Case Study

Customer:
The Greenhatch Group

Project:
Monitoring a historic site

Solution:
Trimble SX10 Scanning Total Station

New bridge for historic site

The accuracy of the Trimble SX10 lends itself to a challenging cliff top survey in Tintagel as a new bridge linking the headland and the ruins of the 13th century castle nears completion.

Rugged, beautiful and steeped in Arthurian legend, Tintagel is set high on the North Cornwall coast where the jagged headland reaches out into the Atlantic. A spectacular setting, it is also one of English Heritage's most visited sites. This is despite the challenging link between the headland and the ruins of the 13th century castle – the legendary home of King Arthur – being a difficult scramble up and down hundreds of steps and via a modest wooden bridge.

However, access is set to become considerably easier thanks to a £4m project which will see a new 72m footbridge constructed high above the current wooden structure. Due for completion in Spring 2019, the new bridge design is based on a prize-winning concept submitted in a competition run by English Heritage. The new bridge will be based on a design that has one cantilever on the Cornish mainland and another on the island fortress with an aim to recreate an historic route into the castle.

Ensuring accuracy

Contracted by English Heritage to carry out the dual tasks of monitoring around Merlin's Cave (before and after the bridge's construction) and scanning the cliff faces for erosion purposes, is geospatial survey company and laser scan specialists, The Greenhatch Group.

Greenhatch surveyors were already familiar with the site following an earlier project at Tintagel that saw them surveying the area for historical records. They were therefore aware that the setting would be particularly challenging to work in with fast rising tides, inaccessible areas due to the ravines and a very tight deadline with the imminent shut down of the site in preparation for the construction work.

▲ The winning design concept

English Heritage required the work to be carried out to within a 5mm tolerance for a deliverable that would include scan to scan comparisons and a colourised pointcloud. Greenhatch Engineering Manager, Jordan Knight therefore felt that scan accuracy was the number one priority along with scan range due to the number of site set ups that would be required because access would be restricted to footpaths for health and safety purposes and time short. Scan speed would also be important along with equipment reliability (there would be only one chance to carry out the work) and finally, equipment portability for a job which would see them climbing hundreds of steps and kayaking through Merlin's Cave.

> "With the SX10, the 5mm accuracies specified by English Heritage were easily achieved and the survey delivered on time."
>
> **Jordan Knight, Greenhatch Group**

Jordan had already used Greenhatch's Trimble SX10 Scanning Total Station on previous monitoring jobs and felt that it would be the best solution to meet the site's various challenges.

Over an initial two-day period, survey monuments were installed using a Trimble S9 high accuracy total station combined with 8 hours of static GNSS observations. Back in the office Jordan carried out a least squares adjustment in Trimble Business Center software (TBC) to ensure the reliability of the network which was used to undertake repeated measurements of the areas of interest using the SX10.

Tackling a challenging site

With the control established in visible positions, Jordan was able to use the SX10

▲ The Trimble SX10 near the old bridge

▲ The Trimble SX10 ready for action at Merlin's Cave

safely from the footpaths by making full use of its 600+ m range. Additionally, he was able to scan selectively to speed up the process. The SX10 is driven by Trimble's Access software on a tablet which means he could draw a polygon over the tablet's live video feed enabling him to define the scan area and density. In each case the polygon scans were overlapped to check the accuracy of the set ups typically achieving a difference of 1.5mm over 100m.

Jordan also used the SX10's built in VISION technology camera to colourise the pointcloud, to clarify the different types of vegetation on and around the cliffs.

Finally, with just one instrument required for the survey work, the portability of the SX10 meant that Jordan's team felt that they could wrap it sufficiently in a waterproof covering to ensure its safety whilst they kayaked through Merlin's cave to reach a cove not normally accessible by the public.

Once the job was completed, the scans were automatically registered and QA'd. The 5mm accuracies specified by English Heritage were easily achieved and the survey delivered on time.

▲ The Trimble SX10 below Tintagel Castle

Many thanks to Jordan Knight of The Greenhatch Group.
www.greenhatch-group.co.uk

Contact us:

Please do get in touch for further information on any of the products or services mentioned in this case study, a demonstration, support or just a chat about your requirements.

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