

**CUSTOMER**

Hillcrest  
Structural

**PROJECT**

Infrastructure projects  
and refurbishments

**SOLUTION**

Trimble X7 3D Laser  
Scanner, FieldLink  
software, RTS773 and  
Tekla software

**CASE STUDY**

# From paper plans to pointclouds

**Purposeful Innovation:** How Hillcrest Structural were able to reduce labour and plant costs, increase accuracy and save time by switching from tapes and dumpy levels to point clouds and robotic measurement.

Based in Fareham, Hampshire, Hillcrest Structural is a steel contractor specialising in the design, supply, fabrication and erection of structural steel and ancillary systems throughout the UK. The company has its own in-house design division, production facilities and site team. This set up enables it to offer a complete solution to its clients as well as a range of useful cross department experiences for employees.

Under the guidance of Managing Director, Jamie Green, the company also has a policy of enabling apprentices to acquire a broad knowledge of the company's workflows through a number of placements in various Hillcrest departments. This has provided the company with fresh insights into how the implementation of new technology can bring benefits across multiple parts of the business. In particular, this approach has highlighted the possibility of improving efficiencies on site through a range of innovative survey techniques that would directly address the challenges the site team faced during their numerous refurbishment projects.

**Initiating change**

The use of traditional survey methods such as tape measurement, dumpy levels and EDMs had left Jamie Green in no doubt that the in-house site team could benefit from a new workflow that complimented its BIM level 2 commitment and made best use of the 3D models of steel it created with Tekla Structures software which the company has been using for around 20 years.

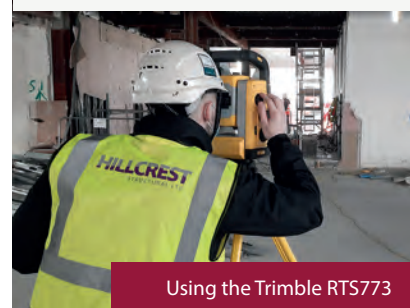
The current workflow involved the creation of 2D drawings from the 3D Tekla model that would then be taken on site for mark up where measurements were undertaken using traditional methods, a process which brought its own set of problems. These included the amount of man hours it took to set up and use the equipment (often requiring a team of at least two), access problems if measurements were required in unreachable areas and in some cases, measurements over longer distances with a tape measure could result in discrepancies. In particular, jobs of this nature require precise information on the exact scope of the survey work and any missed points could result in a costly revisit to the site.



The Trimble X7

**Trimble X7 Benefits**

1. Dramatic reduction of onsite costs
2. Increased productivity on site
3. Reduction / elimination of rework and reduced risk
4. Early clash detection and ability to detect errors in the point cloud whilst still on site
4. Excellent visual representation of the project
5. One pointcloud, many applications
6. New applications, for example, intricate assemblies in the workshop
7. Added value for clients including a 3D model of works



Using the Trimble RTS773



Using the Trimble RTS773 Robotic Total Station with FieldLink software

Jamie's solution was to provide two alternative methods for the collection of onsite data, a robotic total station with  $\pm 2\text{mm}$  accuracy and a 3D laser scanner designed for easy adoption. The robotic system would provide a workflow that Hillcrest was already familiar with but with greater speed and accuracy whilst the 3D laser scanner would bring a completely new way of working with many additional benefits.

As a Trimble Tekla user, he therefore contacted Trimble's UK and Irish distributor, KOREC, to arrange a demonstration and trial that resulted in the purchase of a Trimble RTS773 Total Station, a Trimble X7 3D Laser scanner, a rugged T100 tablet for running Trimble's FieldLink setting out and scanning software and finally Trimble's Connect cloud-based software for sharing drawings and models with all authorised stakeholders. Jamie knew that as well as its ability to seamlessly import IFC models (supported by Tekla), register the scans on site and the ability to compare scans to models for clash detection, FieldLink software would also bring plenty of additional functionality that would allow Hillcrest to grow its survey operations in the future.

#### From tapes and levels to robotics

Offering one man set out and reflectorless DR measuring of 120m, Jamie says that using the Trimble RTS773 with FieldLink on the T100 Tablet is a fast and useful solution when there is no requirement for an entire model of a site, just specific points. For example, when erection packages are produced by the Hillcrest draughtsmen and issued to site works. DWG files of the general arrangement drawings are included within the package to provide setting out information for any site drilling/resin anchor locations.

The site engineer will then use the RTS773 and DWG drawings to mark out all the necessary points around site, as well as using this as an opportunity to review the layout and ensure no further enabling works are required. In short, a high level of accuracy can be achieved quickly and with confidence.

"...the KOREC supplied technology brings us some very tangible benefits. Costs are down, we have been able to reduce manhours on site and the ability to spot problems at the design stage eliminates what can be very substantial problems."

Jamie Green, MD,  
Hillcrest Structural

“With the Trimble X7, a job that previously took us 4 hours can now be completed in minutes!”

Jamie Green, Managing Director



## From paper plans to pointclouds

However, the most noticeable advantages (in saved time, labour and costs) are achieved with the Trimble X7. Although Hillcrest had little previous experience with point clouds having only used them for visual representation purposes, it was felt that laser scanning presented major potential for the optimisation of site surveying (especially in the negation of access requirements), clash detection, as-built analysis, BIM coordination and even clarification of quotes.

Hillcrest specialises in refurbishment works and often needs layout dimensions and existing steelwork connection details in order to successfully integrate its steelwork with the structure they are working on. In the past, this has resulted in the company spending large sums of money on plant hire and access equipment in order to complete surveys. The new workflow with the Trimble X7 sees the survey request drawings submitted to the Hillcrest surveyor as well as a current IFC model aligned with the projects global base points. The surveyor then attends the site and completes the survey using the X7 scanner, calibrating the system to the same base point.

All the scans can be registered there and then on the site and a quick review of the data is undertaken on the tablet to ensure that no additional information is required and nothing has been missed. All being good, the data is then issued back to the drawing office and draughtsmen will import the data into the 3D BIM models and overlay the survey data with the modelled objects for review. The data works particularly well with Tekla Structures due to the direct rendering system and options to adjust the size, density and depth perception of the points.

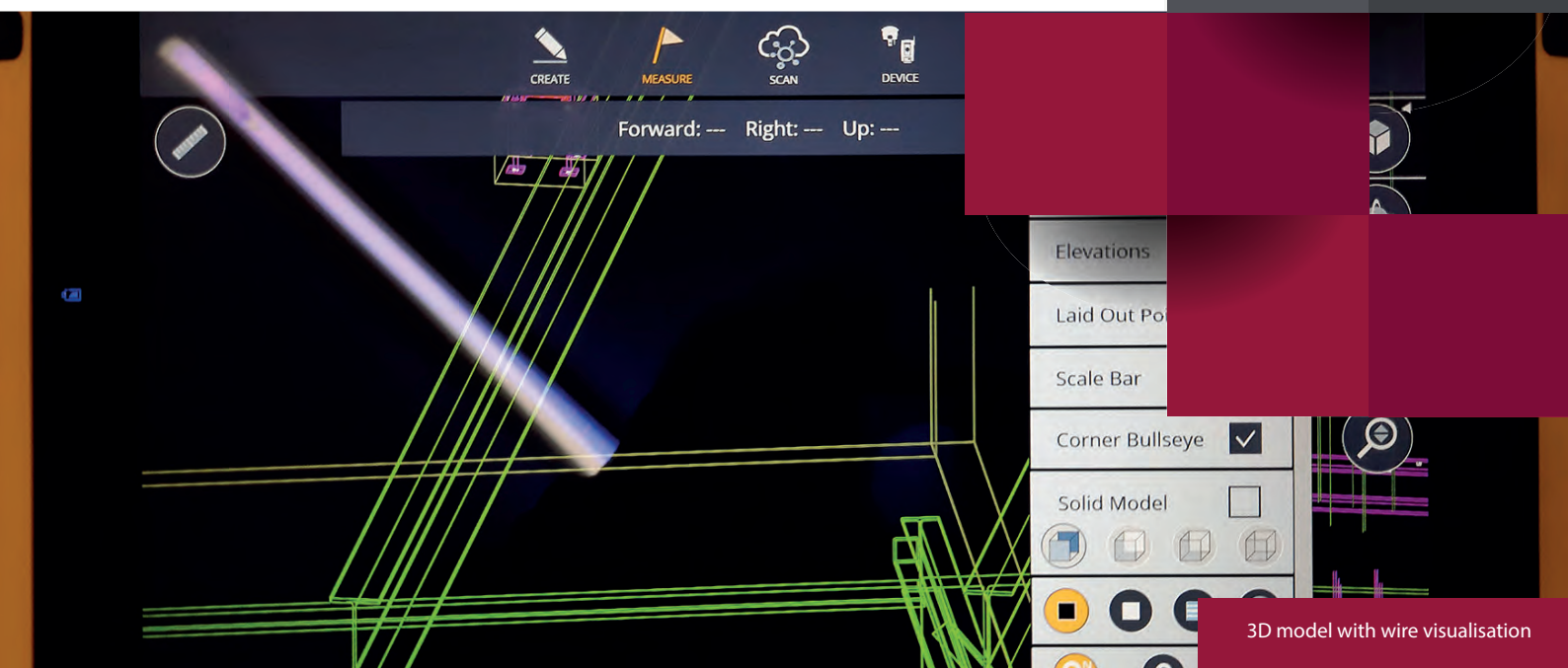
## Stand out benefits of the Trimble X7 laser scanner and FieldLink

Jamie says that despite the technology being new to the survey team, it has been easy to pick up and the RTS773, X7 and FieldLink have been easily integrated into the way the Hillcrest team now works. The X7 in particular had delivered many new benefits:

- Dramatic reduction of costs - expensive plant no longer required for surveying inaccessible areas
- Less time on site – surveys that had taken several man hours or even days were now taking a matter of minutes
- Reduction of risk – as built checks are carried out on site to check for discrepancies or errors in the steel frames/other subcontractor works.
- Easy clash detection – surveyor simply runs the clash detection option in FieldLink on site
- Ability to detect errors on the point cloud and adjust the design accordingly in the office rather than discovering the error on site

**“Working with groundbreaking technology such as this gives the Hillcrest team a chance to flourish and attracts a new generation of draughtsmen to the industry.”**

Jamie Green, MD,  
Hillcrest Structural



- Excellent visual representation of a project for those in the office - images captured by the X7 can be used for both a visual representation of the site as well as to distinguish painted steel from concrete or encased beams etc
- Ability to use the same point cloud to answer new questions with no return to site required
- New applications – for example, in the workshop Hillcrest can survey very intricate assemblies and import the scan back into Tekla for checks against the model
- Option for clients to have an exact 3D model of their works and a very detailed operation and maintenance manual

Jamie concludes, "Hillcrest has an ethos of adopting new technology in order to keep competitive and ensure that our clients are getting the best possible service and value for money. The X7 in particular has allowed us to add value to our services and now we get requests for pointclouds for a variety of purposes that we're happy to supply! Working with groundbreaking technology such as this gives the Hillcrest team a chance to flourish and attracts a new generation of draughtsmen to the industry.

"Aside from this, the KOREC supplied technology brings us some very tangible benefits. Costs are down, we have been able to reduce manhours on site and the ability to spot problems at the design stage eliminates what can be very substantial problems. For example, on a recent job, we were able to see on the pointcloud that the line of a wall face we needed to extend was 60mm out. Because this was spotted so early, we avoided the amount of time this would have taken to put right on site, maybe around 6 extra days on the job as well as a huge knock-on effect for the trades that follow us.

We also have complete confidence in the data. When working on a London project we needed to ensure that RHS beams of 18-19m in length would fit exactly to the faces of pre-cast steel plates within a concrete wall.

For the weld to take we were working with accuracies of just 1mm tolerance. Previously, this would have been a very long-winded process and using a tape measure could result in discrepancies over this distance. With the X7 it took literally minutes! In this case, because the instrument was new to us, we also checked measurements with an EDM which took around 4 hours. The X7 was spot on!"

*Our thanks to Hillcrest Managing Director, Jamie Green and Hillcrest Design Technician, Jay White, for supplying the information for this case study. [www.hillcreststructural.co.uk](http://www.hillcreststructural.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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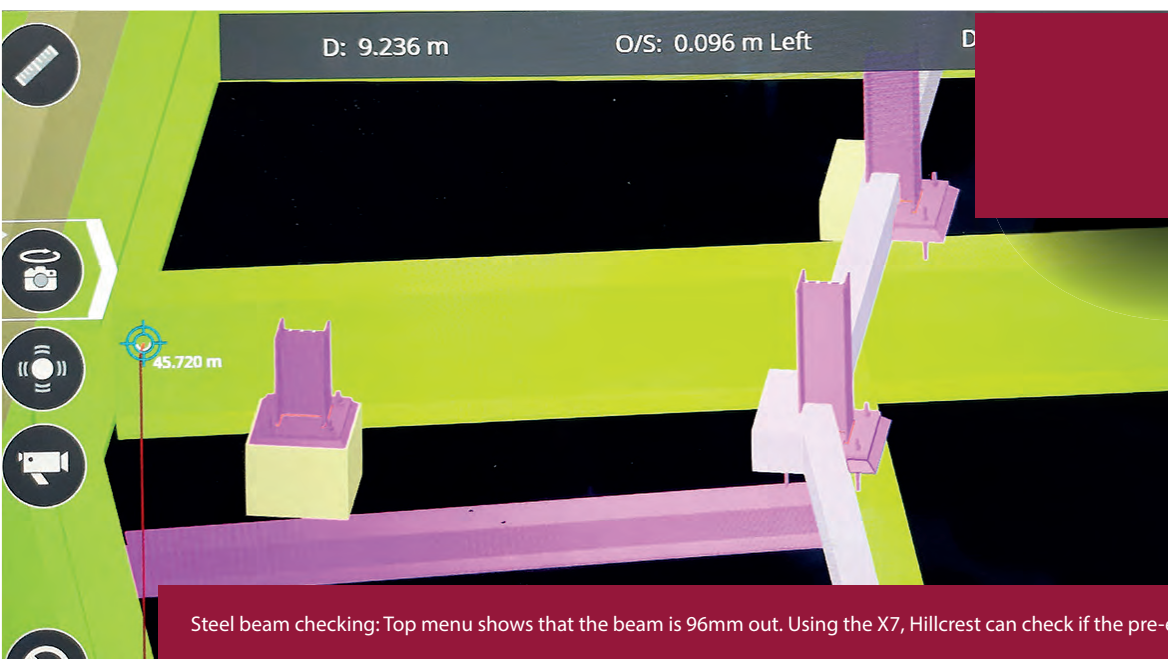
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**Measured Solutions**  
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Steel beam checking: Top menu shows that the beam is 96mm out. Using the X7, Hillcrest can check if the pre-existing structure matches with the 3D model