

SM05: An Efficient Way to Combine RTF Files and Create Multi-Level Bookmarks and a Hyperlinked TOC

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Agenda

1. Background
2. Method
3. Demo
4. Questions

Background

1. RTF (Rich Text Format) is a popular format for analysis reporting in the Pharmaceutical Industry.
2. Why do we need combined RTF files?
 - ☐ To facilitate review.
 - ☐ Regulatory submissions. E.g. FDA BIMO listings.
 - ☐ Best to take advantage of existing reporting tools/outputs.

Background: Existing methods

1. Proc Document
 - ☐ Require the RTF files be generated in a specific way
2. Inserting RTF code in each individual RTF files
 - ☐ Require the RTF files be generated in a specific way
3. Visual Basic
 - ☐ Require MS Word installed / environment dependent
 - ☐ Inefficient
4. Other SAS methods

Goal of the New Approach

1. Efficient

- ❑ Only a couple of minutes to combine ~500 RTF files

2. Independent of environment

- ❑ Can be executed in any environment with Base SAS installed, e.g. Windows, Unix, Linux, etc.

3. No MS Word required

Method: How RTF Works

1. Plain text based.
2. Control words + content.
3. The entire file is included within a pair of curly braces.

```
{\rtf1\ansi\deff0
{\fonttbl {\f0 Courier;}}
{\colortbl;\red0\green0\blue0;\red255\green0\blue0;}
This line is the default color\line
\cf2
\tab This line is red and has a tab before it\line
\cf1
\page This line is the default color and the first line on page 2
}
```

Method: Concatenate RTF Files (1)

Part 1	<pre>{\rtf1\ansi\deff0\deflang1033 {\fonttbl{\f0\froman Times New Roman;} {\f1\fswiss\fcharset0\fprq2 Arial;}} {\stylesheet {\s0 Normal;} {\s1 \ql\widctlpar heading 1;} {\s2 \ql\widctlpar heading 2;} {\s3 \ql\widctlpar heading 3;}}</pre>
Part 2	<pre>\paperw15840\paperh12240\landscape \margl1720\marginr720\margt2880\marginb1800\headery1800\footery1800 {\header\pard\par} {\footer\pard \qr Page \chpgn of {\field{*\fldinst NUMPAGES }} \par} \s15\qc\li0\ri0\sb0\sa0\widctlpar\rin0\lin0\itap0\qc\f0\fs24 \qc\f0\fs24\cgrid Table 1: Summary of Vital Signs \par \trowd\trleft0\trqc</pre>
Part 3	<pre>}</pre>

Method: Concatenate RTF Files (2)

RTF File	RTF Code
First	Part 1 Part 2
Second	\sect Part 2
Third	\sect Part 2
more	\sect Part 2 \sect Part 2
Last	\sect Part 2 Part 3

Method: Create Bookmarks

1. Define styles in part 1 (`{\stylesheet}`)

- `{\s0 Normal;}`
- `{\s1 \ql heading 1;}`
- `{\s2 \ql heading 2;}`
- `{\s3 \ql heading 3;}`

2. Identify and/or extract titles.

3. Insert control words for headings around the titles

With no section titles:

`\s0{\s1` Table 1: Adverse Events `\par}\s0`
`\s0{\s1\fs0\cf8` Table 1: Adverse Events `\par}\s0`

With section titles:

`\s0{\s1\fs0\cf8` Efficacy Analysis `\par}`
`\s0{\s2\fs0\cf8` Table 1: Adverse Events `\par}\s0`

Method: Create Table of Contents (1)

1. Add an empty page at the beginning of the RTF file.

```
\sectd\linex0\endnhere\headery1440\footery1440\marglsxn1440\marginrsxn1440\marginrsxn1440\marginbsxn1440
\qc\f36\b \s0{\s1 Table of Contents \par}\s0\b0\par\par\pard
```

```
\sect
```

2. Change destination names. Each RTF file should have a unique destination name.

From:

```
{\upr{\*\bkmkstart IDX }{\*\ud{\*\bkmkstart IDX } }{\*\bmkend IDX }
```

To:

```
{\upr{\*\bkmkstart IDX1 }{\*\ud{\*\bkmkstart IDX1 } }{\*\bmkend IDX1 }
```

Method: Create Table of Contents (2)

3. Insert RTF field code to create hyperlinks.

```
\fi-2000\li2000{\f1\fs18\cf0{\field{\*\fldinst { HYPERLINK \l  
"IDX1"}}{\fldrslt {\cf0\b Analysis Reports  
\b0\tab}}}\ptabldot\pindtabqr{\field{\*\fldinst { PAGEREF IDX1  
\h}}{\fldrslt{NUMPAGES}}}}\s0\par
```

```
\fi-2000\li2000{\f1\fs18\cf0{\field{\*\fldinst { HYPERLINK \l  
"IDX1"}}{\fldrslt {\cf0 Table01:\tab  
Lab}}}\ptabldot\pindtabqr{\field{\*\fldinst { PAGEREF IDX1  
\h}}{\fldrslt{NUMPAGES}}}}\s0\par
```

Example Macro call

```
%combrtf(  
    inpath=&RPTDRV._CRO\PreProd\Output  
    ,outpath=&RPTDRV.\PreProd\Output  
    ,outfile=Study ABC 123 CSR Tables  
/*    ,inlist=%str(tsi*.rtf    Subject Information Tables  
    |tsfaesol*.rtf    Solicited Adverse Events Tables  
    |tsfaeunsol*.rtf    Unsolicited Adverse Events Tables  
    |tsflab*.rtf    Laboratory Results Tables  
    |tsfvit*.rtf    Vital Signs Tables)*/  
    ,inlist=%str(&RPTDRV.\Pdev\larmisha\section_titles.xlsx)  
    ,file_title1=%str(Study ABC 123)  
    ,file_title2=%str(CSR Tables)  
    ,print_pagenum=Y  
    ,keeplistingnum=N  
    ,papersize=A4  
);
```

Summary

- ✓ This approach can be implemented in SAS, R, Python, etc.
 - ❑ Any programming language that can process plain text files.
- ✓ Highly efficient and environment-independent.
 - ❑ Because RTF files do not need to be opened in the background.
- ✓ Require RTF knowledge to maintain this tool.
 - ❑ Word 2007: Rich Text Format (RTF) Specification, version 1.9.1

Questions?

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