

# ToOptix

ToOptix is an open source topology optimisation tool. It works with FreeCAD and Blender to generate a topologically optimised model based on an existing .stl file.

- Download ToOptix for free here: <https://github.com/DMST1990/ToOptixUpdate>
- Download FreeCAD for free here: <https://www.freecadweb.org/downloads.php>
- Download Blender for free here: <https://www.blender.org/download/>

You can install ToOptix in Blender like any other plugin.

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## Workflow

The ToOptix workflow consists of two main sections: FreeCAD and Blender. FreeCAD comes with a tool called CalculiX in the Windows and Linux distributions. For now, CalculiX does not work on Mac OS. ToOptix uses the mesh generated in FreeCAD with CalculiX for its solve space in Blender.

### 1. FreeCAD

- open .stl in FreeCAD
- go to part design
- part → create shape from mesh (input your tolerance)
- (click on mesh in left-side menu) part → convert to solid
- go to FEM in the part menu
- click on the solid
- Mesh → FEM Mesh from shape → 'apply' to check if the mesh is good
- you've just created a mesh; make the other bodies in your tree invisible (click them and press spacebar)
- drag the mesh into the solver space
- create a constraint face (make sure your body is now turned visible again) (red lock)
- create a push load (blue arrows)
- select material (yellow circle)
- now double-click CalculiX
- select destination folder for the solve
- click 'create .inp'

### 2. Blender

- import the model you've just created into Blender:
- click the ToOptix tab in the left-hand menu
- type in 'ccx' next to 'solver'
- select result folder (this is the folder you've just selected in FreeCAD to save your solve to)
- select path for original file
- untick 'heat transfer' if necessary

- lower or rise the Penalty Exponent, also tinker with the Material Sets
- click 'start optimization'

After ToOptix is done, you will see your optimised model in the Blender viewport.

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