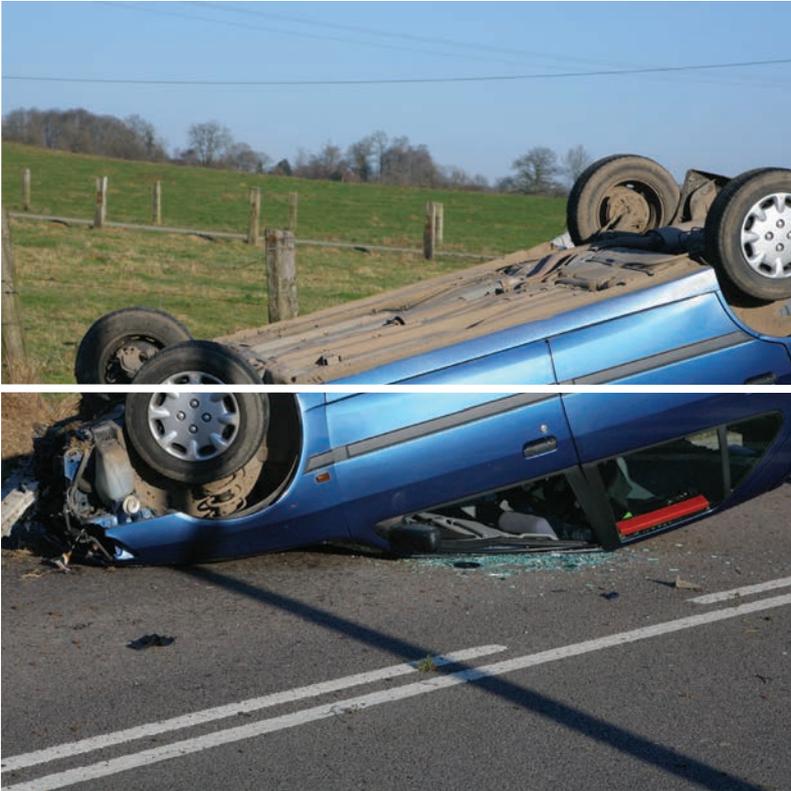
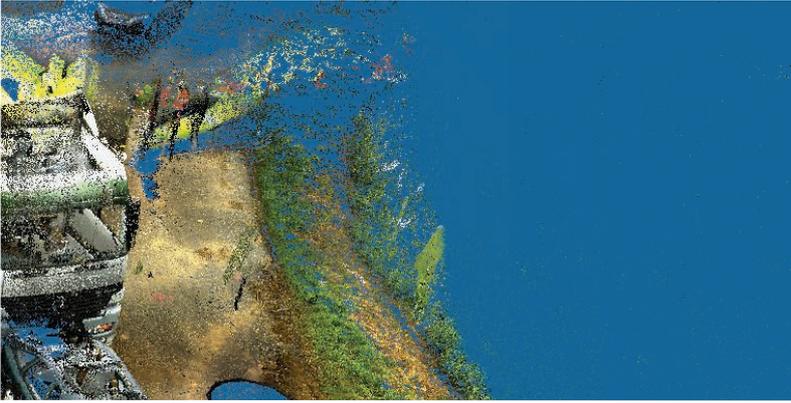




How we build reality



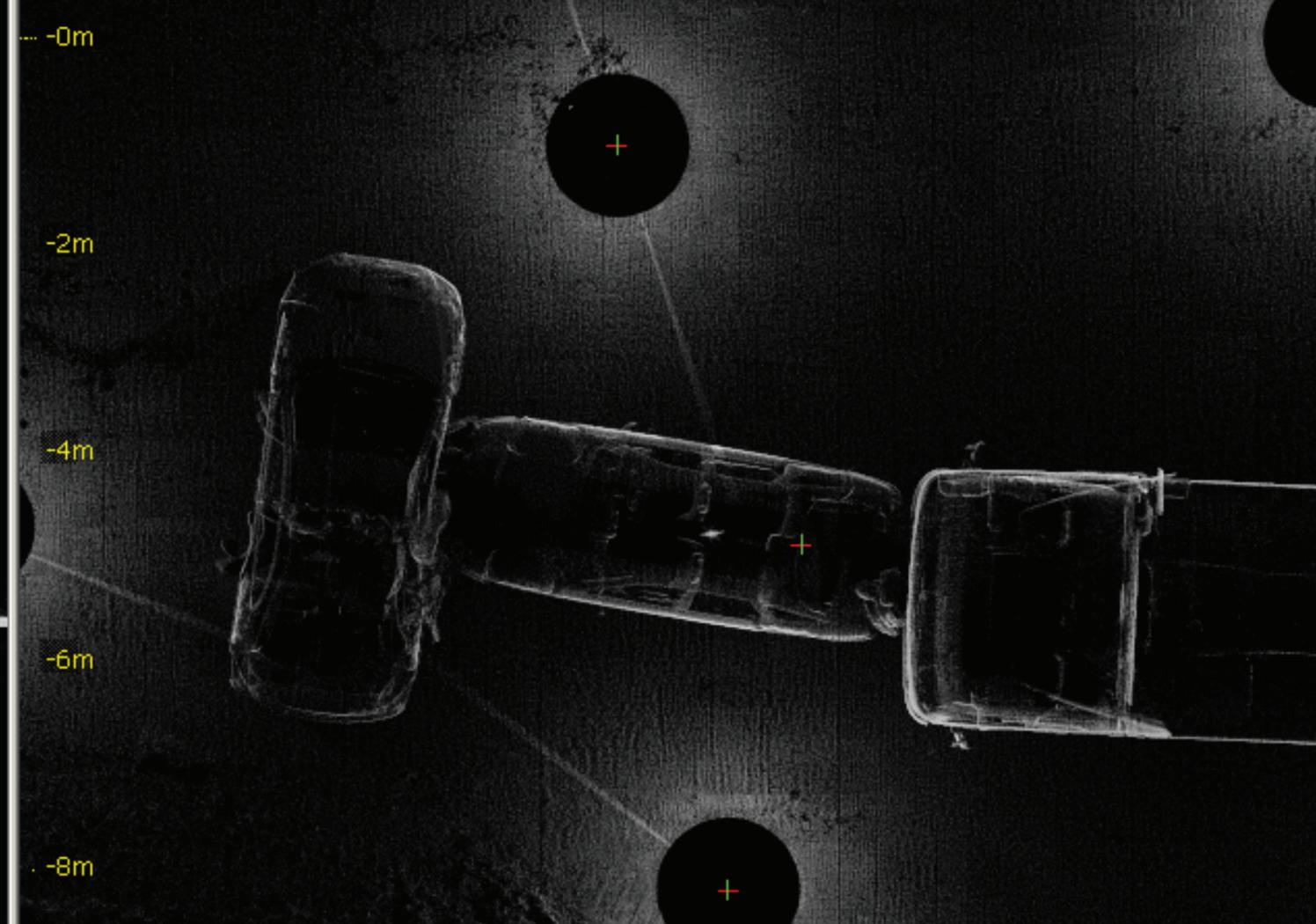
# Case Study Use of 3D Laser Scanning for Collision Investigations



## Company Overview

Z+F is the world leader in the manufacturer of phase based laser scanners.

Our strengths lie in our powerful 3D laser scanning hardware and software innovations which are considered to be the best on the market, the continual nature of these innovations and the support that we show to our customers who are loyal and longstanding owing to the service we provide.



Dataset of the collision scene

## Introduction

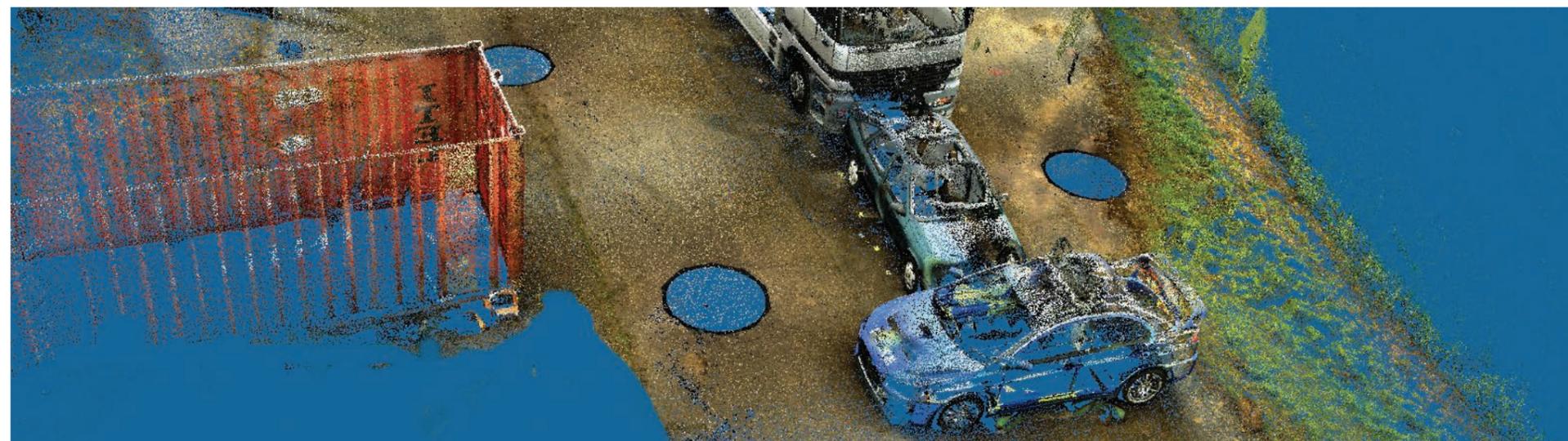
Collecting data following a collision scene creates numerous challenges with respect to accurately documenting the scene for future evaluation.

Many parameters can restrict the investigation, not only other personnel carrying out essential work, but also the added pressure in re-opening the carriage way due to the ongoing cost that occurs to the economy.

Injured personnel are the obvious priority and whilst they are paramount it then becomes important to understand how the accident occurred. Rapid 3D documentation has proven to be of great benefit for collision investigation purposes.

In this case study the Essex Forensic Collision Investigation Unit based in Chelmsford constructed a mock collision scene where 3D laser scanning technology was used to accurately capture the geometry and location of the scene for the purposes of digitally reconstructing the accident.

3D laser scanner technology from Z+F was used to scan a collision scene where seven other neighbouring Collision Unit Forces were invited to review the process.



Complete coloured dataset of the collision scene



*Capturing the collision scene with precise data is essential to reconstruct the scene and to start the investigation.*

## Methodology

### Instruments and Software

The Z+F IMAGER® 5010 phase based scanner was used due to its speed and data capture rate at over 1 million points per second (See "Spotlight On ..." section). An optional automatic camera was also incorporated to capture colour information.

Vast amounts of data were quickly generated and stored on the internal hard drive of the IMAGER® 5010. The IMAGER series consists of totally encapsulated scanners where no peripherals are required to operate. It was important that the scanner was portable and light due to some of the intended environments it would be operated in.

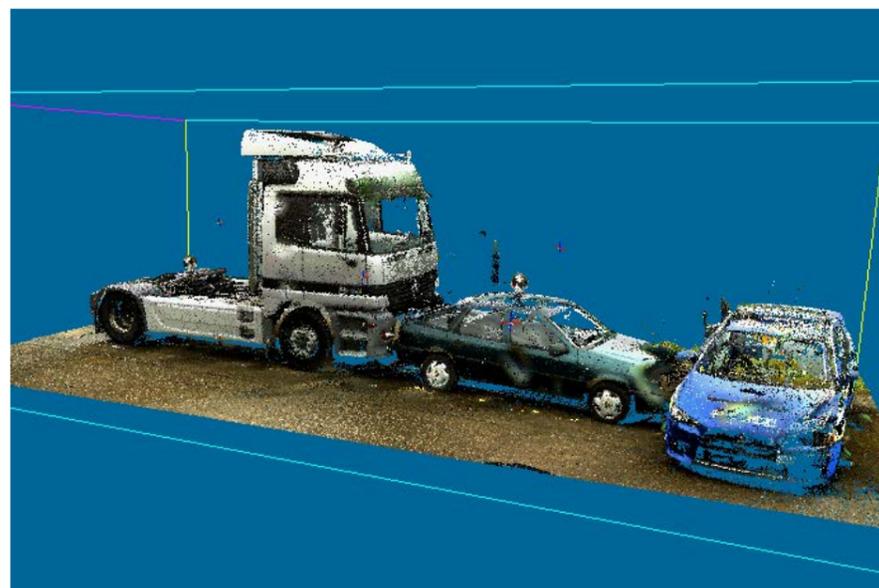
For capturing the scene, multiple scan positions were required in order to create the complete 3D view of the collision. The scans

from each position were then aligned, and extraneous points around the scene were removed, leaving only the point cloud of the accident scene. These point clouds were then merged into a database to allow the overall project to be viewed and finally exported into a CAD package for further development.

### Why was laser scanning chosen?

In order to produce exact reconstructions of collision scenes, the data needs to be as accurate as possible. This serves as the basis, which the investigators depend on.

It was therefore extremely important that the time was used productively and as much data was captured as possible. Various scanning solutions have been considered however



*Partial View of the collision scene for greater detail.*

the phased based scanner from Z+F was the only scanner to capture critical collision evidence marks due to its high resolution, rapid scan rate, portability and overall ease of operation.

The quality of the data produced enables investigators to conduct computer simulations based on objective, accurate and digital data, which speeds up the recording of the scene thus enabling normality to be regained to the area concerned.

### Problems Encountered

Scanning in open environments is uncomplicated although extremes of weather can affect the possibility to scan. With improved IP ratings Laserscanning can also be employed in these conditions. Difficulties arose where heavy rain occurred.

In the field, the challenges faced can be environment related, for example collision scenes are often in difficult environments far away from local towns or villages. Among others, temperature, rugged landscapes, and availability of power were at the forefront of the Collision Investigators concerns. Thankfully, the new Z+F IMAGER® 5010 with one of the best overall temperature ratings available was portable enough to be carried over any terrain without much trouble. The integral battery packs provided plenty of power for a full day's scanning.



View of the collision scene

## Deliverables

The IMAGER® 5010 supplied 3D scans in point cloud format compatible with most 3D CAD packages, allowing the Collision Investigators to import the data into whatever software environment they were most familiar with.

- Kent Forensic Collision Investigation Unit
- Thames Valley Collision Unit
- Hertfordshire Collision Unit
- Bedford Collision Unit
- City Of London Collision Unit.

Register software allowed the scans to be aligned with a high level of accuracy, producing a complete database of the collision scenes composed of multiple point clouds captured from numerous scan positions.

Further demonstrations and evaluations of collision scenes using 3D laser scanning will be scheduled, informing Collision Investigators of technology available to assist them in their difficult task of trying to understand how and why the incidents occurred.

### Conclusion

The mock scene generated significant interest at this initial event with Collision Investigators being present from:

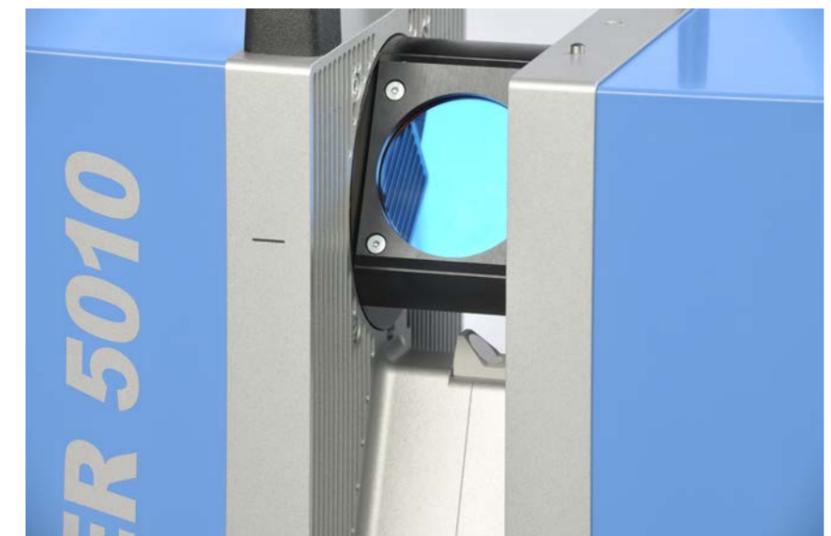
- Essex Forensic Collision Investigation Unit
- Sussex Collision Unit

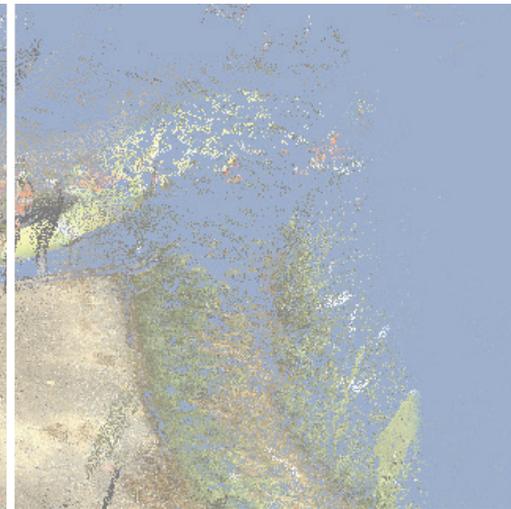
### Spotlight on IMAGER® 5010

The Z+F IMAGER® 5010 sets new standards in the field of 3D laser scanning.

Thanks to its amazing speed and ease of use, this high-end scanner enables people to work efficiently and quickly.

The device can operate up to a maximum range of 187 m, making it a leader in the Laser Scanning industry.





**Zoller + Fröhlich GmbH**  
Simoniusstrasse 22  
88239 Wangen im Allgäu  
Germany

Phone: +49 7522 9308-0  
Fax: +49 7522 9308-252

[www.zf-laser.com](http://www.zf-laser.com)  
[info@zf-laser.com](mailto:info@zf-laser.com)