

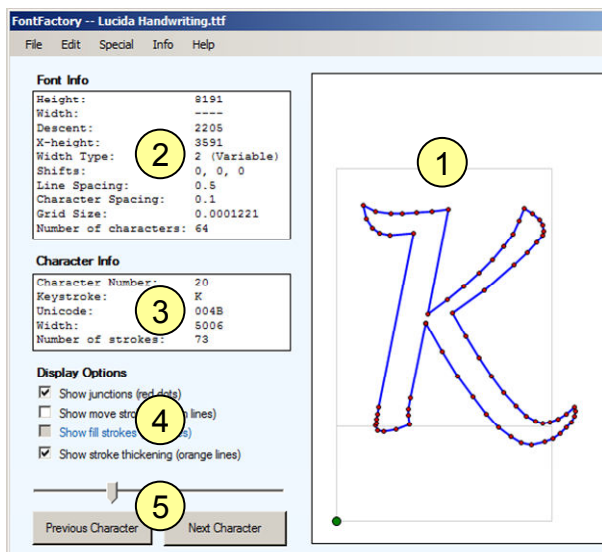
## Introduction

FontFactory is an application for manipulating NX fonts. Among other things, you can look at them, modify them, and convert them to and from other formats. These notes provide a brief outline of its capabilities. There are sections describing the individual functions, plus (at the end) step-by-step instructions for performing a few common tasks.

FontFactory started out as an exercise in Windows programming. I wanted to understand the standard .NET techniques that are used to handle menus, dialogs, events, drawing, and so on in a native Windows application. But then, as with many hobby projects, it got a bit out of hand.

## The FontFactory Window

The FontFactory window is shown below:



It provides:

- (1) A display of the current character in the current font
- (2) Some information about the current font
- (3) Some information about the current character
- (4) Some options to control the character display
- (5) Controls to move from one character to another

## The File Menu

### Open

You can open NX font files in either .FNT or .FNX format.

### Save

You can save NX fonts in either .FNT or .FNX format. Files in the .FNX format are usually more useful, since these can immediately be used within NX. Save your file

in .FNT format if you want to edit it with a text editor (like Notepad).

You can also save fonts in the SFD format. This is the file format used by a free-ware font editor named FontForge. You can then use FontForge to thicken strokes, edit in other ways, and save the font in TrueType format. This gives you a way to convert NX fonts to TrueType form.

You can also save fonts in PostScript Type 3 (PT3) format. This is a very old font format, and is not likely to be useful. Its only virtue is that it is easy to generate.

### Save As

You can save files in either .FNT or .FNX format. Files in the .FNX format are usually more useful, since these can immediately be used within NX. Save your file in .FNT format if you want to edit it with a text editor (like Notepad).

### Close

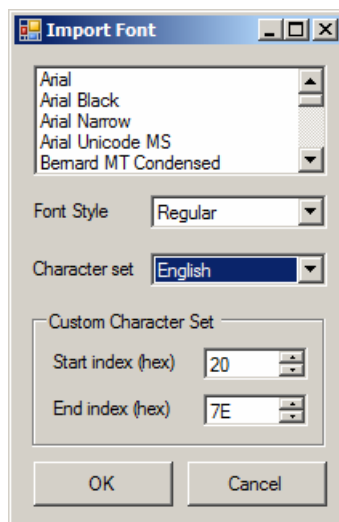
Closes the file you are working on.

### Import TrueType

Allows you to import a specified range of characters from a Windows TrueType font. You can then save the font in NX form. You describe the range using hexadecimal (base 16) numbers. You can find out which characters are available by using the Windows Character Map accessory or the MS Office Insert Symbol function. Both of these also use hexadecimal indexing, so there is consistency.

Since dealing with hexadecimal codes is somewhat painful, some common ranges of characters can be selected from a menu on the dialog. The "European" choice includes enough accented characters to cover most western European languages (I think).

Of course, only a few fonts include broad ranges of characters covering many different languages. Arial Unicode and Lucida Sans Unicode are two of the richest.



## The Edit Menu

### Cut

Removes the current character from the font, and places it on the Windows Clipboard. You can then paste it into another font, or into a text editor like Notepad or MS Word.

### Copy

Copies the current character to the Windows Clipboard. You can then paste it into another font, or into a text editor like Notepad or MS Word.

### Paste

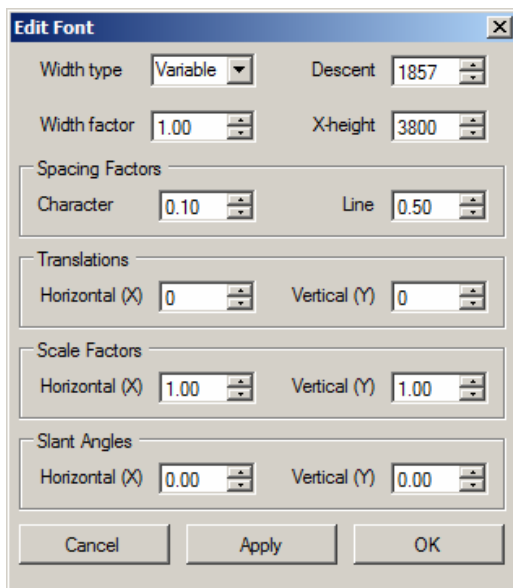
Inserts a character into the font from the Clipboard. The character could have come from a Cut/Copy operation either in FontFactory or a text editor.

### Clear

Removes the current character from the font (but does not place it on the Windows Clipboard).

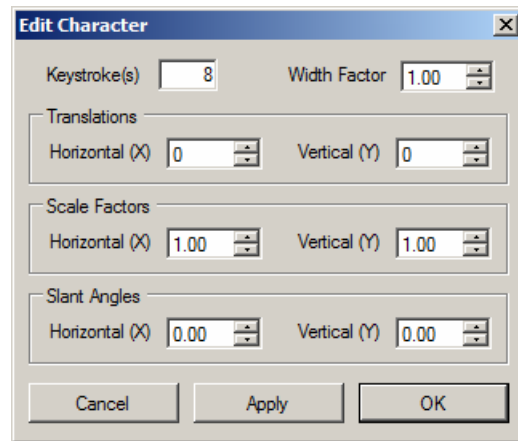
### Edit Font

Allows you to edit the overall characteristics of the font as a whole, such as its x-height and character spacing. Also allows you to apply a common transformation to every character in the font. So, for example, you could slant every character or shrink them all horizontally.



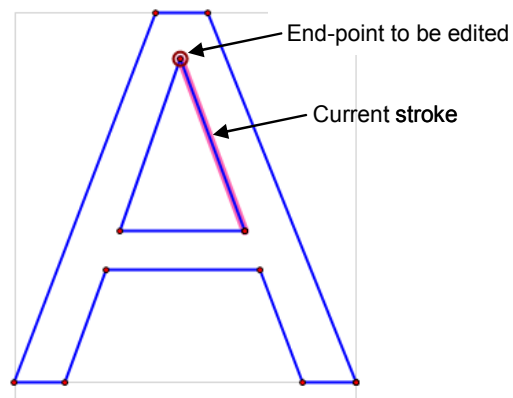
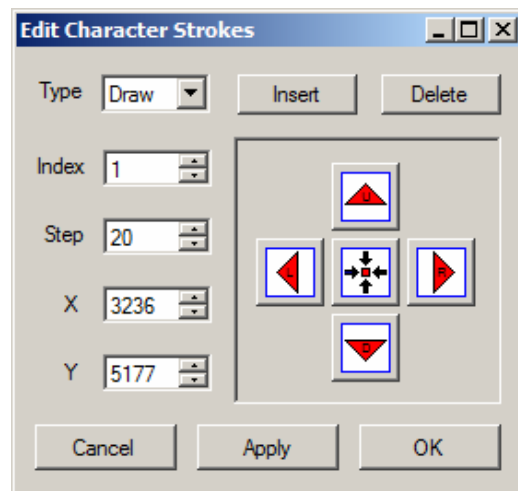
### Edit Character

Allows you to edit the characteristics of the current character, such as its width or assigned keystroke(s). Also allows you to apply a transformation to the character, to move it or stretch it.



### Edit Character Strokes

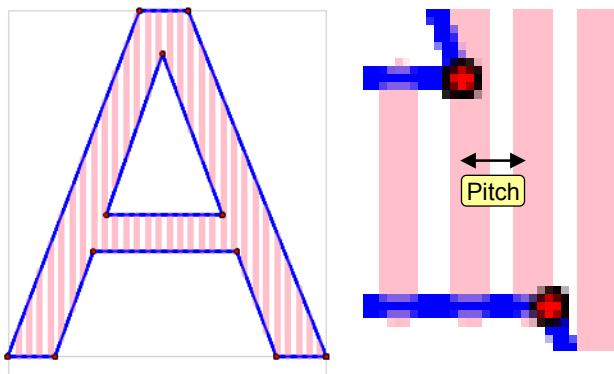
Allows you to edit the individual strokes in the current character. Use the Index field to select the stroke you want to edit. The selected stroke is shown in a pink color on the character display, and the end-point of this stroke is shown with an orange circle. Use the red arrows or the X and Y fields to move this end-point around. The center button with four arrows will return the point to its original position. Buttons also allow you to insert or delete strokes.



## The Special Menu

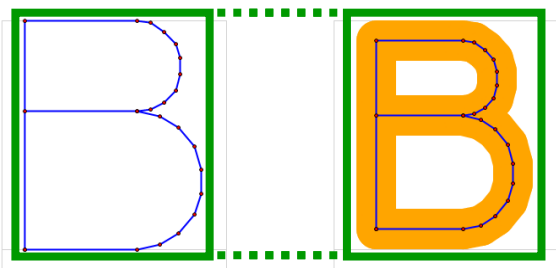
### Fill Characters

Allows you to fill the interior of the character outlines with vertical strokes (see below). Typically you would do this after importing a TrueType font, to make it more legible within NX. The Line Pitch parameter controls the spacing of these vertical lines. The best spacing will depend on the size of characters you will use and the resolution of your printer/plotter. A high-resolution device will draw thinner fill lines, so they will have to be spaced more closely.



### Thicken Strokes

Simulates thickening the strokes of characters. This thickening is one of the steps in converting a traditional NX font into a useful TrueType font. The thickening itself must be done in a font editor such as FontForge or FontLab, but this function allows you to see what the final results will look like. More importantly, it offsets the strokes so the subsequent thickening produces a character with the same overall size as the original one.



### Upgrade Resolution

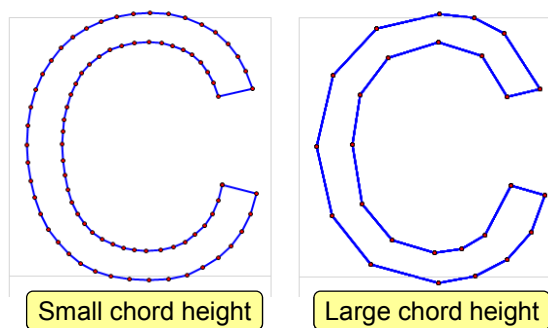
Changes the resolution of the font to 8192. This does not change the size of the characters, it just changes the precision with which they are represented internally. You should always use Upgrade Resolution before you Slant a font -- the slanting operation will ruin the shape of low-precision fonts. In many cases, FontFactory upgrades resolution automatically, so you don't have to.

### Reduce Strokes

Eliminates some types of redundant strokes in the font. For example, two strokes that are almost collinear will be replaced by one. Also, strokes of zero length are removed and consecutive "Move" strokes are compressed.

### Change Chord Height

The characters in a TrueType font are made from Bezier curves. When the font is imported into FontFactory, these Bezier curves have to be approximated by straight lines. The chord height parameter controls how many lines (strokes) are used. A small chord height will produce a smooth character shape with a large number of strokes. A larger chord height will produce a rough shape with fewer strokes.



## The Info Menu

### Large Characters

Provides a list of characters that have a large number of strokes. This is important since NX has a limit of 512 strokes per character. If your font contains characters that are too large, you can increase the chord height parameter (if it's a TrueType font), reduce the number of fill strokes, or delete individual strokes. The @ and % characters are two that are often the worst culprits.

### Empty Characters

Finds characters that have no strokes.

## The Help Menu

### Help

Displays an abbreviated form of this document.

### About

Tells you about FontFactory and its author.

## Task 1: Compiling/Decompiling

The simplest application of FontFactory is in compiling and decompiling NX fonts via the ufontc program. Previously, you had to run ufontc from a command prompt in order to convert NX fonts from .FNT to .FNTX format or vice-versa. If, like many people, you have forgotten what a “command prompt” is, then you can use FontFactory instead. Simply open a file in one format, and save it in another.

## Task 2: Rearranging Characters

Within a single NX font, the positions (order) of characters doesn’t matter, so there is not much point re-arranging them. To transfer characters between fonts, run two copies of FontFactory, and copy/paste characters between them. After pasting a character into a font, you will probably have to adjust its size and position using the Edit Character function.

## Task 3: TrueType to NX

To create an NX font from a TrueType font, proceed as follows:

- (1) Import the font into FontFactory using the File → Import TrueType command.
- (2) Assign keystrokes to the characters using the Edit Character command.
- (3) Use the Special → Change Chord Height command to get the right number of strokes. Be aware that using a very small chord height value will generate a large number of strokes, and you may exceed NX’s 512 stroke limit.
- (3) Fill the characters using the Special → Fill Characters command. Again, be careful you don’t exceed the limit of 512 strokes.
- (4) Save the file in FNTX format

## Task 4: NX to TrueType

This is a much less frequent process, but there are times when it is useful. Proceed as follows:

- (1) Open the NX font file (usually a FNTX file) in FontFactory.
- (2) Offset the character strokes using the Special → Thicken Strokes command. Typically, a thickness value of somewhere between 10 and 30 is suitable.
- (3) Save the file in SFD format.
- (4) Get a copy of the FontForge font editor, install it, and get it running. This is not as easy as it sounds on a

Windows computer, since X-Windows is required. A Macintosh or other Unix machine is easier.

- (5) Open the SFD file in FontForge.
- (6) Use the Element → Expand Stroke command in FontForge to create an outline for each character in the font. The offset distance you use will not be the same as the one you used in FontFactory. I found that an offset of 20 in FontFactory is equivalent to a stroke width of 56 in FontForge, but this may depend on screen resolutions.
- (7) Using the Element → FontInfo dialog, in the “General” section, uncheck the “Stroked Font” button.
- (8) Generally clean up the font using FontForge. The Remove Overlap command is useful for this.
- (9) Add hints using the AutoHint function.
- (10) Use View → Fill to see what the final font will look like.
- (11) Save the font in TrueType format.

## Possible Problems

### Finding ufontc

FontFactory uses ufontc to convert fonts from .FNT form to .FNTX form and back again, and ufontc in turn uses libsys.dll. If neither of these two can be found, then operations involving .FNTX files won’t work. This probably means that the environment variable UGII\_ROOT\_DIR is not set properly.

### Access to Your TEMP folder

As part of the conversion process mentioned above, FontFactory creates temporary files in your TEMP folder. If you don’t have write access to this folder, then, again, operations on .FNTX files won’t work.

Have fun

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