useful backup for determining the position of where the image was taken."

"The most obvious advantage of iSTAR compared to the scanners is the time saved. The onboard cameras in the laser scanners take between two and six minutes to acquire the imagery, whereas with iSTAR it's less than 30 seconds."

Another advantage is that you can choose when you want to take the image. It's robust, no problems, stands up well to the rigors of fieldwork and is simple to use, although we have been using an external battery as we are acquiring up to 100 images a day, so we carry that about with us. We also had to make our own brackets to get it to be compatible with the laser scanner geometry and sit at the right height on the same tripod."

## iSTAR Versatility Assists Working In Different Environments

"We work on a wide range of projects all the time in contrasting settings. For example, we have been involved in an extensive urban planning project around Cardiff Bay. We have acquired laser scan data of this area and then supplemented it with the imagery from the iSTAR. We then went on to prepare a 3D model that can be used as a basis for future visualisations for proposed and planned buildings."

"As mentioned, we do a lot of work in coastal environments, including monitoring the condition of cliffs. It's one thing having just an accurate point cloud but to actually have a good quality visual record of the cliffs at that time can be really useful, both in terms of colouring the point cloud and also to give our clients that additional deliverable of the online panorama where they can visually explore the entire site. It helps give them a context and it helps to understand, for example, different rock colours which may be due to varying types of weathering and indicative of potential failure of the rock face."

"The iSTAR imagery can be invaluable for internal work on buildings. We do a lot of BIM projects. For example, we work with local authorities on refurbishment of schools and other public buildings, so the start point for modelling is to have an accurate point cloud of the structure. To have high definition imagery to go with that is really important as that has always been a bit of weak link. Using iSTAR has given us an advantage, both in terms of time and the quality of our deliverable."

NCTech greatly thanks TerraDat [www.terradat.co.uk](http://www.terradat.co.uk), especially Nick Rusill for his collaboration in this Study Case.

For further information about iSTAR or NCTech software visit [www.nctechimaging.com](http://www.nctechimaging.com) or contact us [sales@nctechimaging.com](mailto:sales@nctechimaging.com)