THE NEW WAY OF MAKING FONTS WITH DTL FONT MASTER

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ABSTRACT Software for professional font production appearing recently, *DTL Font Master*, is like no other program of its kind in its configuration and functions. This article is about the program, its new and improved features in type design and production, through the eyes of a day-to-day user, a type designer and coauthor of the program. Emphasis is placed on the structure of a suite of modules and their utility.

INTRODUCTION

Excellent design is just a part of good typography. The other part is production, the number of actions that ensure proper function of a typeface. Font production technology is as important as the creative process of designing letters. A beautiful font is of no use if it doesn't function properly. That is why special professional font production software is needed. One appeared recently, *DTL Font Master v. 2.5*, and it is completely different from any other font production tools known today. It was developed for the Dutch Type Library, a font foundry that produces digital typefaces since the 1980s. As the foundry grew and font production became more complex, the requirement for a special font software also developed. Programming started in the second half of the 1990s, it developed, improved, changed appearance through time and now version 2.5 is available to everyone (Dutch Type Library, 2007). The software was developed in collaboration with URW+−, a Hamburg based company, one of the most experienced companies on technical font production. The *DTL Font Master* team consisted of experts in the field of font production and design: Gu Jun, Hartmut Schwarz, Axel Stoltenberg, Dr. Jurgen Willrodt, Peter Rosenfeld, Frank E. Blokland and Nikola Djurek, author of this article.

DTL Font Master is comprised of several modules, or Masters, which is a completely new configuration for this kind of software (*figure 1*). Each module performs one of the key operations in producing high quality fonts, such as: data management, editing functionality, digitizing, tracing and kerning, interpolating fonts, testing, correcting contours, generating, etc. The modular structure of *DTL Font Master* underlines the differentiation between type design and font production and is specifically suited for batch production. Batch functions enable you to process large quantities of data at once and are controlled by simple text files; there is no need for any scripting. Because of the modular system *DTL Font Master* is very versatile for users and for programmers. Each utility can be obtained separately and functions independently of the other modules; users can define their own set depending on their production methods. Also, the technical functionality can be enhanced without effecting other modules. This guarantees a stable environment for font production that is always up to date. The user interface of the modules follows the standards of Mac OS and Windows, but can be changed according to one's preference, for example, the display of anchor and control points can be changed to small, medium and large. It is also important to say that all files generated by the *DTL Font Master* modules are platform-independent. This makes it possible to centralize font production files on a server and to work on these from Macs and PCs.

In this article I will present each part of the *DTL Font Master* software, concentrating on new, improved features that are not typical

for other existing font production programs.

About the Modules

DTL Trace Master

First of the seven *DTL FontMaster* modules, necessary for turning a sketch into something more than a sketch, is *DTL Trace Master*. The module for autotracing scanned data is suited for tracing letters and logotypes. That means, for instance, that extreme points will be placed perfectly. It supports scanners directly through the Twin drivers, a standard for the most manufacturers. It is possible, with this module, to scan and directly convert analog data into high quality digital contours.
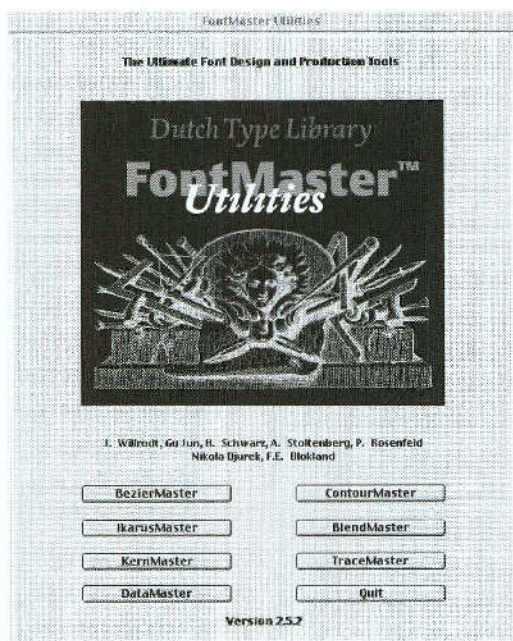

Figure 1 The DTL Font Master opening window, where you choose the module
you wish to use (from DTL FontMaster 2.5.2, screen shot 2007)

It supports IK, BE, EPS, TIFF and several other outline description formats (Dutch Type Library 2004). There is even a possibility to convert scanned data directly into TrueType font format. *DTL TraceMaster* is used to convert TIFF data into BE format. Because the accuracy is exceptional, it is a good alternative for manually digitizing contours (*figure 2*). The relation between the size of the scanned (TIFF) model and the output resolution by *DTL TraceMaster* is simple: 1 centimetre is converted into 1000 units. The quality of the output depends on the resolution and size of the original model. When the outlines are ready for the editing, an editor is needed.
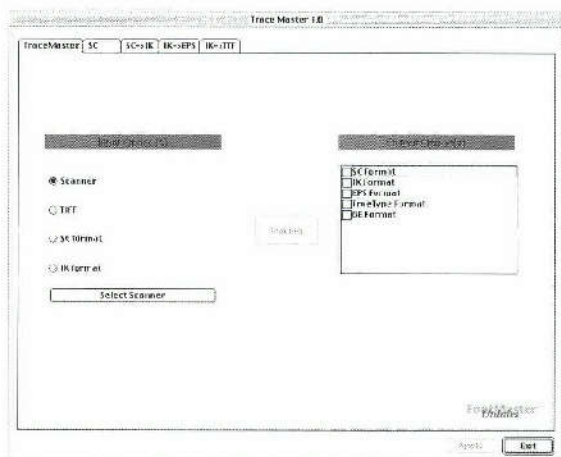
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Figure 2. The main dialog of DTL TraceMaster showing input and output options. (from DTL TraceMaster pdf manual [2004], screen shot 2007)

Bezier Master

DTL Bezier Master is an editor for outlines in bezier format and is intended for drawing and managing character sets (*figure 3*). It has many properties making it unique. For example, the option to check bezier points with the arrow keys and the option to load the same font into the foreground and the background (Dutch Type Library, 2004). Increasingly refined corrections can be made to the letter because changes from the foreground are simultaneously shown in the background. For example, after optimization of the font data in the *DTL Contour Master* it is possible to compare the original and the new version in the *DTL Bezier Master* by opening one font in the foreground and selecting the other in the background. Another important element is Font Administration tool that handles and organizes the font database and manages code pages clearly (*figure 4*). In the Font Adminstration window the different code pages that are supported by the character set in the database can be shown beside the Unicode and the Character Numbers. This tool is very important for the production of large Unicode based fonts such as OpenType. OpenType font glyph sets use Unicode encoding which allow broad international support, as well as support for typographic glyph variants. Additionally, OpenType fonts may contain digital signatures, which allows operating systems and browsing applications to identify the source and integrity of font files, including embedded font files obtained in web documents, before using them. Also, font developers can encode embedding restrictions in OpenType fonts and these restrictions cannot be altered in a font signed by the developer (Microsoft Corporation, 2007). The database of the Font Administration tool can consist of more than 65,000 characters. It is possible to copy and paste between the code

pages. Pasted characters will be placed in the database automatically under the appropriate number. Newly (re)placed characters are saved automatically and can't be undone.
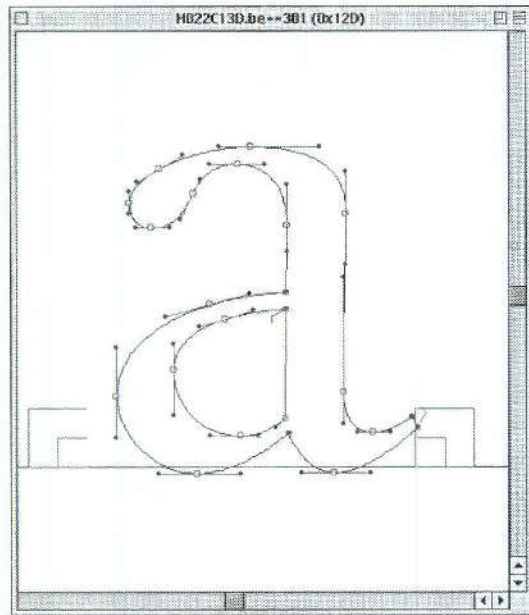

Figure 3 (left) Character Edit window of the DTL BezierMaster where actual designing takes place (below) and menus that are available while this window is active (above) (from DTL FontMaster 2.5.2, screen shot 2007)
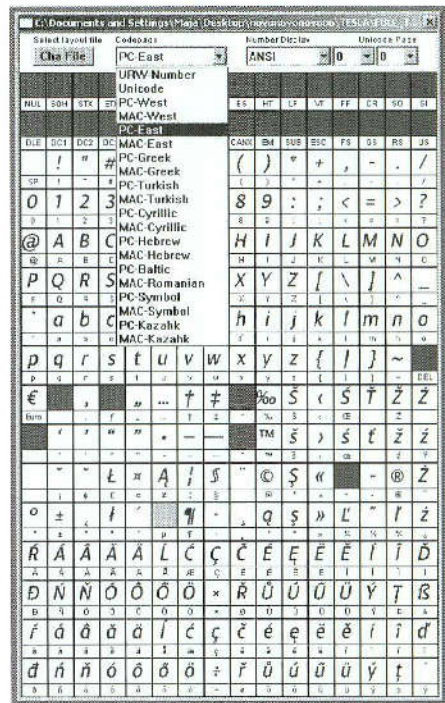
Figure 4 (right) Font Administration window inside the DTL Bezier Master module with dierent code pages shown (from DTL FontMaster 2.5.2 - DTL BezierMaster, screen shot 2007)

An important tool inside *DTL Bezier Master* is also the Metrics Editor (*figure 5*). It adjusts the positions and widths of the characters. The Metrics Window can be resized to take full advantage of the screen resolution. The changes made in the Metrics Editor are saved automatically. In order to aid the type designer in the design of smooth and tangentially continous outlines, four different type of points are available in *DTL Bezier Master*: Start points, only one start point for each contour is allowed; Control points, off curve points, also called Bezier Control Points (BCP); Anchor points, also called corner points: these points are on curve points, marking the end or beginning of a straight line or a Bezier curve and Smooth Anchor points, these points are on curve points, marking the end or beginning of a straight line or a Bezier curve.
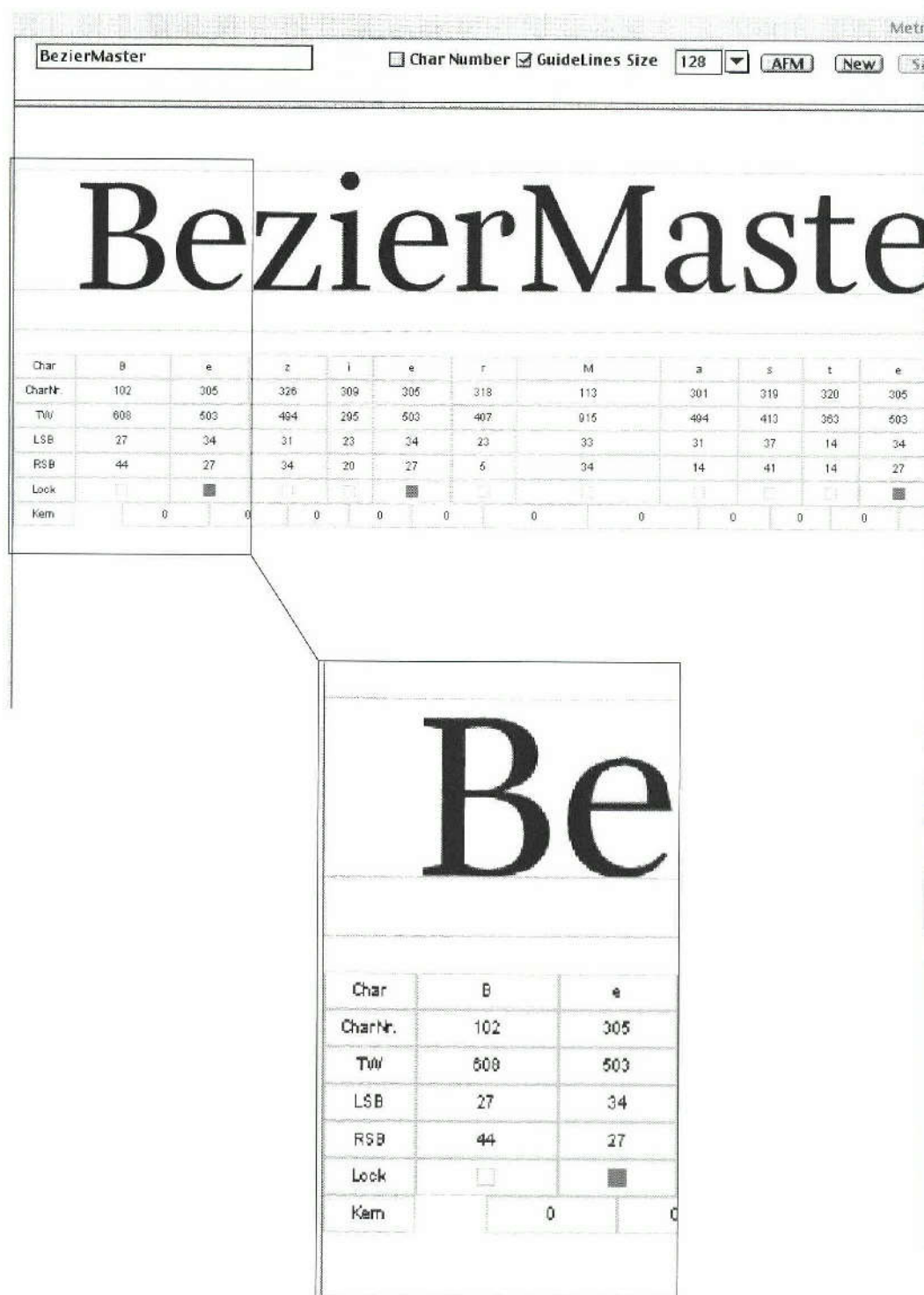
BezierMaster

☐ Char Number ☑ GuideLines Size `128` ▼ (AFM) (New)

BezierMaste

Char	B	e	z	i	e	r	M	a	s	t	e
CharNr	102	305	326	309	305	318	113	301	319	320	305
TW	608	503	494	295	503	407	915	494	410	363	503
LSB	27	34	31	23	34	23	33	31	37	14	34
RSB	44	27	34	20	27	5	34	14	41	14	27
Lock	☐	■	☐	☐	■			☐	☐	☐	■
Kern	0	0	0	0	0	0	0	0	0	0	0

Be

Char	B	e
CharNr.	102	305
TW	608	503
LSB	27	34
RSB	44	27
Lock	☐	■
Kern	0	0

Figure 5. Metrics Editor window inside the DTL Bezier Master module
(from DTL FontMaster 2.5.2 - DTL BezierMaster screen shot 2007)

Start point

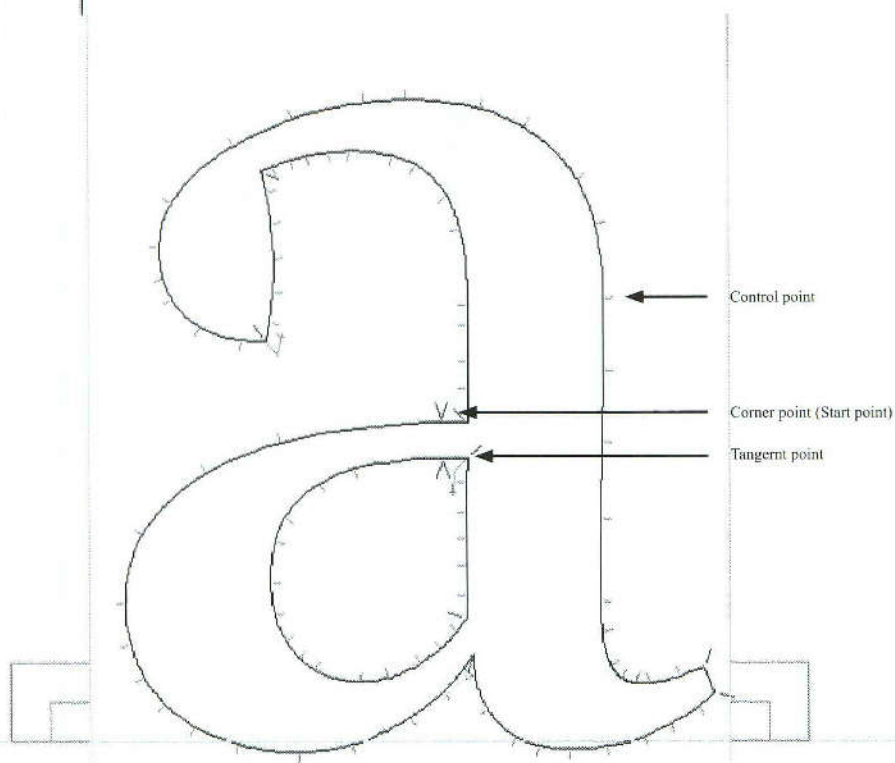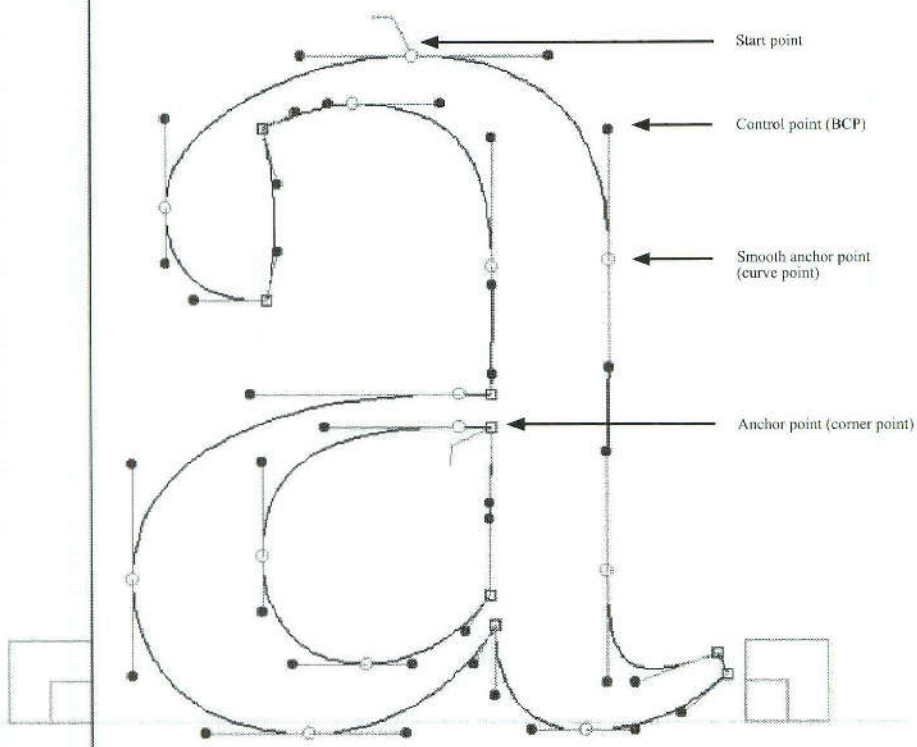Control point (BCP)

Smooth anchor point
(curve point)

Anchor point (corner point)

Control point

Corner point (Start point)

Tangernt point

Ikarus Master

DTL Ikarus Master is an editor for the IK (Ikarus) format. Most of the functions match those *DTL Bezier Master* offers for BE format. Also the IK data can be loaded directly into the background of the *DTL Bezier Master*. Actually, BE format has been developed by URW and it is derived from the Ikarus format. There are few differences between them. The way that IK format describes contours differs completely from the bezier curves in the BE format. Every point lies exactly on the outline, while in BE format, control points are outside outline (*figure 6*). *DTL Ikarus Master* is not normally used for drawing characters directly on screen, for that it is better to choose *DTL Bezier Master*. But for editing characters that are hand digitized, it is ideal for using with a digitizing board. The Ikarus format was for a long time the standard for digitizing fonts, and still a lot of data is in this format. This was the first professional font production system, and it remains relevant because of the conversion of the IK data into TrueType, PostScript or OpenType with *DTL Data Master*. It is used by specialized font production houses around the world. These demanding users appreciate high quality digital data with a flexible system, simplicity and speed that supports a font conversion into other formats. Ikarus was the source for many inventions, such as hinting, interpolation, auto tracing, auto kerning, etc

Figure 7 DTL ContourMaster corrects stem widths and serif lengths (from DTL FontMaster 2.5.2 - DTL ContourMaster, screen shot 2007)

Contour Master

The first module used by the Dutch Type Library was *DTL Contour Master*. It can be used to test and correct all kinds of errors in contours, such as open contours, overlapping or double contours, double points, missing extreme points. Also, things like bar and line widths can be tested (*figure 7*). *DTL ContourMaster* tests and corrects the IK and BE formats. The BE (Bezier) is derived from the Ikarus format. The latter makes a description of contours at extremely high resolution possible. It can automatically correct the contours, according to the chosen options. A program like this is necessary, especially for large quantities of characters that form several code pages in a TrueType or OpenType font. Corrections made by the *DTL Data Master* are irreversible. To protect your original data it is not possible to overwrite the 'master' file (*figure 8*).

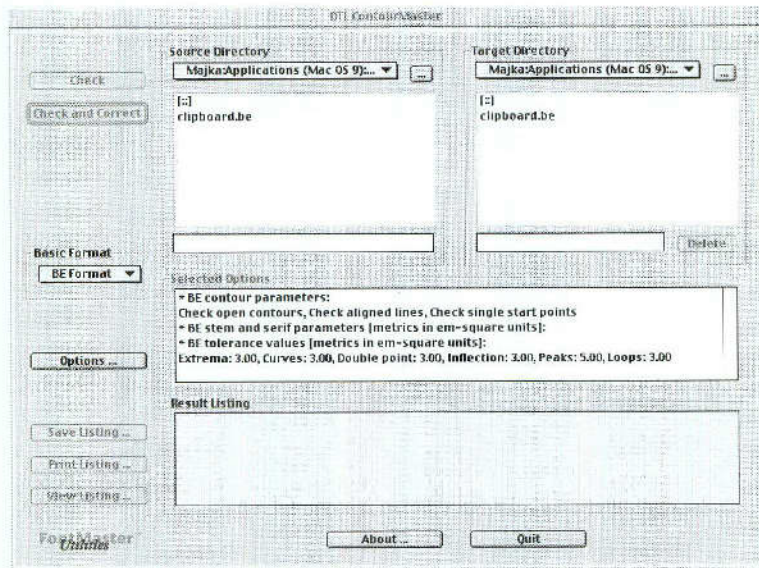Figure 8 Starting dialog of DTL ContourMaster that has two major functions: to select one or more source fonts and to select one or more options for checking and correcting the source fonts (from DTL FontMaster 2.5.2 - DTL ContourMaster screen shot 2007)

Kern Master

DTL Kern Master is a module for automatic creation of kerning pairs for BE and IK databases. This program is specially developed for OpenType production: it is possible to generate kerning for a complete BE and IK database, including Cyrillic, Greek, East European, etc. with one command. Because of that, in most cases, the kerning for the different scripts is stored in a single file. All the different files can be simply edited with a text editor. It is a fact that there are many

combinations that can not be optimized without kerning, especially with Cyrillic, Greek and East European characters. Using very sophisticated algorithms *DTL Kern Master* enables perfect optimization of spacing (*figure 9*). The quality of kerning generated with this program is extremely high, but it is always possible to make changes manually in the *DTL Bezier Master* or *DTL Ikarus Master* Metrics Window (*figure 10*). Any changes made will be saved automatically to the original metrics file. Group kerning can be done here as well. In *DTL Kern Master* the glyphs are converted first to extremely high resolution bitmaps before sophisticated algorithms are used to calculate the kerning. Complete BE and IK font databases can be supplied with kerning pairs. There is basically no limit to the number of kerning pairs, so very large databases that support multiple scripts can be used in combination with extensive kerning pair definitions. The actual calculation is a matter of seconds, depending on the speed of the computer unit (DutchType Library, 2007). *DTL Kern Master* does not work with font formats like PostScript Type 1, TrueType or OpenType directly. Fonts have to be converted to the BE or IK format in *DTL Data Master* first, before using *DTL Kern Master*. After processing the kerning pairs *DTL Kern Master* will show a listing that can be printed, saved and viewed (*figure 11*).
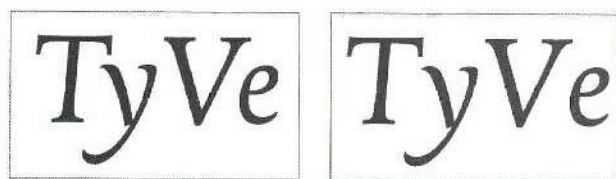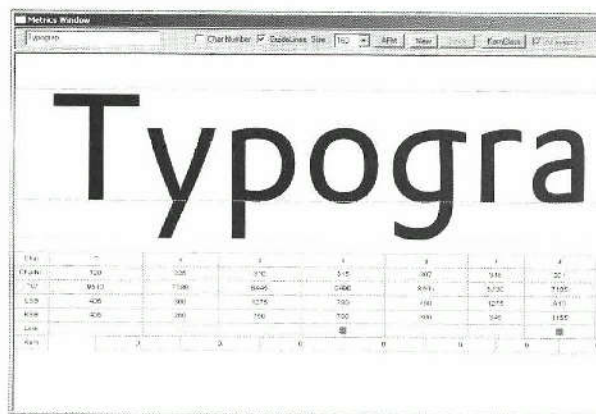

Figure 9 *Two versions of the same typeface, with and without kerning pairs calculated by DTL KernMaster (from http://www.fonttools.org/ DTL KernMaster pdf manual (2004), screen shot 2007)*

Figure 10 *It is possible to check and alter the kerning in the Metrics Editor of both DTL Bezier- and IkarusMaster (from DTL KernMaster screen shot 2007)*

```
DTL KernMaster 2.00.009A : Mar-25-2004 12:00:00
Batch processing is being started.
* kerning class file is "eMac 80GB:Applications (Mac OS 9):Dutch Type
Library:DTL FontMaster 2.00.009A:kernmaster.cla"
* kerning pair file is "eMac 80GB:Applications (Mac OS 9):Dutch Type
Library:DTL FontMaster 2.00.009A:kernmaster.krn"
* character layout file is "eMac 80GB:Applications (Mac OS 9):Dutch Type
Library:DTL FontMaster 2.00.009A:beeditor.cha"
* encoding key is "ANNumLat1"
+ kerning calculation ist being started
+ input: "eMac 80GB:Desktop Folder:AFM_Output:D_19_13T.BE"
+ output: "eMac 80GB:Desktop Folder:AFM_Output:D_19_13T.afm"
- output: "eMac 80GB:Desktop Folder:AFM_Output:D_19_13T.afm"
- input: "eMac 80GB:Desktop Folder:AFM_Output:D_19_13T.BE"
- kerning calculation has been finished
```

*Figure 11 The listing of the kerning process in the DTL KernMaster that can be viewed,
printed and saved (from DTL FontMaster 2.5.2, screen shot 2007)*

Blend Master

DTL Blend Master is a module for interpolating fonts (*figure 12*).
Normally, a Medium is calculated from the Regular and Bold variants
of a typeface, that together form the extremes. From a mathematical
point of view interpolating is not an especially complicated technique,
but in font production it is not easy at all. This program checks and
corrects contours of the extremes so that interpolation proceeds in a
faultless manner (Dutch Type Library, 2004). It uses intelligent routines
which make the number of points and the direction of the contours
equal without changing the form of the glyphs. The interpolation
requires only a few parameters. The interpolation factor can be
independently defined for x-factor and y-factor. Normally the range
for blending is between 0 and 100 percent. It is possible to process
multiple files from two different folders with one command; in that
case it is important that the two folders contain the same number of
files. If characters fail to blend, an Encapsulated PostScript file showing
the problem(s) can be generated. It is possible to import this EPS in
DTL BezierMaster and make the necessary changes in the contours
by hand.

Data Master

The module for managing, converting and generating database and
font formats is called *DTL Data Master*. It converts font formats for
Mac OS and Windows into BE (Bezier) and IK (Ikarus) formats that
are used internally by the *DTL Font Master* utilities and vice versa.
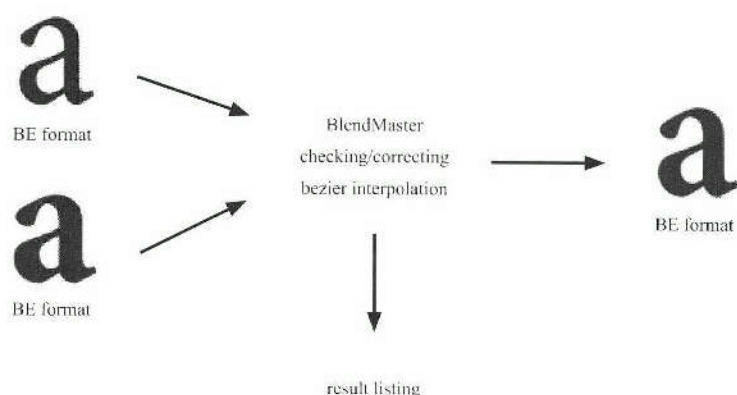
Figure 12 Interpolation process in DTL Blend Master and examples; the regular version (top) and bold version (bottom) of Minion typeface were blended to create medium weight (center) (based on Dutch Type Library [2004] Font Master Utilities manual)

In addition, it can create OpenType fonts according to the Adobe standard, which underlines the up-to-date status of *DTL Font Master*. All the meticulous work needed for the production of OpenType fonts is done automatically by the program. The approach is to provide a simple way to generate OpenType fonts that are also suitable for non-experts.

CONCLUSION

In conclusion, the modular structure of *DTL Font Master* as presented supports the stages of font production.

1) Design stage—Sketching on paper, resulting in manual digitizing (*IkarusMaster*) and/or auto tracing (*Trace-Master*); sketching/drawing on screen, directly in a font/glyph editor (*BezierMaster/IkarusMaster*), or using a vector graphics program like *Adobe Illustrator* in between.

2) Editing stage—Enhancing (aesthetically and technically) the design (*BezierMaster/IkarusMaster*); enhancing the glyph set, from a basic character set to multiple code page support (*BezierMaster/IkarusMaster*); spacing (*BezierMaster/ IkarusMaster*); kerning (*KernMaster/BezierMaster*).

3) Data management stage—Database building/enhancing/ merging (*BezierMaster/IkarusMaster*); consistency checking (*ContourMaster*); technical quality control (*ContourMaster*).

4) Font generation stage—Producing different formats for different platforms (*DataMaster*).

5) Format enhancement stage—Delta hinting (Visual TrueType - a professional level tool for graphically instructing TrueType and OpenType fonts); adding OpenType features (*DataMaster*/Visual OpenType Layout Tool - a Microsoft tool providing graphical user interface to add OpenType layout tables to fonts with TrueType outlines) (Blokland, 2006).

There are a few shortcomings of this software, for example, *DTL FontMaster* is not one-hundred percent compatible with Macintosh OS X system yet. It is compatible with Windows and older Macintosh systems, but with Mac OS X some functions don't work. When digitalizing fonts with *IkarusMaster* you need to have a *Wacom* or similar, specially made digitalizer which adds an extra cost to your font production. Also, the autokerning function in *KernMaster* is not yet perfect, so manual adjustments and control over kerning pairs is still required, because it can create some unusual kerning pairs. It is also important to say that this software is professional and not so user-friendly for beginners. The module configuration is great for professionals because it gives them more control over the process, but is rather confusing for beginners. So, if you are planning to make your first font, *DTL FontMaster* may not be the best choice for you. These are the so-called, downsides, which are minimal when we

consider all advantages that *DTL FontMaster* offers. The separation of work stages, which makes managing the font production process more convenient, also supports various functions and customization of interfaces which are time saving. This and all previously mentioned features and qualities make *DTL Font Master* the most sophisticated font production software available, at least for the time being.[1] The following things are being worked on at this time: adapting the modules for Mac OS X; enhancing OpenType layout feature generation, batch functionality and command file support.

END NOTES

1 You can download *DTL Font Master Light 2.5.4*, for Windows and Mac, from the web site. The light versions of *DTL Bezier-* and *Ikarus Master* are fully functional and have only one restriction: not more than 256 glyphs can be stored per database. The light version of *Contour Master* makes a complete testing of multiple font databases possible, automatic improvement is only enabled in the full version. Of *DTL Kern Master* and *Trace Master* only demo versions are available for free. The light and demo versions of *DTL FontMaster* run under *Mac OS 8.6* and *9.x*, *Mac OS X Classic* mode, *Windows 95/98, Me, NT, 2000, XP* and *Vista* (Dutch Type Library, 2007).

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AUTHOR NOTE

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