lab_stl_output

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1 lab stl output

in addition to transforming a fullcontrol ***design*** into a 'plot' ***result*** or a 'gcode' ***result***, it can also be transformed into a '3d_model' ***result*** - that is a 3D model (e.g. stl file) of the simulated as-printed geometry based on `Point` and `ExtrusionGeometry` objects in the ***design***

this notebook briefly demonstrates how the 3D model can be generated

FullControl lab import

[ ]:
```
import fullcontrol as fc
import lab.fullcontrol as fclab
```

create a *design*

[ ]:
```
EW, EH = 0.8, 0.3 # extrusion width and height
radius, layers = 10, 5
design_name = 'test_design'
steps = fc.helixZ(fc.Point(x=0, y=0, z=EH), radius, radius, 0, layers, EH,␣
  ↪layers*32)
```

transform the design to a 'plot' *result* to preview it

[ ]:
```
fc.transform(steps, 'plot', fc.PlotControls(style='tube', zoom=0.7,
             initialization_data={'extrusion_width': EW, 'extrusion_height':␣
  ↪EH}))
```

ModelControls adjust how a *design* is transformed into a '3d_model' *result* ***designs*** are transformed into a 'plot' according to some default settings which can be overwritten with a `PlotControls` object with the following attributes (all demonstrated in this notebook):

- `stl_filename` - string for filename (do not include '.stl')
- `include_date` - options: True/False (include dates/time-stamp in the stl filename)
- `tube_shape` - options: 'rectangle' / 'diamond' / 'hexagon' / 'octagon' - adjusts cross sectional shape of extrudates in the stl file
  - note this is a slightly different format than that used when generating 3D plots using `tube-sides` in a `PlotControls` object
- `tube_type` - options: 'flow'/'cylinders' - adjust how the plot transitions from line to line
  - see the `PlotControls` tutorial for more info about this parameter
- `stl_type` - options: 'ascii'/'binary' - stl file format

- `stls_combined` - options: True/False - state whether ***designs*** containing multiple bodies are saved with all bodies in a single stl file - multiple bodies occur if the ***design*** includes non-extruding-travel moves between extruded regions
- `initialization_data` - define initial width/height of 3D lines with dictionary: {‘extrusion_width’: value, ‘extrusion_height’: value} - these values are used until they are changed by an `ExtrusionGeometry` object in the ***design***

[ ]:

```
fclab.transform(steps, '3d_model', fclab.ModelControls(
    stl_filename=design_name,
    include_date=False,
    tube_shape='rectangle',
    tube_type= 'flow',
    stl_type = 'ascii',
    stls_combined = True,
    initialization_data={'extrusion_width': EW, 'extrusion_height': EH}))
```

colab if using google colab, the stl file can be downloaded from the file browser on the left-hand side or with:

```
from google.colab import files
files.download(f'{design_name}.stl')
```

(assuming `include_date` is False)