

## Lab #8 WPF GUI - ME 578 Winter 2018

Due March 30th.

### Resources

- GTAC
- NXOpen Documentation
- Microsoft Developer Network
- Google
- UIUC Airfoil Coordinates Database ([http://m-selig.ae.illinois.edu/ads/coord\\_database.html](http://m-selig.ae.illinois.edu/ads/coord_database.html))

### Assignment

Create a WPF program that will remotely interact with NX through the NXOpen API. Your program should allow a user to select a file containing a list of points which define an airfoil. It will then load the file, read all the points and create a sketch containing the profile of the airfoil (You are welcome to use standard straight lines between points) and then extrude the profile. Your GUI should allow the user to also choose the length of the extrude and a scaling factor for the profile. Your program should also work successfully with multiple wing profiles which may be obtained from the UIUC database. Finally, there is no hard limit on the number of lines of code required for this lab but clean up your journal files and submissions. If it feels excessive the grader may dock a point or two. Just to give you an idea, the total length of one solution in the mainwindow.xaml.cs file (including lots of whitespace and comments) is 203 lines. You aren't expected to match that by any means, but do not turn in a 1000 lines of code either.

### Grading Rubric (15 Points)

- Functional Gui (5pts)
  - Allows user to select a file (2pts)
  - Allows user to specify an extrude length (1pt)
  - Allows user to specify a scaling factor (1pt)
  - Uses 1 WPF widget for length and a different one for scale (1pt)
- Interaction with NX (5pts)
  - Uses the NXOpen API remotely (1pt)
  - Creates a Sketch containing the wing profile (2pts)
  - Can successfully extrude the sketch (2pts)
- File Reading
  - Can correctly parse point data out of a single file (2pts)
  - Can correctly parse point data out of multiple files (3pts)

## Hints

- Using the NX API remotely is identical to how you would use it in a journal. This means if you want you could develop most of the core functionality in a journal file or one of the other ways we've done in the past.
- The UIUC airfoil database contains 3.754 bajillion different data files, your project only has to work with 2. Some files are more difficult to process than others, sometimes it is easier to pick a different file
- Most of the files contain a line or two at the beginning telling the file name and various other info about the file. You can delete the lines. (i.e. you don't have to worry about processing them in your code)
- In looking over the airfoil files, I've come across 2 main types:
  - One that starts at the leading edge and goes all the way around
  - One that starts at the leading edge and goes along the top to the trailing edge, jumps back to the leading edge and goes along the underside to the trailing edge.In your code you can tell if it is the second type because there will be a blank line in between the 2 halves of the airfoil.
- There are a lot of widgets you could get the length and scale factor from the user. Pick any 2 you like.
- The files have unitized the profile points so the leading edge is at 0,0 and the trailing edge is at 1,0 (or close to it) sometimes depending on the default units of your part you may get invalid profiles for an extrude a couple items to play around with:
  - Limit the minimum value of your scaling factor
  - Play with the tolerance option on your extrude (NX will let you use a tolerance down to 1e-5)
  - Play with constraints that get added to your sketch
  - Find a profile that is either coarser or has fewer thin sections
- There are plenty of examples for how to open file selector dialog box in C#. Have a look and if you are still struggling, feel free to ask.