Department of Architectural Technology
New York City College of Technology | CUNY
300 Jay Street, Brooklyn, New York 11201

Arch 3690
Intermediate Computation and Fabrication
Tuesday, 8:30 am -11:00 am
Professors Joseph Vidich / Charlie Able
jvidich@citytech.cuny.edu / cable@citytech.cuny.edu

Assignment 2 - Overview

Assignment 2 - Part A

Introduction to Grasshopper and List Management

Due : 2/26/13

Assignment 2 - Part B

Anti-Surface Surfacing - Generation of surface milling toolpath contours.

Due : 3/5/13

Assignment 2 - Part C

Anti-Surface Surfacing - Surface Prototyping.

Due : 3/12/13

Assignment 2 - Part D

Anti-Surface Surfacing - Final Milling.

Due : 3/19/13

Assignment 2
FINAL PRESENTATION
3/19/13

Department of Architectural Technology
New York City College of Technology | CUNY
300 Jay Street, Brooklyn, New York 11201

Professors Joseph Vidich / Charlie Able
jvidich@citytech.cuny.edu / cable@citytech.cuny.edu

Assignment 2 - Part A

Introduction to Grasshopper and List Management

Due : 2/26/13

Grasshopper is a powerful plug-in for Rhino 3-D and will be used extensively in this class. Complete the following tutorials posted on the NYCCT Vimeo site (or on the class website):

1. Grasshopper: Grasshopper Basics
2. Grasshopper: Introduction to Lists – Pt. 1 of 2
3. Grasshopper: Introduction to Lists – Pt. 1 of 2

For class on 2/26, bring the "data tree" definition you created in the 3rd video.

If you are already proficient in Grasshopper, try to modify the definition by adding more complexity. Possible variation might include:

- Randomized rotation angles or branch quantity
- Use of curved instead of strait branches
- 3-D instead of 2-D tree

Video Tutorial Links:
1. http://vimeo.com/59768022
2. http://vimeo.com/59761772
3. http://vimeo.com/59761773

Class Website (Profile):
http://openlab.citytech.cuny.edu/groups/intermediate-computation-and-fabrication/

Class Website (Site):
http://openlab.citytech.cuny.edu/compfab3690sp2013/

Department of Architectural Technology
New York City College of Technology | CUNY
300 Jay Street, Brooklyn, New York 11201

Professors Joseph Vidich / Charlie Able
jvidich@citytech.cuny.edu / cable@citytech.cuny.edu

Assignment 2 - Part B

Anti-Surface Surfacing - Generation of surface milling toolpath contours.

Due : 3/5/13

Complex surface milling has become a major use of CNC routers. Typical work flows begin with the generation of a complex NURBS or Mesh surface which is then approximated using CAM software to produce toolpaths.

The machine is being used to accurately replicate a digital form in the physical world. But unlike their digital counterparts, these physical manifestations will never be perfect; every device, like every craftsman, produces artifacts of their presence; a laser-cutter will often burn material, 3-D printers will produce striations, and a CNC mill will leave varied surface patters dependant on the router bit profile. But, with enough control, these same artifacts can be used to generate complex patterns of their own.

Your assignment will be to (IN GROUPS OF TWO) generate toolpaths using Grasshopper, in order to create a complex milled surface without the use of any original surfaces. You will be graded on your ability to control your Grasshopper definition in order to produce the aesthetic affects you desire; both complex and simple patterns are acceptable, but both must exhibit high levels of refinement).

Complete the following tutorials posted on the NYCCT Vimeo site (or on the class web page) to generate your own complex curves.

1. Grasshopper: Sine Curve Toolpaths – Pt. 1 of 4
2. Grasshopper: Sine Curve Toolpaths – Pt. 2 of 4
3. Grasshopper: Sine Curve Toolpaths – Pt. 3 of 4
4. RhinoCAM: Simulate your Toolpaths – Pt. 4 of 4

For class on 3/5, you and your partner should bring Grasshopper definitions as well as at least one “baked” curve variation each (2 variations per group minimum) and the associated RhinoCam STL simulation files. Simulations should us a 1/2” diameter ball end mill and should be approximately 10” x 10” (depth should between 1/2” and 1”).

Video Tutorial Links:
1. http://vimeo.com/60590928
2. http://vimeo.com/60590929
3. http://vimeo.com/60596839
4. http://vimeo.com/60597017

Class Website (Profile):
http://openlab.citytech.cuny.edu/groups/intermediate-computation-and-fabrication/

Class Website (Site):
http://openlab.citytech.cuny.edu/compfab3690sp2013/

Assignment 2 - Part C

Anti-Surface Surfacing - Surface Prototyping.

Due : 3/12/13

By using curves as milling toolpaths, you have direct control over the mills position. While this has many benefits, it also means a much higher risk of you damaging the material, end mill, router, or even yourself in the process. You should always double-check your partners work to verify that no mistakes have been made. When operating the mill, you must always work in pairs to insure each others safety. If you are unsure of a procedure (digitally or while operating the mill) do not hesitate to ask.

Take time to document your process; you are using a computer controlled 3-axis router to mill complex parametrically driven surfaces... It's interesting, right... So take a photograph or two.

Complete the following tutorials posted on the NYCCT Vimeo site (or on the class web page) to generate the RhinoCam files for your curves.

1. RhinoCam: Contour Milling – Pt. 1 of 2
2. RhinoCam: Contour Milling – Pt. 1 of 2

Using the Precix 11100 and a 12" x 12" x 2" block of blue foam (supplied by the lab), EACH TEAM must prototype AT LEAST one of your curve variations, resulting in a 9" x 9" tile.

For class on 3/12, bring your Grasshopper definitions and your milled prototype(s).

Video Tutorial Links:
1. http://vimeo.com/
2. http://vimeo.com/

Class Website (Profile):
http://openlab.citytech.cuny.edu/groups/intermediate-computation-and-fabrication/

Class Website (Site):
http://openlab.citytech.cuny.edu/compfab3690sp2013/

Assignment 2 - Part D

Anti-Surface Surfacing - Final Milling.

Due : 3/19/13

Analyze your prototypes and determine the strengths and weaknesses; adjust your geometry to achieve desired aesthetics, modify spindle speeds and feed rate to achieve an acceptable surface finish.

Finalize your curve geometry and mill AT LEAST one FINAL 9" x 9" tile per group.

Your ability to present the work you've done is just as important as your ability to produce the work. Take time to analyze your decisions and produce drawings which will help explain your work. Use a variety of representational techniques; orthographic drawings, perspective drawings, exploded isometrics, renderings, photographs, diagrams.

Use the documentation of your prototypes to show what improvements you and your partner have made, what errors you've corrected, what interesting accidents have been exploited.

For class on 3/9, you and your partner will be presenting your final tiles to the class.

Your PDF presentation should include:
- Final Milled Tile(s)
- Tile prototype(s)
- Renderings of possible STL simulations
- Drawings of toolpath curves
- Diagrams to explain your patterns
- Process photographs (don't have to fancy)
- Any other documentation you think important

NOTE: You may use any software to make your presentation, but you MUST export and present using a multi-page PDF.

Class Website (Profile):
http://openlab.citytech.cuny.edu/groups/intermediate-computation-and-fabrication/

Class Website (Site):
http://openlab.citytech.cuny.edu/compfab3690sp2013/