D19 Technical Overview and Application of 3-D Laser Scanning for Shooting Reconstruction and Crime Scene Investigations

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After attending this presentation, the attendees will gain an understanding of the principles, operation, and capabilities of 3D laser scanning as it applies to crime scene investigations.

This presentation will impact the forensic science community and/or humanity by describing the operation, application, and capabilities of 3D laser scanning as a forensic tool.

3D laser scanning for documenting crime scenes is a growing use for a measurement technology that has already gained wide acceptance with surveyors, engineers and construction professionals. 3D laser scanning involves deploying an advanced type of survey/measurement instrument that is used to remotely measure and document crime scenes with extraordinary accuracy, completeness and speed. It is already being used by police agencies in the United States and Europe and can also be used for crash investigations, fire scene reconstruction, failure analysis, vulnerability and threat assessment as well as modeling simulation and analysis of environments.

The benefits of 3D laser scanning for any type of investigation are:

- Scenes can be recorded exactly as the first responder found it without altering evidence
- Exact body positions and evidence can be captured in great detail to an accuracy of 6mm at a distance of 50 meters
- Scanning is an objective scene recording tool which minimizes the chance of overlooking key evidence due to human error
- Measurements can be made between any objects in the scene long after the scene has been released
- The scene can be viewed in 3D from any viewpoint
- The data collected can be used to create compelling 3D jury exhibits

This presentation will describe the operation, application and capabilities of this new forensic tool. Additionally, the accuracy, precision and validity of the technique will be examined by comparing data generated with standard crime scene measurement techniques to those collected with a Leica Geosystems ScanStation 3D laser scanner. Actual crime scenes that have been scanned will be presented as they were documented to demonstrate the advanced capabilities of 3D laser scanning in the areas of captured detail, completeness, and 3D visualization. A visually compelling and accurate 3D method of depicting trajectories will be presented. Data from 3D laser scanning will be compared to trajectory measurements taken using standard methods for comparison in the areas of accuracy and precision. This will be accomplished by firing known impact angle shots through various materials and comparing the measurements using standard methods and tools like protractors, plumb bobs, inclinometers and photographs to those computed from scanned data. The data collected from both the scanning technique and manual methods for this controlled experiment shall be tabulated and compared in order to show the accuracy and validity of this technique. As more and more animations and exhibits generated from 3D laser scanning make their way into courtrooms it is becoming apparent that a generation of jurors raised on 3D video games shall have greater expectations for the kind of exhibits placed before them.

The audience will gain an understanding that 3D laser scanning is a forensic tool that is with us to stay, and that it will only be a matter of time before it becomes the norm for crime scene investigation. At the conclusion of this presentation the audience will have a basic understanding of the principles, operation and capabilities of 3D laser scanning as it applies to crime scene investigation.

3D Laser Scanning, Crime Scene Investigation, Trajectory

 ** Presenting Author*