Bilkent University

Department of Computer Engineering

Senior Design Project

Machine Learning for Machining Processes of Three-Dimensional Parts

Project User's Manual

Project Members: Irmak Akyeli, Denizhan Kemeröz, Alp Üneri, Bulut Gözübüyük, Tuva Tanay Işıksal

Supervisor: Prof. Dr. Uğur Güdükbay

Jury Members and Project Evaluators: Erhan Dolak and Tağmaç Topal

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1 Installation

To run our project, one will first have to have Python version 3.7. Versions higher than 3.7 should also work, with the exception of 3.8. However, it is recommended to have version 3.7 to run our project.

In our zip file, there will be two batch files and two batch scripts. The files named run.bat or run.sh will be the files used to launch our project. The files named importlar.bat or importlar.sh are the files that check the depending Python packages. Thus, it would be better if they were run first before the run.bat or run.sh files. It is also important that the ML models be in the correct folder structure before running the run.bat or run.sh files, however this should be the case already in our zip file.

To conclude, in order to run our project one should run download the zip folder, unzip it, run the importlar.bat or importlar.sh file to make sure the Python dependencies are solid, and then run the run.bat or run.sh file to launch the project. This should be done on Python version 3.7.

2 UI Guide
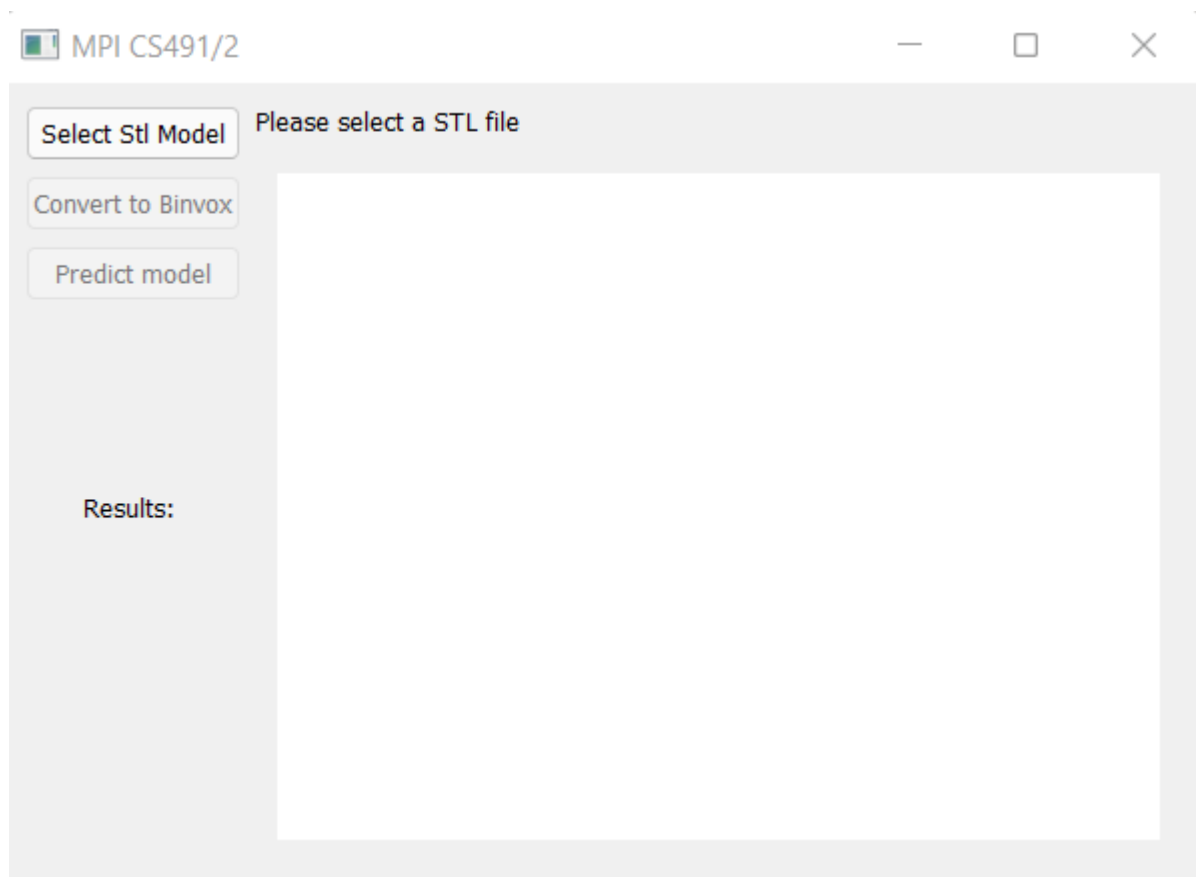
Once the user launches our program, they will be met with the above screen. As you can see at first launch only the Select STL Model button will be enabled. Once the user clicks this button, a pop-up window will open with a standard file selector, as shown below.
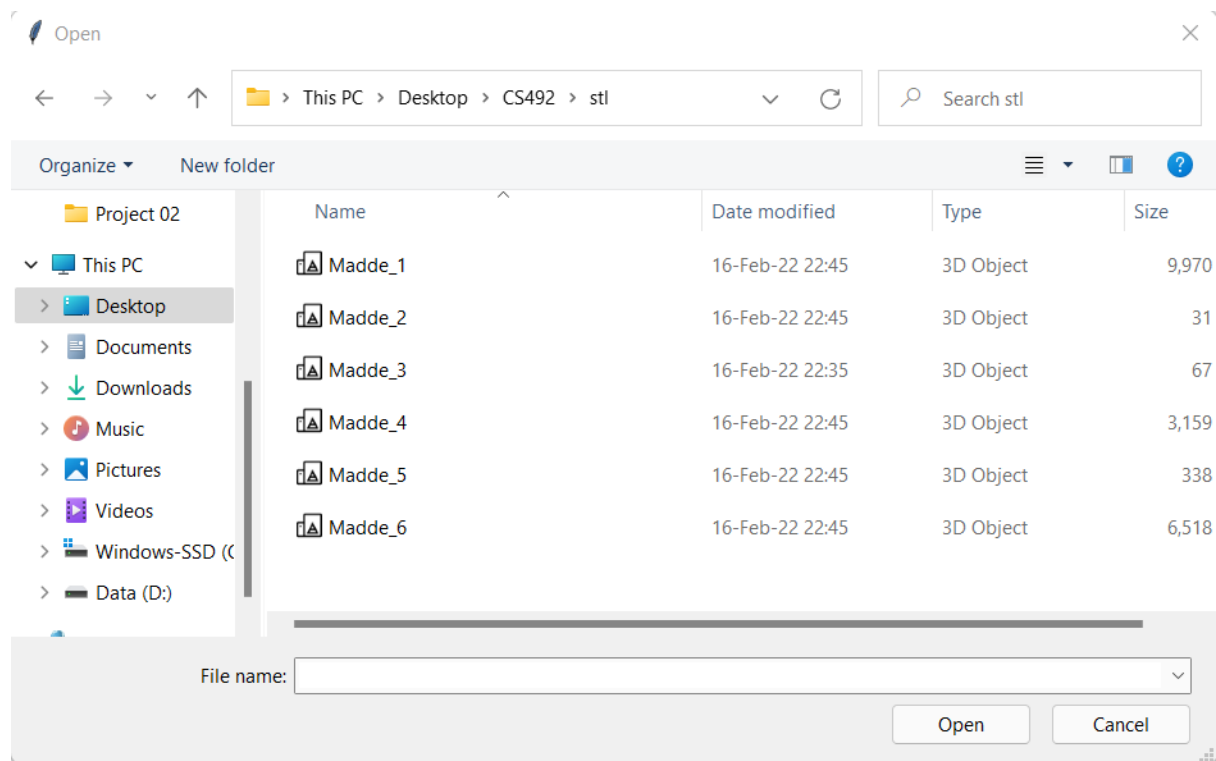
This will pop up once the user clicks the Select STL Model button. From this window users will be able to browse their files and select and STL model. Once they click open, the STL model will be displayed and as well another pop-up window will open prompting the user to select the material that the part will be made out of, for cost estimation purposes.
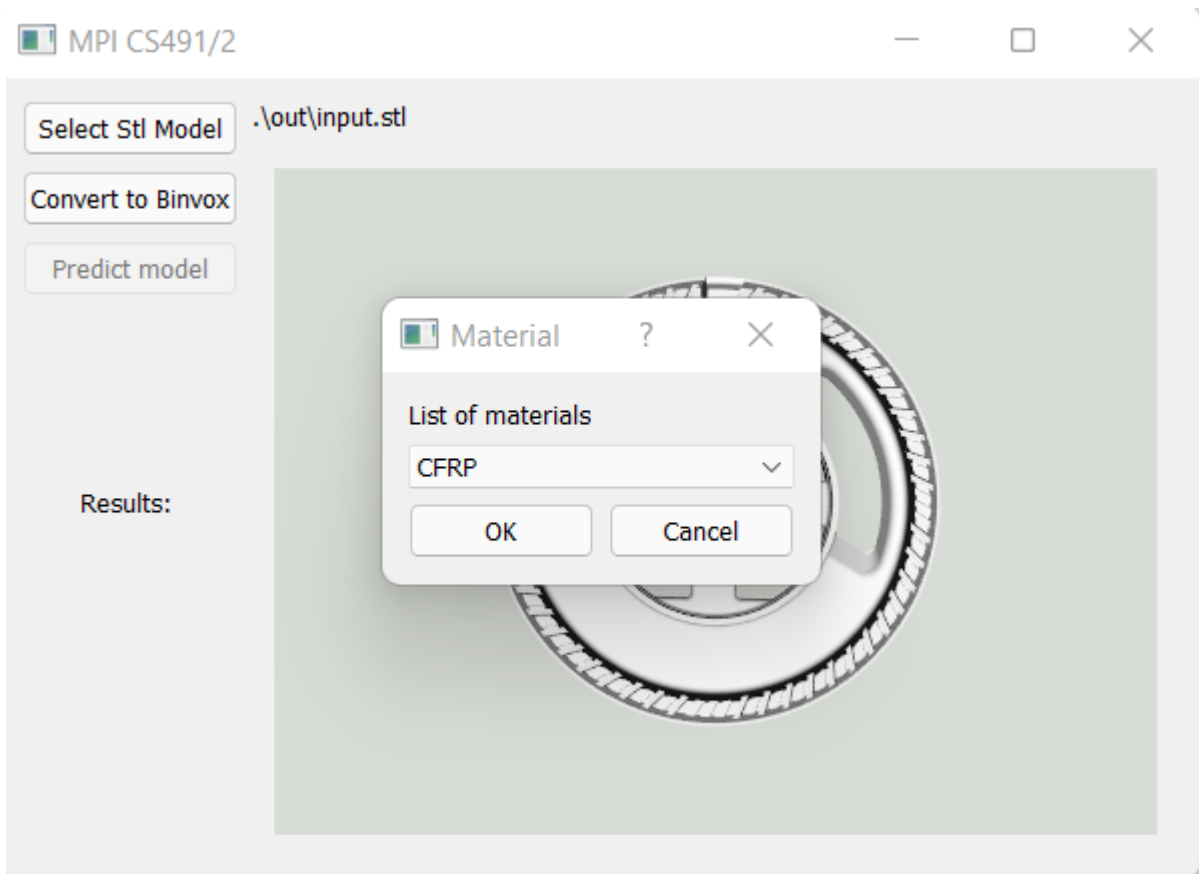
This is the screen the user will be met with once they open an STL model.
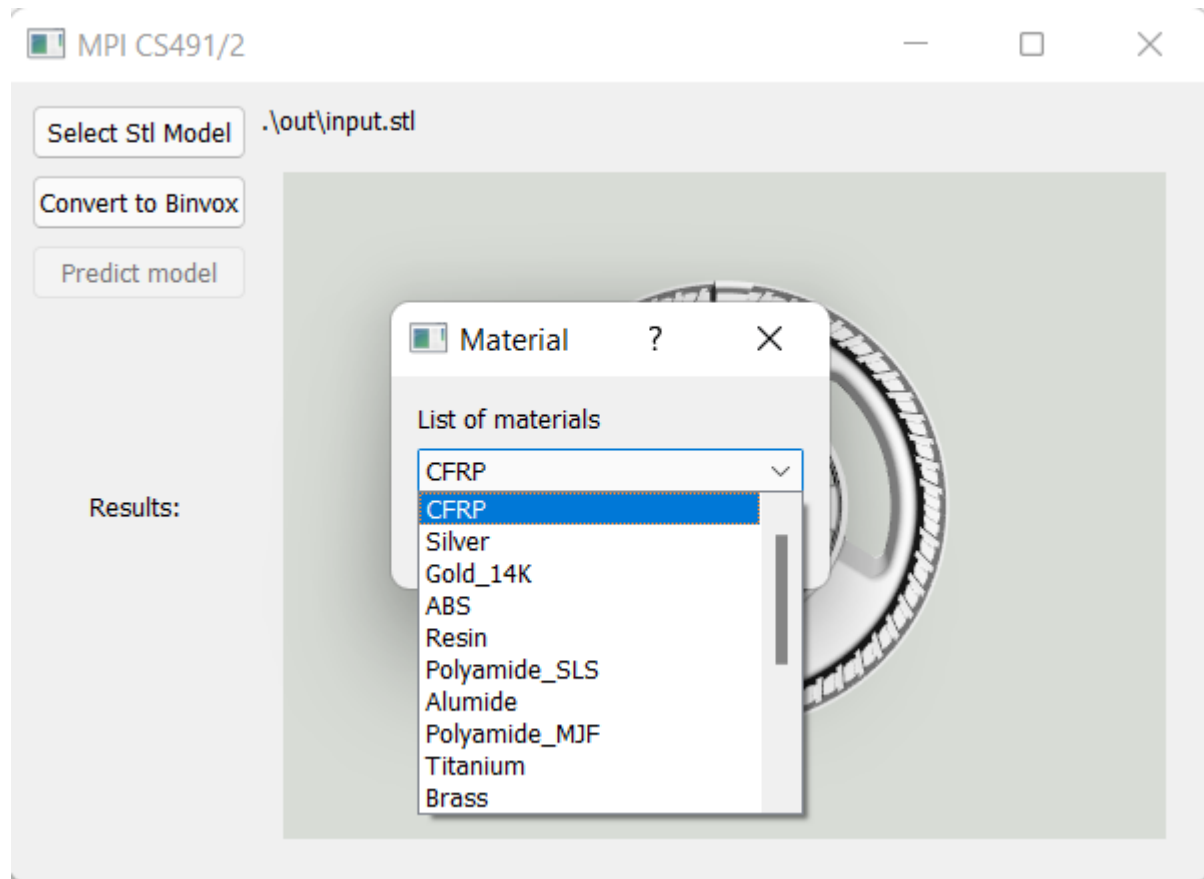
The user will be able to select the material that the part will be made out of using the drop-down menu.
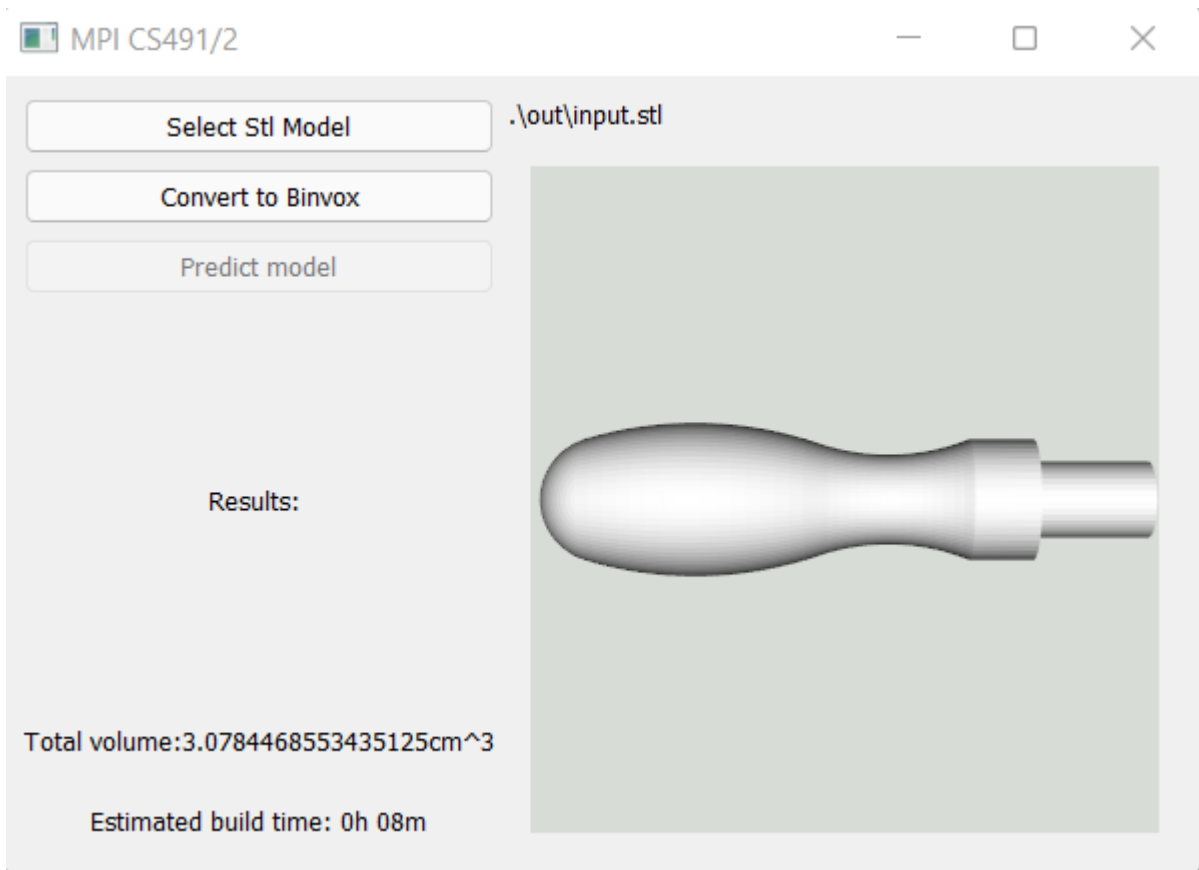
After doing so, the user will be told the total volume of the part and as well the estimated building time to manufacture it. Next, the user may continue the process by clicking the Convert to Binvox button, which will now be enabled.
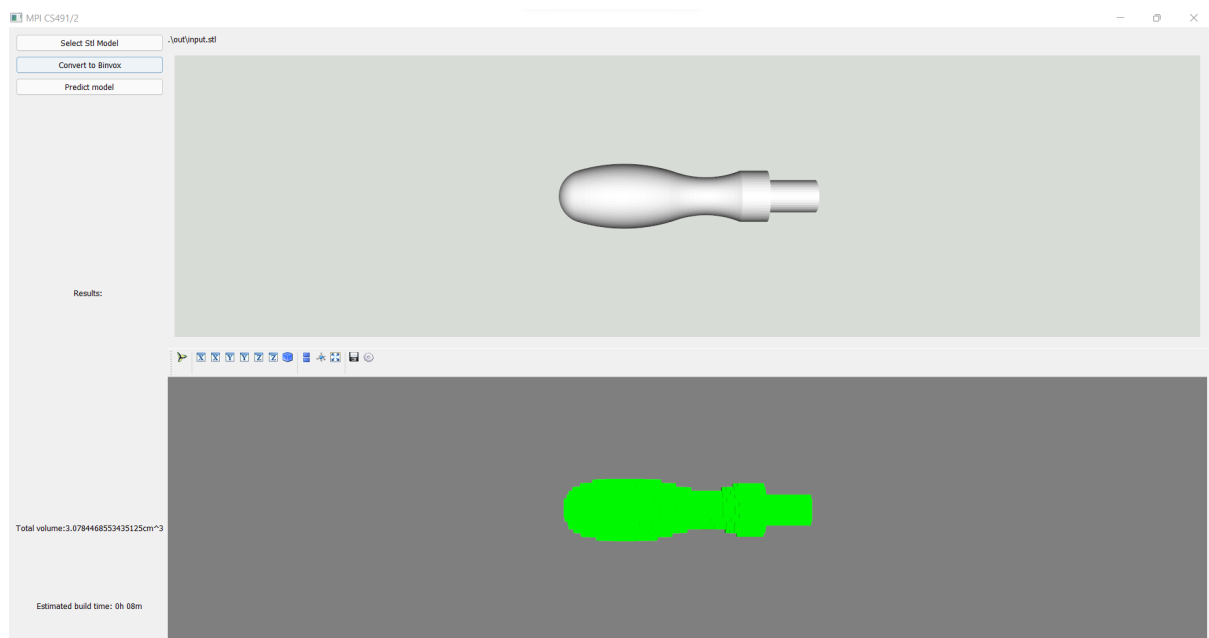
After clicking said button, the system will convert the STL model into Binvox and will display both the models on the screen. It should be noted that the user will be able to rotate and zoom in/out of both models to view them more clearly. Further, the Predict Model button will now be enabled to continue.
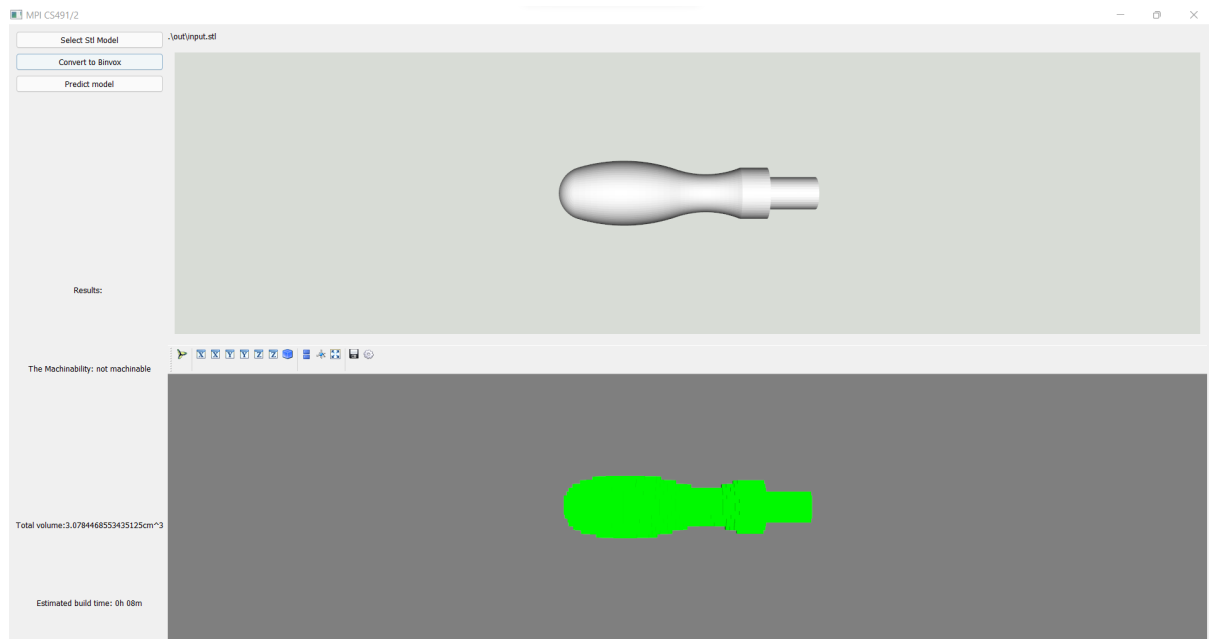
After clicking the Predict Model button, the user will be able to see the results of the prediction. We can see that the above model was not machinable for example.
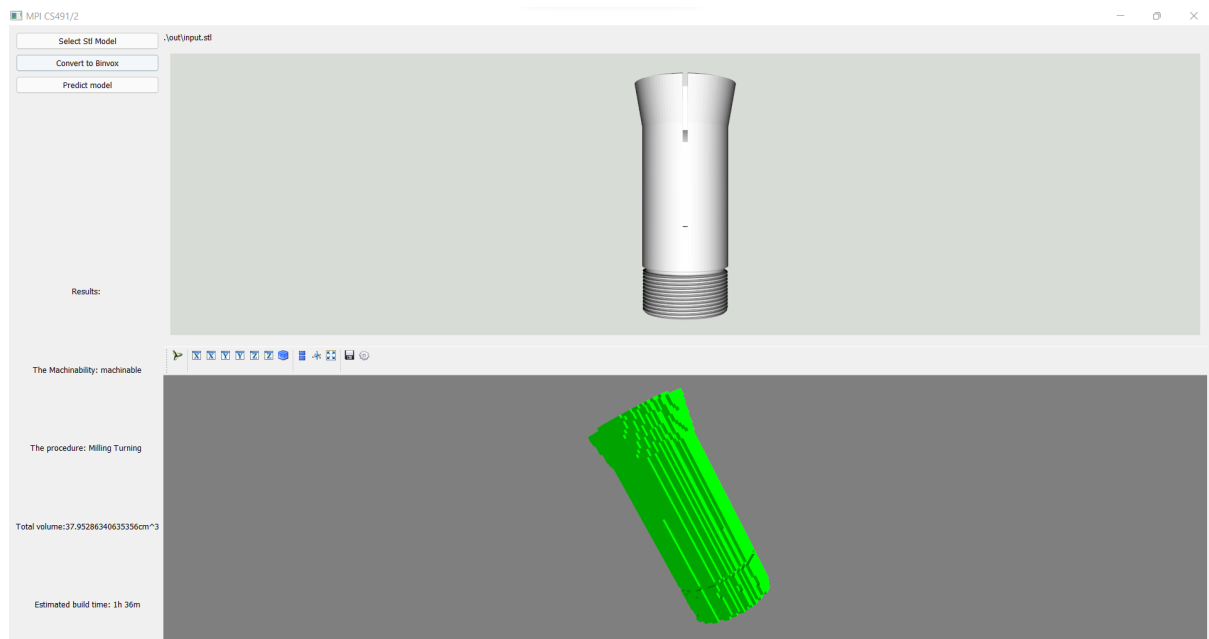
We can see that this model was machinable, and when this is the case the system also lists the machining processes that need to be followed to get this part, which are milling and turning in this case. After this screen is reached, the user will be able to start the process all over again by clicking the Select STL Model once more.