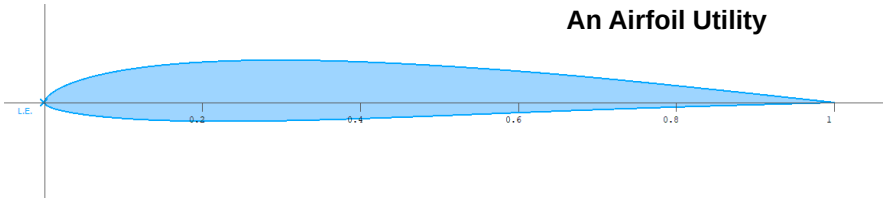
Xfoil_Worker



v1.71.4

Xfoil_Worker is part of the Xoptfoil-JX package and can be used as a standalone tool.

Xoptfoil-JX is maintained on https://github.com/jxjo/Xoptfoil-JX .

Xoptfoil-JX is a modified version of Xoptfoil version 1.11.1 Daniel Prosser.
The original code and program is located at https://sourceforge.net/projects/xoptfoil/ .

Running Xfoil_worker

Xfoil_worker is a handy command line tool to do various tasks around airfoil modification and optimization.

Typically, Xfoil_worker is called within a batch job to automate repeating tasks like setting flap positions and calculating the polars for these flapped airfoils.

Usage

```
Xfoil_worker -w <worker_action> [Options]
```

Following worker actions are supported

`-w polar`	Generate polars for an airfoil
`-w norm`	Repanel and normalize an airfoil
`-w smooth`	Repanel, normalize and smooth an airfoil
`-w flap`	Set flap at an airfoil – after repaneling and normalizing is done
`-w set`	Change max. thickness, max. camber of an airfoil or trailing edge gap
`-w blend`	Two airfoils are blended by a certain degree
`-w check`	Check the surface curvature of an airfoil

Additional `[Options]` depend on the respective worker action described in the following sections.

Example

```
Xfoil_worker -w set t=8.2 -a MH32.dat
```

… will set the thickness of the airfoil MH32 to 8.2%.

Generate polars for an airfoil (-w polar)

A polar for an airfoil will be generated in Xfoils polar format. The generated polar file is ready to be imported into xflr5 or flow5 via the menu function “Polars / Import Xfoil Polar(s)”.

A polar is defined in a Xoptfoil input file. Please find the description of the input parameters in the Xoptfoil-JX reference documentation.

-w polar		**Generate polars**
`-i input_file`	mandatory	Name of an Xoptfoil input file to read the settings for the polar generation. Only the following namelists are relevant for polar generation: `&polar_generation` - mandatory Settings for polar: polar type, based on cl oder alpha, value range `&xfoil_run_options` - optional Options for Xfoils aerodynamic calculations. Normally the default values are fine, so this namelist is optional. Most important here is the ncrit parameter which defaults to ncrit = 9. `&xfoil_paneling_options` - optional Options for Xfoils repaneling which is done prior to the polar generation. Normally the default values are fine, so this namelist is optional
`-a airfoil_file`	mandatory	The name of the airfoil file.
`-r xxxxxx`	optional	The desired Reynolds number of the polar. If the Reynolds number is not defined in the input file, the value is taken from this command line option. This is useful to have a single input file for different Reynolds numbers
`-o output_prefix`	optional	The generated polar will be written to the folder <`output_prefix>_polars` If option -o is omitted the generated polar will be written to the folder <`airfoil_name>_polars`

Example:

```
Xfoil_worker -w polar -i Polars.inp  -a RG15.dat

Polars.inp:

        &polar_generation
          generate_polars = .true.
          type_of_polar   = 1
          op_mode         = 'spec-al'
          op_point_range  = -4, 13, 0.25
          polar_reynolds  = 20000, 50000, 100000, 200000, 500000
        /
```

Repanel and normalize an airfoil (-w norm)

An airfoil will be repaneled and normalized to have the leading edge at 0,0 and the trailing edge at 1,0. The new airfoil will have 7 decimals in the .dat file.

The default number of data points of the new airfoil is 200. This value can be changed if via the input file with the parameter `npan` in namelist `&xfoil_paneling_options`.

Depending on the “micro situation” at the leading edge, an additional data point at 0,0 will be inserted. So the final number of data points could be +1.

-w norm		**Repanel and normalize**
`-a airfoil_file`	mandatory	Name of the airfoil file
`-i input_file`	optional	- optional - Name of a Xoptfoil input file to read the settings for repaneling. Only the following namelist is used for repaneling: `&xfoil_paneling_options` - optional - Options for Xfoil repaneling. Normally the default values are fine.
`-o output_prefix`	optional	Name of the smoothed airfoil. Following file will be generated `<output_prefix>.dat` If option -o is omitted, the name of the output file will be <a`irfoil_name>_norm.dat`
`-v`	optional	In addition to the new airfoil .dat file, additional data will be generated into the subdirectory `<output_prefix>_temp` to visualize the result with the visualizer.

Example: This little batch job will normalize all airfoils, their name beginning with “MH” in the current subdirectory

Norm.bat:

```
set Airfoils=MH*
dir %Airfoils%.dat /B > temp.txt
for /f "delims=#" %%f in (temp.txt) do xfoil_worker -w norm -a "%%f"
del temp.txt
pause
```

Smooth an airfoil (-w smooth)

An airfoil will be repaneled by Xfoil PANGEN routine, normalized and smoothed by Xoptfoil-JX smoothing algorithm – see Xoptfoil-JX reference (appendix) for more information about smoothing.

This action is useful to improve the geometric quality of an airfoil especially if the original airfoil .dat file has too few decimals.

-w smooth		**Repanel, normalize and smooth**
`-a airfoil_file`	mandatory	The name of the airfoil file
`-i input_file`	optional	Name of the input file to read the settings for repaneling and smoothing. Only the following namelists will be used for smoothing: `&curvature` - optional Options for curvature parameters. Only `spike_threshold` is relevant `&xfoil_paneling_options` - optional Options for Xfoils repaneling which is done prior to smoothing. Normally the default values are fine.

`-o output_prefix`	optional	Name of the smoothed airfoil. Following file will be generated
		
		`<output_prefix>.dat`
		
		If option -o is omitted, the name of the output file will be
		
		`<airfoil_name>_smoothed.dat`

`-v`	optional	In addition to the new airfoil .dat file, additional data will be generated into the subdirectory `<output_prefix>_temp` allowing to visualize the result with the visualizer.

Tip: This is a smart example combining Xfoil_worker and the visualizer. When the ".dat"-file extension is assigned to this batch-job in the Windows Explorer, a double click on the airfoil will show the airfoil with all the geometry infos on the screen…

JX-plot.bat

```
@Echo off
IF [%1]==[] (
  Echo   Usage: JX-plot ^<foil_name^>
  Pause
  Goto :eof
)
For %%A in (%1) Do (set Filename=%%~nxA)
Set Airfoil=%Filename:.dat=%~

xfoil_worker  -a "%Filename%" -o "%Airfoil%" -w smooth -v

If %ERRORLEVEL% EQU 0 (
  xoptfoil_visualizer-jx.py -c "%Airfoil%" -o 1-0
  Rmdir %Airfoil%_temp /s /q
  Del %Airfoil%*.dat)

Set Airfoil=
Set Filename=
```

Set flap at an airfoil (-w flap)

The flap is set to a defined angle after the airfoil was repaneled and normalized.

If more than one flap angle is defined several airfoils will be generated having the flap angle as part of the airfoil name.

-w flap		**Set flap to an angle**
-a airfoil_file	mandatory	The name of the airfoil file
-i input_file	mandatory	Name of a Xoptfoil input file to read the parameters for setting flaps. Only the following namelists are used when setting flaps: &operating_conditions x_flap — x position of flap hinge ranging 0...1 (default = 0.75) y_flap — y position of flap hinge ranging 0… (default = 0.0) y_flap_spec — type of y position either 'y/t' or 'y/c' (default = 'y/t') flap_degrees — list of flap angles &xfoil_paneling_options - optional Options for Xfoils repaneling which is done prior to setting flaps. Normally the default values are fine, so this namelist is optional
-o output_prefix	optional	Name of the flapped airfoil. If just one flap angle is defined the following file will be generated <output_prefix>.dat If more than one flap angle is defined the following file will be generated <output_prefix>_<angle>.dat If option -o is omitted, the name of the output file will be <airfoil_name>-flap_<angle>.dat

Example:

```
Xfoil_worker -w flap -i flap.inp -a RG15.dat
```

With the input file `flap.inp`:

```
&operating_conditions
  x_flap       = 0.75
  flap_degrees = 2, 4, 6, 8, 10
/
```

Set geometry parameters of an airfoil (-w set)

The geometry parameters thickness, location of maximum thickness, camber and location of maximum camber can be set.

-w set <parameter>		**Set geometry parameter**
		The argument **<parameter>** defines the modification which should be applied to the airfoil: `t=yy` Set thickness to xx% `xt=xx` Set location of maximum thickness to xx% of chord `c=yy` Set camber to xx% `xc=xx` Set location of maximum camber to xx% of chord `te=yy` Set trailing edge gap to xx%
`-a airfoil_file`	mandatory	The name of the airfoil file
`-i input_file`	optional	Name of a Xoptfoil input file to read the parameters for setting Only the following namelist is used when setting flaps: `&xfoil_paneling_options` Options for Xfoils repaneling which is done prior to changing geometry. Normally the default values are fine, so this namelist is optional
`-o output prefix`	optional	Optional name of the new airfoil. If option -o is omitted, the name of the output file will be `<airfoil_name>-<parameter>.dat`
`-v`	optional	In addition to the new airfoil .dat file, additional data will be generated into the subdirectory `<output_prefix>_temp` to visualize the result with the visualizer.

Example:

```
Xfoil_worker -w set t=8.5 -a RG15.dat
```

… will set the thickness of airfoil RG15 to 8.5%. The new file will be `RG15-t=8.5.dat`

Blend two airfoils (-w blend)

An airfoil is ‘blended’ with another airfoil by a certain percentage

-w blend <percentage>		**Blend two airfoils by x percent**
		<percentage> is the amount of the second airfoil which is blended to the airfoil
-a airfoil_file	mandatory	The name of the airfoil file
-a2 airfoil_file	mandatory	The name of the second airfoil file to be blended to the first one.
-i input_file	optional	Name of a Xoptfoil input file to read the parameters for setting Only the following namelist is used when setting flaps: &xfoil_paneling_options Options for Xfoil repaneling which is done prior to changing geometry. Normally the default values are fine, so this namelist is optional
-o output prefix	optional	Optional name of the new airfoil. If option -o is omitted, the name of the output file will be <airfoil_name>-blended<percentage>.dat
-v	optional	In addition to the new airfoil .dat file, additional data will be generated into the subdirectory <output_prefix>_temp allowing to visualize the result the visualizer.

Example:

```
Xfoil_worker -w blend 60 -a ClarkY.dat -a2 RG15.dat
```

… will be blend 60% of RG15 to ClarkY The new airfoil is `ClarkY-blended60.dat`

Check the surface curvature of an airfoil (-w check)

The curvature of the airfoil is evaluated and assessed based on the parameters of Xoptfoil-JX.

‘Check’ helps to decide, if an airfoil is suitable for optimization.

See the Xoptfoil-FX reference (Appendix) for details and background information.

-w check		**Repanel and normalize**
-a airfoil_file	mandatory	Name of the airfoil file
-i input_file	optional	- optional - Name of a Xoptfoil input file to read the settings for repaneling. Only the following namelists are used for repaneling: &xfoil_paneling_options - optional - Options for Xfoils repaneling. Normally the default values are fine.
-v	optional	In addition to the new airfoil .dat file, additional data will be generated into the subdirectory <output_prefix>_temp to visualize the result with the visualizer.