PhotoMesh 8.0.4 / Wizard 1.4.1 Workflow

1. **Pre-Processing Setup.**
   a. Before starting the Wizard, and after downloading and installing both PhotoMesh and TerraExplorer, there are two things to check for:
      1. Launch TerraExplorer and make sure the software is running properly, so the Wizard can open it after processing. Then close it.
      2. Launch PhotoMesh and make sure the Use Fuser Pool setting is turned off. You can do this under the Tools Tab, in Fuser Pool Settings. Then close it.

2. **Using the Command Line**
   a. If you would like to run the PhotoMesh Wizard from the command line, these are the steps you should take.
   b. Make sure you are running the command line from the location that the PhotoMeshWizard.exe is installed

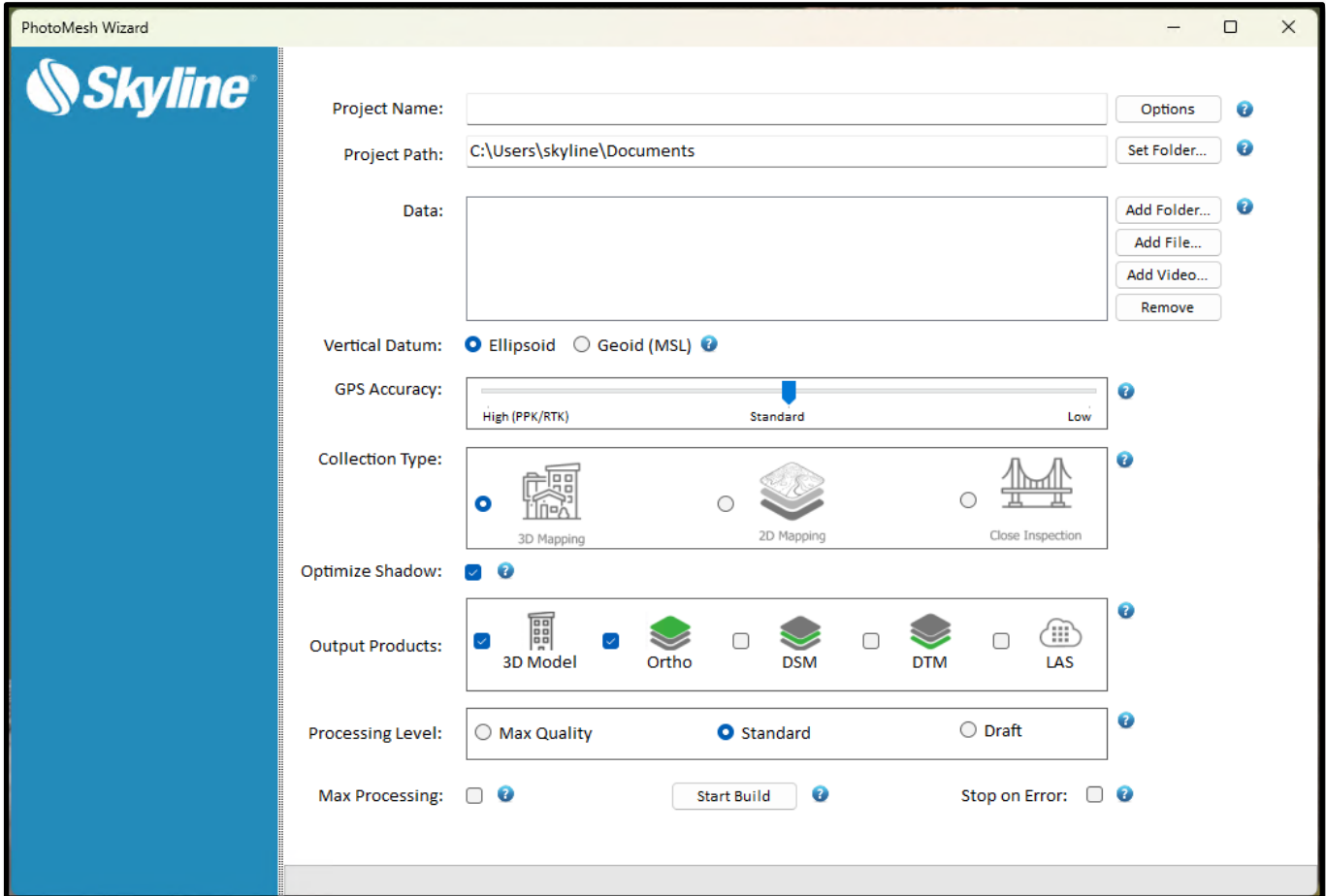   (for example, use: cd C:\Program Files\Skyline\PhotoMesh\Tools\PhotomeshWizard)

   c. The command line for the wizard will use the following parameters:

      1. projectName – a name for the project being created.
      2. projectPath – a save location for the project
      3. folder – a folder of images used for the project
      4. video – a video file used for the project

   d. The folder and video parameters can be used multiple times if there are multiple sources of data for the project
   e. An example command line:

WizardGUI.exe --projectName MyNewProject --projectPath c:\myProjectDirectory --folder c:\mydatafolder\data1 --folder c:\mydatafolder\data2 --video c:\myvideos\video1.ts

   f. Once you run the command line, the PhotoMesh Wizard will open, and you can click **Start Build** at the bottom of the window.
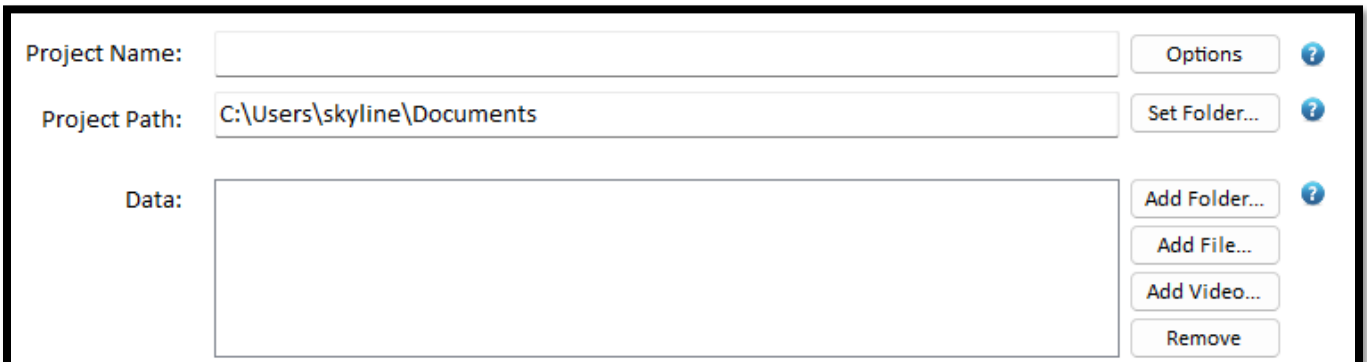
3. **Launch the PhotoMesh Wizard.**
    a. If you want to run the Wizard through the GUI, these are the steps you should take.
    b. Navigate to the PhotoMesh Wizard Icon on the Desktop and double click.
    c. The PhotoMesh Wizard will launch with the following GUI:

d. **Setting up the Project and Importing the Data.** To start, fill in the first field designated **Project Name** with the name of the project to be created in PhotoMesh. A directory with this name will be created to hold relevant project information and data.
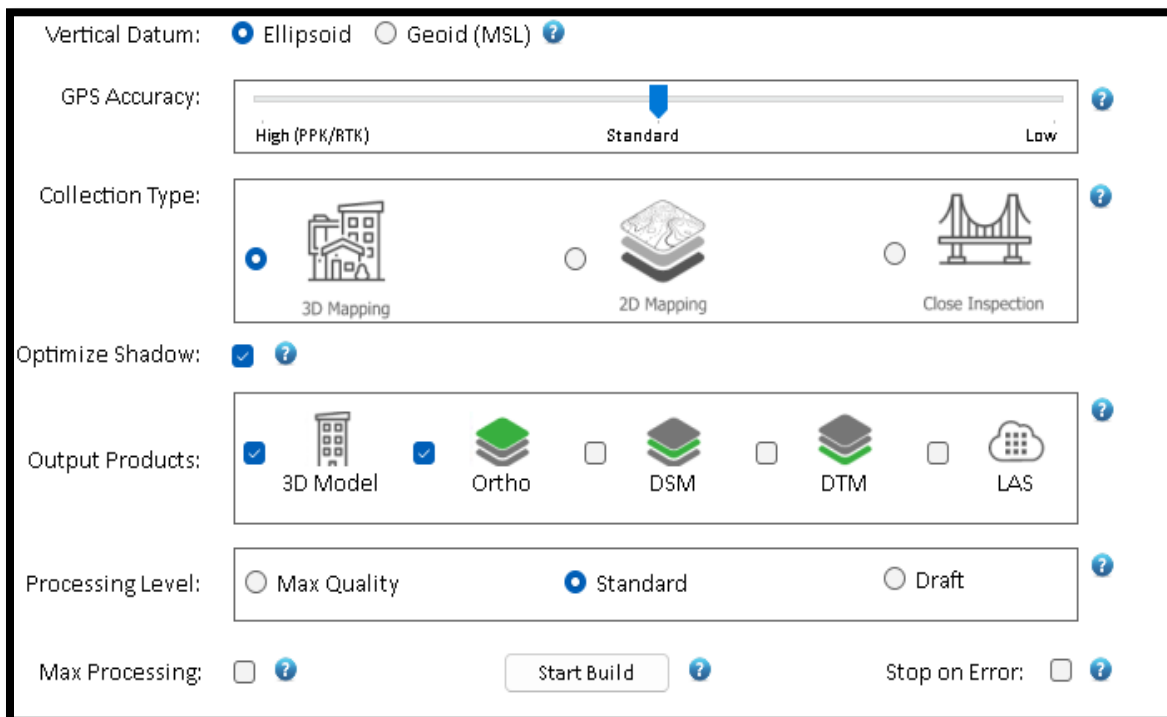
e. In the **Project Path** field, enter the full path on the computer where the project directory and outputs will be created. You can also click on "Set Folder" and navigate to a directory from there.
f. In the **Data** area is where you will import photos and other input sources that will be loaded into the project. These can include:
    1. Individual geotagged images
    2. folders of images (all subfolders will be included)
    3. Full Motion Video with KLV data
    4. Photo list files that include lists of photos, their file paths, camera model, and position and orientation in Excel or Block Exchange XML template.
g. You have three ways to enter your data here:
    1. **Add Folder** allows you to browse your computer files and select a folder of images to import.
    2. **Add File** allows you to browse your computer and select individual photos or files to import.
    3. **Add Video** allows you to browse your computer for specifically video formatted files to import.
    4. You may also browse through your computer in a separate File Explorer window and drag and drop your data into this field.
    5. If you wish to delete data from this field that you have already selected, simply click on the data, and select **Remove**.
4. **Adjusting the Project Settings.**


a. For the project **Vertical Datum,** select to use either Ellipsoid or Geoid. (For more information on these, visit https://en.wikipedia.org/wiki/Geoid)

It is recommended to confirm the datum prior to selection. The general settings for the following platforms are:
- Sensefly, Wingtra, Yuneec use Ellipsoid
- DJI, Skydio use Geoid

b. The **GPS Accuracy** setting will determine the accuracy of the camera positioning data.
1. Low: Low accuracy, GPS denied environment or in obstructed settings, 5 meters or worse.
2. Standard: 1 – 5 meter accuracy.
3. High: 0.5 meter accuracy or better, utilizing PPK or RTK accuracy enhancement.

c. **Collection Type** assists with software presets to get you the best project for your intended purpose.
1. 3D Mapping: If your collection contains diagonal (oblique) imagery AND/OR top-down (Nadir) imagery designed to build 3D models and 2D true ortho projects. Best results require both types of imagery collection.
2. 2D Mapping: If your collection contains top-down (Nadir) imagery only. Mainly for Ortho Photo production of an area.
3. Close Inspection: If you collection is a close-range orbital pattern around a single object.

d. By checking **Optimize Shadow**, PhotoMesh will perform a histogram analysis on each image in the project and adjust the color balance to achieve maximum contrast, level of detail, and a brightness level close to the center of the histogram. Useful for datasets that were flown underneath overcast cloud coverage, low sunlight conditions, or haze.

e. By checking the **Collection Type**, the recommended outputs will already be selected. However, if you want to adjust the type of outputs the project will run, select them in the **Output Products** field. Output types include:
1. 3D Model: A 3DML (Skyline format for 3D textured mesh), containing all geometric vertices and textures in a single file, optimized for streaming, fast performance, and best quality.
2. Ortho: 2D representation of the Earth's surface in a top-down (orthographic) view.
3. DSM: Digital Surface Model, gridded raster with elevation values representing all surfaces in the 3D output.
4. DTM: Digital Terrain Model, gridded raster with elevation values representing terrain only, by removing above ground surfaces such as trees and buildings.
5. LAS: Colorized Photogrammetric Point Cloud, representing all known data points extracted during the 3D Correlation process by PhotoMesh.
6. Once clicking the **Options** tab on the top-right, next to the Project Name, you can select **OBJ** for another 3D Model output. In this Options tab you can also set the Fuser – Network Working Folder.
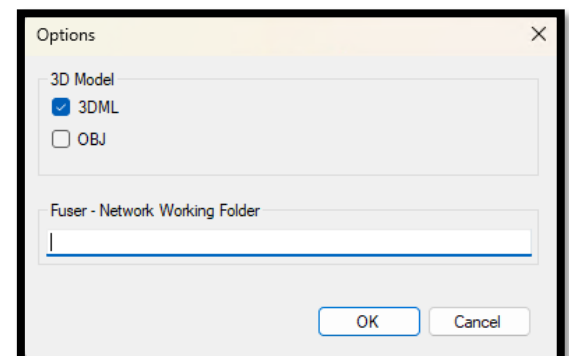
f. Select the **Processing Level** you want your project to run with **Draft Mode** for faster processing, medium quality
1. Max Quality: Utilizes the maximum resolution available for #d Reconstruction; recommended to be used in only large-scale production environments with high quality sensors and lenses.
2. Standard: Runs at optimal resolution for typical drone and light weight cameras; recommended option for most datasets processed on a single computer environment for best balance of quality and performance.
3. Draft: Run at minimal resolution for 3D Reconstruction; recommended for fast turnaround when speed is by far the main consideration, and an immediate review of the project area is required.
g. By selecting **Max Processing**, the project will use all available computer resources to process the data and create the desired output(s). This can cause the computer to become slow for other uses. Only choose this option if the computer is dedicated to PhotoMesh processing.
h. Select **Stop on Error** if you want the project to stop running if any error occurs. Otherwise, the project will continue to run through any minor errors or warnings that may be reported.

5. **Starting the Build.**
a. Once all the data is imported and the desired settings for the project are selected, you can select **Start Build**. This button will kick off the entire process within PhotoMesh. The user will have the ability to cancel the build if desired. A progress bar, status, and time will provide the wizard user feedback on the PhotoMesh project. The wizard can also be closed without interrupting the build process.
b. Once the project finishes processing, the wizard will close, and your project will open in TerraExplorer.

6. **TerraExplorer**
a. Double Click on any layer in Project Tree to navigate to project area.
b. Navigate to Tools.
c. Launch PhotoInspector to view and measure the resulting outputs using project images.

7. **Advanced Options**
a. In file explorer, navigate to where you have PhotoMesh installed and open up the config.json. The path should be similar to: C:\Program Files\Skyline\PhotoMesh\Tools\PhotomeshWizard\config.json
b. The file allows you to change the default settings for the PhotoMesh Wizard.
c. The top section labeled "**NameEllipsoid**" and "**DatumEllipsoid**" is where you can change the default output coordinate system for all projects run through the wizard. If you change this, make sure that you have the correct GTX files for your coordinate system.
d. "**SecondsPerFrame**" allows you to change how many frames will be pulled from a video if that is your input format.
e. "**StandardWaitTime**" (in milliseconds) is how long the software will wait after completing an operation before starting the next.
f. "**UseMinimize**" will keep PhotoMesh minimized in the background while the wizard is running.

g. "**UseLowPriorityPM**" prevents PhotoMesh from using all available resources on your computer, which could slow down your system.

h. "**EnableTextureMeshMaxThreads**" will limit each fuser to only 4 threads of GPU to allocate resources more evenly, good if running multiple fusers on strong computers.

i. "**OutputWaitTimerSeconds**" will change how long the wizard takes to open up the outputs in TerraExplorer once it is finished.

j. "**ClosePMWhenDone**" will close the PhotoMesh window when it finishes processing.

```json
config.json
1  {
2      "PhotomeshRestUrl": "http://localhost:8086",
3      "NameEllipsoid": "WGS 84",
4      "DatumEllipsoid": "GEOGCS[\"WGS 84\",DATUM[\"WGS_1984\",SPHEROID[\"WGS 84\",6378137,298.257223563,AUTHORITY[\"EPSG\",\"7030\"]],AUTHORITY[\"EPSG\",\"6326\"]],PRIMEM[\"Greenwich\",0,AUTHORITY[\"EPSG\",\"8901\"]],UNIT[\"degree\",0.0174532925199433,AUTHORITY[\"EPSG\",\"9122\"]],AUTHORITY[\"EPSG\",\"4326\"]]",
5      "NameGeoid": "WGS 84 + EGM96 geoid height",
6      "DatumGeoid": "COMPD_CS[\"WGS 84 + EGM96 geoid height\", GEOGCS[\"WGS 84\", DATUM[\"WGS_1984\", SPHEROID[\"WGS 84\", 6378137, 298.257223563, AUTHORITY[\"EPSG\", \"7030\"]], AUTHORITY[\"EPSG\", \"6326\"]], PRIMEM[\"Greenwich\", 0, AUTHORITY[\"EPSG\", \"8901\"]], UNIT[\"degree\", 0.0174532925199433, AUTHORITY[\"EPSG\", \"9122\"]], AUTHORITY[\"EPSG\", \"4326\"]], VERT_CS[\"EGM96 geoid height\", VERT_DATUM[\"EGM96 geoid\", 2005, AUTHORITY[\"EPSG\", \"5171\"], EXTENSION[\"PROJ4_GRIDS\", \"egm96_15.gtx\"]], UNIT[\"m\", 1.0], AXIS[\"Up\", UP], AUTHORITY[\"EPSG\", \"5773\"]]]",
7      "SecondsPerFrame": 1.0,
8      "StandardWaitTime": 1500,
9      "UseMinimize": true,
10     "UseLowPriorityPM": false,
11     "UseRawRequests": false,
12     "EnableTextureMeshMaxThreads": true,
13     "OutputsWaitTimerSeconds": 0,
14     "ClosePMWhenDone": true,
15     "DefaultPhotoMeshWizardUI": {
16         "VerticalDatum": "Ellipsoid",
17         "GPSAccuracy": "Standard",
18         "CollectionType": "3DMapping",
19         "OptimizeShadow": true,
20         "OutputProducts": {
21             "Model3D": true,
22             "Ortho": true,
23             "DSM": false,
24             "DTM": false,
25             "LAS": false
26         },
27         "ProcessingLevel": "Standard",
28         "StopOnError": false,
29         "MaxProcessing": false
30     },
31     "GBPerFuser": 24,
32     "UseDepthAnything": false,
33     "PMWServiceTimeoutInMinutes": 1440,
34     "NetworkWorkingFolder": "\\\\192.168.202.9\\PhotoMeshFusers"
35 }
```

JSON file | length: 1,764 lines: 35 | Ln: 15 Col: 34 Pos: 1,276 | Windows (CR LF) | UTF-8 | INS

k. Underneath "**DefaultPhotoMeshWizardUI**" you can change the default settings of the Wizard interface, so when you open the Wizard, it will always have these options selected.

l. In the "**DefaultPhotoMeshWizardUI**" options, you can change the following:

1. Vertical Datum ("Ellipsoid" or "Geoid")
2. The GPS Accuracy ("High", "Standard", or "Low")
3. Collection Type ("2DMapping", 3DMapping", or "CloseInspection")
4. Optimize Shadow ("true" or "false")
5. The outputs products you want to have selected and produced ("true" or "false")
6. Processing Level ("MaxQuality", "Standard", or "Draft")
7. Stop on error and Max processing can both be turned on or off ("true" or "false")

8. The number of fusers that your computer will use, based on how many GB your machine has.

m. You can also add/remove the "**UseDepthAnything**" preset, which utilizes Monocular Depth Estimation to create highly accurate depth maps, which PhotoMesh integrates into the AT engine for enhanced Tie Point Matching, Bundle Adjustment, and Camera Calibration.

n. If you want to use fusers from a different machine over a network, you can type in the network path (using double slashes as seen in the screenshot) of the fusers' working folder in the **NetworkWorkingFolder** parameter (see more on using network fusers in the next step).

o. To save the config.json, save in the PhotoMeshWizard folder, which should be located where you downloaded PhotoMesh (Ex: C:\Program Files\Skyline\PhotoMesh\Tools\PhotomeshWizard).

p. You can always edit this file to return to the default settings.

8. **Using Fusers Over a Network**
    a. To use other fusers, you will first have to start them up on another machine and then open them in the bottom right-hand corner of your screen.
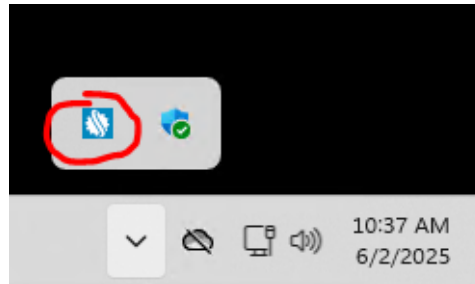
b. The fuser window will open. Navigate to the working folder and change it to the directory that you want to set your fusers to.
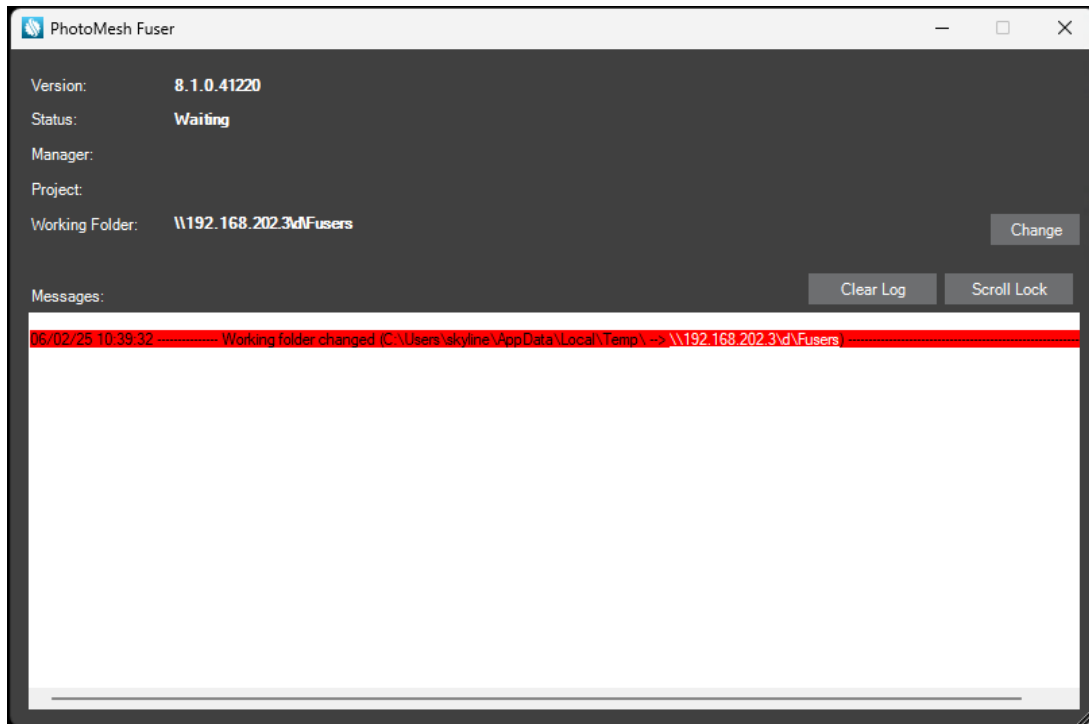
c. You also want to copy this path into the **NetworkWorkingFolder** parameter in the config.json as well.
d. Once you save the config.json and open up the wizard again, and continue from there.
e. The Network Working Folder can also be changed by clicking the **Options** tab on the top-right, next to the Project Name. Once you enter it in there and press OK, there will be a new option next to Start Build that says **Fusers**. It will give you 3 options:
   1. **Network** – to run with any fusers that are located in the folder you assigned them to, the same folder in the config.json.
   2. **OneLocal** – Run with only one fuser on your local machine
   3. **MaxLocal**- Run with the maximum number of fusers available on your local machine.

f. The wizard will kick off the project with fusers based on your settings