The ultimate
CRIME SCENE

ABOVE Assistant Commissioner Peter Cotter APM with Crime Scene Officer Domenic Ranieri
Forensic Imaging is taking virtual crime scenes into the courtroom.

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POLICE MONTHLY

Thanks to innovative thinkers in the Forensic Imaging Section, laser scanning technology used by the mining industry to provide 3D images of underground tunnelling, is being used by the NSWPF to reconstruct crime scenes.

Simply put, the system takes images from 3D laser scans of crime scenes and objects, as well as CCTV footage and photographs, and puts them together to create a virtual crime scene that investigators and members of the jury can ‘walk through’ on a computer.

Commander of Forensic Services Group, Assistant Commissioner Peter Cotter said the NSWPF is leading the country in 3D crime scene reconstruction, pioneering a broad range of applications.

“This is a very specialist resource that’s available to help with the more complex investigations,” he said. “It’s particularly useful when the crime scene involves bullet trajectories, sightlines, CCTV camera angles, blood spatter and collisions. It can also accurately capture crime scene measurements and spatial evidence.”

Widely used in the United States, it was first introduced to the NSWPF by photogrammetrist Chris Little, now an academic with the Griffith University, who had used laser scanners before joining the NSWPF.

Commander of the Forensic Imaging Section, Snr Sgt Arnold Jansen said 3D imaging captures the precise conditions of a hot scene in its volatile state, or parts of the scene are scanned separately after the fact and digitally reconstructed.

“We use terrestrial laser scanners and structured light scanners to capture the environment and objects in 3D,” he said. “We can then produce 3D models overlaid with CCTV vision and photographs to help forensic experts analyse and express their results.

“We have a 3D printer...
capable of producing a physical replica of much of what we create in 3D. We can also provide forensic animations to help investigators succinctly express a sequence of events, to show the feasibility of a given version of events, and to confirm or exclude witness testimony.

“It’s important to note that we don’t reconstruct an event unless we are certain of how it has occurred. We recreate the scene based on the evidence. There is no speculation or conjecture.”

**Statewide rollout ready**
First trialled in 2008 to recreate the events of a vessel collision in Sydney Harbour that took six lives, the system has now been used to recreate more than a dozen major crime scenes.

Following the equipment’s purchase, Commander of the Identification Services Branch, Supt Paul Glinn said it’s taken 18 months to refine and customise the software.

The Forensic Imaging Section now has the capacity to use this technology 24/7 throughout the state and can help operational police to collect evidence and record a variety of crime scenes, he said.

“The ultimate goal of the Forensic Imaging Section is to allow interactive access to these 3D images and videos so that investigators can ‘walk through’ virtual crime scenes on their own computers.”

**Recreating Rozelle**
Crime Scene Officer Domenic Raneri said 3D images were used to reconstruct the site of the recent explosion in Rozelle.

“The scene was chaotic when we got there,” he said. “Emergency services personnel were beginning the rescue and recovery process but there was no access to the site until it could be made safe.

“Using this new technology, we were able to start collecting evidence immediately. We set the scanner up across the road and were able to capture 120 million data points in about 20 minutes.”

“We continued to document the scene as the fires started clearing the site, and managed to capture 70% to 80% of the evidence without entering the danger zone.”

Mr Raneri said the team continued scanning over several days, creating a layered representation until the site was completely cleared.

“We overlaid the 3D images with photographs and technical drawings of the building. By the time we’d finished, the investigators were able to look at...
where evidence was located in context of the original building, with crime scene reconstructions at different stages before and after the explosion.

The benefits of virtual crime scenes

Three-dimensional imaging allows police and members of the judiciary to move through a scene without losing perspective. There is no restriction on your vantage point. Using your mouse, you can get as close or as far away as you need, and look at the scene from any direction.

Mr Raneri said most police are familiar with the Interactive Scene Recording and Presentation System (ISRAPS), which allows you to look at panoramic photographs of crime scenes from a single point of capture.

"ISRAPS gives only the one perspective; then you need to refer to maps and videos, and then back again," he said.

"Three-dimensional imaging combines all the evidence into one presentation including the environment, location, sizes and positions. It presents the evidence in a continuous flow as you virtually ‘walk’ through the scene, allowing you to view any part of it from any angle."

Imagination the only restriction

Snr Sgt Jansen said his team is continuing to explore new ways to use this technology.

"Mr Raneri in particular uses every opportunity to test new applications for these scanners," he said. "He is currently looking for techniques to match implements with injuries at the morgue. Using handheld scanners, he is scanning bruise patterns and other injuries to create 3D models that can be forensically analysed against weapons and witness statements.

"We’ve also tested the equipment at different fire scenes, which are very difficult to photograph under normal circumstances. Laser technology offers infrared and other functions that allow us to map fire patterns, which we’re ready to use this fire season."

To get a taste of what 3D imaging and animation can do for your investigation, search the intranet for ‘Forensic Imaging Section’ or ‘3D imaging’.

ABOVE A mock crime scene created for police training

BELOW The scene of a drive-by shooting: bullet trajectories drawn out from the house and car in 3D space show the projectile’s path and identify the location of the shooter