Data Extraction Tool

Version 1.0

User Guide

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Data Extraction Tool User Guide

1.0 Introduction

Data Extraction Tool (DET) is a tool developed to aid the user in reading a GTSTRUDL Version 2016[1] Output File (.gto) to obtain results for member forces, joint reactions, and structural code checks in a format that is more readily usable in structural analysis. The tool allows the user to export the requested results to a comma separated values (.csv) file or a Microsoft Excel (.xlsx) file.

This user guide provides information about the functionality, use, and limitations of the program. The Organization of the user guide is as follows:

- **Section 2** - provides definitions of program components or functions commonly used throughout the user guide.
- **Section 3** - provides a description of how to use the program to generate results.
- **Section 4** - provides descriptions of the possible errors that the user may experience while running the program.
- **Section 5** - provides examples for typical uses of the program.
- **Section 6** - provides a description of the planned future development as well as current limitations of use.

[1] Output files from other versions of GTSTRUDL may be used with the Data Extraction Tool with caution. Results have been tested and verified on .gto files from GTSTRUDL version 2016.

2.0 Definitions

This section provides definitions for language commonly used throughout this user guide. See Section 3.0 for images of the user interface highlighting the objects related to the definitions below.

Available Results	Display box in the *data processing tab,* which provides a list of available results specific to the current tab. The available results list a set number, set name, and the input line number corresponding to the line number of the result in the *output file*.
Data Processing Tab	Tab corresponding to the types of analysis results available for extraction from the *output file*.
Error Window	Window that contains information relevant to any errors encountered during program execution.
Landing Window	Initial screen encountered when the program is run. Allows the user to select a *working directory* and *output file*.
Output File	GSTRUDL Output file containing member force, joint reaction, or code check results. Support file types are .gto or .txt.
Properties File (.prop)	File containing requested results information saved by the user. This file is generated using the 'store inputs' button from the *data processing tab* and is read into the program using the 'load existing' button.
Requested Results	Display box in the *data processing tab* that provides a list of the user-selected results with corresponding *results parameters*. Parameters displayed in the *requested results* output box is dependent on the active *data processing tab* but will always include set number and set name.
Results Parameters	Parameters selected by the user from the *results selection window*. The *results parameters* are used as matching criteria when the *user-generated output* is created.
Results Selection Window	Window that allows the user to enter *results parameters* into the program to generate *requested results*. The *results selection window* is unique to each *output file* result type (member force, joint reaction, or code check).

Results Set Options	Buttons on the *data processing tab* that allow the user to manipulate the *available results* and the *requested results*.
User-Generated Output	Output containing the information from the *output file* that matches the *requested results* criteria. This file, by default, is stored in the *working directory* and may be a .csv or .xlsx file depending on user selection.
Working Directory	Directory in which all generated results files will be stored by default.

3.0 Program Use

The following section describes the features and primary use of the Data Extraction Tool. The format of this section contains descriptions and images for the main user interface windows and provides detailed information for each.

3.1 Landing Window

The landing window contains information related to the purpose of the program and allows the user to select a *working directory* and an *output file*.

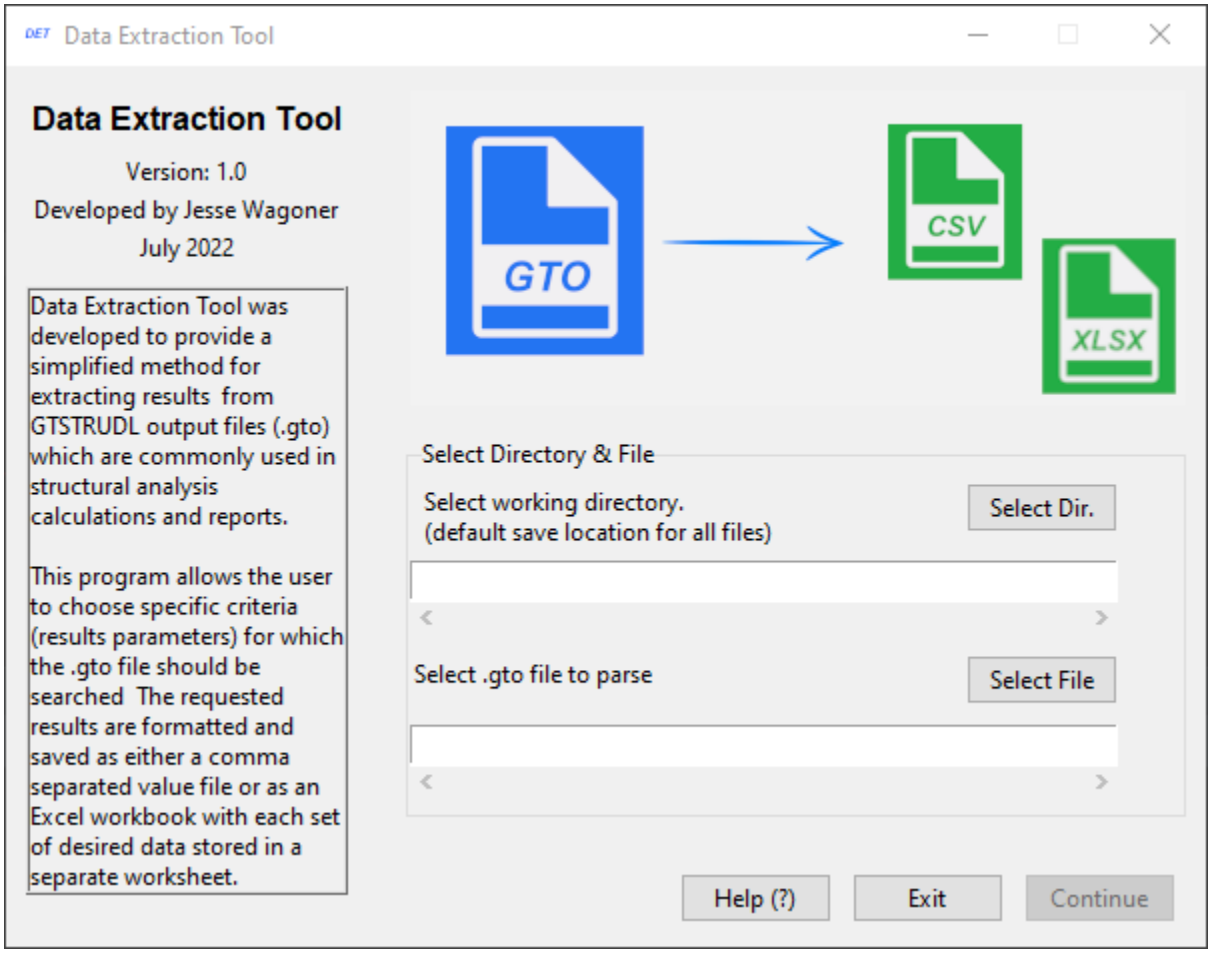

Figure 3.1-1: Landing Window

3.2 Data Processing Tabs

The data processing tab is the base window containing information about the *available results* and any previously *requested results*. The *data processing tab* contains four buttons for manipulating *available results*, 1 button for generating results, and 1 button storing a *properties file* for later use.

Figure 3.2-1 below shows the 'member force' *data processing tab.* The other tabs contain a similar layout, and the information in this section is applicable to all three tabs.

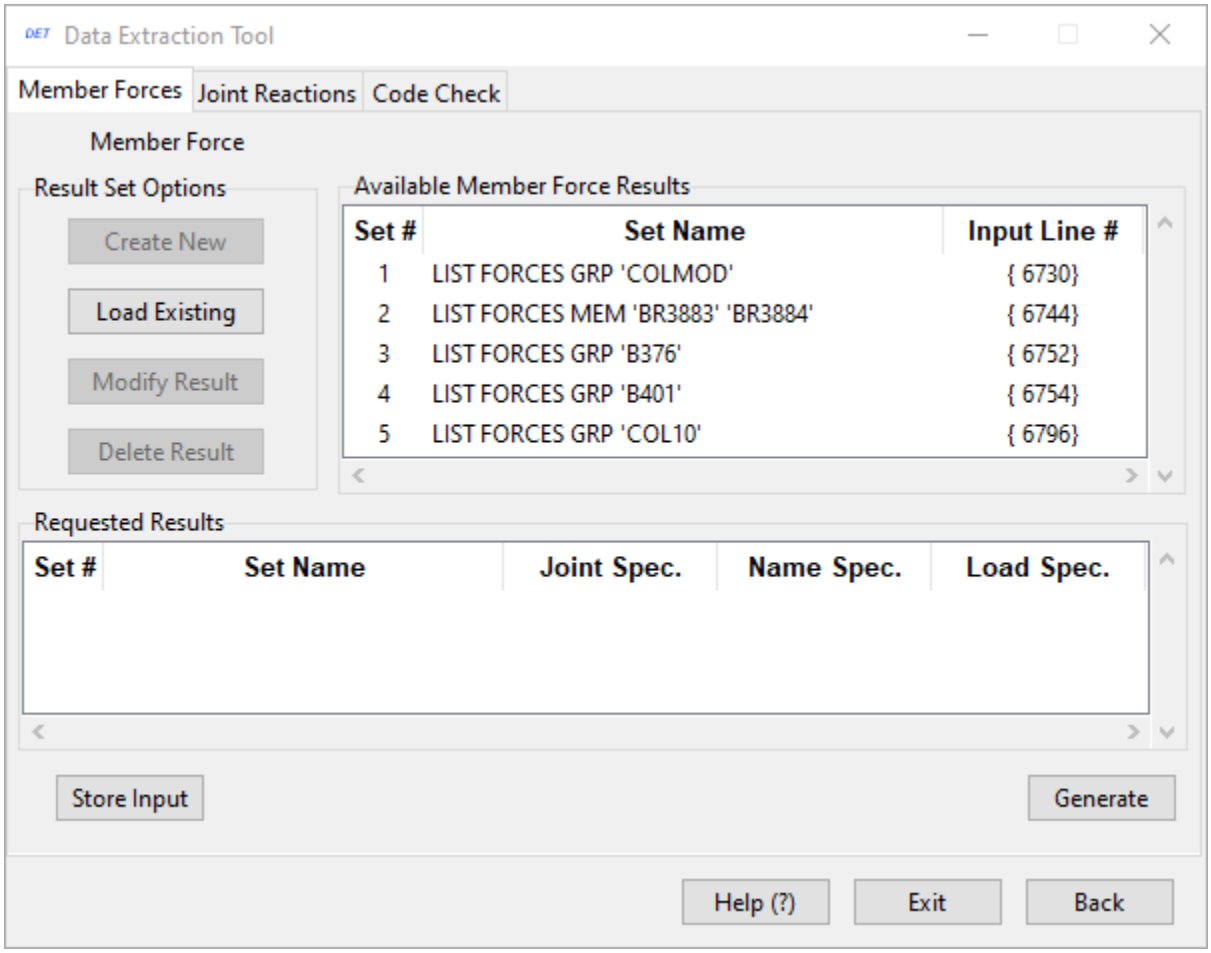

Figure 3.2-1: Data Processing Tab

The *available results* window will show all results from the *output file* matching the standard GTSTRUDL member force[2], joint reaction, and code check format. The order in which the available results are presented in the *data processing tab* is the same order the results appear in the *output file*. The **Set #** is a sequential number of the valid results. The **Set Name**

[2] Currently only member force results generated using the 'OUTPUT BY MEMBER' command in GTSTRUDL are supported.

corresponds to the GTSTRUDL input command used to generate the results. Finally, the **Input Line #** provides the corresponding input file line number as it appears in the output file. This value is provided to allow the user to easily navigate to the location of the results in the *output file* if required. If there are no valid results in the *output file*, the available results window will display a notification indicating no matching results have been found.

In lieu of viewing the *available results* in the *output file* at the specified **Input Line #**, a preview option is available within the Data Extraction Tool. To access the preview of the *available result* set, right click on the desired *available result* and select 'Preview'. This will open a new window containing the information from the *output file* (with blank lines removed) for the selected *available result* set.

If results have previously been stored and a *properties file* has been saved, the user may click on the 'Load Existing' button to load the *results parameters* into the current instance of the Data Extraction Tool. These results will appear in the *requested results* window (See Figure 3.2-2).

If no results have been previously stored, selecting any of the available results will allow the user to create new *results parameters* by clicking on the 'Create New' button. See Section 3.3 for description on the use of the *results selection window*.

Any *results parameters* that have been saved will appear in the *requested results window* as shown in Figure 3.2-2. Clicking on any of the *requested results* allows the user to modify the result (See Section 3.3) or delete the result.

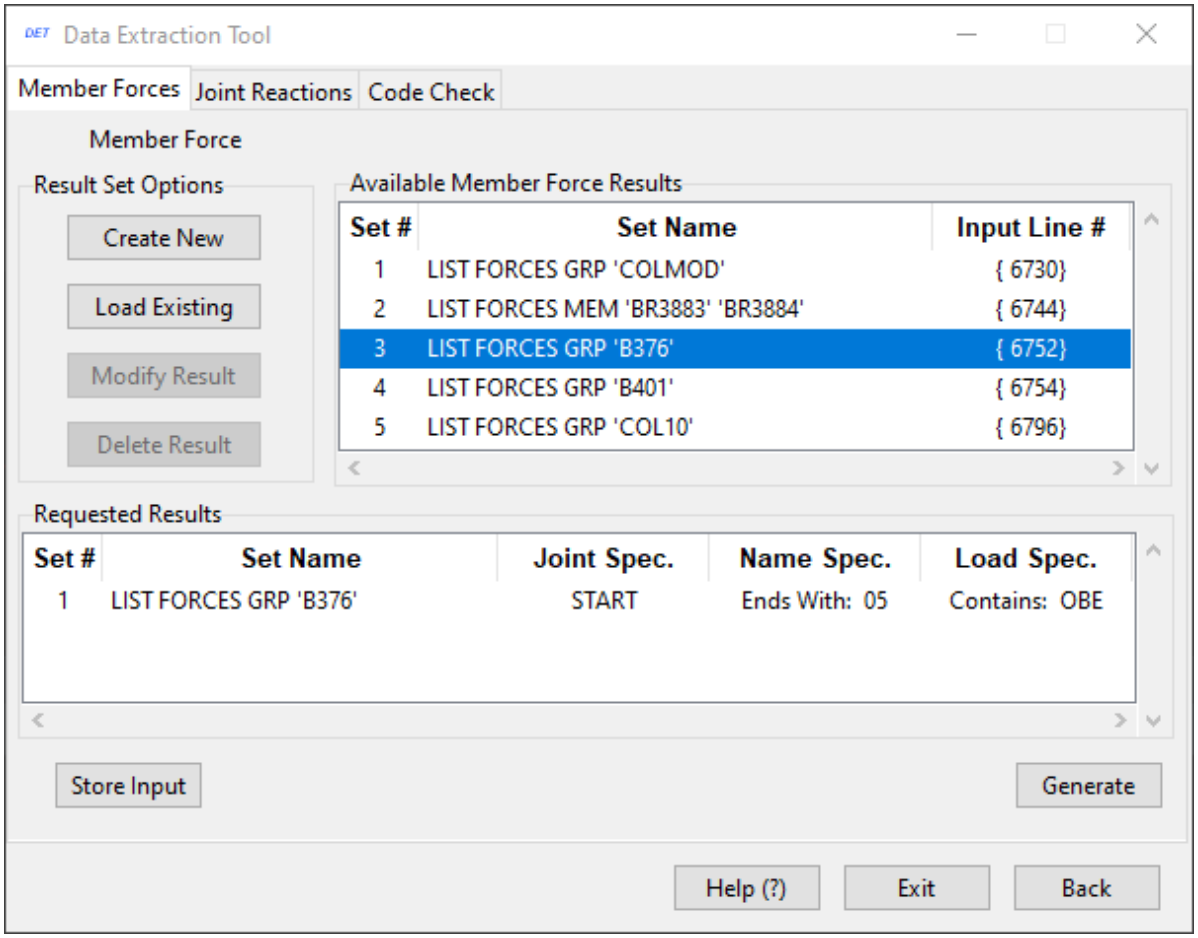

Figure 3.2-2: Data Processing Tab with Requested Results

After the desired number of *requested results* have been created and are shown in the *requested results* window, the user may choose to store the inputs into a *properties file* for later use with the 'Store Input' button or generate the results (see Section 3.4) using the 'Generate' button. Upon clicking the 'Generate' button the Data Extraction Tool will run a check for input errors. If errors exist in the *results parameters*, a notification will be displayed (see Section 4.0).

Both the requested results window and available results window columns may be resized by clicking on the divider between column headings and dragging the mouse to make the column larger or smaller. To reset the size of the columns to their original values double-click anywhere on the column heading.

3.3 Results Selection Window

The *results selection window* appears when the user clicks on the 'Create New' or 'Modify Result' button from the *data processing tab*. The information contained in the *results selection window* is unique to the type of result requested and the active tab on which the button was pressed.

In general, the *result selection window* allows the user to specify specific criteria for which they would like the selected *available result* searched. As such, the following options are typical for each *result parameter* unless otherwise specified.

All	Returns all items from the *output file* for the selected *available result*
Starts with	Returns all items that start with the specified criteria
Ends with	Returns all items that end with the specified criteria
Contains	Returns all items that contain[3] the specified criteria
List	Returns all items that exactly match the individual items in the specified list[4]

3.3.1 Member Forces

The *results selection window* for member force results allows the user to provide criteria for the member name, load case, and joint.

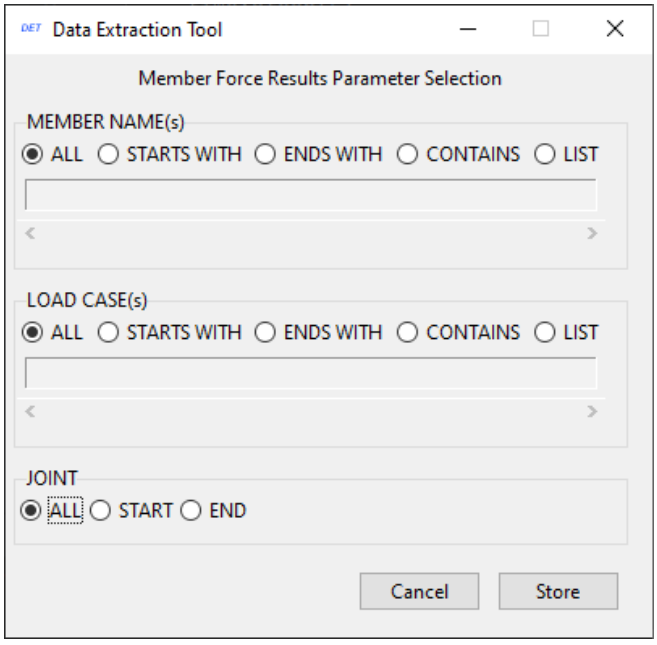

Figure 3.3.1-1: Results Selection Window (Member Forces)

[3] Only results which contain the entirety of the specified criteria in the same order as the criteria are returned.
[4] **List** entries must be comma separated.

3.3.2 Joint Reactions

The *results selection window* for joint reaction results allows the user to provide criteria for the joint name and load case.

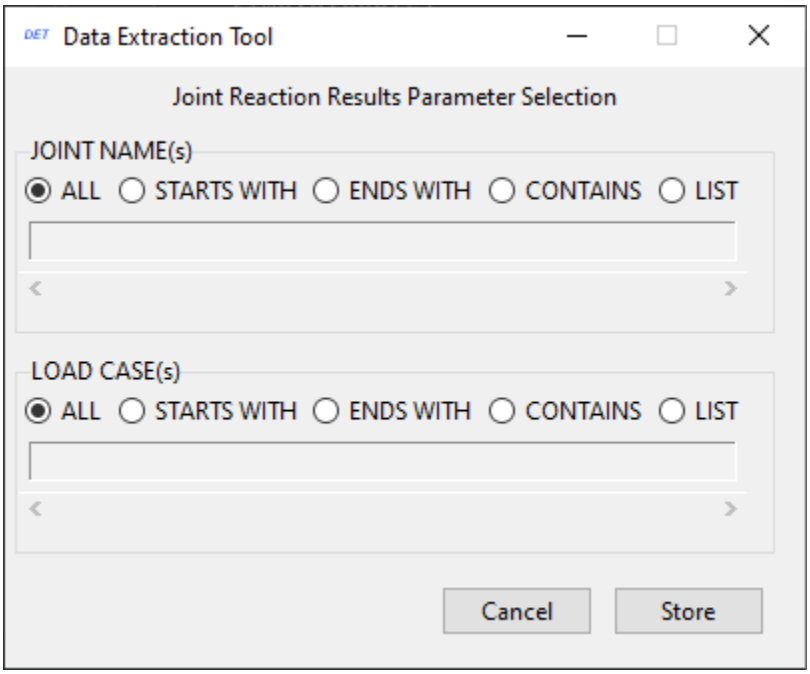

Figure 3.3.2-1: Results Selection Window (Joint Reactions)

3.3.3 Code Check

The *results selection window* for code check results allows the user to provide criteria for the profile, name, IR range as well as choose only members that failed the code check.

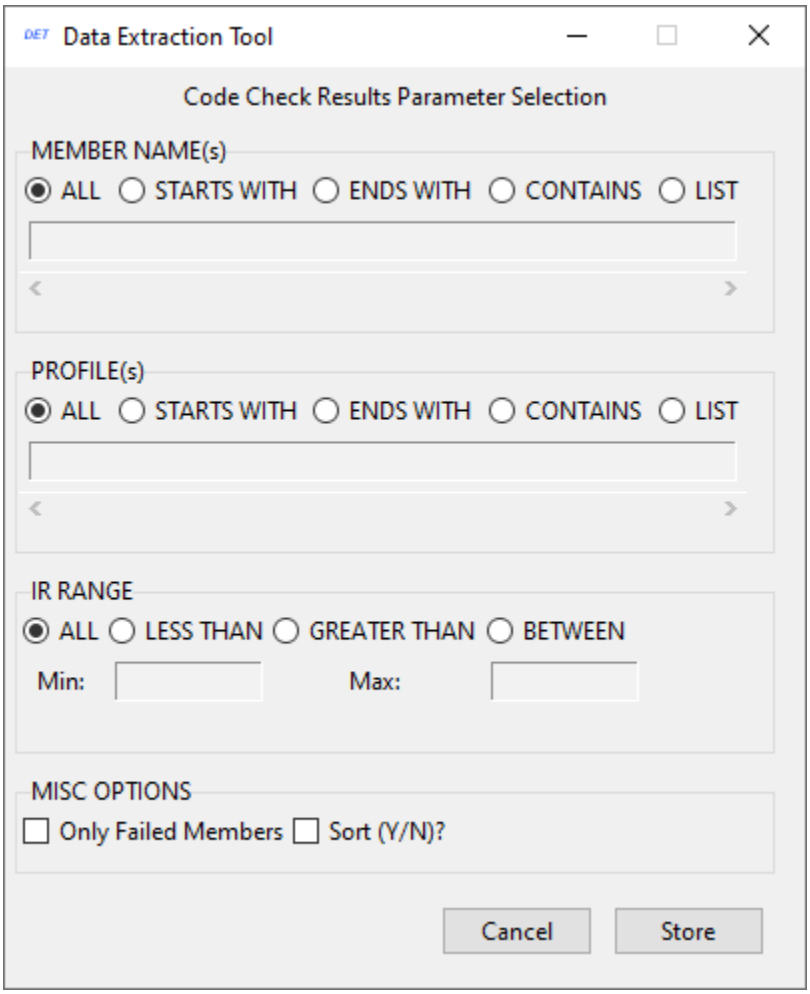

Figure 3.3.3-1: Results Selection Window (Code Check, default)

Optionally, the generated results can be sorted by clicking on the ‘Sort’ checkbox, which creates a supplementary input field for the sort options (Figure 3.3.3-2). Sort options include, profile, name, and IR value. The results can be sorted by any combination of the three options in the following way.

The user selects the option from the available options and clicks add to add it as a sorting criteria. The value of ‘ascending’ or ‘descending’ is captured with each selection. Selecting more than one sorting criteria functions as a multilevel sort based on the order in which the options were selected. For example, if the order selected is profile and then IR, the results will be generated first sorted by profile, and any duplicate values will be sorted a second time by IR.

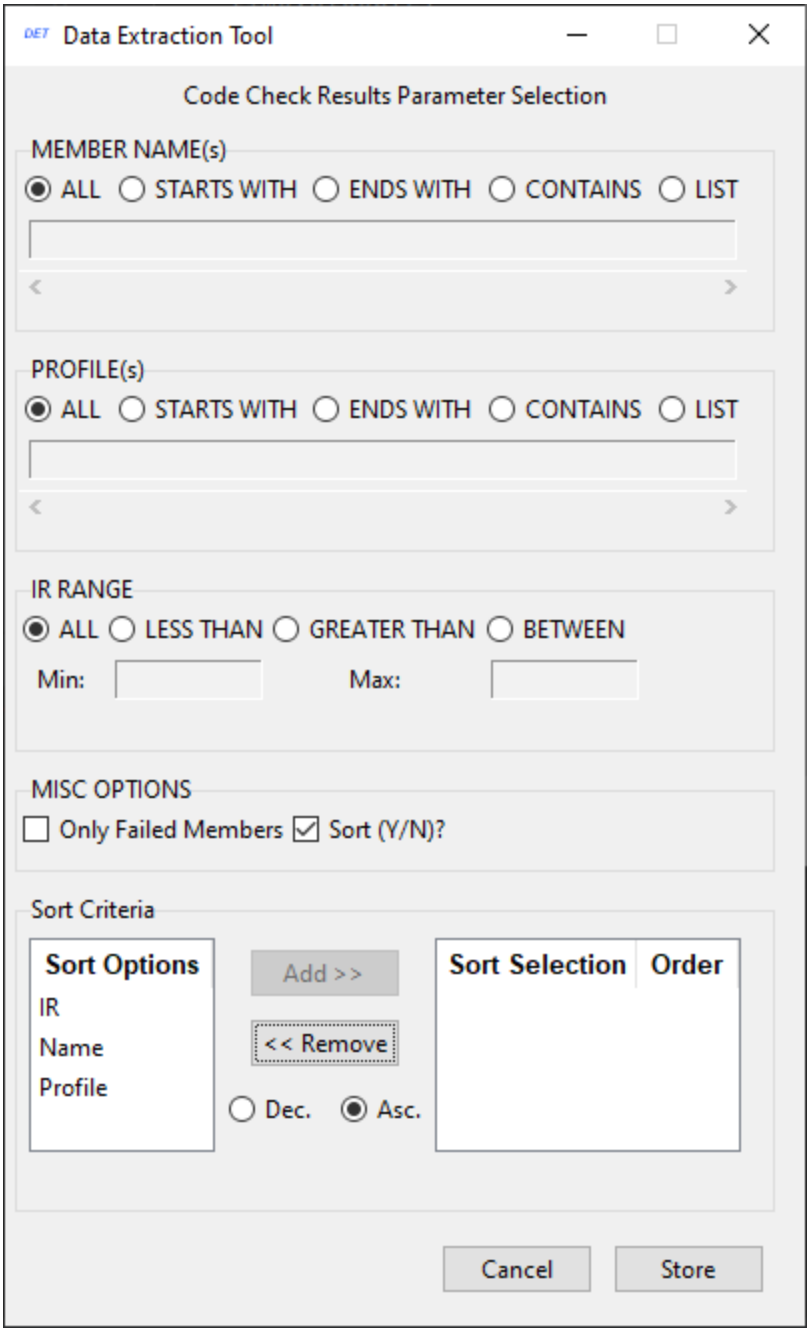

Figure 3.3.3-2: Results Selection Window (Code Check, with sort)

3.4 Output Formatting

The *user-generated output* is available in two formats. When the 'Generate' button is clicked on the *data processing tab* the user is prompted to select a file type of either .csv or .xlsx.[5] Saving results as a .csv file appends the *user-generated output* for each requested result set to a single file with all values separated by a comma. Saving the results as a .xlsx file creates a Microsoft Excel file with each result set stored in a separate tab corresponding to the set number.

If there are no errors in the *results parameters* (See Section 4.0), a notification of a successful *user-generated output* will appear (Figure 3.4-1).

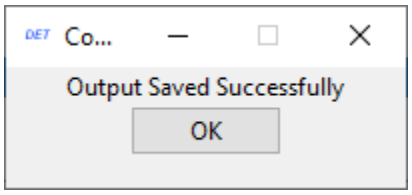

Figure 3.4-1: Success Notification

[5] Since each result set is a separate tab, and all results are stored in individual cells without the need to postprocess, generating results to an Excel file may take slightly longer than a .csv. Based on tests, for *output files* with result sets greater than 100,000 lines generate time may exceed 10 seconds for .xlsx.

4.0 Error Display

When running the program, the user may enter a combination of inputs that produce an error. When this occurs, an *error window* is displayed containing information that the user may find helpful for resolving the error or avoiding the error in the future. This section summarizes of the most common error notifications and how to resolve them.

Table 4.0-1: Common Data Extraction Tool Error Notifications

Error Title	Description	Resolution
No Directory	Occurs when the user tries to select an *output file* before selecting a *working directory.*	Select a *working directory* and then select an *output file*.
Invalid Member Force Format	Occurs when the user selects an *output file* that contains member force outputs by load instead of outputs by member. Currently, Data Extraction Tool only supports member force extraction for *output files* that use 'OUTPUT BY LOAD' formatting. See limitations in Section 5.0	Current workaround to this error is to rerun the GTSTRUDL file with the 'OUTPUT BY MEMBER' option specified for the member force results.
No Result Sets	Occurs when either the 'Store Results' or 'Generate' button is clicked on the *data processing tab* before *requested results* have been generated.	Create *requested results* following the process in Section 3.2 and Section 3.3 before attempting to store results or generate *user-generated results*.
Invalid Properties File	Occurs when the user attempts to load a *properties file* that contains *result parameters* from a different type of result (i.e., loading member force properties into the joint reaction tab).	Ensure the *properties file* selected for import contains *result parameters* applicable to the active *data processing tab*.

Table 4.0-1: Common Data Extraction Tool Error Notifications (continued)

Error Title	Description	Resolution
Invalid Result Parameters	May occur for several reasons. Most commonly this occurs when the user inputs invalid information into the *requested results window*. For example, the user attempts to select all member forces corresponding to the load case 'D+L+E' but the user inputs 'D+L+W' into the selection box. If the *output file* does not contain any load combination matching the user input, an error is returned.	The *error window* provides the user with the set number of the *requested result* set containing the error as well as the *result parameter* with the error. The user should review the error notification carefully to determine how to proceed.
Open File Error	Occurs when the user attempts to save a .csv or .xlsx file with the .csv or .xlsx file already open.	Close the open file or save the results as a new file name.

5.0 Limitations of Use

The following limitations apply to the use of the Data Extraction Tool.

- Member forces in the *output file* which have been generated using the ‘OUTPUT BY MEMBER’ command is supported. Files containing ‘OUTPUT BY LOAD’ or the GTSTRUDL default format will return an error on the *landing window*.

- Joint Reactions *available results* do not include joint reactions in the *output file* that have been generated using the ‘LIST SUM REACTIONS’ command.

- Output for member section forces is not currently implemented.

- *Output files* generated from GTSTRUDL version 2016 have been extensively tested. *Output files* from previous or newer versions of GTSTRUDL may still work, but have not been tested, and the user should carefully validate all results.

- Input commands in the *output file* that have been commented out with a ‘$’ are ignored. Similarly, if the ‘$’ is at the end of the input line, the entire line is also ignored. For example, both of the following input commands are ignored by the Data Extraction Tool even though the second input command is a valid GTSTRUDL command.
    - $ LIST FORCES ALL
    - LIST FORCES ALL $