Reindeer –
a Result Render Tool

Run

Configuration

General

Tool Log	C:\temp\git\reindeer\out\Reindeer.log
Tool Output	C:\temp\git\reindeer\out\final_out.docx
Tool Template	C:\temp\git\reindeer\doc\Reindeer_ExampleTemplate.docx
Result Base Path	C:\temp\git\reindeer\out
Configuration	
Content	

Styles

Heading 1	CustomHeader 1
Heading 2	CustomHeader 2
Heading 3	
Title Caption	CustomCaption
Content Font Text	CustomTextResult
Content Font RTF	CustomRTFResult

Replace

[todayDate]	[todayDate]
[reportID]	REPI025889
[creator]	Katja Glass Consulting
[sponsor]	ClinStat

Content

Header1	Reindeer Example Document
Header2	Listing Outputs with[linefeed]many fancy outputs
Listing	01_class.lst
Listing	02_cars.lst
Listing	03_cars_page.lst
Listing	04_cars_multioutput.lst
Header2	RTF Outputs
RTF	07_class.rtf
RTF	08_cars.rtf
RTF	09_cars.rtf
RTF	10_12_cars.rtf

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About

The Reindeer Result Render open source tool contains a VBA macro which can be used to render multiple outputs created with SAS® into one Word document. Currently the listing (.lst or .txt) and rtf outputs are supported. Options can be set either through a configuration in this file (see configuration section) or through a text file which is references in configuration. For more information about the usage, please go into the help section.

This open source tool is developed by Katja Glass Consulting and sponsored by ClinStat GmbH. By investing in open source ClinStat enabled this project, which is available under the MIT license. Feel free to use and modify this tool, but be aware that there is no warranty. Please feel free to perform push requests in GitHub or mail me if you want to further enhance this tool. If you consider to become an open source sponsor, please reach out to me as well. You can mail me via info@glacon.eu.

Future Plans

To be able to further enhance the tool, I am looking for additional sponsors. The following features are currently missing.

- Inclusion of Figures
- Flexible date formats for [todayDate]
- Option to check page breaks for text results (e.g. SAS PS Option selected accordingly)
- Support of ODS Tagsets.RTF
- PDF Rendering
- Abort/Continue on Missing File specification

Help

This document contains a VBA macro which can be used to render outputs created with SAS® into a Word file. Various options are available which are explained here. To view the macro source, please press alt+F11 to open the macro view from Word.

Usage

The following prerequisites must be available to run this tool:

- Template file (all content is rendered into this file)
- Configuration details (either in this file or in a configuration text file)
- Content specifications (either trough a configuration or a separate text file)

To run the macro, please press the "Run" button on the first page. You can also start the VBA macro "RunReindeer".

Example

A running example is available. If the complete reindeer package is downloaded, then the example is already included with all required files. Please update the paths in the "Configuration – General" section. Then by pressing the "Run" button, the example will execute. Make sure that the "content" is enabled, as the execution of VBA macros is for security reasons per default not allowed.

To run an example with a configuration and content text file, please include the appropriate updated values and press the "Run" button for execution.

Configuration	C:\Reindeer\doc\config.txt
Content	C:\Reindeer\doc\content.txt

Configuration Settings

The configuration can be done either in this file directly under the configuration section in the "General" and "Fonts" table or provided through a text file, which could for example be created with SAS. When options are configured in this Word file and in the configuration text file at the same time, then the value from the text file is used. Text configurations overwrite configuration of this file.

The following table shows supported options. Further details can be found in the corresponding sections below.

Option	Description
Tool Log	Path and name of the created log file. General information like start, end time and which files are included are printed to the log as well as warnings and issues if available.
Tool Output	Path and name of the output file.
Tool Template	Path and name of the input template file – all referenced Styles must be included in this document.
Result Base Path	The path where all result files are located which should be included into the template,

Option	Description
Configuration	Optional: Configuration text file to be used, Single option values of the text file overwrites options of this word file (General & Styles table).
Content	Optional: Content text file to be used. When this is specified, "Replace" and "Content" of this word file is completely ignored and only the content specification from the text file is used.
Style definitions	
Heading 1	Optional, style to be used for "Heading 1"
Heading 2	Optional, style to be used for "Heading 1"
Heading 3	Optional, style to be used for "Heading 1"
Title Caption	Optional, style to be used for all captions – the first line of the outputs is considered as title, these titles are formatted as captions
Content Font Text	Optional, style to be used for "Listing" inputs – except for titles/captions
Content Font RTF	Optional, style to be used for "RTF" inputs – except for titles/captions

If this document is used for specification, then the values must be entered into the corresponding tables under the corresponding values. When a configuration text file should be used, the options and values are to be separated by a semicolon. The content could look like the following:

```
Tool Log;C:\Reindeer\out\Reindeer_log.log
Tool Output;C:\Reindeer\out\final_result.docx
Tool Template;C:\Reindeer\doc\Reindeer_ExampleTemplate.docx
Result Base Path;C:\Reindeer\out
Content;C:\Reindeer\doc\content.txt
Heading 1;CustomHeader 1
Heading 2;CustomHeader 2
Heading 3;CustomHeader 3
Title Caption;CustomCaption
Content Font Text;CustomTextResult
Content Font RTF;CustomRTFResult
```

Content Settings

The content what texts, headings, listings and rtf outputs should go into the template including the order can be done either through the configuration in this file in the "Replace" and "Content" table, or through a text file. When a text file is provided, then the content from this file is completely ignored.

Apart from the replacement definition which are executed at the beginning of the program execution, the order of the content specification is of crucial importance. The order of the content is the order of how the content is included into the template.

The following table shows the supported content groups. Further details can be found in the corresponding sections below.

Option	Description
Replacement Tags	Any text can be replaced with any other text. It is recommended to use a special syntax like using special brackets for the replacement tags to avoid possible conflicts. If the text "[todayDate]" appears as replacement text, then the date of today is included in the format of DDMMMYYYY UK-English in uppercase.
Content Tag "Header1"	A document heading is included formatted according the style definition "Heading 1". The text is put into one standalone page. If th text "[linefeed]" is added, then a soft line feed is included at that space.
Content Tag "Header2"	A document heading is included formatted according the style definition "Heading 2". The text is put into one standalone page. If th text "[linefeed]" is added, then a soft line feed is included at that space.
Content Tag "Header2"	A document heading is included formatted according the style definition "Heading 3". The text is put into one standalone page. If th text "[linefeed]" is added, then a soft line feed is included at that space.
Content Tag "Listing"	This tag can be used to include a text file at the specific position. This is typically for ".lst" or ".txt" files. The first line(s) is expected to contain the title of the result.
Content Tag "RTF"	This tag can be used to include a rich text file at the specific position. This is typically for ".rtf" files. The first line(s) is expected to contain the title of the result.

The content tags can be used multiple times to include multiple different contents. For example, by using a "Listing" of "01_class.lst" followed by a "Listing" of "02_class.lst", two different output files are included into the template, first the content from 01_class.lst and then the content from 02_class.lst.

By using a text file, the replacement tags have to be specified using "Replace;" as indicator followed by the replace tag and separated by another semicolon followed by the replace value. Direct content like headers, listings and RTFs can be included by the tag and the value separated by a semicolon. For example, the content specification could look like this:

```
Replace;[todayDate];[todayDate]
Replace;[reportID];REPI025889
Replace;[creator];Katja Glass Consulting (2)
Replace;[sponsor];ClinStat GmbH
Header1;Reindeer Example Document According Content File
Header2;Listing Outputs Below
Listing;01_class.lst
Listing;02_cars.lst
Listing;03_cars_page.lst
Listing;04_cars_multioutput.lst
Header2;RTF Outputs Below
RTF;07_class.rtf
RTF;08_cars.rtf
```

```
RTF;09_cars.rtf
RTF;10_12_cars.rtf
```

Configuration – Tool Log

When a log output file is specified through "Tool Log", then various information is printed into the log file. If there are issues with the general configuration or the tool log itself, e.g. no write access or invalid files – the log will not be created. Instead warnings and error are printed into an alert window directly in Word stating the issue. General information is printed with "INFO;" at the beginning, warnings with "WARNING:" and errors with "ERROR:".

Next to information about the start and finish of the macro and which files and headers has been included, also information about the parameter values used are printed into the log.

The following is an example log:

```
INFO: Reindeer Reindeer starting : 06.01.2020 08:42:00
INFO: ConfigurationFile = C:\Reindeer\doc\config.txt
INFO: ContentFile = C:\Reindeer\doc\content.txt
INFO: ResultsBasePath = C:\Reindeer\out
INFO: ToolLog = C:\Reindeer\out\Reindeer_log.log
INFO: ToolOutput = C:\Reindeer\out\final_result.docx
INFO: ToolTemplate =
C:\Reindeer\doc\Reindeer_ExampleTemplate.docx
INFO: FontHeading1 = CustomHeader 1
INFO: FontHeading2 = CustomHeader 2
INFO: FontHeading3 =
INFO: FontTitleCaption = CustomCaption
INFO: FontContentText = CustomTextResult
INFO: FontContentRTF = CustomRTFResult
INFO: Process Listing File: 01_class.lst
INFO: Process Listing File: 02_cars.lst
INFO: Process Listing File: 03_cars_page.lst
INFO: Process Listing File: 04_cars_multioutput.lst
INFO: Process RTF file: 07_class.rtf
INFO: Process RTF file: 08_cars.rtf
INFO: Process RTF file: 09_cars.rtf
INFO: Process RTF file: 10_12_cars.rtf
INFO: Reindeer Reindeer finished : 06.01.2020 08:42:11
```

Configuration – Tool Output

The template file is used as input, content is included into this file. Finally, the file has to be stores as final output file. The file name and path must be provided through "Tool Output". An example value could be "C:\Reindeer\out\final_out.docx".

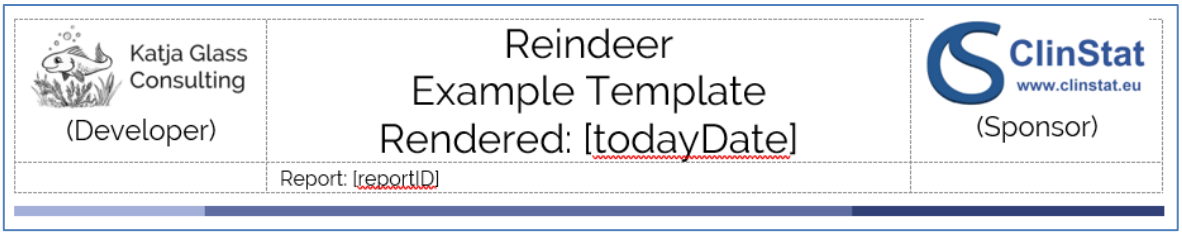
Configuration – Tool Template

The template file which is used as input to include all content into, must be specified through "Tool Template". An example value could be "C:\Reindeer\doc\template.docx".

All content is included into the last paragraph of this document. What ever content is in this template will stay in – apart from replacement tags. The header and footer of the document is also not changed. When styles are specified in the configuration area, then these styles must be available also in the template document. All fields which are available in the document like a table of contents or a page reference, will be updated by the tool.

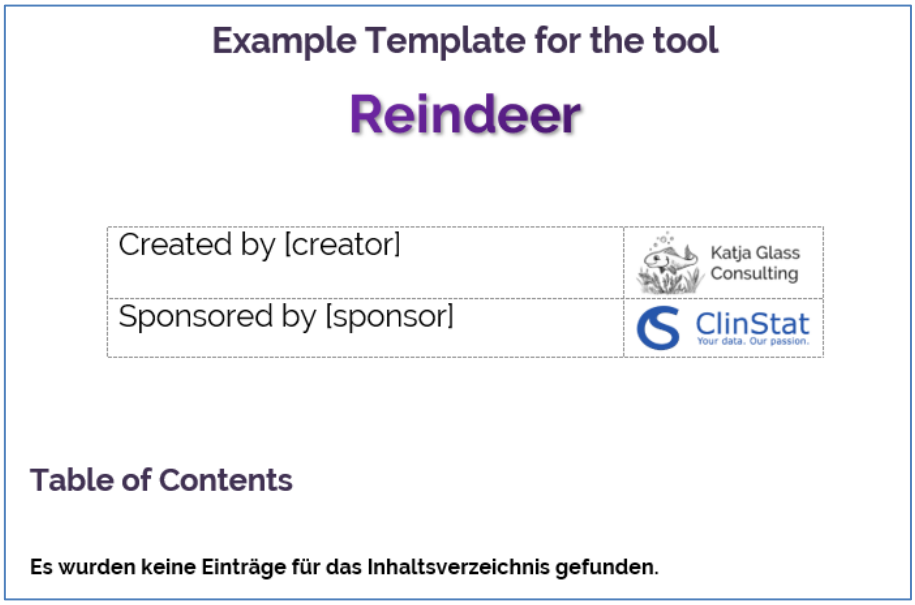
The template could for example contain a cover sheet in portrait and then an empty new section in landscape where the content should be included to. The landscape content section could contain a specific header and footer section which will be kept for all content included.

The header could look like the following:

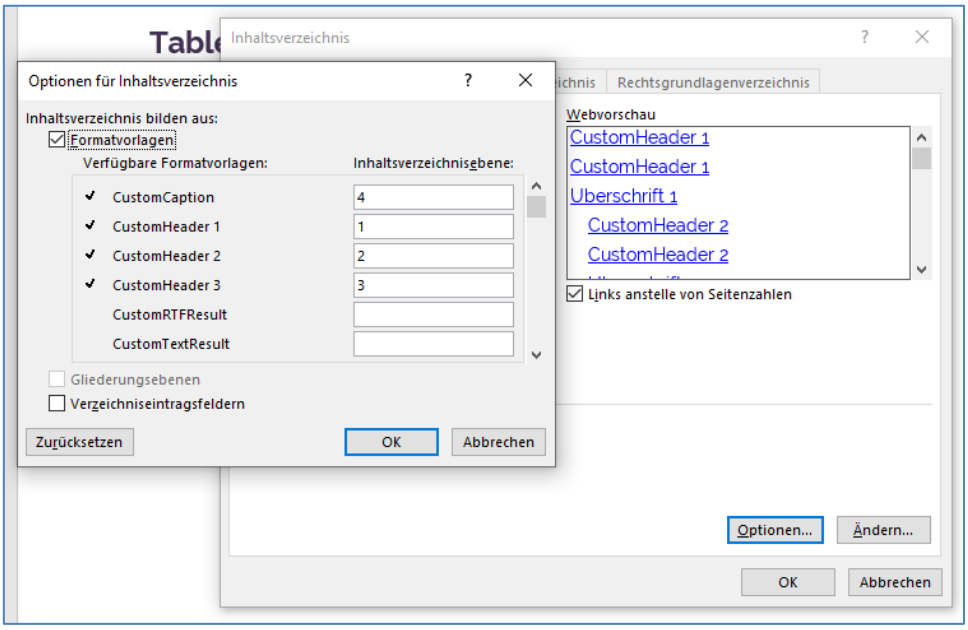


When a replacement tag is defined, the tags will be replaced with the corresponding value. This is working for headers, footers as well as parts of the body content.

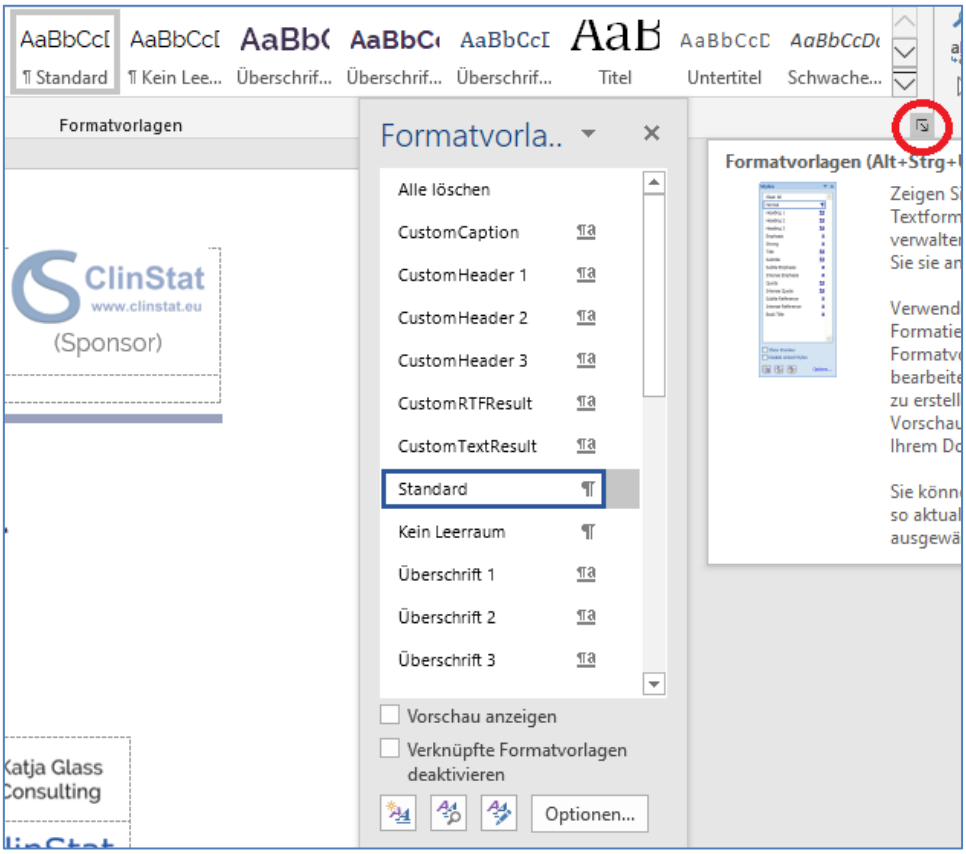
The content could for example also contain replacement tags and other word fields like a table of contents:



The table of contents could be created that way, that custom defined styles appears at various levels:

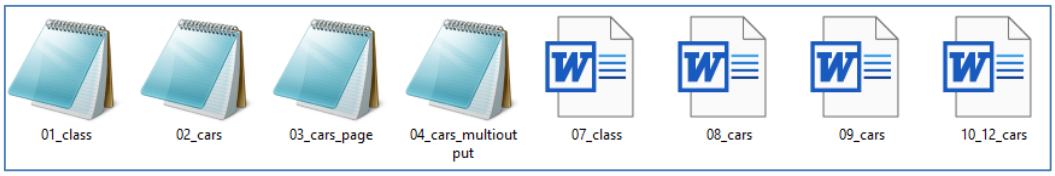


Make also sure to define the custom styles in Word, so they are available by the tool to be used:



Configuration - Result Base Path

The path where all the results are located must be provided through "Result Base Path". An example value could be "C:\Reindeer\out". This folder should contain all results to be included.

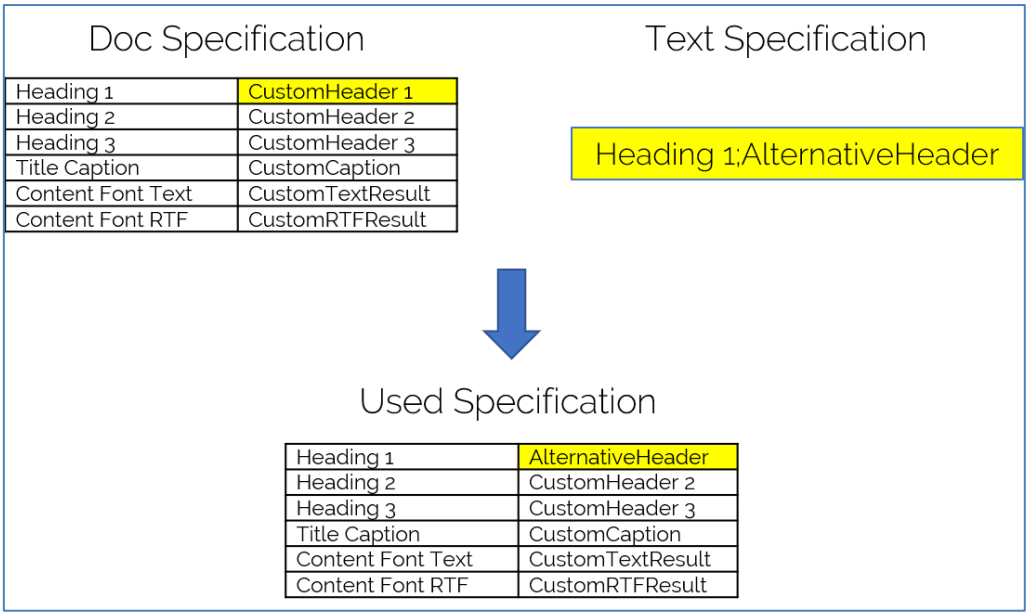


Configuration – Configuration specification

The value "Configuration" could contain a path and name of a text file with a specific format containing additional or different configuration values. An example value could be "C:\Reindeer\doc\config.txt". Possible values are explained under

Configuration.

When configuration values are specified in the Word files and in the text file, the value from the text file is used.



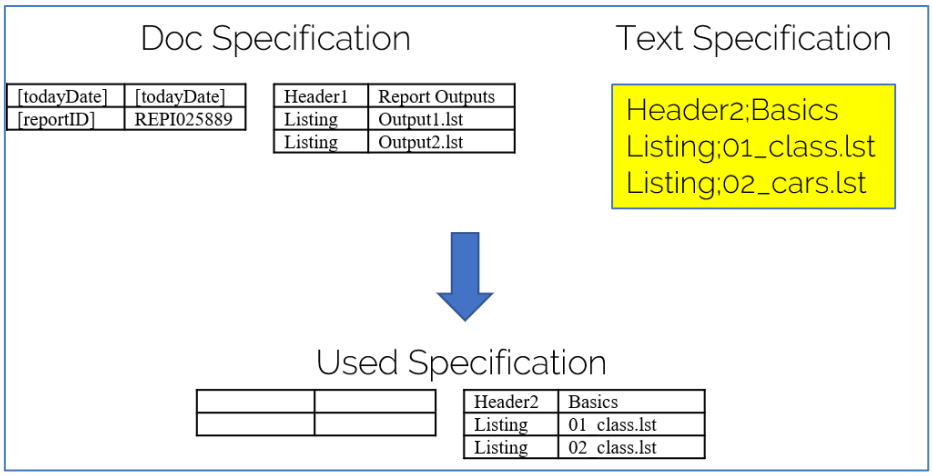
Heading 1	CustomHeader 1
Heading 2	CustomHeader 2
Heading 3	CustomHeader 3
Title Caption	CustomCaption
Content Font Text	CustomTextResult
Content Font RTF	CustomRTFResult

Heading 1	AlternativeHeader
Heading 2	CustomHeader 2
Heading 3	CustomHeader 3
Title Caption	CustomCaption
Content Font Text	CustomTextResult
Content Font RTF	CustomRTFResult

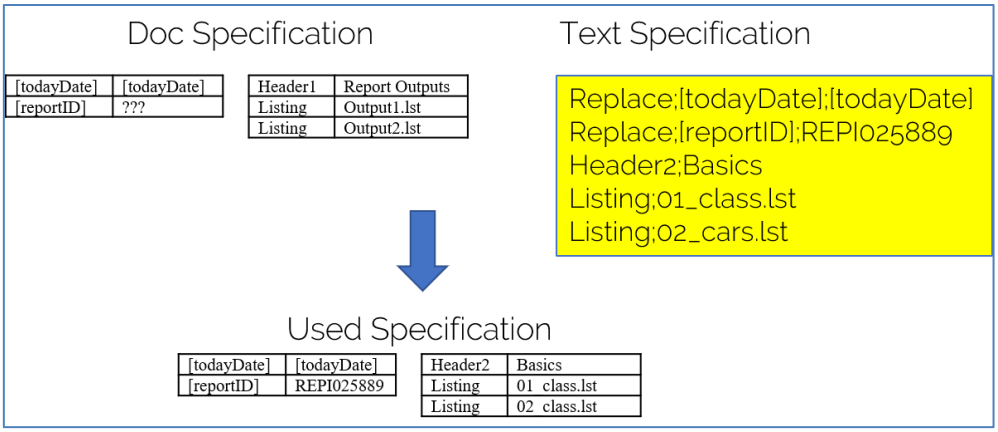
Configuration – Content specification

The value "Content" could contain a path and name of a text file with a specific format containing the complete content containing replacements and results to include. An example value could be "C:\Reindeer\doc\content.txt". Possible values are explained under Content section.

When replacements and content values are specified in the Word files and in the content text file is provided, then only the text file values including replacements are used.



If the replacement tags should be used as well, then this needs to be specified in the content specification file itself.



Configuration - Styles

Six differ styles can be defined. The first three styles are named “Heading 1”, “Heading 2” and “Heading 3”. These styles are applied to included “Header1”, “Header2” and “Header3” texts. These texts are included into the document at a separate page each and the corresponding style is applied. If the style contains a numbering scheme, then the headings will contain also preceding numbers. If no style is defined, the text is included as pure text without any styling.

When the “Content Font Text” style is provided, then the complete “Listing” content part will be styled with the provided style. This could be used to include all listing content formatted as “SAS Monospace 10pt” or similar. This formatting is overwritten by the “Title Caption” for some parts, if specified.

When the “Content Font Text” style is provided, then the complete “RTF” content part will be styled with the provided style. This could be used to include all content formatted as “Times New Roman 10pt” or similar. This formatting is overwritten by the “Title Caption” for some parts, if specified. If no style is provided, the original formatting is kept.

When "Title Caption" is provided, after a special title processing, identified titles are styled according the provided style. For content types "RTF" and "Listing" titles are combined into a single line, when multiple lines are used. When "Title Caption" is provided, then the titles are styled accordingly with the following algorithm:

- Investigate first title (first paragraph of the processed listing of RTF file
- Format first title
- Loop
    - Find the next title (first paragraph after page break)
    - If title is different than previous, format as "Title Caption" value

Due to this algorithm, repeated titles are not styled as "Title Caption", but only the first one.

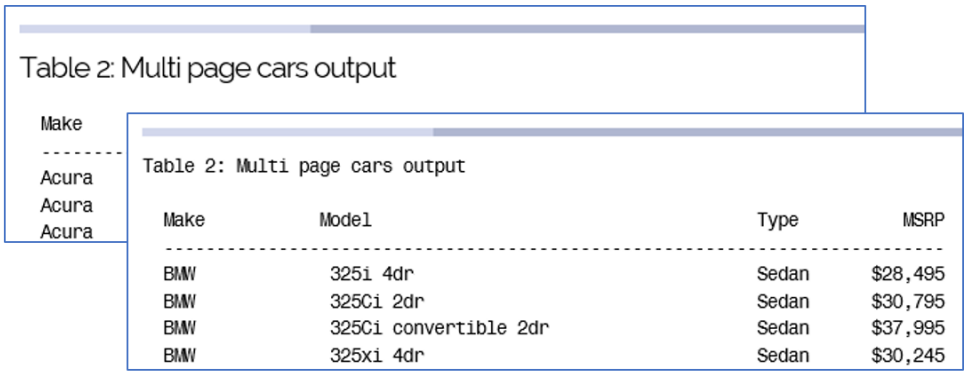


Table 2: Multi page cars output

Make

Acura
Acura
Acura

Table 2: Multi page cars output

Make	Model	Type	MSRP
BMW	325i 4dr	Sedan	$28,495
BMW	325Ci 2dr	Sedan	$30,795
BMW	325Ci convertible 2dr	Sedan	$37,995
BMW	325xi 4dr	Sedan	$30,245

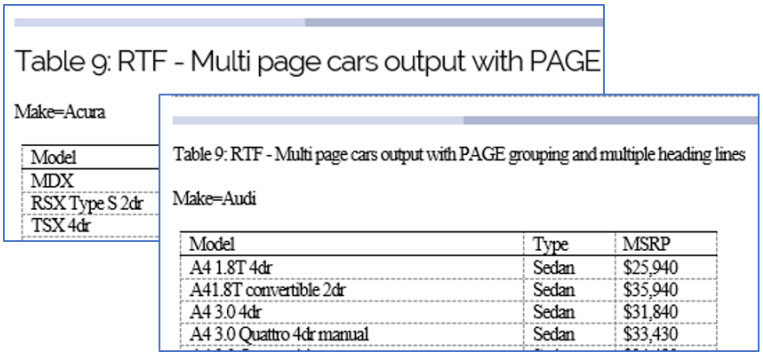


Table 9: RTF - Multi page cars output with PAGE

Make=Acura

Model
MDX
RSX Type S 2dr
TSX 4dr

Table 9: RTF - Multi page cars output with PAGE grouping and multiple heading lines

Make=Audi

Model	Type	MSRP
A4 1.8T 4dr	Sedan	$25,940
A41.8T convertible 2dr	Sedan	$35,940
A4 3.0 4dr	Sedan	$31,840
A4 3.0 Quattro 4dr manual	Sedan	$33,430

Content – Replace Tags

Any text can be replaced with any other text. It is recommended to use a special syntax like using special brackets for the replacement tags to avoid possible conflicts. If the text "[todayDate]" appears as replacement text, then the date of today is included in the format of DDMMMYYYY UK-English in upper case.

When the replace content-definition is specified in this word file and additionally a "content" configuration text file is used, then only replacements which are specified in the "content" configuration text file will be used.

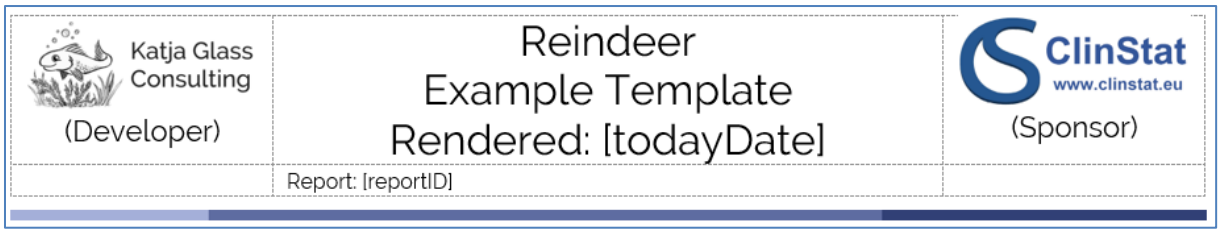
When a replacement tag is defined, the tags will be replaced with the corresponding value. This is working for headers, footers as well as parts of the body content.

The following replacements tags could for example be specified:

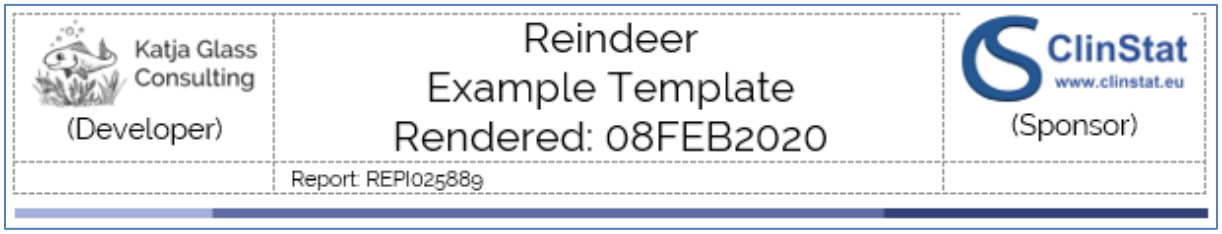
Replace Specification:

[todayDate]	[todayDate]
[reportID]	REPI025889

When these tags are used in the template, for example in the header:



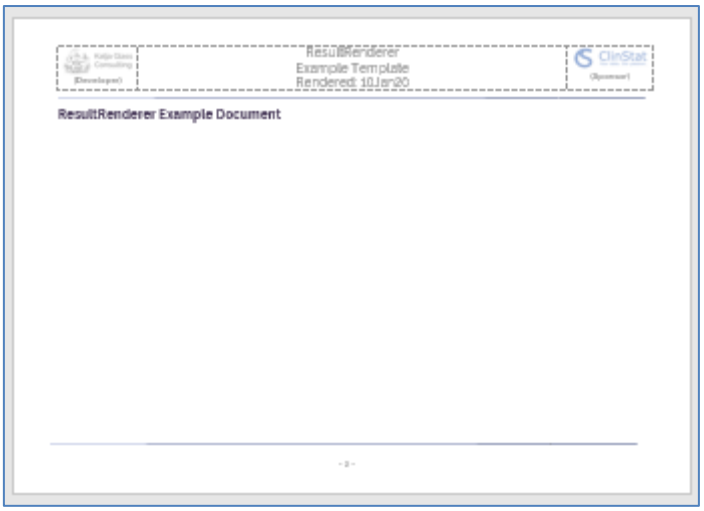
These tags are exchanged with the corresponding values, expecting "today" is the 8th February 2020:



Content – Header1, Header2, Header3

When headers should be included into the document, these will be included each on a separate page. Depending on the level of the header, the corresponding style is applied to this header. When headers should have consequtive numbering, then the corresponding style must use a numbering scheme.

If Header1 is for example defined with "Reindeer Example Document", then this header will receive the applied style as provided and be included on a stand-alone page.



If a vertical alignment is more suitable for the output, then the template can be modified to use a vertical alignment. To apply so, go to layout settings, page setup, then on the layout panel use vertical alignment with "center" and apply this to the complete document.

For the header options, there is additionally the special tag "[linefeed]", when this tag is used, the header is printed to two lines using a "soft" line feed. Due to this the header line is available as whole in the TOC, but on the single page, multiple lines are used. The [linefeed] tag can also be used to provide an indention from the top with free lines.

Example header 2: Listing Outputs with[linefeed]many fancy outputs

TOC:

Page output:

Content – Listing

Any kind of text files can be included through the "Listing" content specifciation. Typical listing file extensions would be ".txt" and ".lst". Finally, the extension does not matter. When a file is provided, it is handled and processed as text file.

It is expected that the listing file contains already approriate **page breaks**, no checks of whether the breaks are correct or not are perfomred. Furthermore, it is expected, that the **first line contains the table caption** which will be processed and formatted in a special way. It is also expected that each new page containt the repeated table table. This enables the tool to combine multiple title lines into a single line and to investigate and format title captions appropriately, also when different tables are available within the listing file.

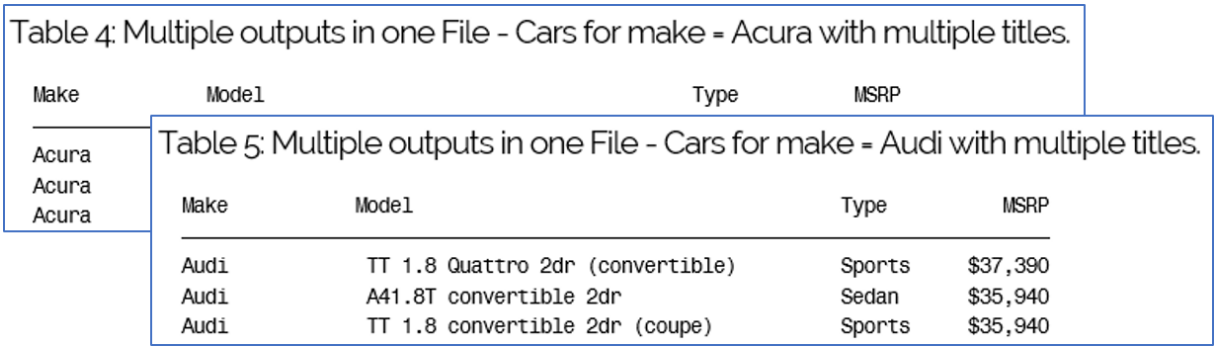
The input listing file including page breaks and titles in the first line could look like the following:

```
Table 4: Multiple outputs in one File - Cars for make = Acura
with multiple titles.

  Make           Model                                          Type          MSRP
  ------------------------------------------------------------------------------
  Acura           MDX                                           SUV         $36,945
  Acura           RSX Type S 2dr                                Sedan       $23,820
...

↟Table 5: Multiple outputs in one File - Cars for make = Audi
with multiple titles.

  Make           Model                                          Type          MSRP
  ------------------------------------------------------------------------------
  Audi            A4 1.8T 4dr                                   Sedan       $25,940
  Audi            A41.8T convertible 2dr                        Sedan       $35,940
  Audi            A4 3.0 4dr                                    Sedan       $31,840
...
```

This tool includes this content into Word. The pagebreaks will stay available in Word which enables an appropriate page layout. The complete content is styled as the specified "Content Font Text" if defined. The titles are proceesed. Multiple title lines (first line of each page) are combined into a single logical line. When a line is too long in Word, it will break automatically. After the title line there must be an **empty line**.

The first title line of this file will get the title caption style applied if provided. On each following page, the title line will also get the title caption style, when the title differs.

When there are different titles, each one will get the caption style like this example:



When the title is identically, the title on the following page will be styled according to the specified "Content Font Text".

Table 2: Multi page cars output

Make	Model	Type	MSRP
Audi			
Audi			
Audi			

Table 2: Multi page cars output

Make	Model	Type	MSRP
BMW	330i 4dr	Sedan	$35,495
Buick	Century Custom 4dr	Sedan	$22,180
Acura	NSX coupe 2dr manual S	Sports	$89,765

If a Table of Contents is included in the document which will include the "Title Caption" style in the display, then the titles will appear in this TOC.

Content – RTF

RTF word files can be included into the final word file by using the "RTF" content specification. Currently files created with ODS RTF are supported. For outputs using ODS TAGSSETS.RTF, multiple titlelines does not work as expected.

If page breaks should be available at special positions, e.g. before a new table starts, it is expected that these **page breaks** are already available in the doucment. Long logical tables which will split through multiple pages in the RTF file will likely also be split in the final word file.

It is also expected that the first line afte each page break and the first line of the document containd the **caption**.

The input RTF file could look like the following:

Table 10: Multiple outputs in one File - Cars for make = Acura with multiple titles.

Make	*Model*	*Type*	*MSRP*
Acura	MDX	SUV	$36,945
…			
Acura	NSX coupe 2dr manual S	Sports	$89,765

Table 11: Multiple outputs in one File - Cars for make = Audi with multiple titles.

Make	*Model*	*Type*	*MSRP*
Audi	A4 1.8T 4dr	Sedan	$25,940
…			
Audi	S4 Avant Quattro	Wagon	$49,090

This tool includes this content into Word. The pagebreaks will stay available in Word which enables an appropriate page layout. The complete content is styled as the specified "Content Font RTF" if defined. The titles are proceesed. Multiple title lines (first

line of each page) are combined into a single logical line. When a line is too long in Word, it will break automatically. After the title line there must be an **empty line or the table start**.

The output file might then look like the following:

Table 10: Multiple outputs in one File - Cars for make = Acura with multiple titles.

Make	Model	Type	MSRP
Acura	MDX	SUV	$36,945
Acura	RSX Type S 2dr	Sedan	$23,820
Acura			
Acura			
Acura			
Acura			
Acura			

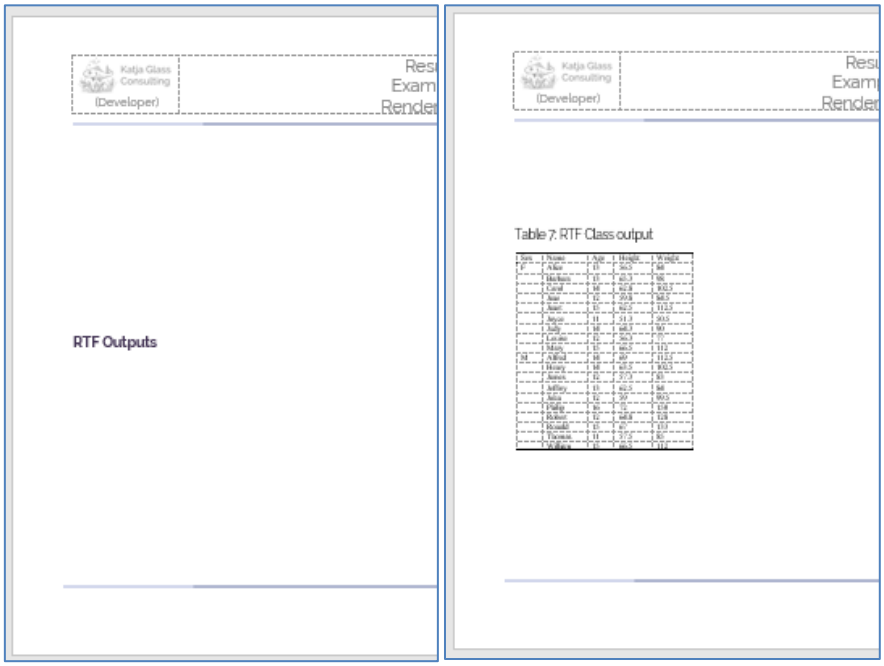
Table 11: Multiple outputs in one File - Cars for make = Audi with multiple titles.

Make	Model	Type	MSRP
Audi	A4 1.8T 4dr	Sedan	$25,940
Audi	A41.8T convertible 2dr	Sedan	$35,940
Audi	A4 3.0 4dr	Sedan	$31,840
Audi	A4 3.0 Quattro 4dr manual	Sedan	$33,430
Audi	A4 3.0 Quattro 4dr auto	Sedan	$34,480

Tipps

Numbering. If headings should contain a numbering schema, then create a style containing using numbers. When the style is applied, the numbering will be done accordingly.

Vertical Alignment. The complete document can be vertically aligned, by using a vertical alignment in the template document. To apply so, go to layout settings, page setup, then on the layout panel use vertical alignment with “center” and apply this to the complete document. Then the contents of the pages are vertically aligned.



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Environment

This tool is NOT validated, but a functionality test is performed. To perform the test, SAS output created with the educational version of SAS® was used (Unix). Furthermore Word in the version of Office 2016 was used.

SAS & VBA through DDE (not tested)

If you are aware of the SAS code required to use DDE or similar in a SAS® Windows environment, I would be happy to include this code as help here for others. Please send me a mail (info@glacon.eu).

The following SAS code seems **not** to run:

```
options noxwait noxsync;
x '"C:\Program Files\Microsoft Office\Office\excel.exe" ';
/* Sleep for 5 seconds to give Excel time to come up */
data _null_;
x=sleep(5);
run;
filename cmds dde 'excel|system';
data _null_;
file cmds; /* Open the excel file test.xlsm which contains the VBA macro */
put '[open("C:\Reindeer\doc\reindeer.xlsm")]'; /* Run myVBAmacro */
put '[run("reindeer.xlsm!RunReindeer")]'; run;
```