10.35 ScanStation

10.35.1 Purpose

The Leica ScanStation is a three-dimensional (3D) laser scanning device which uses a high-speed laser and built in or external camera to document and photograph scenes. The ScanStation can record up to 1 million data points per second and has a full 360°x 290° field of view with a maximum working range of 270 meters (~885 feet). Data and images collected from the 3D scanner may be used to preserve scene images, create diagrams, provide measurements, and/or allow investigators and prosecutors to later examine the scene from varying perspectives.

10.35.2 Advantages & Limitations

10.35.2.1 The ScanStation shall be available and every effort shall be made for its deployment for all crimes scenes and scenes of law enforcement use of force; however, circumstances such as scene size, space availability, weather conditions, lighting, and case circumstances/requirements shall be considered and may alter, limit, or prevent use on scene. This decision should be made by the ScanStation VCRT member on a scene in conjunction with the VCRT Leader. In the event that scanning cannot take place, this will be clearly documented in the ScanStation VCRT member and/or VCRT Leader's notes.

10.35.2.2 The 3D scanner captures data points and photography within the field of view of the scanner. Considerations should be given to the scanner's field of view when determining the appropriateness of deployment, scanner placement, and number of scans required. For example, when placed in small rooms, such as a closet, the scanner may not have a wide enough field of view to capture data. Weather and lighting should also be considered regarding the appropriateness and timing of scanning. Rain and snow may hinder the scanner's laser; therefore, preventing scanner deployment or hindering range. Photography may also be limited during low light conditions, so every effort should be made to deploy during daylight hours or with added lighting at night. Consideration for weather or lighting may require VCRT members to return to a scene when conditions improve if scanning is determined to be necessary.

10.35.3 Equipment and Reagents

Leica ScanStation PS30, C10, or comparable model
NIST traceable twin target pole with HDS 3" targets and target accessories
Tribrach adapter
Tripod
NC Tech iSTAR Fusion HDR camera
Tripod star
Tripod rolling base
Targets (black & white and/or spherical)
Current version of Leica Cyclone software
Current version of Leica TruView Global software

10.35.4 Documentation

10.35.4.1 As with all VCRT members, ScanStation personnel shall take notes at each crime scene that is processed.

10.35.4.2 A unique project file shall be created at the beginning of each scene and that file name shall be documented in the ScanStation VCRT member's notes.

10.35.4.3 A sketch of the scene (Scan Plan) shall be generated for each scene that is scanned. This Scan Plan shall be labeled with the following information:

- NIST twin target pole location
  NOTE: If multiple Scan Plans are generated, NIST twin target pole location shall be included in at least one Scan Plan.
- Scan locations (e.g., SW1, SW2, etc.)
- Target location(s) (e.g., T1, T2, etc.) (if applicable)
- Date(s)
- Laboratory number
- ScanStation VCRT member's handwritten name or initials
- Page number
- Compass heading
- Not to scale

10.35.4.4 If possible, evidence markers should be placed prior to scanning. Evidence may be collected prior to scanning; however, evidence markers should stay in original location until all scanning is complete. If additional evidence is located after all scanning has been

completed, detailed notes should be included documenting why the evidence was not captured in the scans or, if time permits, this area should be rescanned.

10.35.5 Operation

10.35.5.1 A performance check of the scanner shall be done at each scene using the NIST traceable twin target pole. The performance check data shall be verified on scene to demonstrate that the measurement ("Slope Distance") falls within the acceptance criteria of 1.0 meter (the accepted tolerance for the measurement is 0.99-1.01 meters (+/- 1%)).

10.35.5.2 If the scanner fails to fall within the tolerance of the performance check, another check will be immediately conducted. If this check is within tolerance, the instrument will be considered acceptable and both results will be recorded in the notes of the ScanStation VCRT member. If the scanner fails to fall within tolerance of the second check, the scanner will immediately be taken out of service. As soon as practicable, the vendor will be notified of the issues and appropriate action will be taken.

10.35.5.3 The iSTAR camera should be used to take photos at each scanned scene. The iSTAR photography must take place prior to any movement of the tripod after scanning a location. All iSTAR photos will be verified on scene to demonstrate that the photos have been captured properly before moving the scanner to the next scanning location.

10.35.5.4 If the iSTAR camera is out of service for any reason, the internal camera on the scanner may be used.

10.35.5.5 Refer to the "Leica PS30 Forensic ScanStation Instructions" for additional information.

10.35.6 Technical Review of ScanStation Documentation Notes

10.35.6.1 A technical review of all ScanStation documentation notes shall be conducted prior to the final release of the Crime Scene or Law Enforcement Use of Force report and be done according to the TBI Laboratory Quality Assurance Manual.

10.35.6.2 At a minimum, the technical review shall include a review of all ScanStation documentation notes to ensure conformance with proper technical procedures and applicable laboratory policies and procedures.

10.35.6.3 This review may be done by any member of the Violent Crime Response Team.

10.35.6.4 The technical review shall include the following, at a minimum:

10.35.6.4.1 Ensure that the scan project file is documented in the ScanStation VCRT member's notes.

10.35.6.4.2 Ensure that the distance for the targets on the twin target pole performance check is 1.0 meter (the accepted tolerance for the measurement is 0.99-1.01 meters (+/- 1%)).

10.35.6.4.3 Ensure that there is a Scan Plan and that it includes all requirements in 10.35.4.3.

10.35.7 Final Work Product

10.35.7.1 Data processing will be performed as requested by the requesting agency or appropriate district attorney's office.

10.35.7.2 The final work product will be supplied to the requesting agency and the appropriate district attorney's office using one of the following two methods:

10.35.7.2.1 Generation of screenshots in Cyclone.

10.35.7.2.1.1 Screenshots should be made at the VCRT Leader's discretion, based on the customer's request, to give a representation of the scene from pertinent vantage points (e.g., bird's eye view of scene, deceased individuals present, vehicles involved, etc.).

10.35.7.2.1.2 The following information shall be included on each screenshot:

- Description of screenshot
- Laboratory number
- Agency case number
- Date of scene
- Date prepared
- Location
- VCRT members

- ScanStation VCRT member's initials (handwritten after printed)
- Compass heading

10.35.7.2.1.3 The case file shall include a printed copy and a portable media device containing this data.

10.35.7.2.2 Generation of TruView Global merged scan data.

10.35.7.2.2.1 This data shall be uploaded to the TBI server and customer provided the current downloadable plug-in software to properly view the completed scan(s) and TruView Global data file.

10.35.7.2.2.2 If needed, the customer shall be provided with basic information on how to install the plug-in and navigate around the software. A copy of these instructions provided shall be included in the case file.

10.35.7.2.2.3 A list of ScanWorlds and the viewpoint of each pertinent to the scene shall also be provided to the customer.

10.35.8 Reporting

When a final work product is requested and provided, a ScanStation report shall be issued to provide the requesting agency with a record of evidence that has been documented at the scene and may also be used for court presentations at a later date.

10.35.8.1 The ScanStation report shall be issued after the Crime Scene or Law Enforcement Use of Force report has been released and be the responsibility of a qualified ScanStation VCRT member.

10.35.8.2 Every effort will be made to complete this report as quickly as practicable. With the exception of law enforcement use of force and/or in custody death investigations, reports shall be completed in 120 calendar days after the request. Law enforcement use of force and/or in custody death investigations shall be completed within 30 calendar days after the request (request date should be noted in the case file).

10.35.8.3 If the ScanStation report cannot be completed within the time frames specified above, then the ScanStation VCRT member shall contact the requesting agency to inform of this delay. This shall be documented in the case file and reason given for this delay.

10.35.8.4 ScanStation reports involving crime scenes/technical assists shall use the report heading “Official Crime Scene Report”.

10.35.8.5 ScanStation reports involving law enforcement use of force and/or in custody death investigations shall use the report heading “Official Law Enforcement Use of Force Report”.

10.35.8.6 Each report shall contain, but is not limited to, the following information:

- A statement such as the following: Refer to the TBI Official Crime Scene/Law Enforcement Use of Force report dated _____ for related information.
- Name and title of the person making the request (if different than original request)
- Any external conditions that may have impacted the ability to collect data (e.g., extreme temperatures, rain, snow, etc.) (if applicable)
- General statement as to what documentation was captured (e.g., photos, screenshots produced from registered point cloud data, etc.)
- General statement as to how the data was processed (Cyclone software, TruView Global, etc.)
- General statement denoting that additional documentation is available upon request.

10.35.9 Technical Review of ScanStation Report and Final Work Product

10.35.9.1 The ScanStation report and supporting documentation as outlined in this policy will not be subject to the content check procedure as required in 8.3.

10.35.9.2 This ScanStation report shall be technically and administratively reviewed prior to its final release by another qualified ScanStation VCRT member that did not actively participate in the collection of data at the scene.

10.35.9.3 At a minimum, the technical review shall include a review of all ScanStation documentation to ensure conformance with proper technical procedures and applicable laboratory policies and procedures.

10.35.9.4 The Mean Absolute Error for enabled constraints shall be checked to ensure it is below the recommended criteria of 0.03 ft or 0.001

m. If not, each individual constraint should be reviewed in order to locate the specific issue.

10.35.9.5 Generated data should be reviewed to ensure consistency between the work product(s) and other documents in the case file.

10.35.10 Additional Final Work Products

By request, additional final work products may be created that include, but are not limited to, the following:

- TruView Global scenes of smaller areas of the scene
- Animations
- Images and/or videos linked in the TruView Global for quick reference
- Copies of images captured by ScanStation or iSTAR camera
- Trajectory information obtained through scanning trajectory rods inserted into possible bullet defects
- Distances measured between two points in the point cloud data

10.35.11 Distribution of Work Product

Upon completion of the report and associated data generated, the author of the ScanStation report shall distribute the work product in the following manner, if applicable:

10.35.11.1 Laboratory Case File

- Crime Scene or Law Enforcement Use of Force report
- ScanStation Documentation Checklist
- Final work product (Cyclone screenshot printouts and/or customer instructions or documents for TruView Global)
- Photocopy of ScanStation notes
- Photocopy of Scan Plan
- Digital media containing ScanStation data (include all that are applicable):
    - Raw data
    - Processed data (.IMP files)
    - TruView Global data
    - Customer instructions/documents
    - Unprocessed iSTAR photos
    - Processed iSTAR photos

- Cyclone screenshots

10.35.11.2 Customer (Lead Investigator and/or DA's Office)

- ScanStation report (including attachment)
- Digital media containing ScanStation data (Cyclone screenshot printouts and/or customer instructions or documents for TruView Global).

10.35.11.3 Digital Media

10.35.11.3.1 The original iSTAR photo SD card shall be given to the VCRT Leader and stored on-site at the respective laboratory.

10.35.11.3.2 The original ScanStation data (raw data) and any processed data (.IMP files, TruView Global data, processed iSTAR photos, Cyclone screenshots, etc.) shall be stored at an offsite storage location. In addition, this may also be stored on a secure on-site digital storage.

10.35.12 Other

Suggested abbreviations are as follows:
SW = ScanWorld
RP = reference point
TTP = twin target pole
TTPU = twin target pole – upper
TTPL = twin target pole – lower
HR = high resolution
TVG = TruView Global
PT = paper target
B/W = black and white target
MK# or M# = marker number