Smoky letters
Linus Romer

Abstract
The wish for an individually designed thank-you card led to the idea of developing a “smoky” capital D that would look a bit different with each compilation but still elegant, such that it could be combined with a copperplate font to form the word Danke (German for thanks). This project was substantially facilitated by METAPOST and its random number generator.

Danke

From a single path to a bunch of paths
For a quick start, I read the coordinates of the most important points (mainly extrema) of the letter D in the Calligra font using the FontForge editor. These points were connected in a path like this:

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{example.png}
\caption{An example of a path constructed from the coordinates of the letter D.}
\end{figure}

\begin{verbatim}
beginfig(0);
 u:=1mm; % standard unit
 pickup pencircle scaled .2pt; % pen size
 z1=(21u,34u); z2=(48u,52u); z3=(60u,42u);
 z4=(26u,20u); z5=(8u,36u); z6=(52u,65u);
 z7=(52u,40u); z8=(39u,0); z9=(6u,7u);
 z10=(0,4u); z11=(13u,0); z12=(50u,13u);
 z13=(68u,36u); z14=(91u,53u);
 draw z1..tension 1.5 and 1..z2{right}..
 z3{down}..tension 1.5 and 1..
 z4{left}..z5{up}..tension 1.4 and 1..
 z6{right}..z7{down}..z8{left}..
 z9{left}..z10{down}..z11{right}..
 z12..z13..z14;
 endfig;
\end{verbatim}

Then, a replacement for the \texttt{draw} macro was needed, namely \texttt{smokydraw}. This new macro shifts the main points of the path and constructs a new path with the same directions and tensions as the original path:

\begin{verbatim}
def smokydraw expr p =
 save widths,k,n,smokypath;
 numeric widths,k,n;
 k=length p;
 n=10; % number of curves on each side
 for j=0 upto k: % set random widths
  widths[j]=5u*abs(normaldeviate);
 endfor
 path smokypath;
 for s=1,-1: % both sides of p
  for i=1 upto n: % curve index
   smokypath:=
    for j=0 upto k-1: % point index
     (point j of p shifted
      (dir(angle(direction j of p)+90)*i/n*widths[j]*s)){direction j of p}
    ..tension posttension j of p
     and pretension j+1 of p..
   endfor
  endfor
 draw p % original path (in the middle)
draw smokypath;
enddef;
\end{verbatim}

In the final version of \texttt{smokydraw} the stem widths are additionally changed by using random numbers (\texttt{normaldeviate}).

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  widths[j]=5u*abs(normaldeviate);
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 path smokypath;
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   smokypath:=
    for j=0 upto k-1: % point index
     (point j of p shifted
      (dir(angle(direction j of p)+90)*i/n*widths[j]*s)){direction j of p}
    ..tension posttension j of p
     and pretension j+1 of p..
   endfor
  endfor
 draw p % original path (in the middle)
draw smokypath;
enddef;
\end{verbatim}

\texttt{smokydraw} needs a predefined standard unit \texttt{u} and the macros \texttt{posttension} and \texttt{pretension} as described in \textit{The METAPOSTbook}. Enjoy!

\begin{verbatim}
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\end{verbatim}