

# Step File Converter User Manual

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# Introduction

The STEP File Converter is a tool for CNC engineers, designed to automate a lengthy and costly process. Nothing like this application currently exists. The value is derived from the process being automated. This process involves performing vibration analysis on different permutations of an object until a satisfactory sequence of faces is found. Vibration analysis is performed to ensure the piece worked on remains stable throughout the cutting process. The proposed tool will extract geometrical data from a STEP file and catalogue the different faces of the object described. High level features will be identified from these faces. One by one these features will be subtracted from a solid block shape. Vibration analysis is performed between each step, if the piece does not pass the requirements then a different face will be used. This will eventually create a list of faces to cut in order. Ex. A,B,F,G,C might be an order in which to carve first. Although vibration analysis already exists within various CAD applications, the process described only exists in a manual implementation. This tool will use the Solid Works API to outsource the calculations and identify the optimal cutting order within the application. An engineer will pass a STEP file to the program and the program will start working on the results. Depending on the parts complexity this process may take some time. Typically this process is done manually and can take up to three weeks to complete, this tool hopes to automate that process and reduce that time down to one day.

# System Requirements

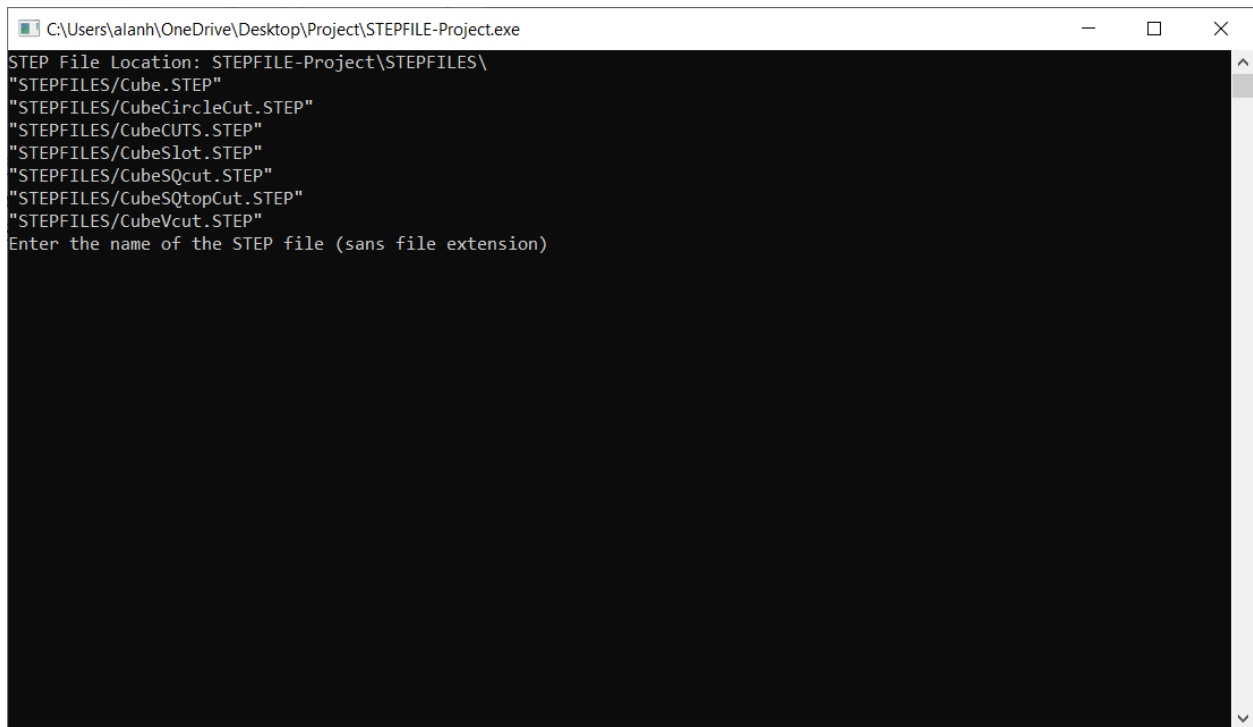
- Windows 10 Installed
- Any CPU + RAM

## Guide

The .exe file is ready to be used. Please ensure the folders 'STEPFILES' and 'WriteTests' are located in the same folder as STEPFILE-Project.exe. To use this application the STEP files must be of STEP protocol AP203. The object files must be saved in the .STEP format.

## Usage

To use the application simply follow the instructions in the console.



```
C:\Users\alanh\OneDrive\Desktop\Project\STEPFILE-Project.exe
STEP File Location: STEPFILE-Project\STEPFILES\
"STEPFILES/Cube.STEP"
"STEPFILES/CubeCircleCut.STEP"
"STEPFILES/CubeCUTS.STEP"
"STEPFILES/CubeSlot.STEP"
"STEPFILES/CubeSQcut.STEP"
"STEPFILES/CubeSQtopCut.STEP"
"STEPFILES/CubeVcut.STEP"
Enter the name of the STEP file (sans file extension)
```

Fig 1: Program Enter Name of File

After you have entered the file name, the program will do the rest of the work. The high level features will be identified and will be saved as their own STEP files in WriteTests/. The currently available STEP files will be displayed to the user to pick from.

```
C:\Users\alanh\OneDrive\Desktop\Project\STEPFILE-Project.exe
#480 = CARTESIAN_POINT ( 'NONE', ( -20.000000000000000, 0.000000000000000, -22.00985141461424988 ) );
#554 = CARTESIAN_POINT ( 'NONE', ( -20.000000000000000, 48.71370998226320381, 15.43548021284640015 ) );
#577 = CARTESIAN_POINT ( 'NONE', ( -20.000000000000000, 0.000000000000000, 15.43548021284640015 ) );
#600 = CARTESIAN_POINT ( 'NONE', ( -50.000000000000000, 0.000000000000000, -22.00985141461424988 ) );
#625 = CARTESIAN_POINT ( 'NONE', ( -50.000000000000000, 48.71370998226320381, 15.43548021284640015 ) );
Press any key to continue . . .
High Level Feature : 3
#216 = CARTESIAN_POINT ( 'NONE', ( 50.000000000000000, 50.000000000000000, 50.000000000000000 ) );
#400 = CARTESIAN_POINT ( 'NONE', ( 50.000000000000000, 77.01209037248150935, 50.000000000000000 ) );
#435 = CARTESIAN_POINT ( 'NONE', ( 30.87096042569275056, 62.14829461196279681, 50.000000000000000 ) );
#519 = CARTESIAN_POINT ( 'NONE', ( 50.000000000000000, 50.000000000000000, -50.000000000000000 ) );
#580 = CARTESIAN_POINT ( 'NONE', ( 30.87096042569275056, 62.14829461196279681, -50.000000000000000 ) );
#597 = CARTESIAN_POINT ( 'NONE', ( 50.000000000000000, 77.01209037248150935, -50.000000000000000 ) );
Press any key to continue . . .
High Level Feature : 4
#279 = CARTESIAN_POINT ( 'NONE', ( 17.500000000000000, 100.000000000000000, 50.000000000000000 ) );
#367 = CARTESIAN_POINT ( 'NONE', ( -17.500000000000000, 65.000000000000000, -50.000000000000000 ) );
#40 = CARTESIAN_POINT ( 'NONE', ( -17.500000000000000, 65.000000000000000, 50.000000000000000 ) );
#477 = CARTESIAN_POINT ( 'NONE', ( -17.500000000000000, 100.000000000000000, 50.000000000000000 ) );
#589 = CARTESIAN_POINT ( 'NONE', ( 17.500000000000000, 65.000000000000000, 50.000000000000000 ) );
#628 = CARTESIAN_POINT ( 'NONE', ( -17.500000000000000, 100.000000000000000, -50.000000000000000 ) );
#7 = CARTESIAN_POINT ( 'NONE', ( 17.500000000000000, 65.000000000000000, -50.000000000000000 ) );
#748 = CARTESIAN_POINT ( 'NONE', ( 17.500000000000000, 100.000000000000000, -50.000000000000000 ) );
Press any key to continue . . .

Would you like to start again? (Y/N)
```

Fig 2: Start Again?

Once the program is finished and has displayed the vertex points of each high level feature, you will be prompted to start the application again. Simply type 'y' to start again or 'n' to close the application. If you choose to start again and pass a new object to the program, the high level features from the last time will be overwritten. If you would like to save these, navigate to WriteTests/ and make a copy.