

Introduction

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Today, font technology supports rather than defines type design, but this was not always the case. In the early days of Western typography, technical constraints played a far more dominant role, often shaping the very patterns that established harmony and rhythm in type. In that historical context, engineering and design were closely intertwined: a relationship explored extensively in the OTF Course, where understanding the foundations of type design and font production is essential.

Contemporary type designers, however, are no longer bound by such limitations. Digital tools have dramatically reduced technical barriers, allowing designers to prioritize visual and functional goals over mechanical feasibility. Applications like Glyphs, FontLab, and RoboFont conceal much of the complexity of font production, making the process appear deceptively simple. Yet this abstraction comes at a cost: by hiding the underlying mechanics, users often lack insight into what happens behind the scenes. Furthermore, the aspects that are exposed are typically structured according to each tool's specific workflow.

In other words, our perception of font technology is largely shaped by how font tools organize data. Today, font production is often the final step in the type-design process, an inversion of early practices, when type design initiated font production. This shift has subtly changed how we understand and approach type design.

Additionally, by abstracting or altering key processes, these tools can make troubleshooting more difficult when technical issues arise. And while much has been simplified, that simplicity is often only surface-deep: after all, what appears straightforward may ultimately introduce new layers of complexity.

Organization

During the technical sessions of the course, the foundations of digital type are both discussed and explored hands-on. There are ten technical sessions in total, each lasting two hours (the eleventh session is dedicated to evaluating both group and individual projects).

The sessions begin with an overview of the historical development of digital type and its production. This is a topic to which Jürgen brings firsthand experience, having worked as a font-tools developer since the early 1980s. From there, the course delves into the technical details of font formats and the practical application of fonts. Notably, much of the functionality from the original IKARUS editors has been

ported under Jürgen's guidance into the DTL font tools, keeping the core technology relevant today.

Objective

The objective of the technical sessions is twofold: to deepen participants' understanding of font technology, and more importantly, to help them gain greater control over the associated production process.

Schedule

The sessions are scheduled as follows (subject to change):

1. *A short history of digital font technology*

- 1.1 The early days
- 1.2 The IKARUS system
 - Contour description
 - Interpolation
 - Gridfitting
 - File system
- 1.3 Bitmaps and early outline fonts
 - PostScript Type 3 and Type 1
- 1.4 Introduction of hinting
- 1.5 TrueType
- 1.6 Unicode
- 1.7 The font wars
- 1.8 OpenType
 - Layout features
 - Complex scripts
- 1.9 Variable fonts

2. *Terminology, definitions, character sets, and encodings*

- 2.1 Typographic terms (Latin)
 - Typeface vs. font
 - Character vs. glyph
 - EM square, body size, cap height, x-height
 - Spacing/fitting, kerning, tracking
- 2.2 Font metrics
 - Point size (text, display, poster)
 - Optical scaling
 - Leading / line spacing
- 2.3 Script-specific character sets
 - Latin-1, Latin-2, etc.
 - CJK code sets (e.g., GB18030-2004)

- 2.4 ISO encoding
- 2.5 Unicode
- 2.6 Glyph naming

3. *Font tools*

3.1 Design tools

- IKARUS (URW)
- FoundryMaster (DTL)
- Fontographer (Macromedia / Fontlab Ltd.)
- FontLab (Pyrus / Fontlab Ltd.)
- Glyphs

3.2 Production tools

- VOLT (Microsoft)
- VTT (Microsoft)
- RoboFog
- TTX
- AFDKO (Adobe)
- fontmake
- Google tools
- Glyphs
- OTMaster (DTL)

3.3 Conversion tools

3.4 Analysis and quality control

- FontDetective (shareware)
- FontValidator (Microsoft)
- FontBakery
- OTMaster (DTL)

4. *Basic concepts of font formats (outline and bitmap)*

4.1 Bitmap formats

- TIFF, BMP, GIF, BDF, etc.

4.2 Outline formats

- Bézier curves
- Quadratic splines
- Other vector representations

4.3 Hints and instructions

4.4 Rasterization and screen display

- Display challenges
- Resolution: logical vs. physical size
- Grayscale rendering
- ClearType

4.5 Legibility standards

- ISO / DIN legibility guidelines

5. *Font formats and standards* (part 1)

5.1 Overview of outline formats (revisited)

- IKARUS
- Bézier, quadratic spline
- Spirals, lines, and circles

5.2 PostScript Type 1 (in detail)

- Structure
- Character set
- Outline description, hints
- Subroutinizing
- macOS and Windows formats
- Kerning (AFM, PFM)
- Strengths and weaknesses
- Screen display, bitmap embedding

5.3 CID fonts (PostScript 2-byte for CJK)

- Structure
- Character set, encoding

6. *Font formats and standards* (part 2)

6.1 TrueType (in detail)

- Structure
- Outline description
- Hinting
- Composites
- Character set, encoding, Unicode
- Additional tables
- Screen display, bitmap embedding
- Strengths and weaknesses

6.2 TrueType collections (TTC, OTC)

- Structure

6.3 PCL (Intellifont, Infinifont)

- Structure
- Outline description, hinting
- Use in printers

7. *Font formats and standards* (part 3)

7.1 OpenType (in detail)

- Structure
- Outline description

- Hinting
- Character set, encoding, Unicode
- Glyph substitution (GSUB)
- Glyph positioning (GDEF)

7.2 Apple Advanced Typography (AAT)

7.3 Color font extensions

- COLR / CPAL
- CBDT / CBLT
- SVG
- SBIX

7.4 Variable fonts

- CFF2 (PostScript outlines)
- TTF (TrueType outlines)

7.5 UFO format

7.6 WOFF and WOFF2

8. *Font support (OS and web)*

(Covers macOS, iOS, Windows, Linux, and Android)

8.1 Supported formats

8.2 Rasterizers

8.3 Encodings and multilingual support

8.4 Keyboard input and drivers

8.5 Application interfaces

8.6 Font installation and management

- Third-party tools (ATM, etc.)

8.7 Layout engines

8.8 Browser engines

8.9 Fonts in HTML

- Unicode support
- Web fonts
- Flash (legacy)

8.10 Email

- Unicode and multilingual support

8.11 Browser support for variable fonts

9. *Word processors and other applications*

9.1 Encoding and multilingual support

9.2 Exchange formats: export and import

9.3 Platform compatibility and document workflows

9.4 Office applications (Word, Excel, etc.)

9.5 Graphics software (Illustrator, CorelDRAW, etc.)

9.6 Layout programs (InDesign, QuarkXPress, etc.)

9.7 Presentation software (PowerPoint, Keynote, etc.)

10. *Print formats and fonts*

10.1 Page description languages (PostScript, PCL)

10.2 Printer drivers

10.3 Printer-resident fonts

10.4 PDF and font embedding
