FoundationBuilder - Specification

Introduction

This document provides the overview of **FoundationBuilder application** (hereinafter Application) describing basic requirements for the software.

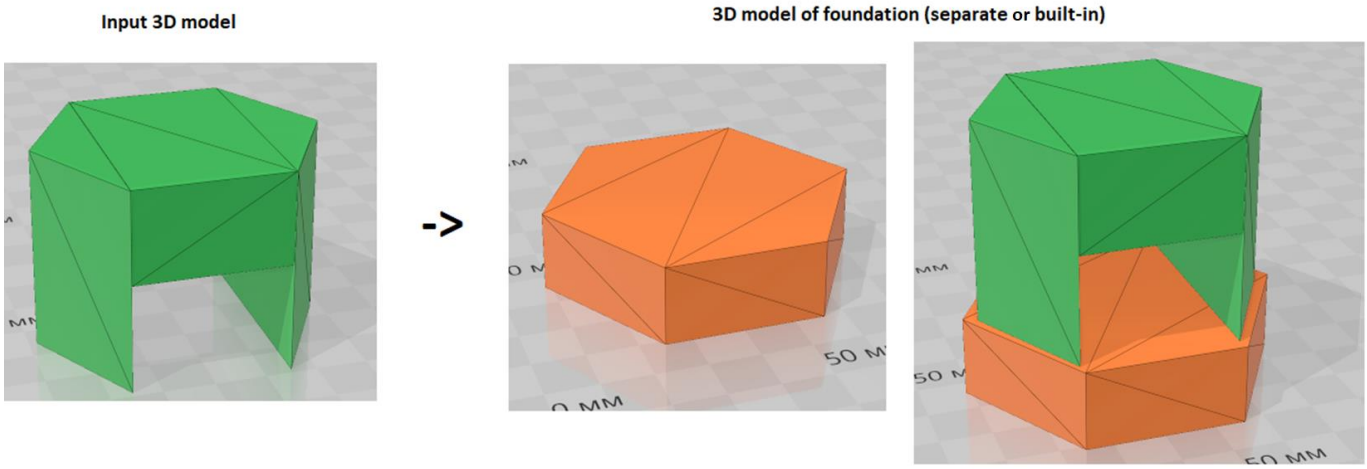
Application Overview and Requirements

Basic Software Requirements

- C++ application for Desktop Windows platform;
- console interface for interaction with User(there are no any requirements for the GUI, but please see Further Work section);
- multithreading support (OpenMP and Intel Cilk technologies) to speed up the geometric core calculations;
- input: any 3D STL model, output: well-defined 3D STL model.

High Level Idea

Basic intend of the Application is the follwoing (please refer to the image below): 1) Application reads input model and then 2) calculates the foundation for the model.



Input model is 3D model in STL format. **Foundation** is the ground or raft for the input model. Foundation should have convex shape of the model outline geometry. Foundation can be produced as a separate *well-defined* 3D STL model or can be built-in into the model geometry placed under the model. *Well-defined* means that model should correspond the STL format convention (https://en.wikipedia.org/wiki/STL_(file_format)), thus can be loaded into any STL viewer without any problems.

Interaction Details

Application should support command line parameters of, at least, following set:

```
- i - file path to the input model
- o - file path to the output model
- h - height of the Foundation (in mm, 1.0 by default)
- m - enable multithreading (false by default)
- b - make foundation built-in along with model geometry (false by default)
```

Thus, the example of Application launching may look like this:

```
./FoundationBuilder.exe -m -b -i file/path/to/input.stl -o file/path/to/output.stl -h 1.2
```

Further Work

As a follow up to the main requirements, the Application version 2.0 should have the simple GUI to display input and output models. Any suitable graphic library can be used for this. There are no any specific requirements for GUI, as well as no any terms. This requirement is additional and should be considered ONLY IF TIME ALLOWS.

Terms and Conditions

- Customer is not allowed to change Basic Software Requirements, but is allowed to precise some requirement during development process.
- Development Team is obliged to familiarize with the Software Requirements and implement Application in the following time frame: 4 weeks, effectively from 4 May 2020 till 31 May 2020 including. Any implementation details not reviewed in this document are left to the discretion of the Development Team.