

MusiX \TeX , even more beautiful than Music \TeX for music typesetting

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Abstract

MusiX \TeX is a new music typesetting package derived from Music \TeX , but it provides more beautiful scores than Music \TeX did. While Music \TeX was a single pass package, MusiX \TeX is a three pass system: the first pass performs a rough \TeX ing which reports the spacings of each music section, the second pass is a computation of the best note spacings, and the third one is the final \TeX ing process.

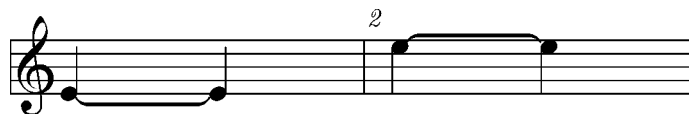
The beauty of single notes does not significantly differ from Music \TeX , but slurs are much more beautiful, and notes are regularly spaced instead of being irregularly spaced with glue.

1 History

Music \TeX is now well known and widely spread over the world for music typesetting. It is mostly used by highly skilled amateurs, but even sometimes by music typesetting professionals.

Nevertheless, most connoisseurs actually regretted the questionable aesthetic of its slurs and ties; this ugliness was due to the fact that only horizontal lines (`\hrule`) would resist the glue inserted by \TeX to achieve line¹ justification. This would lead to something like:

1. We use the word 'line' to meet \TeX ers' way of thinking, but the correct musical word describing a synchronous set of staves tied together with braces or bar rules, is 'system'.



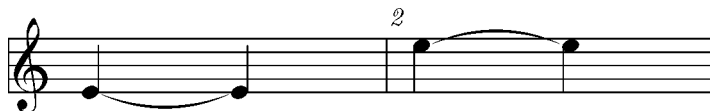
Various suggestions were proposed, all of them resulting in a several pass system, for example inserting `\specials` in the DVI, analyzing this DVI byte after byte to compute the accurate size of needed slurs, and eventually invoking metafont when needed to generate the final text with the slurs/ties of the exact required length.

In 1992, Ross Mitchell² proposed another package (initially called 'Muflex') in which \TeX explicitly writes in a file the spacings consumed – regardless of an arbitrary unique scale factor – by each group of notes.

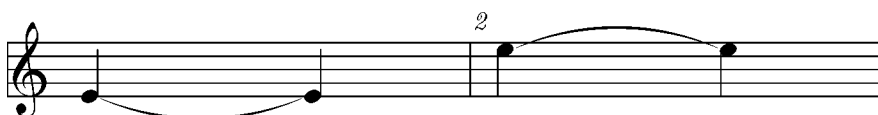
At the next pass, this file read by a small program – `musicflx` initially in Fortran, now in C – which determines the optimal value of the elementary spacing (`\elemskip`) so that each score line exactly fits in a \TeX line (i.e. one `\hspace`) without any additional glue to be inserted.

Then, at final pass, \TeX reads the brainstorming results of this small Fortran or C program, and it readily knows which spacing it must assign to the various notes in order to avoid any glue inclusion to fill the line. Thus, if the unit length `\elemskip` is known to be 14.25 pt, while a given slur is 13 units long³, it is then easy to choose the convenient sequence of symbols to build a smart curve of the right length, with an accuracy of one point.

Thus, using `MusiX \TeX` the previous sequence becomes:



and when the spacings are increased, one obtains:

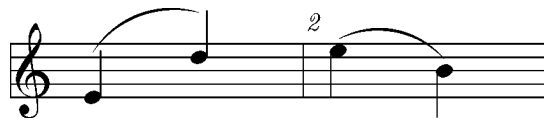


After this preliminary trial `MusiX \TeX` was created by Andreas Egler⁴ and Daniel Taupin, tuning the Muflex by Ross Mitchell and 'negotiating' some features of `Music \TeX` .

2. CSIRO Division of Atmospheric Research, Mordialloc, Victoria – Australia.
 3. In fact this is seldom an integer, due to additional spaces for bars and special insertions.
 4. Ruhr-Uni-Bochum, D-44793 Bochum.

2 The characteristics of MusiX \TeX

Most commands are taken from Music \TeX , sometimes with name changes such as `debutmorceau` becoming `startpiece`. Some people may smile about this point, but as a matter of fact the existence of keywords taken from the French language sometimes triggers allergy reactions⁵... In addition, MusiX \TeX provides specific macros to achieve slurs whose final altitude is different from the initial, for example:



Here is another example – Intermezzo op. 117,1 by Brahms – according to data provided by Miguel Filgueiras

3 MusiX \TeX 's advantages and difficulties

3.1 The glue problem

Obviously, the *glue* notion is essential to \TeX , since it enables justifications equally spread over the text lines. Music \TeX also reasonably uses this feature, in order to approximately

5. Werner Licking humoristically suggested that German people use something like `\HierbeginntmeinePartitur` instead of `\debutmorceau`.

justify the lines of music scores, with that specific difficulty that music ‘paragraphs’ may not finish with partial lines.

However, the MusicT_EX experience was that glue imposed slurs and ties with a wide horizontal section, in order to enable overlappings or extensions of the `\hrule` form. Moreover, if the user was poorly careful, glue would introduce wide empty spaces between compact sequences of notes.⁶

MusiX_TE_X solves all these problems, but the unfortunate counterpart is that the least parasitic space:

- forgotten % at end of line when not ended with a keyword,
- boxes containing text (lyrics) spilling out of the horizontal length allocated to the group of notes,

results in, at best some Underfull boxes filled *in extremis* with glue, at worst catastrophic Overfull boxes.

As a consequence, when getting these messages, hunting spilling boxes or parasitic spaces becomes sophisticated operation, of the competences of a skilled T_EXpert only.

3.2 Compatibility with MusiX_TE_X

Our idea – as well as of another musician, Werner Icking – was to build a new package using the same commands as MusicT_EX except hard impossibility, and offering in addition a more automatic page layout, and an aesthetic slur generation by means of a set of additional commands.

But later, one of the co-authors – Andreas Egler – wanted to do the other way, namely a distinct *new* package, obviously taking advantage of the bases of MusicT_EX but providing different internal and external commands:

- unification of certain distinct commands whose choice could have been automatized... with deletion of the old ones;
- compilation speed enhancement replacing many `\def` by `\let`, admittedly faster but badly encapsulated;
- replacement of command names taken from French and Italian with English looking keywords;⁷
- locking some internal identifiers by inserting @ ;
- ambiguous shortening of command names, which were really long but self-explanatory, probably due to memory problems in his computer.

Nevertheless, although he claimed that music typesetters should give up using MusicT_EX to definitely move to MusiX_TE_X, with no possible backstepping, he accepted

6. This the unfortunate experience of most MusicT_EX beginners.

7. However Andreas Egler is German, and I would have definitely preferred that he replace `\barre` with the German word `\Takt` rather than `\bar` which is confusing with basic T_EX/L_AT_EX.

to develop an optional set of macros, `musiccpt`, which superposes the fundamental MusiX \TeX most of the commands commonly used by the 'old-fashioned' Music \TeX -ers.

And all this works... except some details presently under revision.

Thus, it is presently possible to have a unique source file which can be compiled with both Music \TeX or MusiX \TeX . To do that it suffices changing the `\inputs` at the beginning or, even better, creating two formats:

1. a format with Plain \TeX +`musicnft+musicctex`,
2. a format with Plain \TeX +`musixtex+musiccpt`.

3.3 The remaining problems

1. A persisting controversy between A. Egler on one side, and D. Taupin and W. Icking on the other, about the developing strategy for MusiX \TeX .
2. Clean lyrics insertion, since `musixflx/Muflex` is unable to handle and shrink text lengths to meet zero glue justification.

4 Availability

- Original version (presently T.396) supported by D. Taupin at `ftp://rsovax.lps.u-psud.fr/[anonymous.musixtex]` and at `ftp://hprib.lps.u-psud.fr/pub/musixtex`;
- Copies in the various CTANs (directory `macros/musixtex/taupin`);
- Andreas Egler's version is also available now in the various CTANs (directory `macros/musixtex/egler`). Note that Egler's version is not compatible with sources designed for Music \TeX .

5 Two examples

On page 356 is the beginning of Charles Gounod's 'Ave Maria', transcribed for organ and soloist (violin and/or singer), typeset with format `musicctex.fmt` (Music \TeX); in page 357 is the output of the same source file using format `musixtex.fmt` (MusiX \TeX). Note the different slur shapes, and the unfortunate exceeding glue at bars 10–12 with Music \TeX .

Méditation – Ave Maria

G.O.: flûte 8' [+4']
 Positif : flûtes 8'+4' [+2']
 Pédale : 16', acc. positif

Charles Gounod & J.-S. Bach
 Transcription Orgue+soliste Daniel Taupin
 & Markus Veittes

The musical score is arranged in three systems. Each system contains three staves: Positif (organ), Chant (voice), and Violon (violin). The Positif part features a continuous, rhythmic accompaniment of eighth-note chords. The Chant part is a vocal line with lyrics in French. The Violon part provides harmonic support with sustained notes and some melodic lines.

System 1: Positif (measures 1-3), Chant (measures 5-6), Violon (measures 1-3).
 Chant lyrics: A — ve Ma-

System 2: Positif (measures 4-6), Chant (measures 7-9), Violon (measures 4-6).
 Chant lyrics: ri — a, gra — ti — a

System 3: Positif (measures 7-9), Chant (measures 10-12), Violon (measures 7-9).
 Chant lyrics: ple — na, Do — mi — nus te — cum,

Méditation – Ave Maria

G.O.: flûte 8' [+4']
 Positif : flûtes 8'+4' [+2']
 Pédale : 16', acc. positif

Charles Gounod & J.-S. Bach
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 & Markus Veittes

The musical score is arranged in four systems. Each system contains three staves: Positif (organ), Chant (voice), and Violon (violin). The Positif part features a complex rhythmic pattern of eighth and sixteenth notes. The Chant part includes the lyrics: "A-ve Ma-ri-a, gra-ti-a ple-na, Do-mi-nus te-cum,". The Violon part provides harmonic support with sustained notes and melodic lines. Measure numbers 2, 3, 5, 6, 7, 8, 9, 10, 11, and 12 are indicated above the staves.