Some of the following material for the C19 webpages has been prepared by Engineering Geology students of Prof. Scott Burns at Portland State University (USA. This material has been screened and approved by the C19 Chair.

Data Processing Best Practices

Data Management

Data processing with point cloud processing and CADD software produces a number of very large files. For instance, a point cloud file containing one million points will take up about 30 Mbytes as an ASCII file and about 10 Mbytes as a binary file. The file will become larger as digital images and other kinds of information (such as stereonets and text) are added to the file. At a minimum, the original files from the scanner should be stored, as well as the point clouds once they have been registered (preferably in the xyz format). Each scan or set of scans should have a dedicated folder that contains the raw scanner files, registered point clouds, field notes, digital images, CADD files, etc.

Point Cloud Stitching

Individual point clouds usually have 1 to 3 million points (for 2 cm point spacing that is a square areal coverage of approximately 25-45 m (82-148 ft) on a side). A site may consist of ten or more point clouds. The point clouds can both be viewed and processed separately, or they can be stitched together into a single combined point cloud. For extracting geotechnical data, it is not necessary to stitch the point clouds together, and in general it is not recommended to do so. This is because the combined point cloud may have 20 million points or more, and will be very difficult to visualize and rotate in point cloud software. Point cloud software such as Split FX does allow the individual unstitched point clouds to be in the same file, and to combine the fracture orientation data on a single stereonet without having to stitch the point clouds together. For other purposes, such as viewing and making 3D measurements, it may be advantageous to have a single stitched DTM. In this case, it is recommended that a triangulated surface is made and only the merged triangulated surface is used for combined 3D measurements. Alternatively, the point cloud could be decimated (up scaled), so that the point spacing can be optimized for the desired task.

Software and procedures used for processing point clouds

Differences in how the point cloud is analysed to determine fracture orientation results in large differences in the estimation of the strike and dip of a fracture surface. One method is to pick three points on a fracture and determine the orientation of the plane made by these three points. Because actual rock fracture surfaces are not flat planes, this technique will show large variations depending on the roughness of the surface and which three points are selected. A better method is to select all the points that make up the fracture and calculate the best-fit plane through those points.