

User Manual: IPA Data Processing Tool (CSV/TXT files)

Prepare CSV or TXT Files for Analysis in the IPA Analysis Tool

1 Introduction

The **IPA Data Processing Tool** is a web-based application that formats terrestrial laser scanner (TLS) data. Specifically, it formats individual data files collected during the OSAC Interim Performance Assessment (IPA) test procedure into a single coherent file that can be uploaded directly into the secondary **TLS Analysis Tool**.

NOTE: This user manual is specifically for the CSV/TXT version of the **IPA Data Processing Tool**. A separate version exists for formatting DXF files. The DXF version is uniquely designed to check for and remove background noise (artifacts) in the dataset, whereas the CSV/TXT version assumes that no artifacts are present in the uploaded files.

During an IPA evaluation, four separate scans are taken of a stationary array of targets to collect their Cartesian (X , Y , Z) center coordinates. It is critical that the coordinates collected at each position remain in their individual coordinate systems and not be unified (registered) to a common coordinate system. This is achieved by saving a unique data file after each individual scan is performed.

However, the downstream **IPA Analysis Tool** requires that the scan data for all four positions be combined into a single file where the coordinates for any given target align perfectly in the same row. For this CSV/TXT version of the **IPA Data Processing Tool**, it is a strict requirement that all uploaded files have already been cleaned. There cannot be any stray background points (artifacts) in the datasets, and all four files must contain the exact same number of rows.

With clean files provided, this requirement still leaves one primary data management problem:

- **Scrambled Target Order:** The scanner often saves the targets in a completely different order from one scan to the next. The data points must be rearranged to line up row-by-row.

The **IPA Data Processing Tool** fixes this problem automatically. The application finds the matching targets across all four scans, fixes the scrambled order, and bundles everything into one clean `.csv` file that is appropriately formatted for the secondary **IPA Analysis Tool**.

2 Getting Started

2.1 File Requirements & Constraints

To ensure the **IPA Data Processing Tool** can read the data, files must follow these rules:

- **File Type:** Plain text (ASCII encoded `.txt`) or comma-separated value (`.csv`) files only.
- **Dimensionality:** Each file must contain exactly three (3) columns representing the Cartesian coordinates (X, Y, Z). No extraneous columns or qualitative tags are permitted within the data file.
- **Consistent Number of Targets:** All four uploaded files must have the exact same number of rows. This ensures that every target in the array was successfully measured from all four scanning positions.
- **Number of Files:** Exactly four (4) files must be supplied simultaneously, corresponding to the four scanning positions.
- **Unique Filenames:** Each file must have a unique name. Duplicate filenames will trigger an error.

3 The Screen Layout

The webpage is divided into two parts, as shown in Figure 1.

1. **The Sidebar (Left Side):** This section contains the file upload slots, data settings configuration, and the data processing execution controls.
2. **The Main Screen (Right Side):** Under the header “Processed Data”, this section will display warnings, a preview of the combined data, and download controls for the finished spreadsheet after the files have been processed.

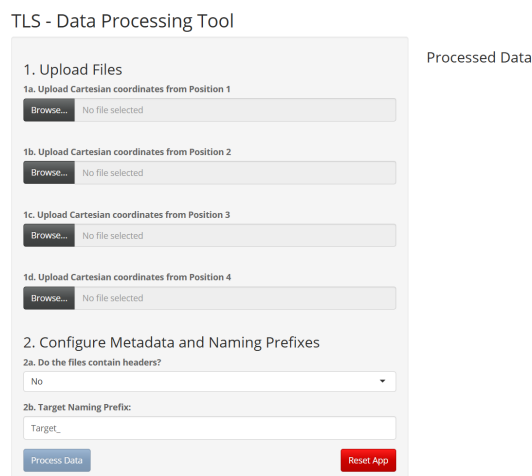


Figure 1: A screenshot of the CSV/TXT Data Processing Tool interface.

4 Step-by-Step Instructions

The layout of the user interface and the relevant entry fields are shown in Figure 1.

4.1 Step 1: Upload Files

Locate the left-hand configuration sidebar. Upload the coordinate files for Positions 1, 2, 3, and 4 into their matching upload slots. The target order in the Position 1 data file will serve as the reference coordinate baseline to which all subsequent position indexes are remapped.

Note: The blue **Process Data** execution button will stay locked until all four files have been uploaded and passed the unique naming check.

4.2 Step 2: Configure Metadata and Naming Prefixes

Configure the data structure options located directly beneath the file upload inputs:

- **2a. Do the file contain headers?:** Set this dropdown to “Yes” if the data files contain a structural top header row (e.g., column label tags). If the numeric data starts directly on line 1, select “No”.
- **2b. Target Naming Prefix:** Input the name to be used for the targets. The tool automatically adds sequential numbers to the end of the text string (for example, typing Target_ will yield Target_01, Target_02, etc.).

4.3 Step 3: Process Data

Once the files are uploaded and validated, the blue **Process Data** button will become active. Click this button to run the application. The tool will automatically match the targets across all setups and combine the four separate files into a single, unified data file.

4.4 Step 4: Error Messages

If the application identifies any issues with the data, processing stops and a red error message appears at the top of the screen. Common errors include:

- **Header Mismatch:** This occurs if “No” is selected for headers, but the file actually contains a row of text or column names at the very top.
- **Missing Data (NA):** This occurs if any of the files contain blank spaces, missing numbers, or incomplete rows.
- **File Dimension Mismatch:** This occurs if the files do not contain exactly three columns (X, Y, Z) or if the files do not all contain the exact same number of rows.

TROUBLESHOOTING NOTE: If data validation fails, check the original data files for empty spaces, character padding, or truncated rows before attempting to process the data again.

4.5 Step 5: Preview and Download

When the processing completes successfully, a summary message appears on the right side of the screen displaying the final count of matched targets, followed by a preview grid of the organized data (see Figure 2).

The preview table should be reviewed to ensure the target names are correct and that the data contain the expected number of target coordinates. Clicking the green **Download Processed Data** button at the bottom of the main display panel saves the finished spreadsheet to the computer as a standard .csv file named with the current date.

4.6 Resetting the Application

To clear the environment and start over with a fresh set of data, click the red **Reset App** button at the bottom of the sidebar to refresh the application instantly.

TLS - Data Processing Tool

1. Upload Files

1a. Upload Cartesian coordinates from Position 1

1b. Upload Cartesian coordinates from Position 2

1c. Upload Cartesian coordinates from Position 3

1d. Upload Cartesian coordinates from Position 4

2. Configure Metadata and Naming Prefixes

2a. Do the files contain headers?

Yes No

2b. Target Naming Prefix:

The processed data contains coordinates for 20 targets.

Processed Data

TargetID	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
1 Target_01	1553.975	-3254.187	-1097.807	5173.099	4014.285	-1069.626	-2632.3	8047.03	-1705.237	-5669.16	-1901.029	-1723.193
2 Target_02	-378.192	-3562.156	-1102.409	5592.272	2102.934	-1074.384	-721.488	8472.509	-1705.506	-4603.71	21.317	-1729.365
3 Target_03	-2483.609	-3891.784	-1121.806	6042.976	19.113	-1093.695	1360.361	8931.774	-1721.195	-6425.075	2117.191	-1751.019
4 Target_04	1546.348	-3257.326	692.044	5169.336	4004.966	720.516	-2627.434	8049.515	84.342	-5677.204	-1892.665	66.549
5 Target_05	-401.84	-3562.225	702.547	5587.1	2078.047	730.551	-702.115	8474.347	98.78	-6039.824	46.061	75.596
6 Target_06	-2502.522	-3888.369	714.927	6035.519	-0.128	742.264	1375.119	8929.167	115.863	-6428.713	2135.837	86.561
7 Target_07	1541.448	-3256.774	2142.563	5165.162	2999.106	2170.678	-2625.034	8049.02	1525.822	-5682.648	-1897.953	1517.508
8 Target_08	-400.515	-3559.507	2124.029	5579.79	2079.019	2151.764	-706.809	8471.793	1523.467	-6041.953	44.237	1407.15
9 Target_09	-2504.37	-3886.14	2110.586	6027.92	-1.775	2198.109	1373.225	8927.037	1511.152	-6430.443	2137.128	1481.996
10 Target_10	-4910.784	-158.791	-1135.419	2457.298	-2619.346	-1121.672	4011.257	5354.077	-1729.488	-2765.623	4652.019	-1753.074
11 Target_11	-5425.281	3152.634	-1125.73	-818.518	-3324.187	-1124.346	4728.472	2080.65	-1719.226	530.176	5264.332	-1732.544

Showing 1 to 20 of 20 entries

Figure 2: An example of the Preview and Download stage.

5 Example Datasets

Two sets of example files are provided with the IPA Data Processing Tool to illustrate how the application handles different file types. Each set contains four separate position files:

- **CSV Example Set:** Comma-separated value (.csv) files that include column headers at the top. When using these files, the **Header Configuration Toggle** must be set to “Yes”.
- **TXT Example Set:** Plain text (.txt) files that do not include headers. When using these files, the **Header Configuration Toggle** must be set to “No”.

Processing the four files from either example set through the IPA Data Processing Tool creates a single, combined data file. This output file matches the exact structure of the LSS999_Jan2026.csv file found within the ExampleData2/January2026 folder of the secondary Data Analysis Tool.