D58 The Next Step: Creating and Using the 3D Working Model From Laser Scan Data to Better Seek and Illustrate the Truth

Craig T. Fries, BA*, Precision Simulations, Inc, 115 S Church Street, Grass Valley, CA 95945

After attending this presentation, attendees will better understand the 3D working model, 3D laser scanning, and their effective use in incident documentation, analysis, and visualization.

This presentation will impact the forensic science community by introducing a powerful and proven concept from traditional sciences to the forensic field. The 3D working model will facilitate the search for the truth by reducing conjecture and increasing fidelity to the physical evidence.

All phases of accident and crime reconstruction have been revolutionized by 3D laser scanning. The documentation of physical evidence is now so accurate and complete that experts can work directly with the 3D working model years after the fact as if they were working in the crime scene itself. Measuring millions of data points in mere minutes, a modern 3D laser scan is capable of capturing every inch of a scene with precision and detail sufficient to locate the smallest evidence. A typical scan contains approximately 10,000,000 data points — a level of detail akin to having the entire scene and all the physical evidence extracted and delivered to the expert's lab for thorough and exacting analytical forensics. Harnessing these rich datasets with the analytical power of modern computers allows unparalleled depth of analysis. From determining the velocity of vehicles involved in accidents, deriving critical values from video footage and scene photographs to exacting line-of-sight calculations and ballistic trajectory analysis, the 3D working model provides the expert with a toolset based upon physical evidence that was previously unavailable. The fastest growing areas of growth is the use of the 3D working model to analyze opposing expert's conclusions and opinions. Being able to plug the underlying assumptions back into the 3D working model allows the expert to determine how well, or not, the results match the physical evidence.

Once the dataset has been utilized to complete a thorough investigation and derive fact-based conclusions supported by the physical evidence, the final stage of the process also benefits greatly from the underlying 3D working model. The visualization of the dataset and the conclusions via 3D computer animation and simulation allows the experts to present their findings in a clear, compelling manner. Using the laser scan data directly in the visualization provides a level of realism and accuracy that far exceeds what was possible before. In addition to being visually compelling in its own right, the scan data gives the expert the opportunity to animate over the exact same dataset upon which their calculations were performed. This increases the accuracy of the final visualization, eliminating the need to resort to mere illustrations and elevating the animation to a true engineering visualization. This ability to maintain the highest level of scene fidelity increases the likelihood that the animation will be admitted into the trial setting and significantly helps combat the CSI-effect often seen in urban courtrooms. Today's juror comes to the trial with an expectation, born from television and other media, that the facts and findings will be presented in a visually compelling manner. The use of the 3D working model and 3D laser scanning in forensics in the United States will be demonstrated via compelling graphics and analyses in all three phases of the reconstruction process, pulling from 20 year's experience and more than 1,000 cases.

Laser Scaning, 3D Animation, Visualization